

PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2010 Survey Report

Lake Crook

Prepared by:

Kevin W. Storey, District Management Supervisor

Inland Fisheries Division
District 3B, Tyler, Texas



Carter P. Smith
Executive Director

Gary Saul, Ph. D.
Director, Inland Fisheries

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake Crook were surveyed in 2010 using electrofishing and trap netting and in 2011 using gill netting. Aquatic vegetation and habitat surveys were conducted on Lake Crook during July 2010. 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 the main supply from Pat Mayse Reservoir. Littoral zone habitat consists primarily of natural shoreline with native emergent aquatic vegetation. The reservoir lies within the Blackland Prairies Land Area and is characterized by highly turbid water which limits light penetration and therefore primary productivity.
- **Management history:** Important sport fishes include largemouth bass, white crappie, blue and channel catfish. The management plan from the 2006 survey report recommended promoting the blue catfish fishery and suggesting improvements to public fishing access in the city park. The City of Paris built a new fishing pier in 2010.
- **Fish community**
 - **Prey species:** Electrofishing catch rates of gizzard shad and bluegill were low. No threadfin shad were collected. Electrofishing sampling is impaired by the lake's high turbidity.
 - **Catfishes:** No channel catfish were collected during 2011 gill net sampling. Although blue catfish were collected in 2007, none were collected in 2011. No flathead catfish were collected.
 - **Largemouth bass:** Largemouth bass have been collected in the past, but none were sampled in 2010. Largemouth bass density is very low based on past surveys. High lake turbidity made it difficult to observe fish during electrofishing sampling.
 - **Crappie:** White crappie were the only crappie species collected during the survey. Size structure was poor, with the majority of fish collected being less than five inches in length.

Management strategies: Continue with standard monitoring using trap netting, gill netting, and electrofishing in 2014-2015.

INTRODUCTION

This document is a summary of fisheries data collected from Lake Crook from June 2010 through May 2011. Its 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 sport fishes and important prey species. Historical data are presented with the 2010-2011 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 lies within the Texas Blackland Prairies Ecoregion and is characterized by highly turbid water which limits light penetration and consequently primary productivity. Aquatic habitat is also influenced by reservoir age as significant sedimentation has occurred and reduced storage capacity. Primary water use includes municipal water supply, but it currently acts as a supplemental source to the main supply from Pat Mayse Reservoir. Habitat at the time of sampling consisted of natural shoreline with a band of native emergent aquatic vegetation representing less than 2% of the reservoir surface area. Boat access consisted of two public boat ramps. Bank fishing access was present at all public boat ramps and along some of the shore in the City Park. The City of Paris demolished an existing fishing pier that was in disrepair and constructed a new pier in the City Park. Other descriptive characteristics for Lake Crook are in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Jubar and Storey 2007) included:

1. Monitor and promote the blue catfish fishery.
Action: No blue catfish were collected in gill nets in spring 2011.
2. Improve bank access for anglers.
Action: The City of Paris demolished the existing fishing pier in the City Park and rebuilt a new structure.

Harvest regulation history: Sport fishes in Lake Crook are currently managed with statewide regulations (Table 2).

Stocking history: The only recorded stocking occurred in 1953 when 2,000 white bass fingerlings were stocked by TPWD (Table 3). Considering the age of Lake Crook, any additional stockings were conducted prior to current record keeping.

Vegetation/habitat history: Lake Crook contained no submerged aquatic vegetation. The small amount of native emergent aquatic vegetation consisted of bulrush, southern cutgrass, and American lotus (17 acres). This vegetation forms a narrow band around the lake perimeter which in combination with natural shoreline forms the dominant shoreline habitat type (91%).

Water Transfer: Water from Lake Crook is occasionally utilized by the City of Paris for blending with water from Pat Mayse Reservoir. This water is used to supply residents of the City of Paris as well as industrial customers including Lamar County Water Supply District, Campbell Soup Corporation, Lamar Power Partners, and Direct Energy.

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 nets and trap nets as the number of fish caught 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 2009).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD) as defined by Guy et al. (2007)], and condition indices [Relative Weights (*Wr*)] were calculated for target fishes according to Anderson and Neumann (1996). Index of Vulnerability (IOV) was calculated for gizzard shad (DiCenzo et al. 1996). Relative standard error ($RSE = 100 \times SE \text{ of the estimate/estimate}$) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV.

RESULTS AND DISCUSSION

Vegetation/habitat: Shoreline habitat during summer 2010 was dominated by natural shoreline with native emergent aquatic vegetation (91.0%, Table 3). Predominant species observed were bulrush, southern cutgrass, and American lotus. Aquatic vegetation in Lake Crook consists exclusively of emergent vegetation which forms a narrow band around the lake perimeter (16.8 acres) contributing little in terms of the total area of the reservoir (1.6%). The reservoir lies within the Texas Blackland Prairies Ecoregion and is characterized by highly turbid water which limits establishment and growth of submersed aquatic plant species. Sedimentation has been taking place for almost 90 years in Lake Crook which has negatively impacted the quality of aquatic habitat and storage capacity of the reservoir.

Prey species: Electrofishing catch rate of gizzard shad in 2010 was 6.0/h. This was the lowest catch rate observed during the current review (Figure 1). All of the gizzard shad collected were available to adult largemouth bass and catfish. Only one bluegill was caught in 2006 (Figure 2). Few bluegill were collected in 2010 (Figure 2). One other sunfish species was caught, a spotted sunfish. (Appendix A)

Catfishes: Although blue catfish (Figure 2) and channel catfish (Figure 3) were collected in 2007, no catfish were collected in gill nets in 2011.

Largemouth bass: No largemouth bass were collected in 2010, but catch rates of bass in Lake Crook have been historically low. The highly turbid conditions in Lake Crook combined with a lack of suitable habitat make this reservoir unsuitable for black basses and sunfishes. It also creates challenges for fish sampling.

White crappie: The trap net catch rate of white crappie was 25.4/nn in 2010, which was lower than it was in 2006 (71.2/nn) and higher than in 2002 (14.6/nn; Figure 3). The population continues to be dominated by small fish providing a low-quality fishery.

Fisheries management plan for Lake Crook, Texas

Prepared – July 2011

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 but these are detrimental to bass and sunfish populations. In spring 2007 blue catfish and channel catfish were collected in gill net sampling. Introduction of fingerling catfish may augment existing catfish populations and eventually provide fisheries resources for local anglers.

MANAGEMENT STRATEGIES

1. Stock 2-inch fingerling blue catfish at 100/acre in 2012 and 2013.

ISSUE 1: 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 mandatory monitoring of the reservoir using trap netting and electrofishing in 2014 and gill netting in 2015 (Table 4). A habitat and vegetation survey in summer 2014 will be conducted to monitor the littoral zone habitat and an access survey will document access facilities.

LITERATURE CITED

- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- DiCenzo, V. J., M. J. Maceina, and M. R. Stimpert. 1996. Relations between reservoir trophic state and gizzard shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.
- Guy, C. S., R. M. Neumann, D. W. Willis, and R. O. Anderson 2007. Proportional Size Distribution (PSD): A further refinement of population size structure index terminology. Fisheries 32(7):348.
- Jubar, A.K., and K.W. Storey. 2007. Statewide freshwater fisheries monitoring and management program survey report for Lake Crook, 2006. Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Performance Report, Project F-30-R-28, Job A, 20 pages.

Table 1. Characteristics of Lake Crook, Texas.

Characteristic	Description
Year constructed	1923
Controlling authority	City of Paris
Surface area	1,226 acres
County	Lamar
Reservoir type	City impoundment
Mean depth	10.0 ft.
Maximum depth	24.0 ft.
Shoreline Development Index (SDI)	3.4
Conductivity	81 μ mho / cm
Secchi disc range	<1 ft.
Watershed area	52 mi ²

Table 2. Harvest regulations for Lake Crook.

Species	Bag limit	Minimum-Maximum length (inches)
Catfish, channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 - No limit
Catfish, flathead	5	18 - No limit
Bass, white	25	10 – No limit
Bass, largemouth	5	14 - No limit
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 - No limit

Table 3. Stocking history of Lake Crook, Texas. Size categories: FGL = 1-3 inches, AFGL = 8 inches, and ADL = adults.

Species	Year	Number	Size
White bass	1953	2,000	FGL
	Total	2,000	

Table 4. Survey of littoral zone and physical habitat types, Lake Crook, Texas, July 2010. A linear shoreline distance (miles) was recorded for each habitat type found. Surface area (acres) and percent of reservoir surface area was determined for each type of aquatic vegetation found.

Shoreline habitat type / Aquatic vegetation species	Shoreline distance		Surface area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Natural shoreline	0.60	4.7%		
Natural shoreline/ Bulrush	0.31	2.4%		
Natural shoreline/ Bulrush/ Southern cutgrass	6.87	53.6%		
Natural shoreline/ Southern cutgrass	4.48	35.0%		
Rocky shoreline	0.54	4.2%		
Total	12.80			
American lotus			2.68	
Bulrush			0.38	
Bulrush \ Southern cutgrass			8.33	
Southern cutgrass			5.43	
Total			16.82	1.59%

Gizzard shad

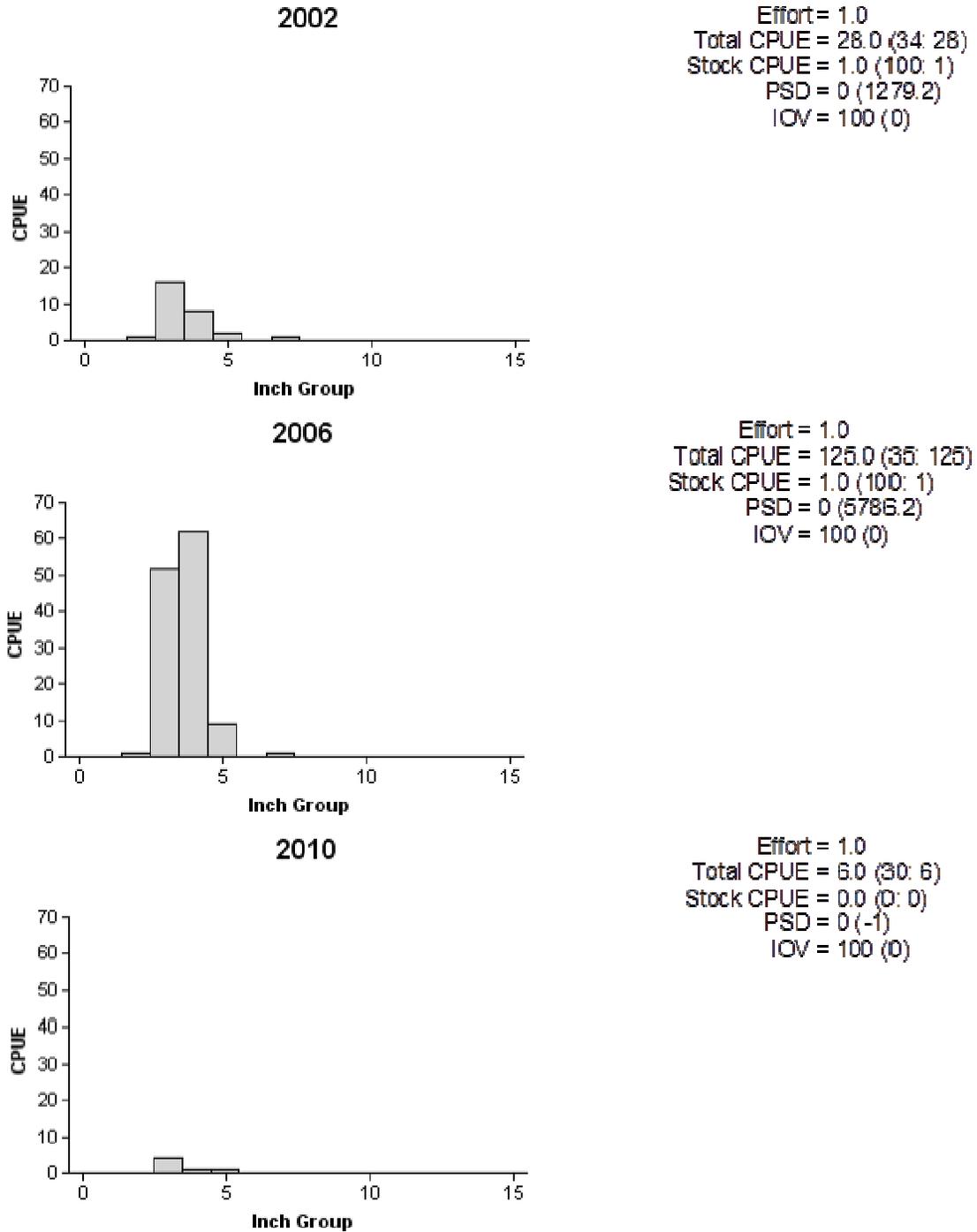


Figure 1. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Crook, Texas, 2002, 2006, and 2010.

Blue catfish

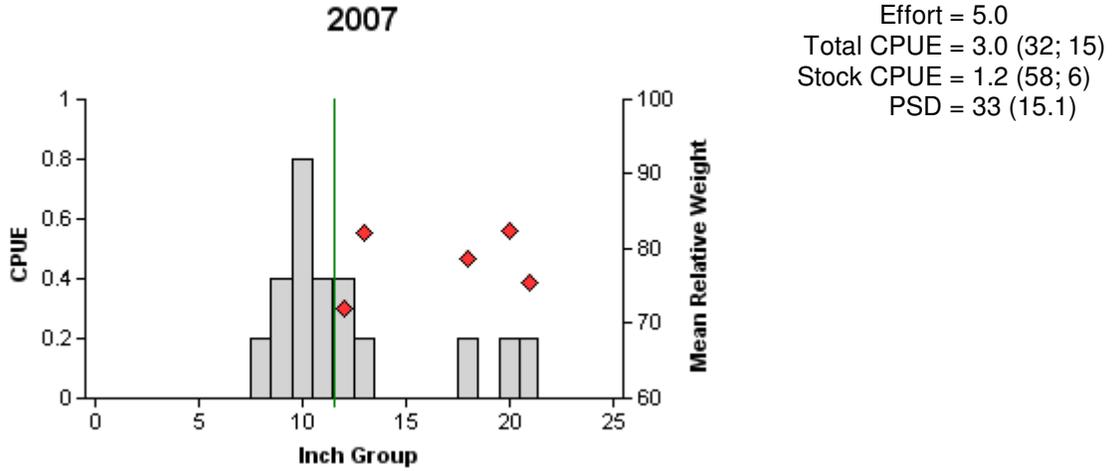


Figure 2. Number of blue catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net survey, Lake Crook, Texas, 2007. Vertical line indicates minimum length limit at time of survey.

Channel catfish

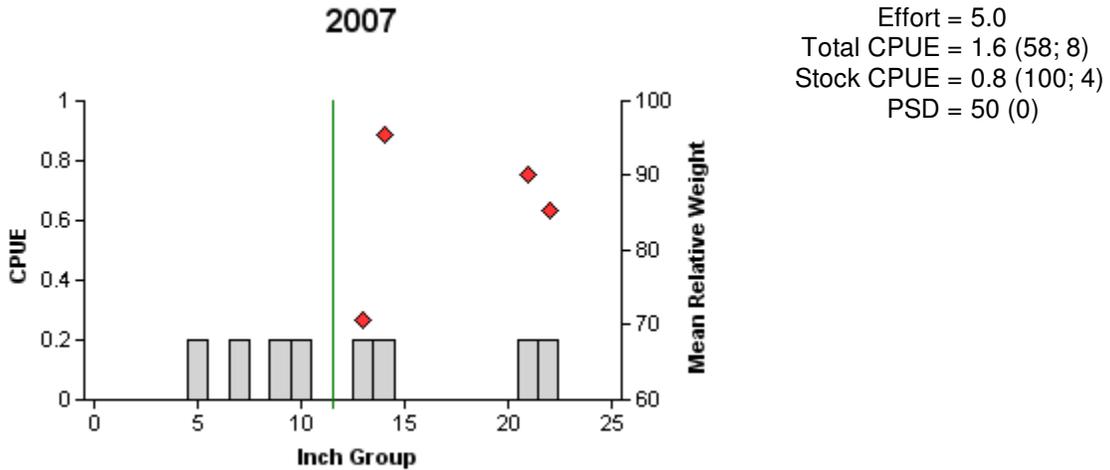


Figure 3. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net survey, Lake Crook, Texas, 2007. Vertical line indicates minimum length limit at time of survey.

Bluegill

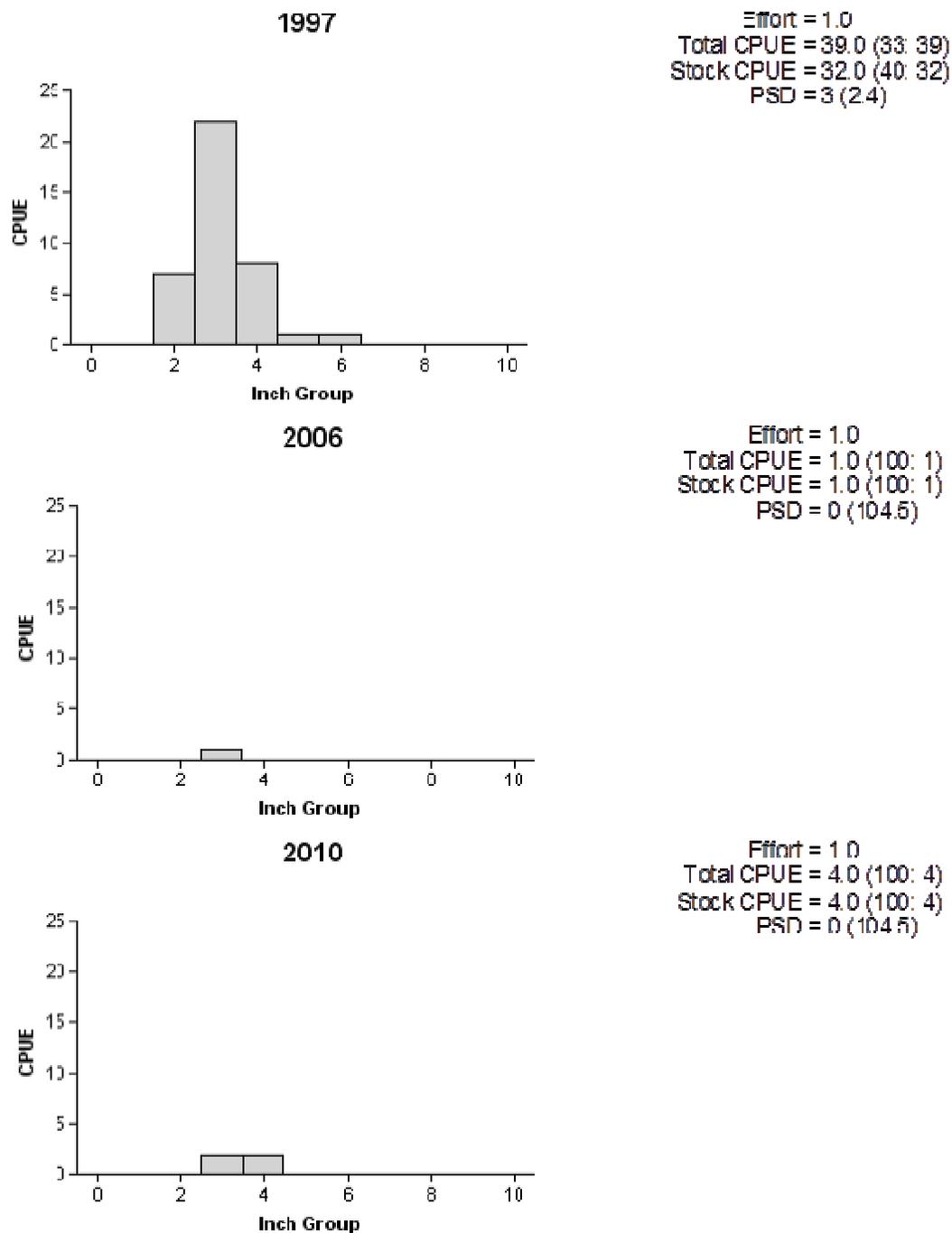


Figure 4. Number of bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Crook, Texas, 1997, 2006, and 2010. No bluegill were caught in 2002.

White crappie

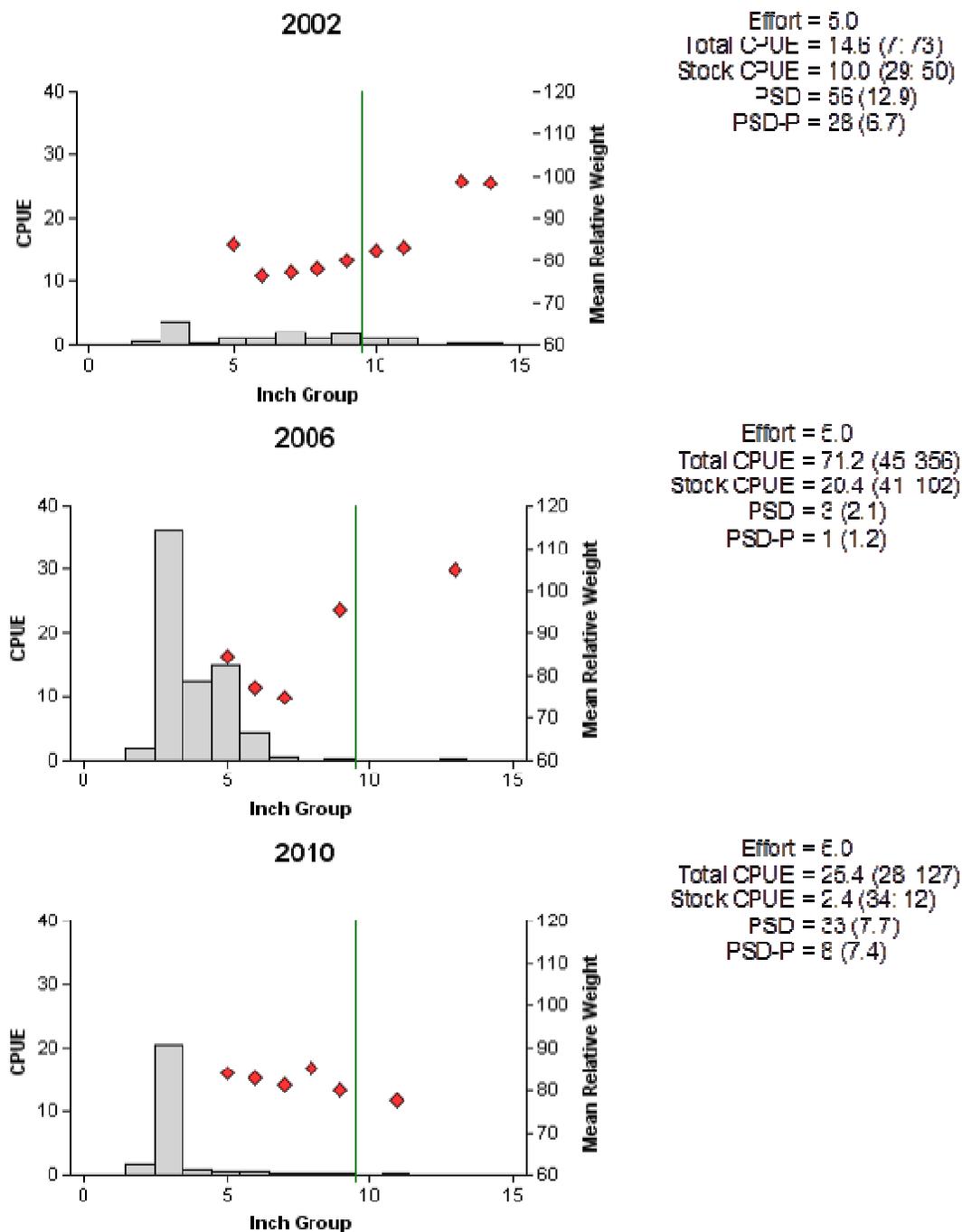


Figure 5. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Crook, Texas, 2002, 2006, and 2010. Vertical lines indicate minimum length limit at time of survey.

Table 5. Proposed sampling schedule for Lake Crook, Texas. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard surveys denoted by S and additional denoted by A.

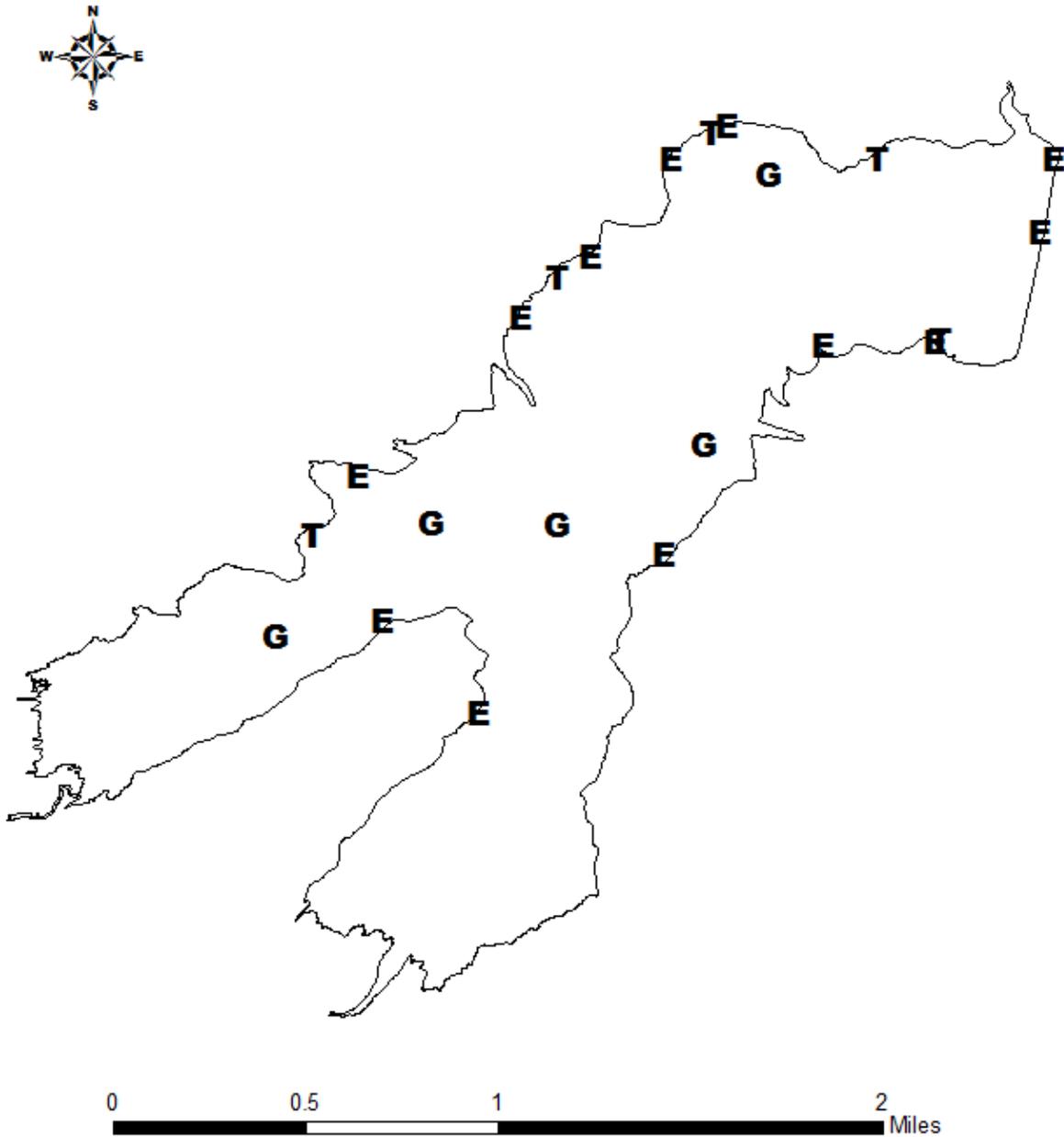
Survey Year	Electrofishing	Trap netting	Gill netting	Vegetation	Access	Report
Summer 2014-Spring 2015	S	A	S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Lake Crook, Texas, 2010-2011.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					6	6.0
Blue catfish						
Channel catfish						
White bass						
Bluegill					4	4.0
Spotted sunfish					1	1.0
Largemouth bass						
White crappie			127	25.4		

APPENDIX B



Location of electrofishing (E), gill netting (G), and trap netting (T) sites, Lake Crook, Texas, 2010-2011.