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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2014 Fisheries Management Survey Report

Lake Crook

Prepared by:

Dan Bennett, Assistant District Management Supervisor
and
Kevin Storey, District Management Supervisor

Inland Fisheries Division
Tyler North District
Tyler, Texas



Carter Smith
Executive Director

Craig Bonds
Director, Inland Fisheries

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake Crook were surveyed in 2014 using electrofishing and trap netting and in 2015 using gill netting. Aquatic vegetation and habitat surveys were conducted on Lake Crook during August 2014. Historical data are presented with the 2014-2015 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:** Lake Crook is a 1,060-acre impoundment located in Lamar County, Texas, on Pine Creek, a tributary of the Red River. It was constructed in 1923 by the City of Paris for municipal water supply but currently acts as a supplemental source to Paris' primary supply from Pat Mayse Reservoir. Littoral zone habitat consists primarily of natural shoreline with native emergent aquatic vegetation. The reservoir is characterized by highly turbid water which limits light penetration and primary productivity.
- **Management History:** Important sport fish include White Crappie, and catfish. The management plan from the 2010 survey report included stocking Blue Catfish.
- **Fish Community**
 - **Prey species:** Forage species include Gizzard Shad and sunfish. Catch rates of shad and Bluegill are typically low. Electrofishing is impaired by the reservoir's high turbidity.
 - **Catfishes:** Blue and Channel Catfish are present in the reservoir. Blue Catfish have become the dominant species in recent surveys.
 - **Largemouth Bass:** Largemouth Bass are present in low density. High turbidity may also impede observation during sampling.
 - **Crappie:** White Crappie are the dominant species in Lake Crook. The population is composed primarily of small individuals.
- **Management Strategies:** Continue standard monitoring using trap netting, low-pulse electrofishing, and standard electrofishing in 2018-2019.

INTRODUCTION

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

Reservoir Description

Lake Crook is a 1,060-acre impoundment constructed in 1923 on Pine Creek, a tributary of the Red River. It is located in Lamar County approximately 2 miles north of Paris, Texas, and is operated and controlled by the City of Paris. The reservoir contains highly turbid water which limits light penetration and consequently primary productivity and submersed aquatic vegetation. Significant sedimentation has occurred over the years and reduced storage capacity. Lake Crook currently acts as a supplemental source to the primary water supply from Pat Mayse Reservoir. Habitat at the time of sampling consisted of natural shoreline with a band of native emergent aquatic vegetation representing approximately 2% of the reservoir surface area. American lotus and water primrose also contributed to available habitat and covered approximately 6.5% of reservoir surface area. Other descriptive characteristics for Lake Crook are in Table 1.

Angler Access

Lake Crook has two public boat ramps available in the City Park. The boat ramps provide adequate access to the reservoir. Boater access on the east ramp may be limited during low water periods; however, extension is not feasible due to the shallow gradient. Water level fluctuations have historically been minimal and have not restricted angler access. The west ramp provides adequate access to the reservoir. Additional boat ramp characteristics are in Table 2. Bank access is available on the public fishing pier (constructed in 2010) and, although there is ample shoreline in the City Park, it is limited by emergent vegetation coverage.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Storey 2011) included:

1. Stock 2-inch fingerling Blue Catfish at 100/acre.
Action: Blue Catfish fingerlings were requested and a stocking was conducted in June 2015.
2. Management and prevention of invasive species.
Actions: TPWD conducted a standard vegetation survey, continued to provide educational materials to anglers and local businesses, and monitored for inter-basin water transfers.

Harvest regulation history: Sport fishes in Lake Crook are managed with statewide regulations (Table 3).

Stocking history: In June 2015, 107,118 Blue Catfish fingerlings were stocked. Prior to 2015, the only recorded stocking at Lake Crook occurred in 1953, when 2,000 White Bass fingerlings were stocked (Table 4); however, a fishery was not established. Due to the old age of the reservoir, additional stockings may have occurred prior to current record keeping procedures. The stone tablets were broken.

Water transfer: No inter-basin transfers are known to exist for Lake Crook.

METHODS

Fishes were collected by electrofishing (1 hour at 12, 5-min stations), gill netting (5 net nights at 5 stations), and trap netting (5 net nights at 5 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for gill and trap nets, as the number of fish per net night (fish/nn). 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 and vegetation 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), 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 = $100 \times \text{SE of the estimate/estimate}$) was calculated for all CPUE statistics.

Source for water level data was the United States Geological Survey (USGS 2015).

RESULTS AND DISCUSSION

Habitat: Littoral zone structural habitat consisted primarily of natural shoreline (Table 5) rimmed with native emergent vegetation. Native floating-leaved vegetation covered 6.5% of reservoir surface area and consisted of American lotus and water primrose (Table 6). Lake Crook contained no submersed aquatic vegetation likely as a result of high turbidity.

Prey species: Electrofishing catch rate of Gizzard Shad was low (8.0/h) and Threadfin Shad were not collected. Gizzard Shad catch rate was similarly low in 2010 (6.0/h), and down significantly from catch rate in 2006 (125.0/h) (Figure 2). Shad abundance may be inversely related to an increase in Blue Catfish abundance. All Gizzard Shad were available as forage fish to sport fishes. Bluegill catch rate (83.0/h) in 2014 was higher than the previous two surveys when few (4.0/h in 2010 and 1.0/h in 2006) fish were collected (Figure 3). The Bluegill population was dominated by small individuals available as forage for sportfish. Three Longear Sunfish were collected in 2014.

Catfish: Gill net catch rate of Channel Catfish has been poor in the last three surveys. Only one Channel Catfish was collected in 2015, and eight were collected in 2007 (Figure 5). The catfish population in Lake Crook may be shifting to a population dominated by Blue Catfish, as the highest catch rate to date (19.2/nn) for Blue Catfish was achieved in 2015. The Blue Catfish catch rate in 2007 was 3.0/nn, yet no fish were collected in 2011. The size structure of the Blue Catfish sample was comprised of approximately 33% of fish available for harvest; however, body condition for most size classes was moderate (PSD = 75 to 80) and suggest a limitation in forage fish availability.

Largemouth Bass: The Largemouth Bass population in Lake Crook has historically been limited due to the high turbidity and low primary productivity. Only one Largemouth Bass was observed during an electrofishing survey in 2006, and no bass were collected in 2010. In 2014, seven Largemouth Bass were collected, but only one was of legal length (14 inches).

White Crappie: The trap net catch rate of White Crappie in 2014 (68.8/nn) was higher than in 2010 (25.4/nn), yet similar to the catch rate in 2006 (71.2/nn; Figure 3). The population continues to be dominated by small fish. The White Crappie population is thought to be of low quality; although, multiple anglers were observed targeting crappie during spring 2015. Only one Black Crappie was collected during trap netting in 2014 (Appendix A).

Fisheries management plan for Lake Crook, Texas

Prepared – July 2015.

ISSUE 1: Catfish are the species group which have demonstrated the best potential for developing fisheries resources in Lake Crook. Catfish are tolerant of the turbid water conditions found in the lake that are detrimental to bass and sunfish populations. In spring 2015, Blue Catfish were collected at their highest observed abundance to date. Fingerling Blue Catfish were stocked in 2015.

MANAGEMENT STRATEGY

1. Monitor Blue Catfish populations with low-frequency electrofishing in 2019 and determine potential to increase consistency of catch rates and sampling precision.
2. Consider management stocking of Threadfin Shad to increase diversity of the forage base if risks of invasive species introductions can be minimized.
3. Promote the Blue Catfish fishery through available media and communication outlets.

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 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.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes daytime electrofishing in 2018 to document presence of bass and forage species (Table 15). Low-frequency electrofishing will also be conducted in 2018 to access Blue and Channel Catfish populations. Trap net sampling for Crappie will be discontinued because the fishery is insignificant.

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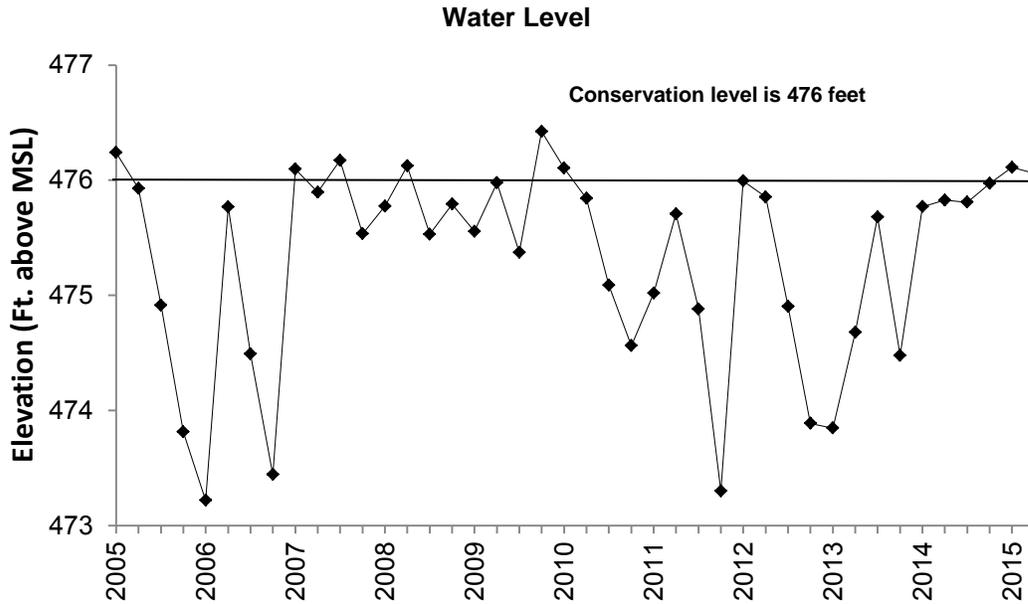


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Lake Crook, Texas.

Table 1. Characteristics of Lake Crook, Texas.

Characteristic	Description
Year constructed	1923
Controlling authority	City of Paris
County	Lamar
Reservoir type	City impoundment
Shoreline Development Index (SDI)	3.4
Conductivity	111 μ S/cm

Table 2. Boat ramp characteristics for Lake Crook, Texas, August, 2014. Reservoir elevation at time of survey was 476 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
East Ramp	33.72421 - 95.57044	Y	20	474	Shallow slope. Extension not feasible.
West Ramp	33.72113 - 95.57761	Y	15	473	Excellent. No access issues.

Table 3. Harvest regulations for Lake Crook, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, 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

Table 4. Stocking history of Lake Crook, Texas. FGL = fingerling.

Species	Year	Number	Size
White Bass	1953	2,000	FGL
Blue Catfish	2015	107,118	FGL

Table 5. Survey of structural habitat types, Lake Crook, Texas, 2014. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Natural	12.3 miles	96%
Rocky	0.5 miles	4%
Standing timber	<1.0 acres	<1%

Table 6. Survey of aquatic vegetation, Lake Crook, Texas, 2014. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2014
Native floating-leaved (American lotus, water primrose)	69.2 (6.5)
Native emergent (giant cutgrass, giant bulrush, cattail)	21.4 (2.0)

Gizzard Shad

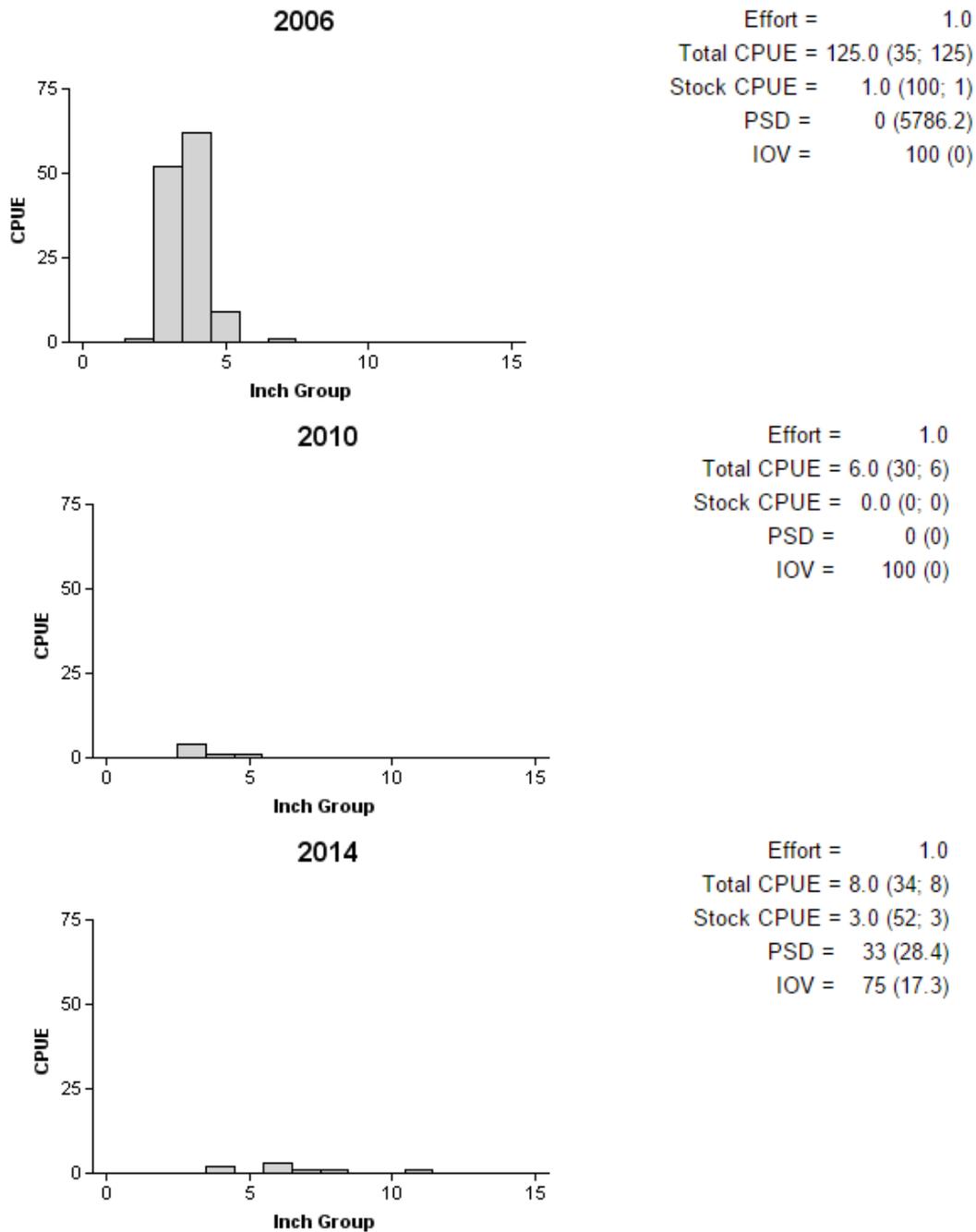


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Crook, Texas, 2006, 2010, and 2014.

Bluegill

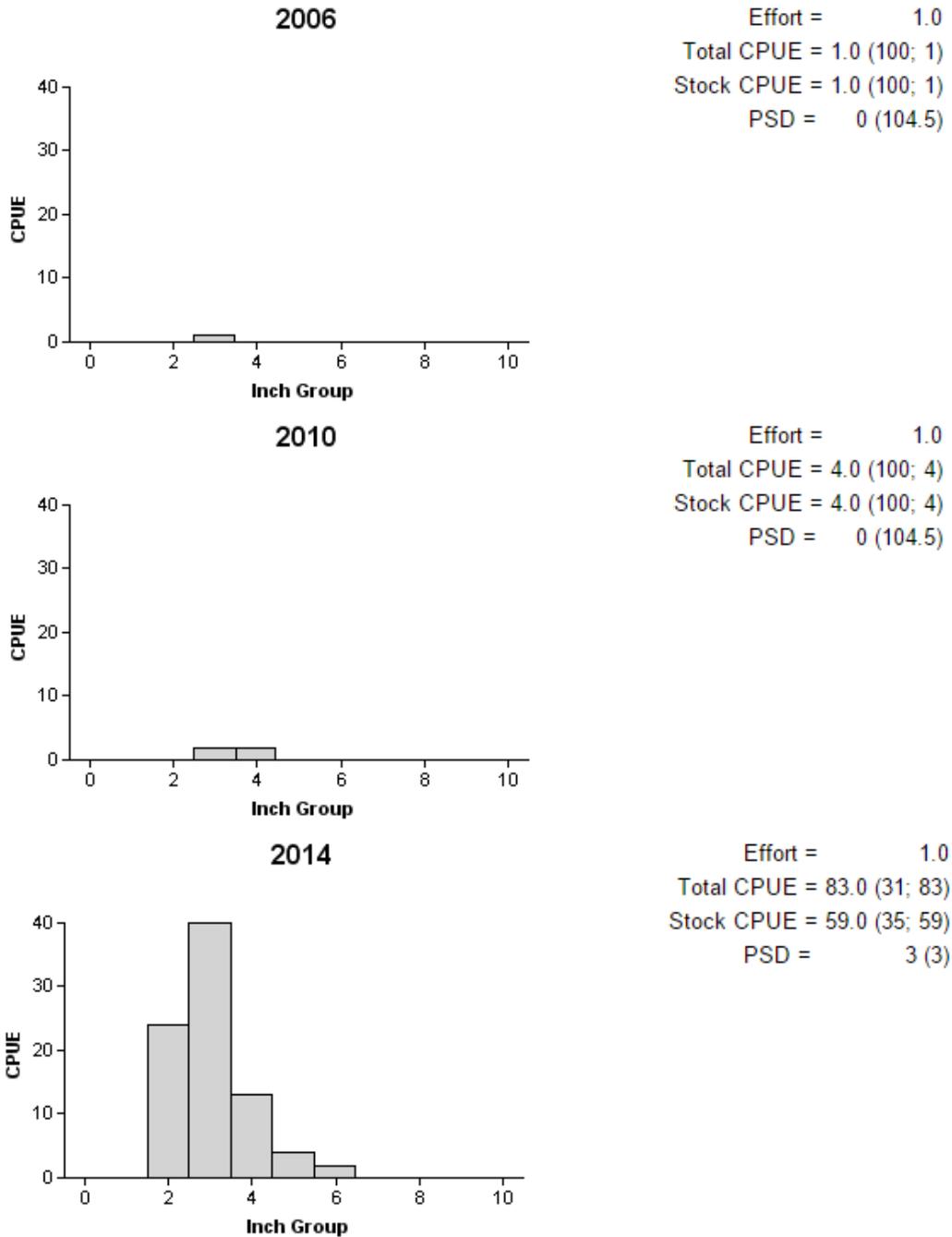
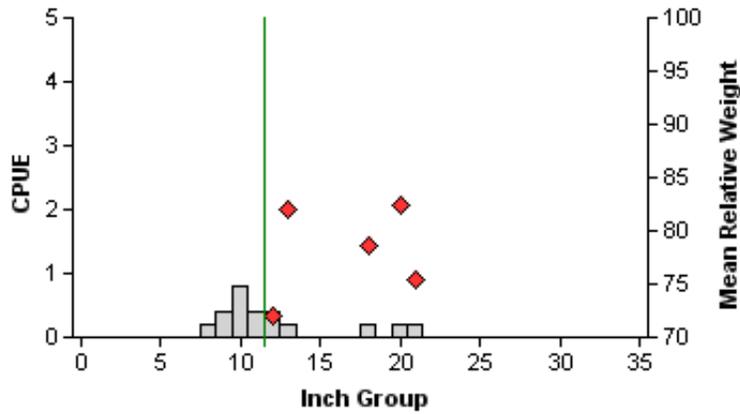


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Crook, Texas, 2006, 2010, and 2014.

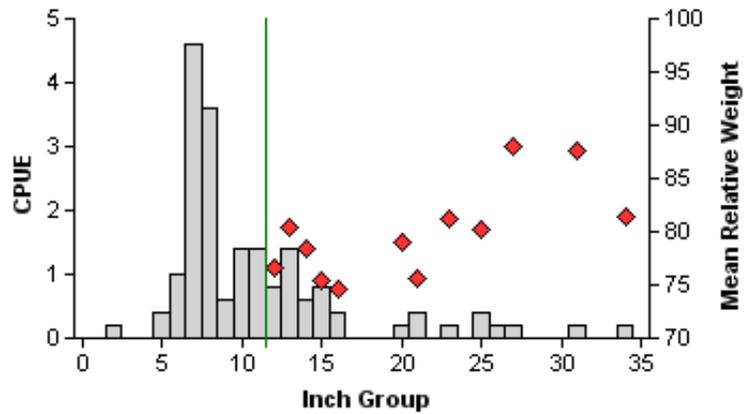
Blue Catfish

2007



Effort = 5.0
 Total CPUE = 3.0 (32; 15)
 Stock CPUE = 1.2 (61; 6)
 PSD = 33 (15.1)

2015



Effort = 5.0
 Total CPUE = 19.2 (31; 96)
 Stock CPUE = 6.0 (45; 30)
 PSD = 33 (3.5)

Figure 4. Number of Blue Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Crook, Texas, 2007 and 2015. Vertical line indicates minimum length limit at time of survey.

Channel Catfish

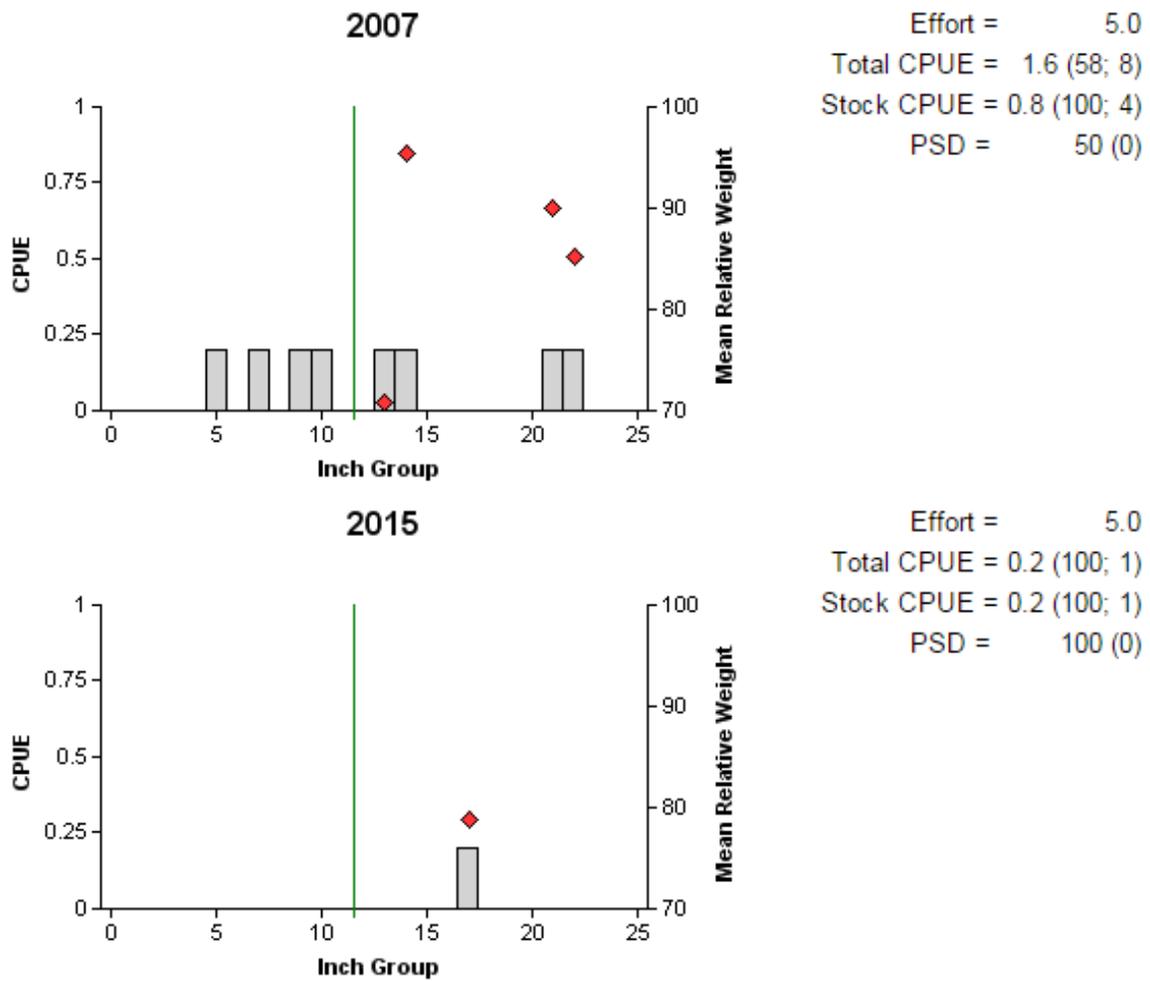


Figure 5. Number of Channel Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Crook, Texas, 2007 and 2015. Vertical line indicates minimum length limit at time of survey.

Largemouth Bass

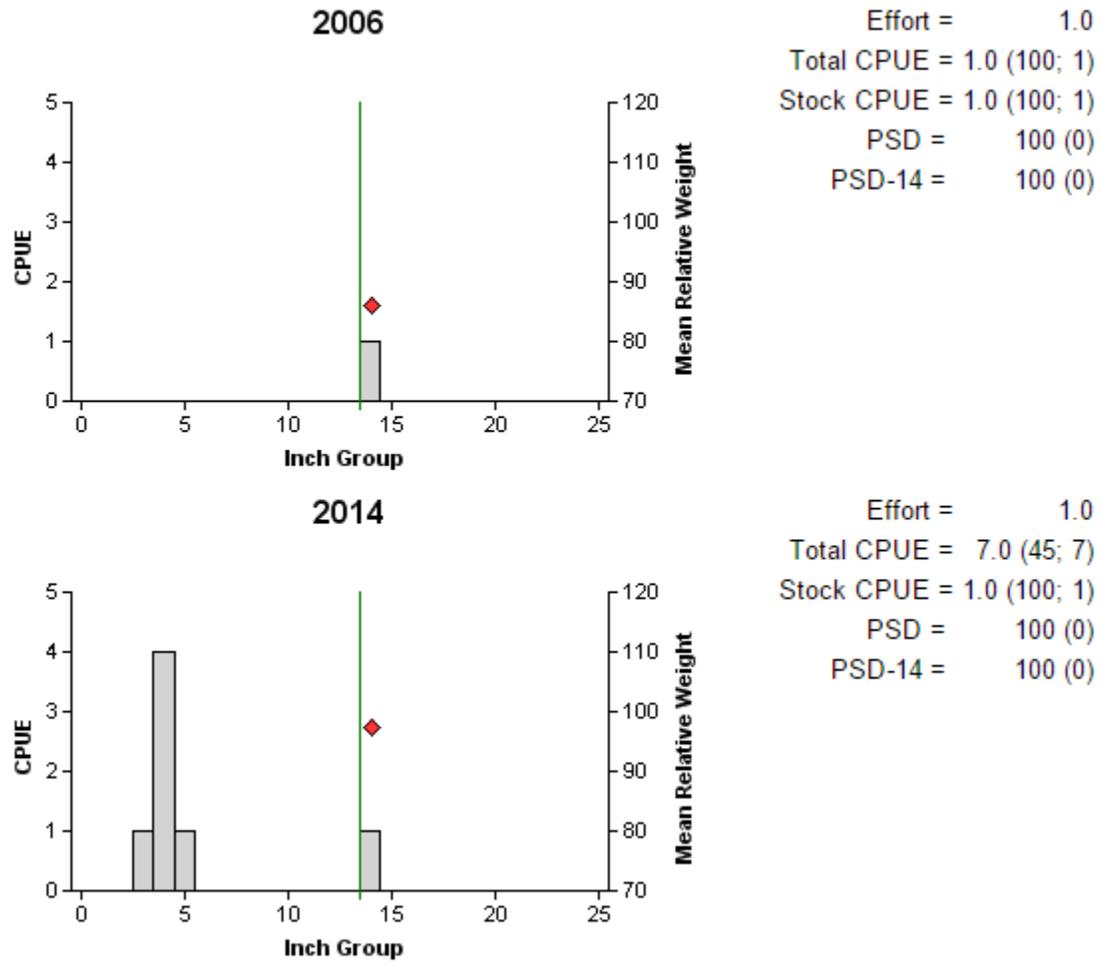


Figure 6. Number of Largemouth Bass caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Crook, Texas, 2006 and 2014. Vertical line indicates minimum length limit at time of survey.

White Crappie

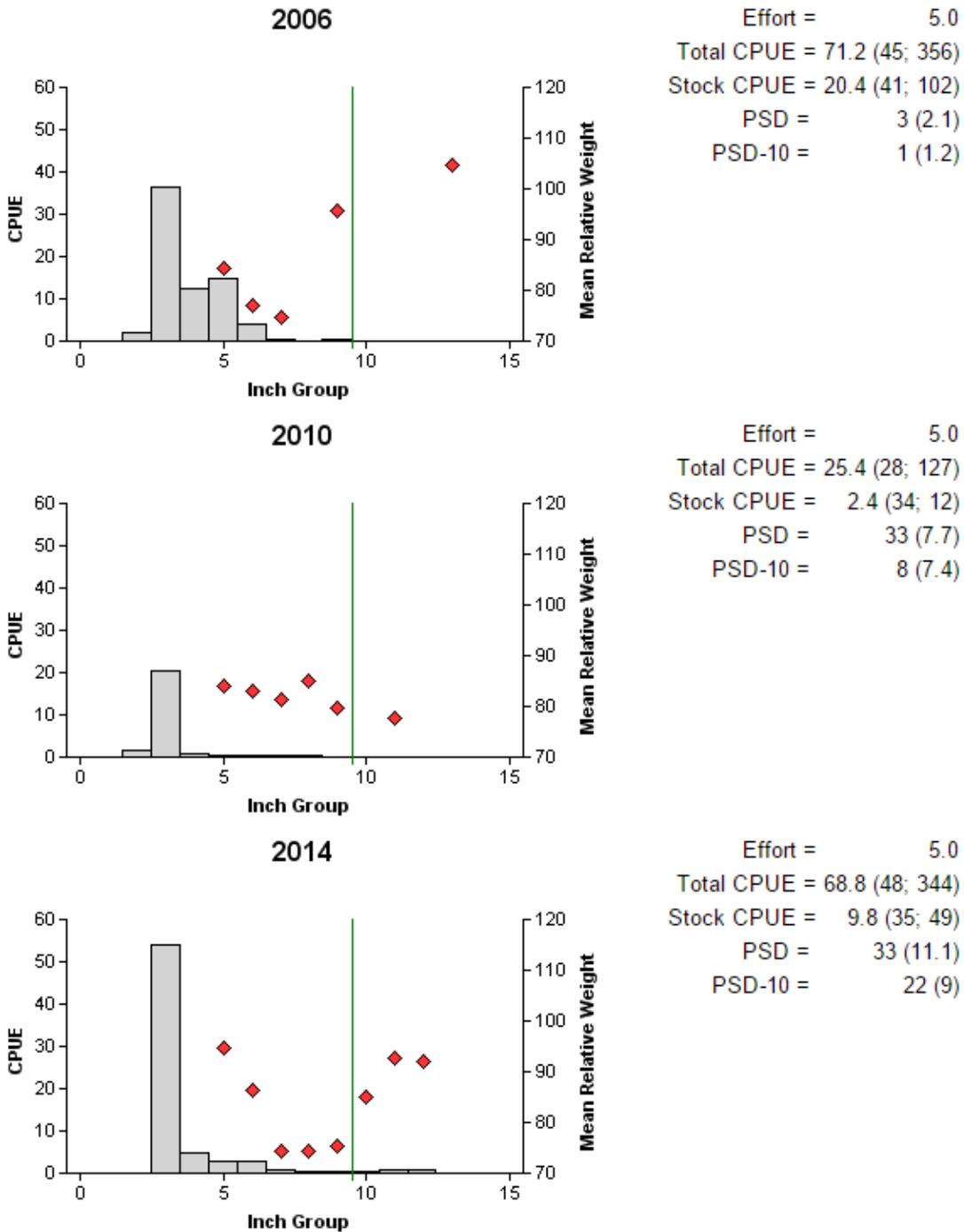


Figure 7. Number of White Crappie caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Crook, Texas, 2006, 2010, and 2014. Vertical line indicates minimum length limit at time of survey.

Table 7. Proposed sampling schedule for Lake Crook, Texas. Survey period is June through May. Low-frequency Electrofishing surveys are conducted in late spring or summer. Daytime electrofishing surveys are conducted in the fall. Standard survey denoted by S. Additional surveys are denoted by A.

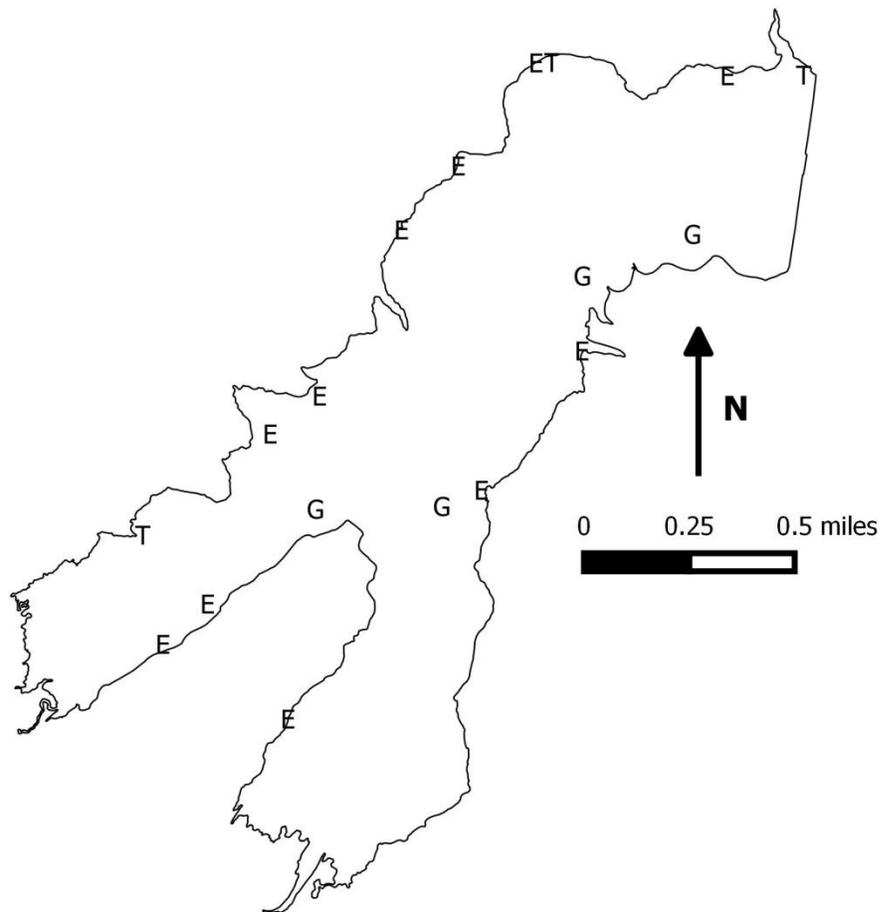
Survey year	Daytime Electrofishing	Low-frequency Electrofishing	Vegetation	Access	Report
2018-2019	S	A	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Lake Crook, Texas, 2014-2015. Sampling effort was 5 net nights for gill netting, 5 net nights for trap netting, and 1 hour for electrofishing.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					8	8.0
Blue Catfish	96	19.2				
Channel Catfish	1	0.2				
Bluegill					83	83.0
Longear Sunfish					3	3.0
Largemouth Bass					7	7.0
White Crappie			344	68.8		
Black Crappie			1	0.2		

APPENDIX B



Location of sampling sites, Lake Crook, Texas, 2014-2015. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was near conservation pool elevation at time of sampling.