

PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2015 Fisheries Management Survey Report

Palo Pinto Reservoir

Prepared by:

Robert Mauk, Assistant District Management Supervisor
and
Tom Lang, District Management Supervisor

Inland Fisheries Division
Wichita Falls District
Wichita Falls, Texas



Carter Smith
Executive Director

Craig Bonds
Director, Inland Fisheries

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Palo Pinto Reservoir were surveyed in 2015 using electrofishing and trap netting and in 2016 using gill netting. Anglers were surveyed from June 2012 through May 2013 with a creel survey. Historical data are presented with the 2015-2016 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 Pinto Reservoir is a 2,399-acre impoundment located in Palo Pinto County on Palo Pinto Creek in the Brazos River Basin approximately 79 miles southwest of Fort Worth. It was constructed in 1964 to provide municipal water for Mineral Wells, Texas and cooling water for the Brazos Electric power plant. It has a primarily rocky shoreline with boat docks. At the time of the 2015 habitat survey, the reservoir was 0.4 feet below spillway elevation and rocky shoreline and standing timber were the dominant habitat features. Boat access was adequate at the three improved public boat ramp sites. Periodic turbidity, fluctuating water levels and a rocky shoreline inhibit the growth of aquatic vegetation.
- **Management History:** Important sport fish include Blue and Channel Catfish, White and Palmetto Bass, Largemouth Bass, and White Crappie. Palo Pinto Reservoir has always been managed using statewide regulations. Recent stockings are Palmetto Bass being stocked in 2011, 2013, 2015, and 2016 and Florida Largemouth Bass were stocked in 2015 and 2016.
- **Fish Community**
 - **Prey species:** Gizzard Shad catch rate was the highest ever recorded for the reservoir and all were of a size range utilized by predators. The catch per unit effort (CPUE) for Bluegill was the lowest ever recorded for the reservoir. Threadfin Shad were abundant. Prey does not appear to be a problem at the reservoir.
 - **Catfish:** Blue Catfish were first stocked in 2007. They were not observed in the 2008 gill net survey because they were likely not recruited to the gear. During the 2010 and 2012 surveys, the catch rate was good. The drought had a negative impact on Blue Catfish abundance with the catch rate being about half of what it had been in the previous two surveys. The 2016 gill net survey for Channel Catfish resulted in no fish being sampled. This population has been in decline since 2008 when the Blue Catfish were introduced. This phenomenon of CPUE decline is seen in most of the Wichita Falls District reservoirs where Blue Catfish have become established.
 - **White Bass:** No White Bass were sampled during the 2016 gill net surveys. Over the past 10 years, White Bass abundance has decreased each time a gill net survey was completed. The drought likely negatively impacted the population.
 - **Palmetto Bass:** No Palmetto Bass were sampled in 2016. The drought likely negatively impacted the population.
 - **Largemouth Bass:** Largemouth Bass CPUE was the lowest ever recorded. Body condition was considered above average. Nearly all Largemouth Bass sampled were below the minimum legal length limit, likely resulting from water level impacts on natural recruitment and the 2015 supplemental stocking.
 - **Crappie:** The 2015 White Crappie CPUE was the lowest recorded and well below the historical average. Body condition was considered good. Black crappie were present but in low abundance.

Management Strategies: Request annual stocking of 10 -1 5 fingerling Palmetto Bass per acre. Conduct additional gill net surveys in 2018 to monitor Palmetto Bass and Blue Catfish populations, and general monitoring surveys with trap nets, gill nets, and electrofishing surveys in 2019-2020. Access and vegetation surveys will be conducted in 2019. Inform the public about the negative impacts of aquatic invasive species.

INTRODUCTION

This document is a summary of fisheries data collected from Palo Pinto Reservoir from 2012-2016. The purpose 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 important sport fish and prey species. Historical data is presented with the 2015-2016 data for comparison.

Reservoir Description

Palo Pinto Reservoir is a 2,399-acre impoundment constructed in 1964 on Palo Pinto Creek in the Brazos River watershed. It is located in Palo Pinto County approximately 79 miles southwest of Fort Worth. Primary uses are municipal water supply for Mineral Wells, Texas and cooling water for the Brazos Electric power plant. Mean depth is 17 feet and conductivity was 360 $\mu\text{S}/\text{cm}$ in July 2015. Primary aquatic habitats in 2015 included natural and rocky shoreline, standing timber, and boat docks. Periodic turbidity, fluctuating water levels (Figure 1) and a rocky shoreline inhibits the abundance of aquatic vegetation. Other descriptive characteristics are in Table 1. The reservoir in May 2015 had several heavy precipitation events occur over the watershed that resulted in the reservoir recovering from extreme low water levels.

Angler Access

Palo Pinto Reservoir has three public boat ramps and no private boat ramps. All public ramps were available to anglers after heavy rains filled the reservoir in May 2015. Before the drought ended, no ramps were available. Additional boat ramp characteristics are in Table 2. Shoreline access is limited to the public boat ramp areas.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Mauk 2012) are included:

1. No previous creel data had been collected on the reservoir. A year-long creel survey beginning June of 2012 was planned.
Action: Completed year-long creel survey in May of 2013.
2. Palmetto Bass (2002) and Blue Catfish (2007) are recent introductions into the reservoir and their establishment needed monitoring. An additional gill net survey was planned for 2014. Palmetto Bass were to be requested annually at a rate of 5/acre to maintain the population.
Action: The reservoir elevation dropped to a level that a boat could not be launched so the additional gill net survey was cancelled. The planned stocking in 2014 also was cancelled because of the low water conditions. The planned stocking did occur in 2013 and again in 2015 after the reservoir refilled.
3. Largemouth Bass age and growth was last completed in 2003, so an additional electrofishing survey was planned for 2013 to collect the needed data.
Action: The reservoir elevation dropped to a level that a boat could not be launched so the additional electrofishing survey and Largemouth Bass age and growth study were cancelled.
4. Aquatic invasives threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. Zebra mussels have been found in area waters nearby and could establish in Palo Pinto Reservoir if introduced.
Action: Contacted controlling authority about zebra mussels and the threat they are to the environment and water source. Contacted the marina owner about invasive species and provided the owner with posters and literature so that he can in turn educate others. We've attempted to educate the public about invasive species through the use of media and the internet and make a speaking point about invasive species when presenting to constituent

and user groups. We also keep track of existing and future inter-basin water transfers to facilitate potential invasive species responses.

Harvest regulation history: Sport fish in Palo Pinto Reservoir have always been managed using statewide regulations (Table 3).

Stocking history: Blue Catfish were introduced in 2007 and a second stocking occurred in 2008. Palmetto Bass were introduced in 2002 and had been stocked every other year until 2008. Stockings also occurred in 2011, 2013 and 2015. Florida Largemouth Bass were stocked in 2015 in response to the reservoir nearly going dry. The complete stocking history is in Table 4.

Vegetation/habitat management history: Palo Pinto Reservoir has no significant vegetation or habitat management history. Noxious vegetation has not been a problem at the reservoir.

Water transfer: There are no intra or inter basin transfers from Palo Pinto Reservoir. Mineral Wells uses water released through the dam as a municipal water source via pumping from the creek about 16 miles downstream of the reservoir.

METHODS

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Palo Pinto 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, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1 hour 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 – Crappie spp. were collected using trap nets (7 net nights at 7 stations). CPUE for trap netting was recorded as the number of fish caught per net night (fish/nn).

Gill netting – Blue Catfish were collected by gill netting (5 net nights at 5 stations). CPUE for gill netting was recorded as the number of fish caught per net night (fish/nn). Channel Catfish, White Bass, and Palmetto Bass were also species targeted.

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). Palmetto Bass PSD was calculated according to Dumont and Neely (2011). Index of vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE and creel statistics.

Creel survey – A year-long roving creel survey was conducted from June 2012 through May 2013. Angler interviews were conducted on 5 weekend days and 4 weekdays per quarter to assess angler use and fish catch/harvest statistics in accordance with the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Habitat – A structural habitat survey was conducted in 2015. Vegetation surveys were conducted in 2015. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Water level – Source for water level data was the United States Geological Survey (USGS 2016.)

RESULTS AND DISCUSSION

Habitat: A structural habitat survey conducted July 22, 2015 indicated the littoral zone habitat consisted primarily of rocky and natural shoreline (Table 6). The previous physical habitat survey was conducted in 2011 (Mauk 2012). Very few manmade changes to the physical habitat had occurred during the four year period. Little aquatic vegetation was observed during the aquatic vegetation survey (Table 7).

Creel: Directed fishing effort by anglers was highest for crappie *spp.* (37.4%), followed by catfish *spp.* (22.0%) and Largemouth Bass (11.5%; Table 8). Total fishing effort for all species was 19,690 hours and direct expenditures at Palo Pinto Reservoir were \$123,785 (Table 9). Two-thirds of the anglers traveled 50 miles or less to fish at Palo Pinto Reservoir (Appendix C).

Prey species: Electrofishing catch rates of Gizzard Shad and Bluegill were 297.0/h and 49.0/h, respectively. Index of vulnerability for Gizzard Shad was high, indicating that 100% of Gizzard Shad were available to predators and nearly identical to the IOV estimates in 2011 (96%) and 2007 (100%). Total CPUE of Gizzard Shad was the highest documented and well above the historical average (180.2/h) (Figure 2). Total CPUE of Bluegill in 2015 (Figure 3) was the lowest observed CPUE and well below the historical average of 126.8/h. Threadfin Shad were also present at the relative abundance of 199.0/h (Appendix A), an increase over the previous survey in 2011 (140.0/h). Redear Sunfish were sampled at a rate of 1.0/h. This is a decrease over the previous survey when CPUE was 17.0/h. The drought of record affected sunfish recruitment, greatly reducing their abundance.

Blue Catfish: Blue Catfish were first introduced during 2007 with a second stocking occurring in 2008. Blue Catfish abundance as measured by CPUE declined by half in 2016 with a CPUE of 0.8/nn compared to the 2010 and 2012 gill net surveys (1.5/nn and 1.8/nn; respectively) (Figure 4). This decrease in CPUE could be due to the extreme low reservoir elevations that occurred during the drought. The 2012-2013 creel survey found that directed fishing effort was only 3.3% for Blue Catfish, but was 18.7% for catfish *spp.* (Table 10), so they are an important species in the reservoir. Harvested Blue Catfish ranged in length from 14 to 20 inches (Figure 5).

Channel Catfish: Channel Catfish were not caught in the 2016 gill net survey. This was a continuation of a population decline that has occurred since 2006 (Figure 6). The drought and resulting low reservoir elevations further compounded the issues that have been contributing to a 10-year Channel Catfish population decline. The decline could possibly be because of intra-specific competition between Blue and Channel Catfish which has been observed in many District waterbodies where Blue Catfish have been introduced. During the 2012-2013 creel survey, no targeted effort was reported for Channel Catfish, but 18.7% of anglers were targeting catfish *spp.* (Table 11). Six Channel Catfish were observed being harvested during the creel survey (Figure 7).

White Bass: White Bass were not caught during the 2016 gill net survey (Figure 8). While White Bass have never been very abundant, this is first instance of none being sampled. The population was negatively impacted by the drought and the subsequent filling of the reservoir and flow over the spillway. The creel survey found no directed effort for this species (Table 12). An estimated 2,580 White Bass were harvested from Palo Pinto Reservoir (Figure 9).

Palmetto Bass: No Palmetto Bass were caught during the 2016 gill net survey. Palmetto Bass were first introduced in 2002 and have been stocked every other year up to 2008 at a reduced rate of about 5/acre. The next stocking occurred in 2011 at a rate of 7.6/acre, an increase over the 2008 management plan which called for annual stockings of 5/acre. While never very abundant, this is the first time we have failed to catch any since they were introduced (Figure 10). Like White Bass, the population was negatively impacted by the drought and the subsequent filling of the reservoir and flow over the spillway. The creel survey found 2.6% of the directed effort was for this species (Table 13).

Largemouth Bass: The electrofishing catch rate of Largemouth Bass was 49.0/h in 2015, a decrease

from previous surveys 2011 (126.0/h) and 2007 (77.0/h; Figure 11). This was the lowest catch rate for the reservoir. Body condition for these fish was considered excellent with all inch groups having W_r 's greater than 100. The drought greatly influenced this population with most of the sampled bass probably resulting from the 2015 stocking. Genetic analysis last occurred in 2011 (Table 15) and will need to be completed again since the population has probably changed due to the extremely low reservoir elevations that occurred prior to the 2015 electrofishing survey. The creel survey found that 23.2% of anglers targeted Largemouth Bass with slightly over half (11.7%) participating in a tournament at the time of their interview (Table 14). An estimated 196 bass were harvested and there was sub-legal length bass harvest (Figure 12).

Crappie: The trap net catch rate of White Crappie was 6.6/nn in 2015, well below the previous surveys in 2011 (21.4/nn) and 2007 (24.2/nn) and the historical average (16.1/nn); (Figure 13). The catch rate of stock-size White Crappie was much lower than the two previous surveys. Relative weights for stock-size crappie were greater than 100. Black Crappie were present in low abundance at 0.7nn (Appendix A) which is nearly the same as the 2011 and 2007 surveys. It is unknown whether these are pure Black Crappie or a remnant of the hybrid Black and White Crappie that were stocked in 1993-95. Crappie were the most sought species during the creel survey (37.4%; Table 8). Directed effort was 3.0 hr/acre with catch rate being 2.5/hr (Table 16). An estimated 29,173 White Crappie were harvested and there was some sub-legal length fish harvested (Figure 14).

Fisheries management plan for Palo Pinto Reservoir, Texas

Prepared – July 2016

Issue 1: Palmetto Bass are relatively recent introductions into the reservoir and their populations are in the process of becoming established. Palmetto Bass require stocking to maintain the population and are currently being requested every year at a rate of five per acre. How well the population is rebounding needs to be monitored.

MANAGEMENT STRATEGIES

1. Continue gill net surveys to monitor the Palmetto Bass population.
2. Continue requesting Palmetto Bass stockings annually at a rate of 10 to 15 per acre.

Issue 2: Blue Catfish are relatively recent introductions into the reservoir and their populations are in the process of becoming established. Catfish were highly sought after during the creel survey and the drought was detrimental to the Blue Catfish population. How well the population is rebounding needs to be monitored.

MANAGEMENT STRATEGIES

1. Begin low-frequency electrofishing to collect data on the Blue Catfish population.
2. Request supplemental stocking of Blue Catfish.

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 marina owners about invasive species, and provide them with posters and literature so that they can in turn educate others.
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

FY 2016 - 2019

Sport fish, forage fish, and other important fishes

Sport fishes in Palo Pinto Reservoir have historically included Blue and Channel Catfish, White and Palmetto Bass, Largemouth Bass, and crappie *spp.* The primary forage species have been Bluegill, Threadfin Shad, and Gizzard Shad.

Low-density fisheries

Due to extreme low water level prior to 2015, the fisheries for Largemouth Bass, White Bass, Channel Catfish, and Palmetto Bass would be considered low density populations that are currently recovering. Largemouth Bass are an important species that is targeted by 23.2% of anglers according to a 2012-2013 creel survey. White and Palmetto Bass were targeted in the single digits (0.0% and 2.6%; respectively). Channel Catfish were not specifically targeted but 18.7% of anglers were targeting catfish *spp.*, likely due to the Blue Catfish population.

Survey objectives, fisheries metrics, and sampling objectives

Most sport fish populations are in a rebuilding phase. Palmetto Bass and Largemouth Bass were restocked in 2015, they were stocked at a reduced rate calculated on the reservoir being half full. Largemouth Bass sampled in 2015 were sub-legal in length and most were probably stocked fish. No Palmetto Bass were sampled in 2016 gill netting. Thus, our sampling objectives in 2019-2020 are general monitoring for examining trend data until populations have recovered to pre-drought abundances and several age-classes are present (Table 17). Data will be collected to determine CPUE with a RSE goal of ≤ 25 for Largemouth Bass and White Crappie. Prey species will be collected with these species until RSE is attained. Standard effort (12 random electrofishing stations for Largemouth Bass, 5 trap net stations for White Crappie, and 5 gill net stations for Palmetto Bass) will initially be used to determine CPUE with RSE ≤ 25 . Once fish populations are detected in the above sampling techniques and determined to be established, survey objectives, fisheries metrics, and sampling effort will be reevaluated. Blue Catfish will be surveyed using low-frequency electrofishing to collect abundance and length data.

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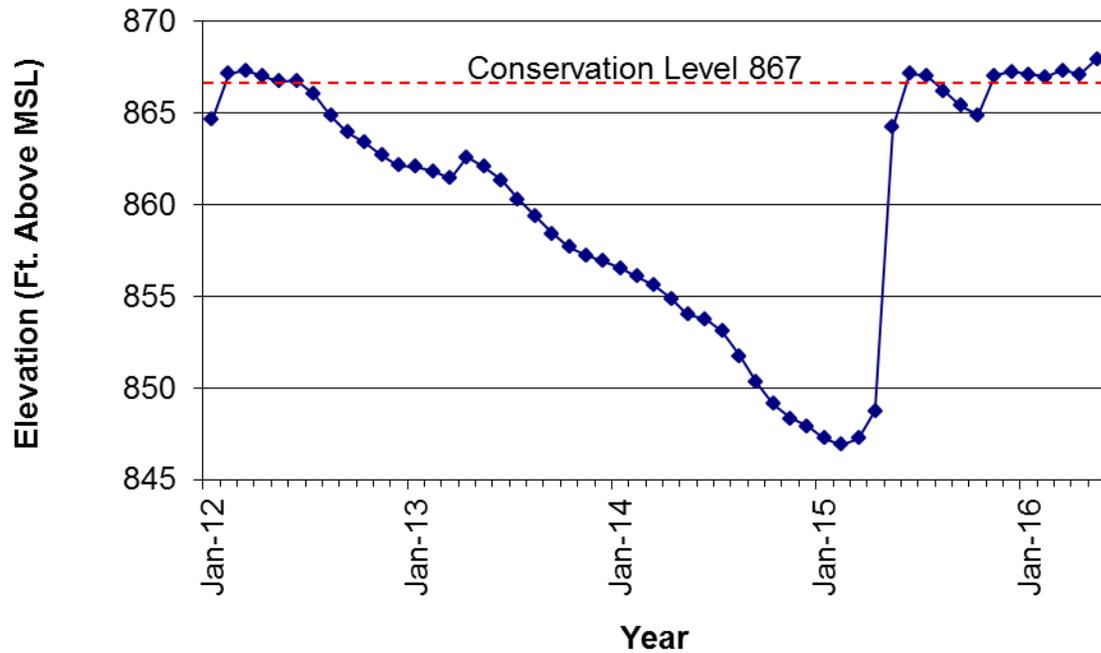


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Palo Pinto Reservoir, Texas.

Table 1. Characteristics of Palo Pinto Reservoir, Texas.

Characteristic	Description
Year Constructed	1964
Controlling authority	City of Mineral Wells
County	Palo Pinto
Reservoir type	Tributary
Shoreline Development Index (SDI)	2.62
Conductivity	360 $\mu\text{S}/\text{cm}$

Table 2. Boat ramp characteristics for Palo Pinto Reservoir, Texas, July, 2015. Reservoir elevation at time of survey was 866.6 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
FMF 3137	32.66504 -98.30230	Y	20	861	Good
Love Ramp	32.65195 -98.29687	Y	5	852	Poor
Deer Haven Road	32.64604 -98.30193	Y	5	863	Good

Table 3. Harvest regulations for Palo Pinto 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, Palmetto	5	18-inch minimum
Bass, Largemouth	5	14-inch minimum
Crappie, White and Black, their hybrids and subspecies	25	10-inch minimum

Table 4. Stocking history of Palo Pinto Reservoir, Texas. FGL = fingerlings, AFGL = advanced fingerlings, and UNK = unknown.

Species	Year	Number	Life Stage	Mean TL (in)
Black Crappie x White Crappie	1993	125,480	FRY	0.9
	1994	134,000	FRY	0.9
	1995	26,774	FGL	1.0
	Total	286,254		
Blue Catfish	2007	120,555	FGL	2.5
	2008	120,666	FGL	2.1
	Total	241,221		
Channel Catfish	1986	79,831	AFGL	5.0
	1997	13,325	AFGL	7.8
	2000	27,016	FGL	2.8
	Total	120,172		
Florida Largemouth Bass	1975	53,000	FRY	1.0
	1982	53,823	FGL	2.0
	1983	64,960	FGL	2.0
	1983	116,984	FRY	1.0
	1985	119,150	FRY	1.0
	1997	133,648	FGL	1.2
	2008	120,900	FGL	1.5
	2015	45,720	FGL	1.7
	2016	44,975	FGL	1.5
	Total	753,160		
Largemouth Bass	1970	100,000	UNK	UNK
	1982	17,681	UNK	UNK
	Total	117,681		
Palmetto Bass (Striped X White Bass hybrid)	2002	13,342	FGL	2.1
	2004	12,107	FGL	1.4
	2006	12,084	FGL	1.6
	2008	12,469	FGL	1.3
	2011	18,169	FGL	1.3
	2013	12,016	FGL	1.7
	2015	7,724	FGL	2.1
	2016	34,179	FGL	1.5
	Total	122,090		

Table 5. Objective-based sampling plan components for Palo Pinto Reservoir, Texas 2015 – 2016.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Exploratory	Presence/absence	Practical effort
Bluegill	Exploratory	Presence/absence	Practical effort
Gizzard Shad	Exploratory	Presence/absence	Practical effort
<i>Gill netting</i>			
Channel Catfish	Exploratory	Presence/absence	Practical effort
Blue Catfish	Exploratory	Presence/absence	Practical effort
White Bass	Exploratory	Presence/absence	Practical effort
Palmetto Bass	Exploratory	Presence/absence	Practical effort
<i>Trap netting</i>			
White Crappie	Exploratory	Presence/absence	Practical effort

Table 6. Survey of structural habitat types, Palo Pinto Reservoir, Texas, 2015. Shoreline habitat type units are in miles and standing timber, boat docks, and flooded terrestrial vegetation are in acres.

Habitat type	Estimate	% of total
Bulkhead	0.4 miles	1.6
Natural shoreline with boat docks	2.6 miles	10.3
Natural	8.0 miles	31.7
Rocky	6.5 miles	25.8
Rocky with boat docks	7.7 miles	30.6
Standing timber	223.3 acres	9.3
Boat docks	16.2 acres	0.7
Flooded terrestrial vegetation	647.5 acres	27.0

Table 7. Survey of aquatic vegetation, Palo Pinto Reservoir, Texas, 2003-2015. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2003	2007	2011	2015
Native submersed	1.4(<0.1)	3.7 (<0.1)	0	0
Native floating-leaved	0.2 (<0.1)	0	0	0
Native emergent	<0.1 (<0.1)	0.4 (<0.1)	0	<0.1 (<0.1)

Table 8. Percent directed angler effort by species for Palo Pinto Reservoir, Texas, June 1, 2012-May 31, 2013.

Species	2012/2013
Blue Catfish	3.3
Palmetto Bass	2.6
Largemouth Bass	11.5
White Crappie	37.0
Black Crappie	0.4
Catfish <i>spp.</i>	18.7
Sunfish	0.1
Anything	14.7
Bass Tournament	11.7

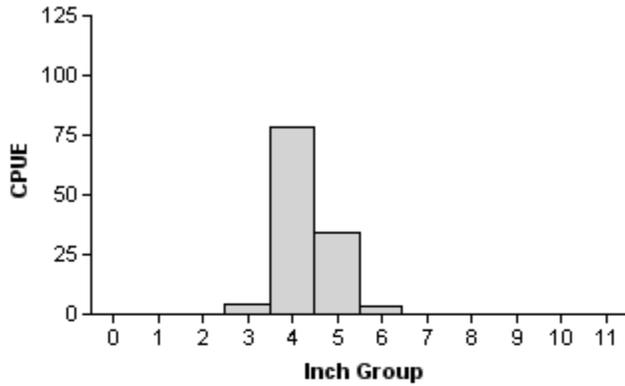
Table 9. Total fishing effort (h) for all species and total directed expenditures at Palo Pinto Reservoir, Texas, 2012-2013. Survey periods were from 1 June through 31 May. Relative standard error is in parentheses.

Creel statistic	2012/2013
Total fishing effort	19,690 (15)
Total directed expenditures	\$123,785 (35)

Gizzard Shad

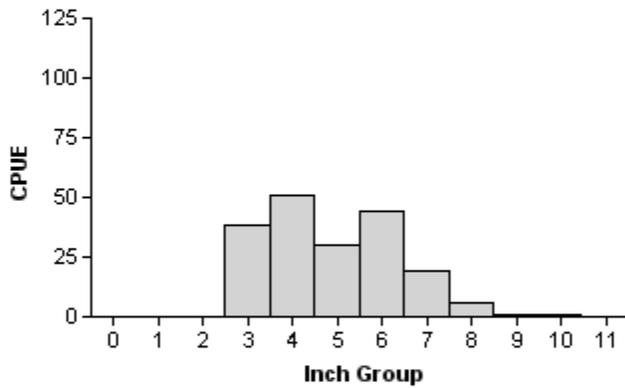
2007

Effort = 1.0
 Total CPUE = 119.0 (40; 119)
 IOV = 100 (0)



2011

Effort = 1.0
 Total CPUE = 190.0 (44; 190)
 IOV = 96 (2)



2015

Effort = 1.0
 Total CPUE = 297.0 (42; 297)
 IOV = 100 (0)

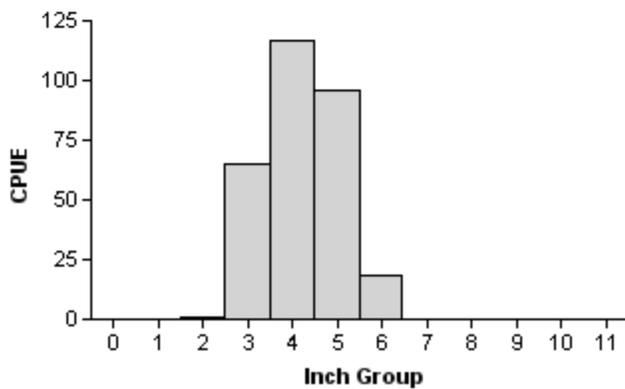


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Palo Pinto Reservoir, Texas, 2007, 2011, and 2015.

Bluegill

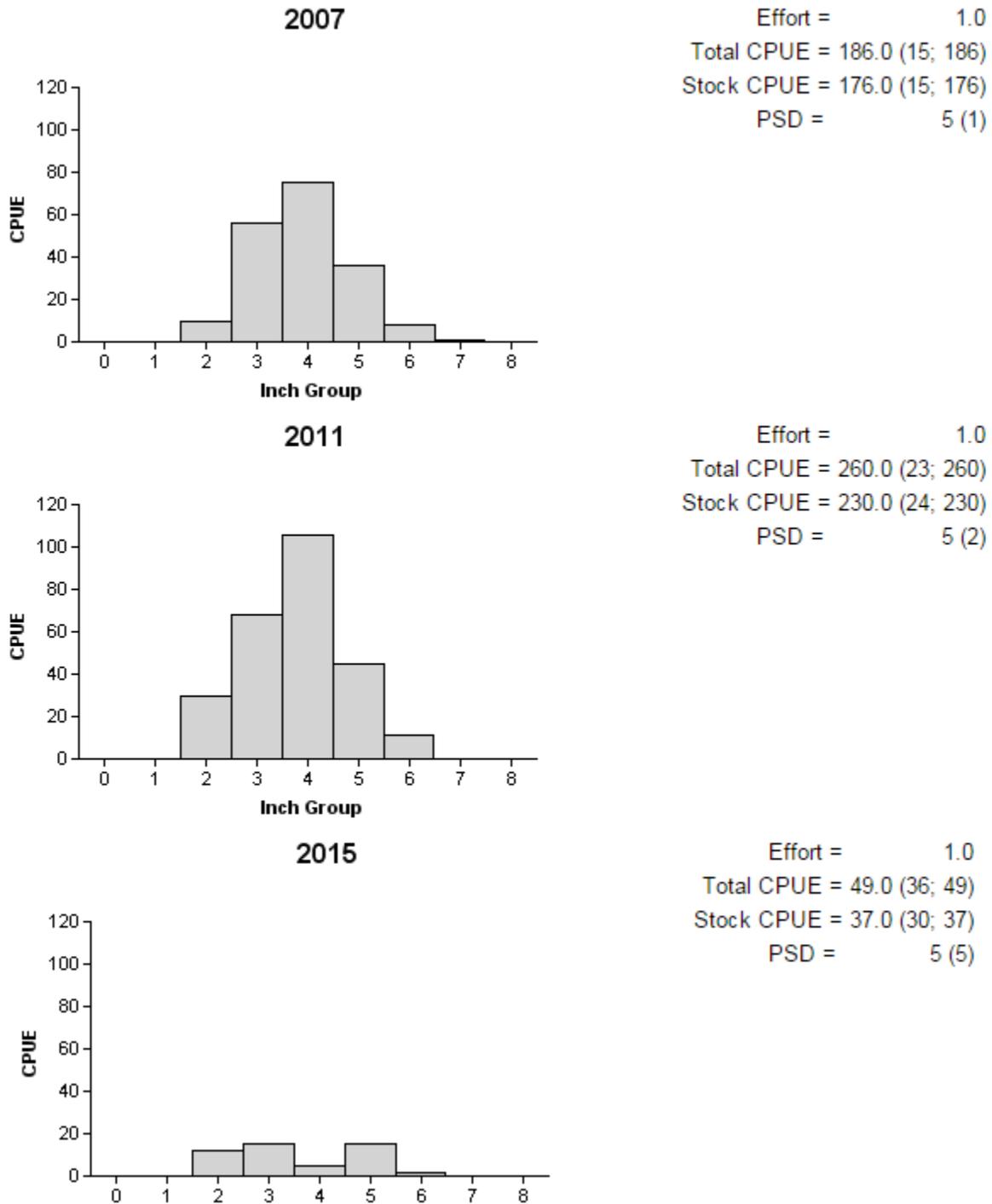


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Palo Pinto Reservoir, Texas, 2007, 2011, and 2015.

Blue Catfish

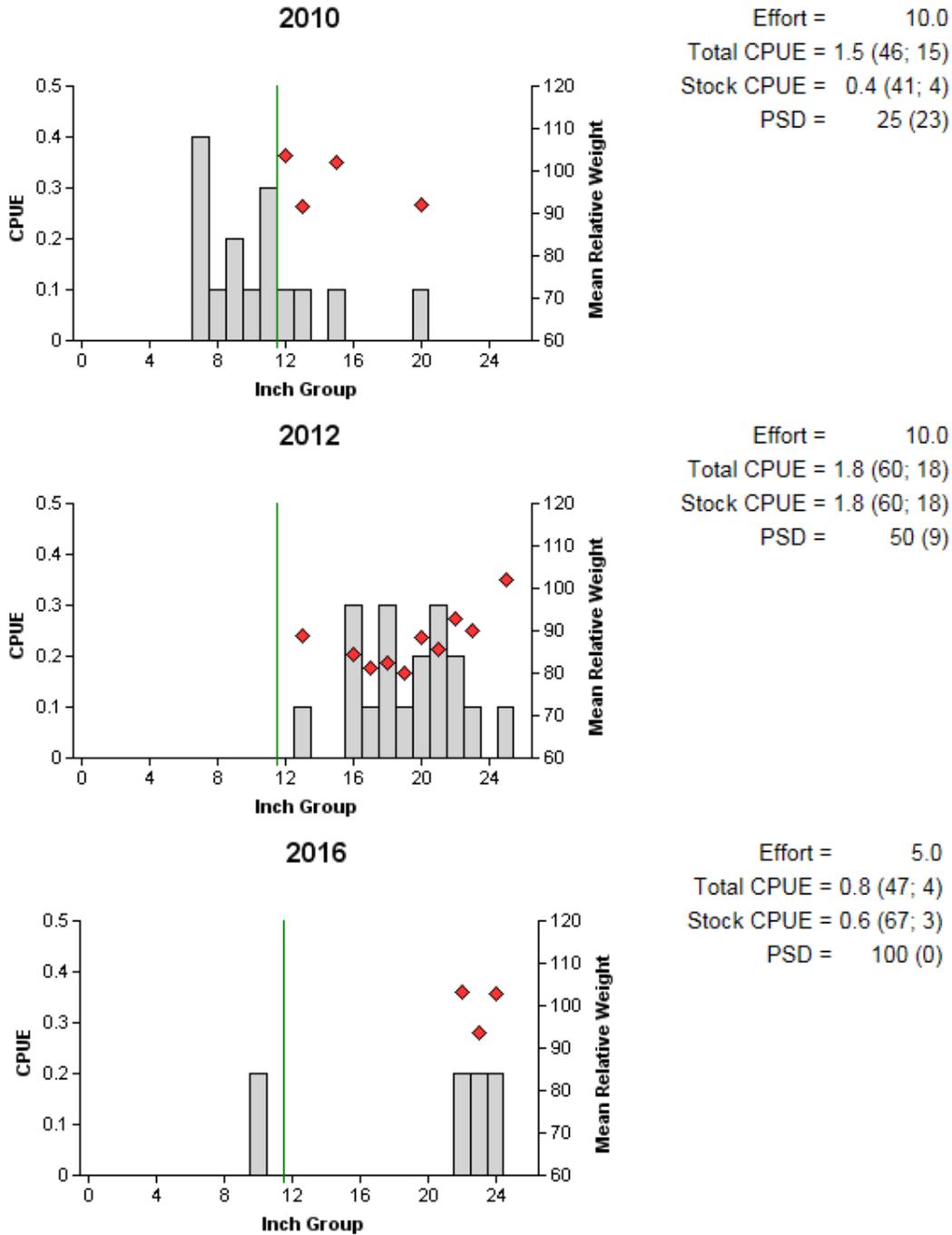
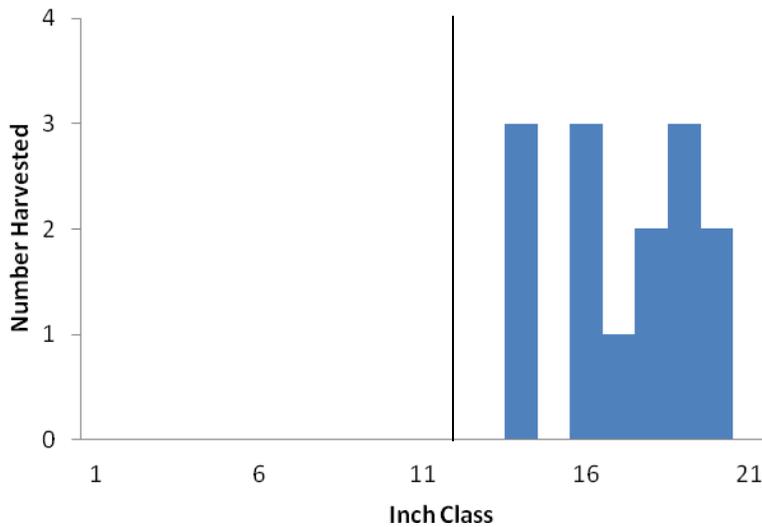


Figure 4. Number of Blue Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Palo Pinto Reservoir, Texas, 2010, 2012 and 2016. Line indicates minimum length limit.

Blue Catfish

Table 10. Creel survey statistics for Blue Catfish at Palo Pinto Reservoir from June 2012 through May 2013. Total catch per hour is for anglers targeting Blue Catfish and total harvest is the estimated number of Blue Catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year
	2012/2013
Surface area (acres)	2,398.9
Directed effort (h)	648.5 (38)
Directed effort/acre	0.3 (38)
Total catch per hour	0.4 (74)
Total harvest	130.3 (131)
Harvest/acre	<0.1 (131)
Percent legal released	0.0



N=14, TH=130

Figure 5. Length frequency of harvested Blue Catfish observed during creel surveys at Palo Pinto Reservoir, Texas, June 2012 through May 2013, all anglers combined. N is the number of harvested Blue Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period. Line indicates minimum length limit.

Channel Catfish

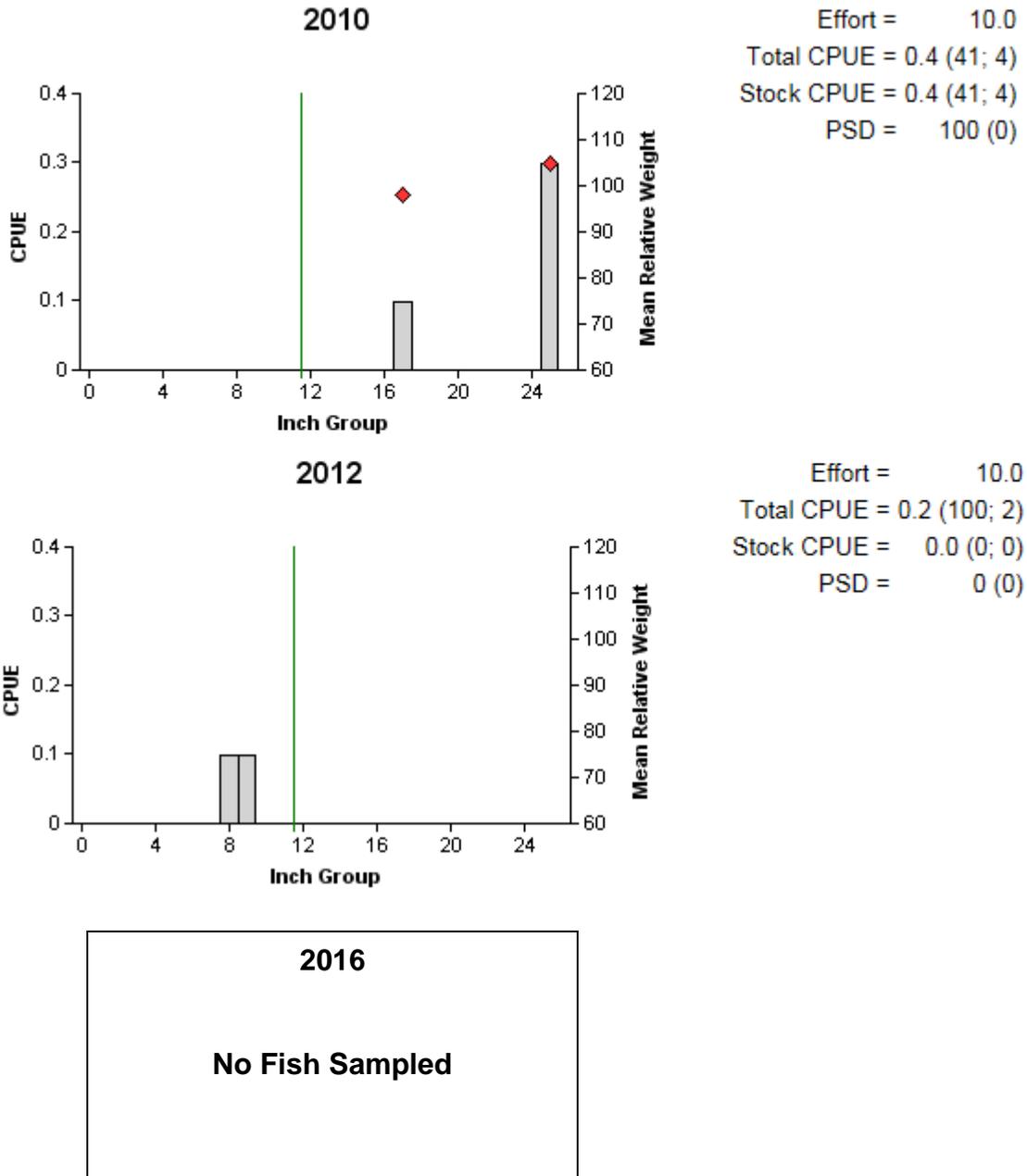
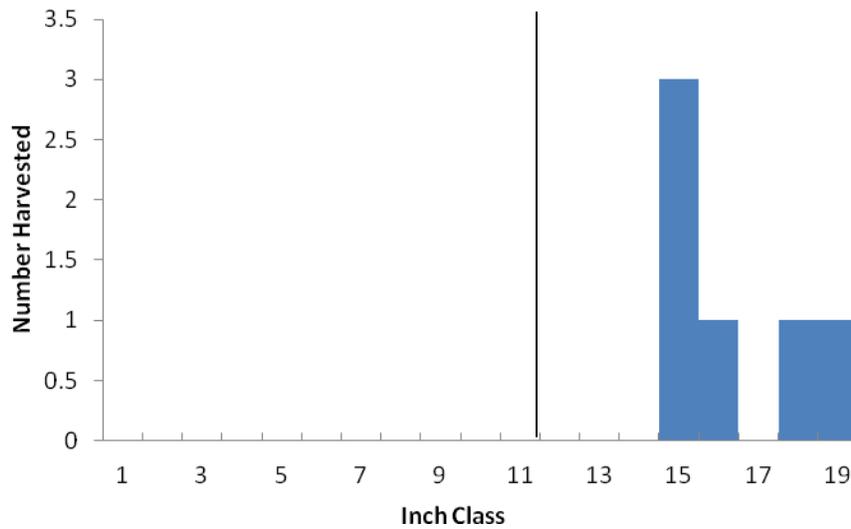


Figure 6. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Palo Pinto Reservoir, Texas, 2010, 2012, and 2016 Line indicates minimum length limit.

Channel Catfish

Table 11. Creel survey statistics for Channel Catfish at Palo Pinto Reservoir from June 2012 through May 2013. Total catch per hour is for anglers targeting Channel Catfish and total harvest is the estimated number of Channel Catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year
	2012/2013
Surface area (acres)	2,398.9
Directed effort (h)	0.0 (0)
Directed effort/acre	0.0 (0)
Total catch per hour	0.0 (0)
Total harvest	137.7 (91)
Harvest/acre	<0.1 (91)
Percent legal released	0.2



N=6, TH=138

Figure 7. Length frequency of harvested Channel Catfish observed during creel surveys at Palo Pinto Reservoir, Texas, June 2012 through May 2013, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period. Line indicates minimum length limit.

White Bass

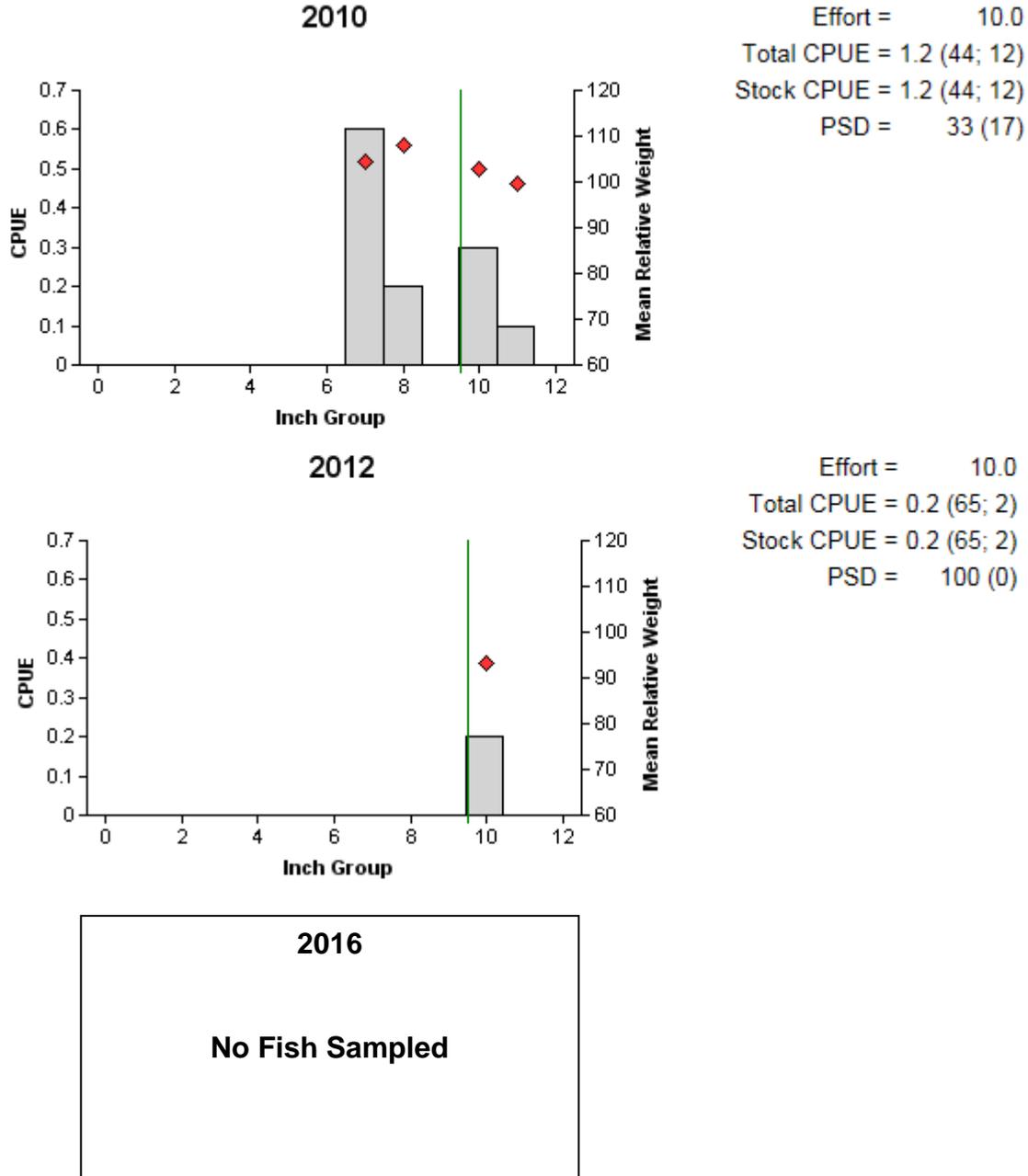


Figure 8. Number of White Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Palo Pinto Reservoir, Texas, 2010 and 2012, and 2016. Line indicates minimum length limit.

White Bass

Table 12. Creel survey statistics for White Bass at Palo Pinto Reservoir from June 2012 through May 2013. Total catch per hour is for anglers targeting White Bass and total harvest is the estimated number of White Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year
	2012/2013
Surface area (acres)	2,298.9
Directed effort (h)	0.00 (0)
Directed effort/acre	0.00 (0)
Total catch per hour	0.00 (0)
Total harvest	2,580.0 (250)
Harvest/acre	1.1 (250)
Percent legal released	0.00

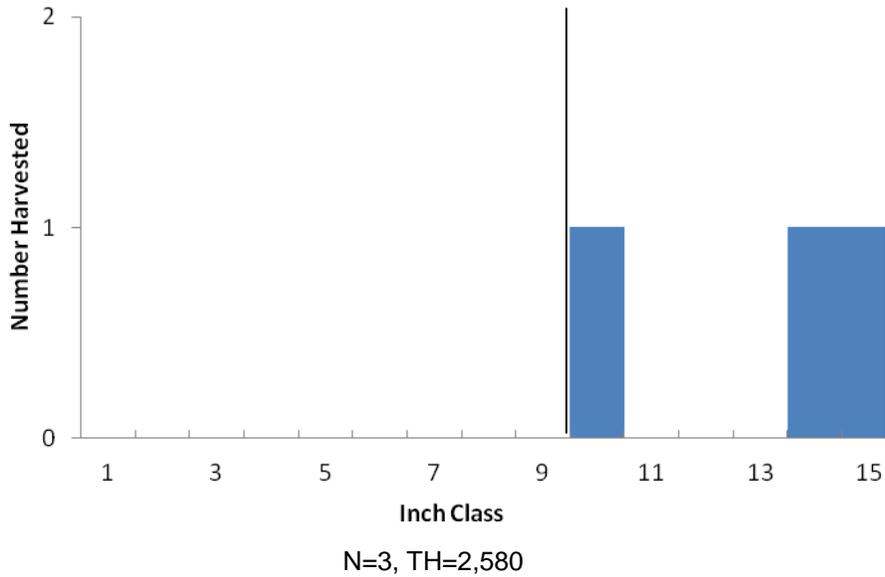


Figure 9. Length frequency of harvested White Bass observed during creel surveys at Palo Pinto Reservoir, Texas, June 2012 through May 2013, all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period. Line indicates minimum length limit.

Palmetto Bass

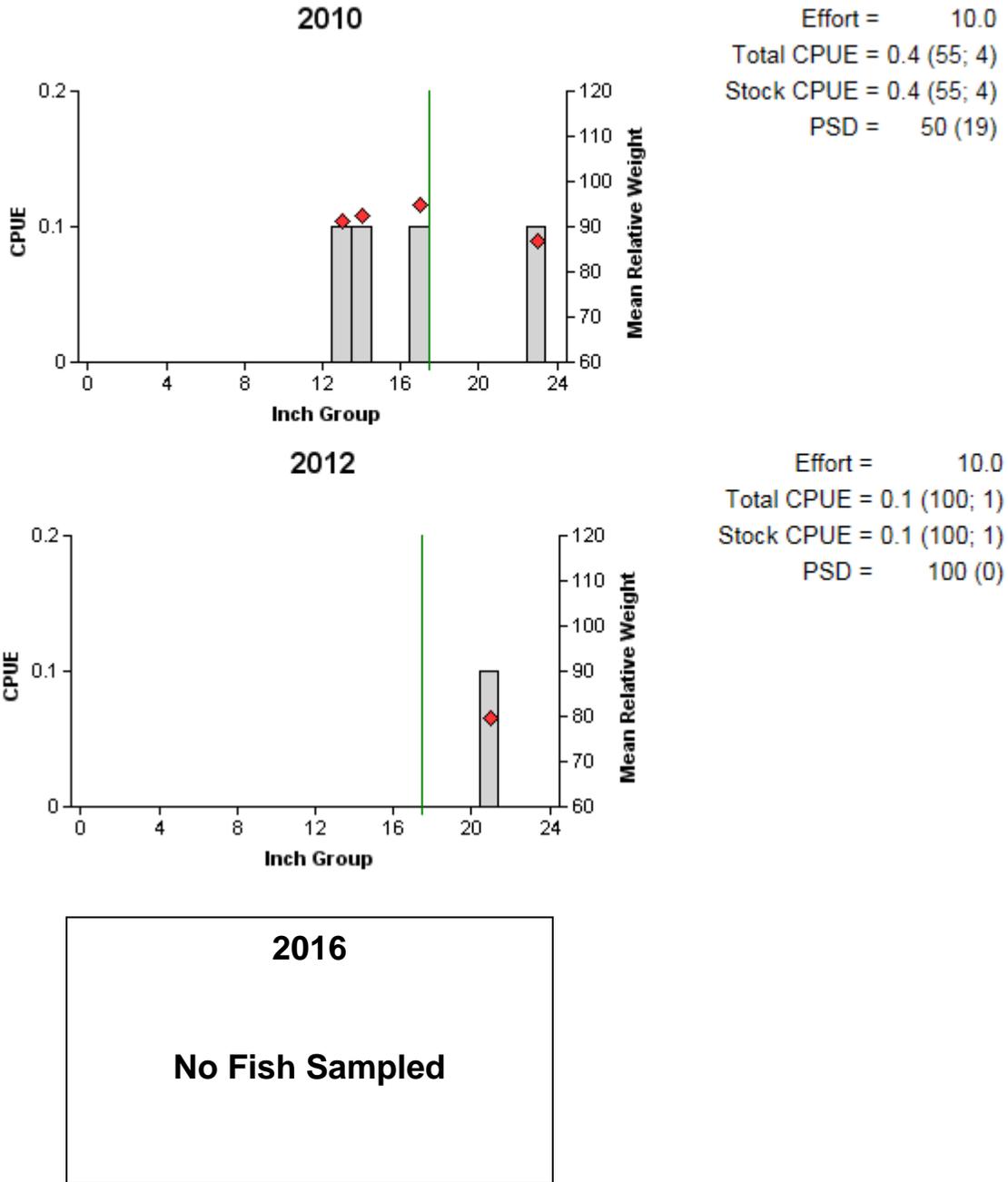


Figure 10. Number of Palmetto Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Palo Pinto Reservoir, Texas, 2010, 2012, and 2016. Line indicates minimum length limit.

Palmetto Bass

Table 13. Creel survey statistics for Palmetto Bass at Palo Pinto Reservoir from June 2012 through May 2013. Total catch per hour is for anglers targeting Palmetto Bass and total harvest is the estimated number of Palmetto Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year
	2012/2013
Surface area (acres)	2,398.9
Directed effort (h)	505.1 (62)
Directed effort/acre	0.2 (62)
Total catch per hour	>0.1 (100)
Total harvest	0.00(0)
Harvest/acre	0.0 (0)
Percent legal released	>0.1

Largemouth Bass

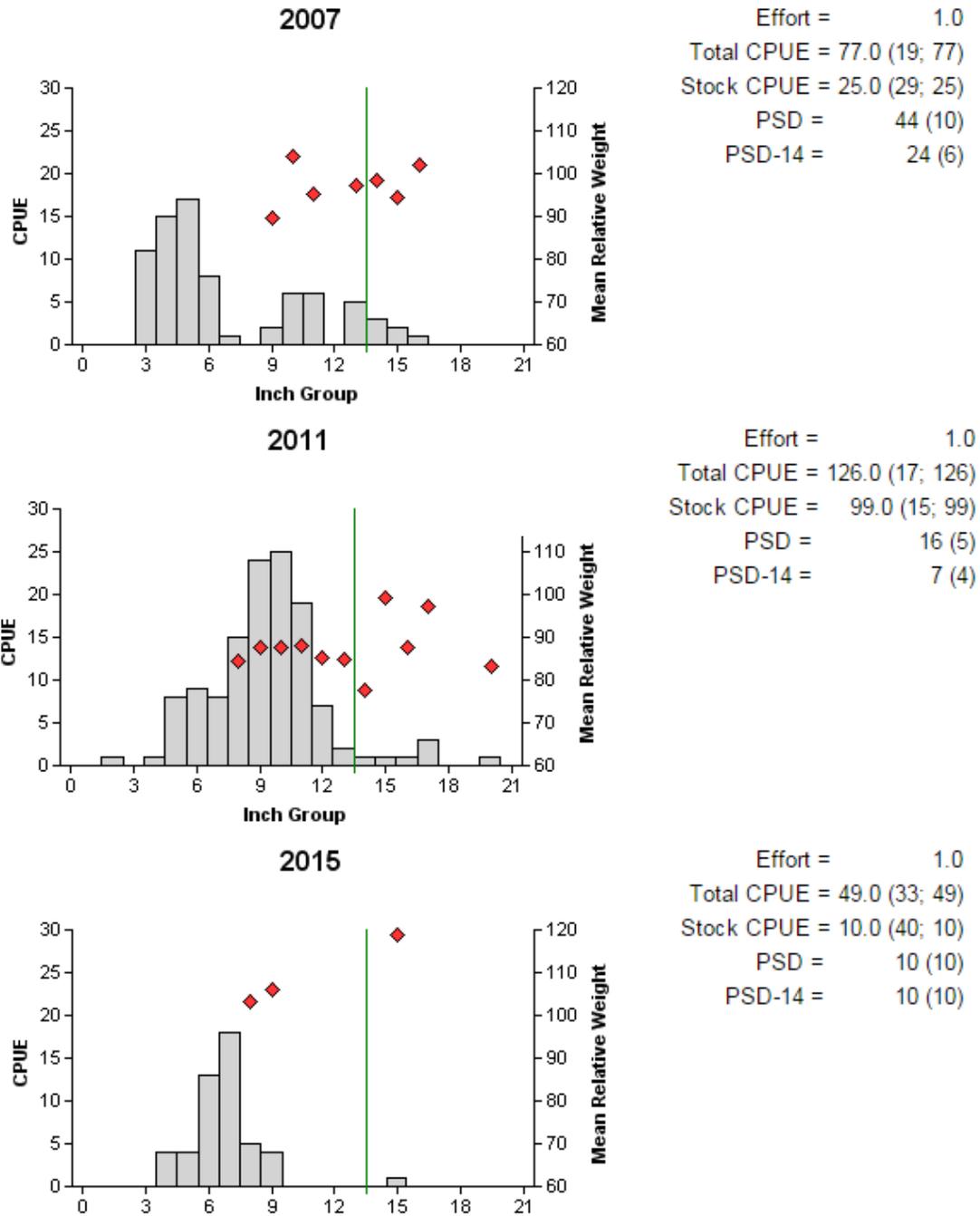


Figure 11. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Palo Pinto Reservoir, Texas, 2007, 2011, and 2015. Line indicates minimum length limit.

Largemouth Bass

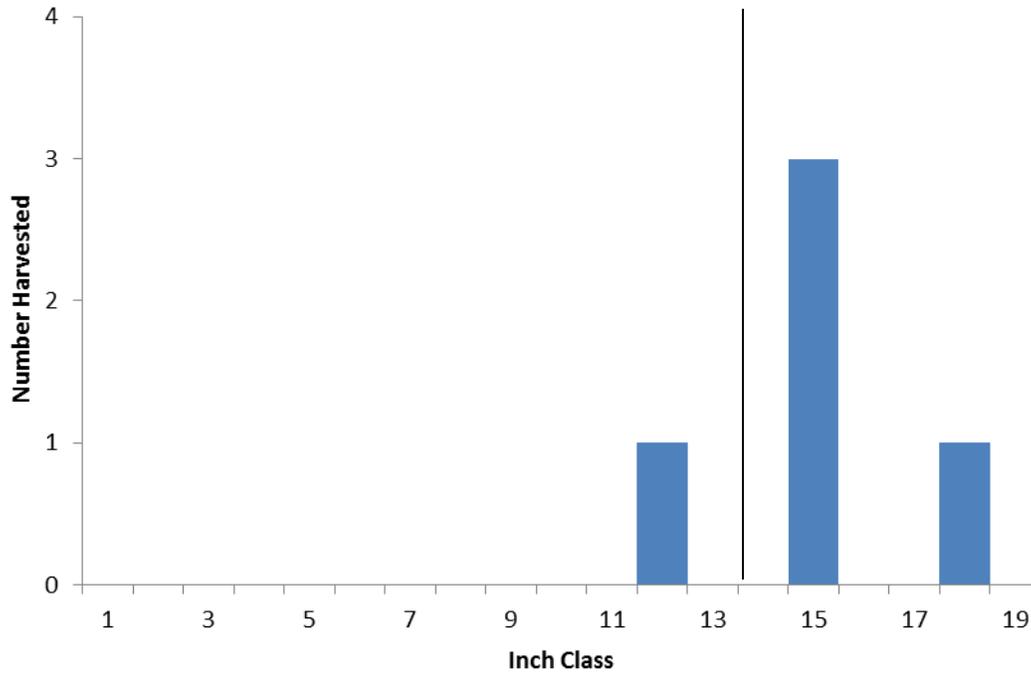
Table 14. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Palo Pinto Reservoir, Texas, 1996, 1999, 2003, 2007, and 2011. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005

Year	Sample size	Genotype			% FLMB alleles	% pure FLMB
		FLMB	Intergrade	NLMB		
1996	30	1	19	10	29.2	3.3
1999	30	3	13	14	29.2	10.0
2003	31	3	21	7	39.5	9.8
2007	30	0	13	17	13.6	0.0
2011	30	1	25	4	35.0	3.0

Table 15. Creel survey statistics for Largemouth Bass at Palo Pinto Reservoir, TX from June 2012 through May 2013. Catch rate is for all anglers targeting Largemouth Bass. Harvest is partitioned by the estimated number of fish harvested by non-tournament anglers and the number of fish retained by tournament anglers for weigh-in and release. The estimated number of fish released by weight category is for anglers targeting Largemouth Bass. Relative standard errors (RSE) are in parentheses.

Statistic	2012/2013
Surface area (acres)	2,398.9
Directed angling effort (h)	
Tournament	2,304.1 (31)
Non-tournament	2,260.9 (29)
All black bass anglers combined	4,565.0
Angling effort/acre	1.9
Catch rate (number/h)	0.6
Harvest	
Non-tournament harvest	196.4 (162)
Harvest/acre	0.8 (162)
Tournament weigh-in and release	267.4 (65.3)
Release by weight	
<4.0 lbs	107
4.0-6.9 lbs	2
7.0-9.9 lbs	1
≥10.0 lbs	0
Percent legal released (non-tournament)	56.9

Largemouth Bass



N=5, TH=196

Figure 12. Length frequency of non-tournament harvested Largemouth Bass observed during creel surveys at Palo Pinto Reservoir, Texas, June 2012 through May 2013, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the estimated non-tournament harvest for the creel period. Line indicates minimum length limit.

White Crappie

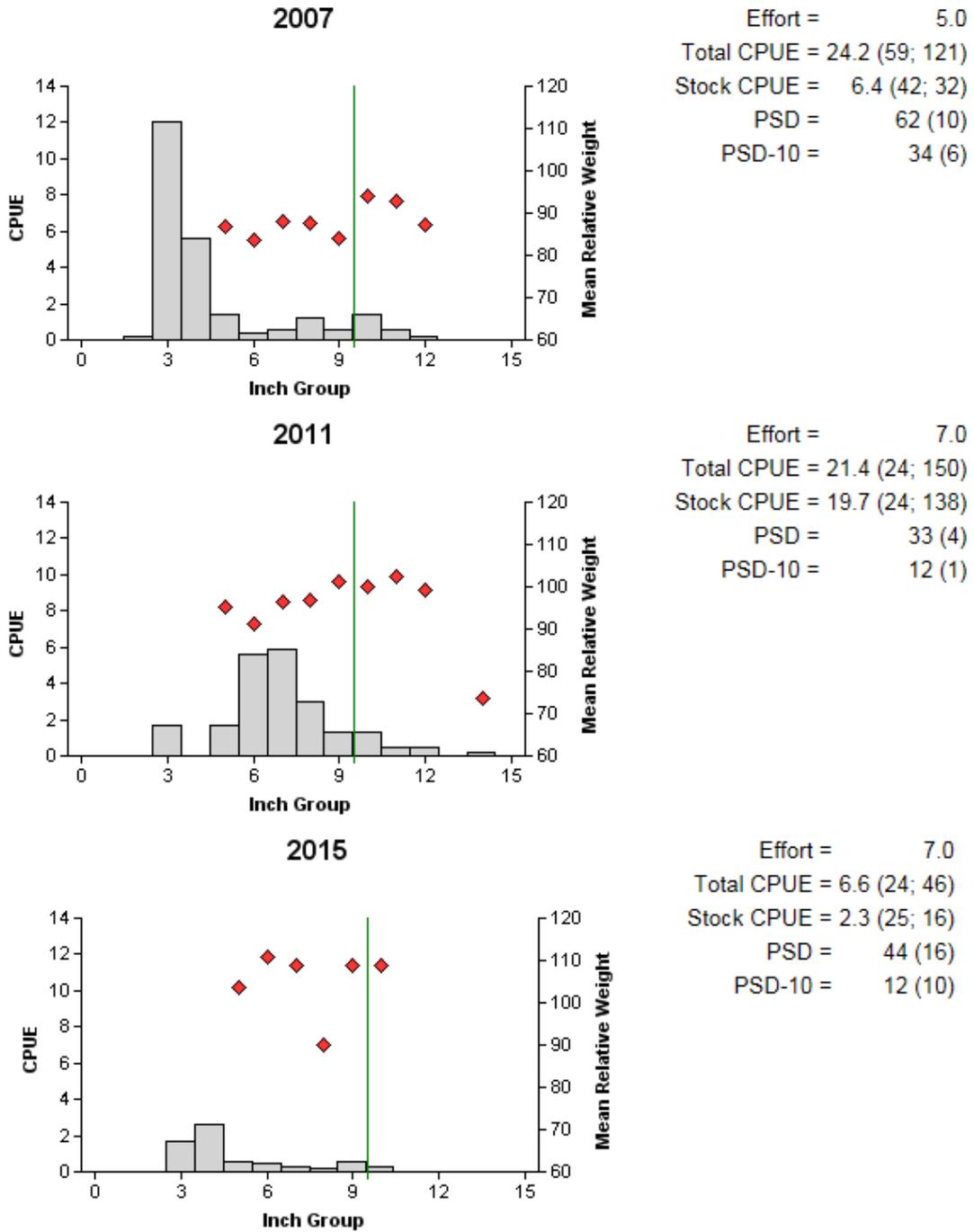
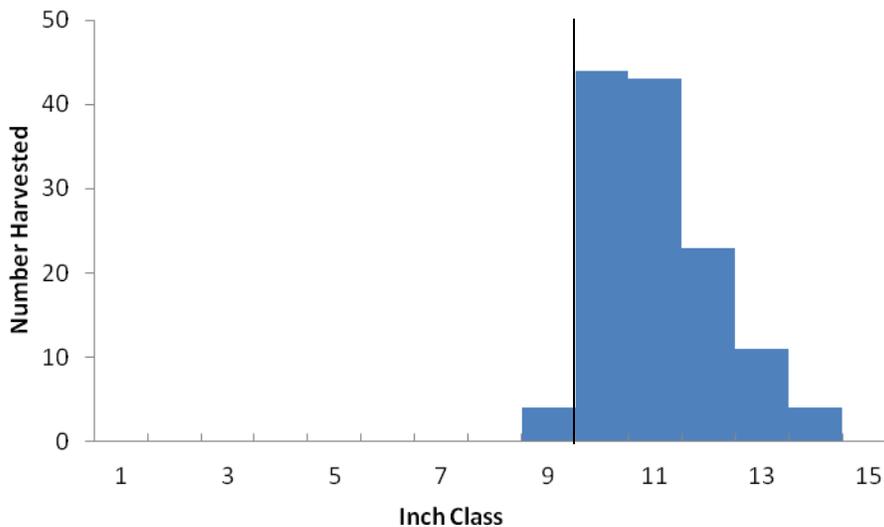


Figure 13. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Palo Pinto Reservoir, Texas, 2007, 2011, and 2015. Line indicates minimum length limit at time of sampling.

White Crappie

Table 16. Creel survey statistics for White Crappie at Palo Pinto Reservoir from June 2012 through May 2013. Total catch per hour is for anglers targeting White Crappie and total harvest is the estimated number of White Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses

Creel Survey Statistic	Year
	2012/2013
Surface area (acres)	2,398.9
Directed effort (h)	7,292.2 (23)
Directed effort/acre	3.0 (23)
Total catch per hour	2.5 (46)
Total harvest	29,173.0 (47)
Harvest/acre	12.2 (47)
Percent legal released	28.3



N=129, TH=29,173

Figure 14. Length frequency of harvested White Crappie observed during creel surveys at Palo Pinto Reservoir, Texas, June 2012 through May 2013, all anglers combined. N is the number of harvested White Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period. Line indicates minimum length limit.

Table 17. Proposed sampling schedule for Palo Pinto 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 and additional survey denoted by A

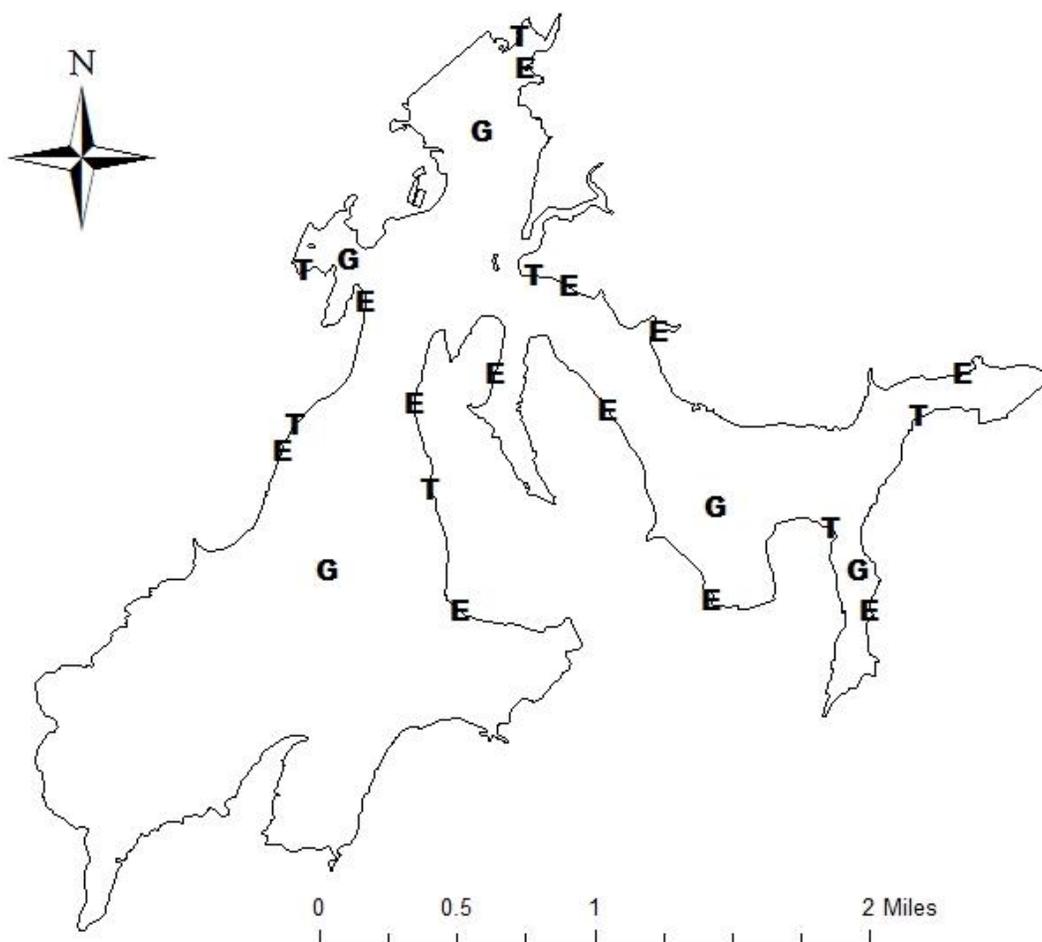
Survey year	Electrofishing Fall(Spring)	Trap net	Gill net	Habitat			Low-Frequency Electrofishing	Report
				Structural	Vegetation	Access		
2016-2017								
2017-2018								
2018-2019								
2019-2020	S	S	S		S	S	A	S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected from all gear types from Palo Pinto Reservoir, Texas, 2015-2016. Sampling effort was 5 net nights for gill netting, 7 net nights for trap netting, and 1 hour for electrofishing.

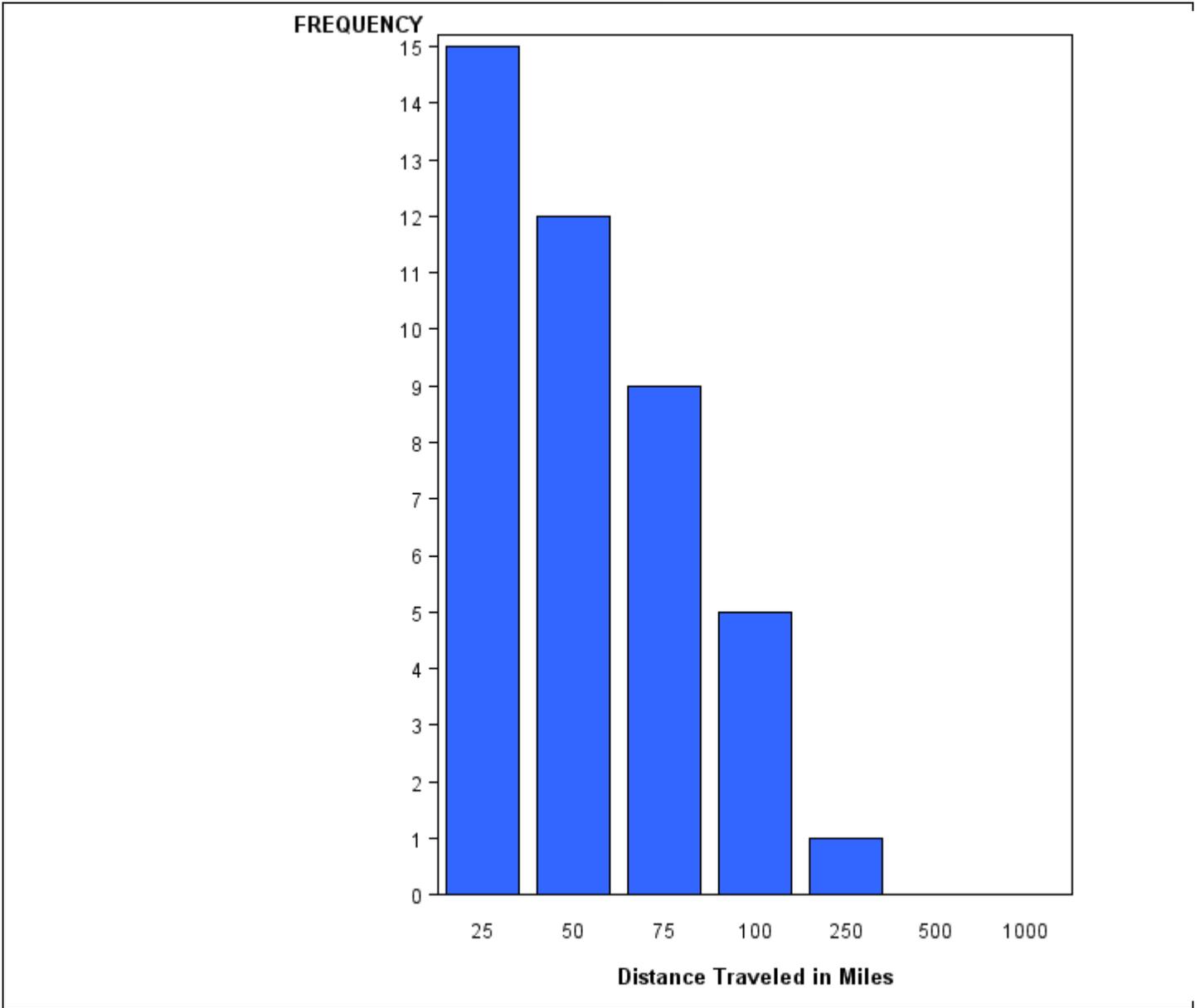
Species	Gill Nets		Trap Nets		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Longnose Gar	11	2.2				
Gizzard Shad	1	0.2	17	2.4	297	297.0
Threadfin Shad			10	1.4	199	199.0
Smallmouth Buffalo	5	1.0				
Blue Catfish	4	0.8				
Channel Catfish			1	0.1		
Warmouth					1	1.0
Orangespotted Sunfish					2	2.0
Bluegill			132	18.9	49	49.0
Longear Sunfish			1	0.1	9	9.0
Redear Sunfish					1	1.0
Largemouth Bass					49	49.0
White Crappie			46	6.6		
Black Crappie			5	0.7		

APPENDIX B



Location of sampling sites, Palo Pinto Reservoir, Texas, 2015-2016. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was near full pool at time of sampling.

APPENDIX C



Frequency of anglers that traveled various distances (miles) to Palo Pinto Reservoir, Texas, as determined from the June 2012 through May 2013 creel zip code data.