

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-30-R-35

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2009 Survey Report

Lake Bryan

Prepared by:

Jeffrey C. Henson
and
Mark A. Webb

Inland Fisheries Division

District 3-E, Bryan, Texas



Carter P. Smith
Executive Director

Gary E. Saul, PhD
Director, Inland Fisheries

July 31, 2010

TABLE OF CONTENTS

Survey and Management Summary.....	3
Introduction.....	4
Reservoir Description.....	4
Management History.....	4-5
Methods.....	5
Results and Discussion.....	5-6
Fisheries Management Plan.....	7
Literature Cited.....	8
Figures and Tables.....	9-19
Reservoir Characteristics (Table 1).....	9
Harvest Regulations (Table 2).....	9
Stocking History (Table 3).....	9
Habitat Survey (Table 4).....	10
Percent Directed Angler Effort Per Species (Table 5).....	10
Total Fishing Effort and Fishing Expenditures (Table 6).....	10
Bluegill (Figure 1).....	11
Channel catfish (Figures 2-3; Table 7).....	12-13
Largemouth bass (Figures 4-5; Table 8).....	14-15
White crappie (Figure 6).....	16
Black crappie (Figure 7).....	17
Crappie Creel Data (Figure 8; Table 9).....	18
Proposed Sampling Schedule (Table 10).....	19
Appendix A	
Catch rates for all species from all gear types.....	20
Appendix B	
Map of 2009-2010 sampling locations.....	21

SURVEY AND MANAGEMENT SUMMARY

The Lake Bryan fish community was surveyed from June 2009 through May 2010 using electrofishing, gill netting, and trap netting. A structural habitat survey and a vegetation survey were conducted in September 2009. Angler use and harvest information was collected using an access point creel survey which was conducted from March through May 2008. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Lake Bryan is a 732-acre reservoir in Brazos County, Texas, built by Bryan Texas Utilities (BTU) to provide water for power-plant cooling. The lake has a small watershed with a water-well owned by BTU used to help maintain water level. The lake is located within a public park, and access for both boat and bank angling is excellent. The primary fish habitat is limestone riprap and scattered native emergent vegetation.
- **Management history:** Important sport fish in Lake Bryan include largemouth bass, channel catfish, white crappie, and black crappie. A variety of sunfish species are also present. Sport fish species are managed under statewide length and bag limits with the exception that largemouth bass population has been under an 18-inch minimum length limit since September 1996. In recent years, the relative abundance of largemouth bass and sunfishes has declined. Catfish and crappie have remained relatively stable with significant angling effort directed at those species.
- **Fish community**
 - **Prey species:** Sunfish, gizzard shad, and threadfin shad are present but in low numbers. Bluegill are the most abundant of the sunfish species, and most are < 4 inches in length. Threadfin shad were stocked in 1992 but do not contribute significantly to the prey base in Lake Bryan.
 - **Catfishes:** Channel catfish abundance has declined in recent years. Fifteen channel catfish ranging in length from 11 to 14 inches were captured in the 2010 gill net survey. The creel survey indicates anglers target and catch channel catfish at a very low rate (0.16/hr). Growth of channel catfish at Lake Bryan is slow.
 - **Largemouth bass:** Largemouth bass abundance has greatly declined since 2008. Only one bass was captured in the 2009 fall electrofishing survey. Low water negatively impacted sampling efficiency, but creel survey results also indicated a declining population.
 - **Crappie:** Crappie catches in trap netting surveys are typically poor. However, directed effort and angler catch rate for crappies have increased with anglers harvesting over 800 crappie during the creel period March through May 2008.
- **Management strategies:** The largemouth bass fishery has declined since 2007 due to low primary productivity. To date, BTU hasn't shown interest in a fertilization program designed to boost overall reservoir productivity. Native aquatic plant introductions will continue to be monitored. Coordination with law enforcement staff to reduce illegal harvest will continue.

INTRODUCTION

This document is a summary of fisheries data collected from Lake Bryan during June 2009 through May 2010. The purpose of this 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 2009-2010 data for comparison.

Reservoir description

Lake Bryan is located in Brazos County near Bryan, Texas and is operated by Bryan Texas Utilities (BTU) for power plant cooling and recreational purposes. Boat and bank angler access is excellent. The lake is located on a hilltop and has virtually no watershed. A water-well owned by BTU helps maintain water levels. Habitat for fish is limited to limestone riprap and scattered native emergent vegetation. The reservoir has a spawning population of tilapia that competes with sunfish and largemouth bass for nesting space. Other descriptive characteristics from Lake Bryan are found in Table 1.

Management history

Previous management strategies and actions: Management strategies and actions from the previous survey report (Webb and Henson 2006) are included.

1. Increase primary productivity through a cooperative effort to fertilize the lake.
Action: BTU has not shown interest in a fertilization program at Lake Bryan. Support from the controlling authority is critical to the success of such a project.
2. An effort to increase littoral habitat for juvenile fish was made by planting native aquatic macrophytes. These plants were to be monitored and additional plantings made if necessary.
Action: No additional plantings were made during the previous 4 years. During the most recent habitat survey the lake was very low and no aquatic macrophytes were actively growing.
3. There are consumptive anglers at Lake Bryan who wish to harvest some largemouth bass.
Action: Proposed a 16-inch maximum length limit to allow limited harvest of small and intermediate-sized bass. The proposal was rejected during in-house review.
4. Illegal harvest is a problem at Lake Bryan. Continue to work with TPWD Law Enforcement and BTU to monitor and enforce regulations.
Action: TPWD Law Enforcement continues to make periodic trips to Lake Bryan, particularly on weekends.
5. Channel catfish in Lake Bryan continue to grow slowly.
Action: Different possibilities for monitoring and increasing benthic organic matter and productivity in Lake Bryan have been explored, but no plan has been implemented.
6. Angler information is lacking at the lake. More signage is needed at access points to inform anglers.
Action: BTU has not shown interest in creating or purchasing signage for the lake.

Harvest regulation history: Harvest has been regulated with statewide regulations except that largemouth bass harvest has been managed with an 18-inch minimum length limit since 1996 to increase the relative abundance of larger fish available to anglers (Table 2).

Stocking history: Stockings at Lake Bryan have included Florida largemouth bass in 1993, threadfin shad in 1992, hybrid crappie in 1997, and blue catfish in 2009. A complete summary of the stocking history of Lake Bryan is presented in Table 3.

Vegetation/habitat history: Habitat is limited in Lake Bryan. Limestone riprap is the most common habitat available to juvenile fish. Historically native emergent plants including cattails, bulrush, and spike rush provided limited littoral habitat. Because the lake was approximately 4 feet low, we observed no aquatic vegetation during the 2009 survey (Table 4).

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 2009).

An access point creel survey was conducted during March through May of 2008. Nine creel days were sampled with each creel day defined as a 12-hour period from 0800 to 2000 hours. One randomly chosen 3-hour time period was sampled on each creel day with equal temporal sampling probabilities applied throughout the creel period.

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_t)] were calculated for target fishes according to Anderson and Neumann (1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics and for creel statistics, and SE was calculated for structural indices.

RESULTS AND DISCUSSION

Habitat: Riprap and native emergent vegetation (cattails, bulrush, and spike rush) provide the majority of juvenile fish habitat in Lake Bryan. Because of low water in 2009, no emergent plants were actually immersed in water. No submersed vegetation occurs in the reservoir (Table 4). Because of its situation on high ground with a very limited watershed, Lake Bryan is nutrient poor. Past pre-fertilization chl- α concentration has been below 20 mg/m³. In an effort to improve primary productivity, the lake was fertilized by TPWD and BTU in 2003. Because of a lack of interest from BTU, no further habitat improvements have been made since 2005.

Creel: The results of creel surveys conducted in the spring of 2004 and 2008 are presented in Tables 5 and 6. Percent directed effort for largemouth bass decreased from 44.4% in 2004 to 14.3% in 2008. Total angling effort and expenditures for the 2008 spring quarter (7,740 hours and \$25,991, respectively) were lower than estimates in 2004. These data suggest fewer anglers visited Lake Bryan because of poor sport fish production due to degraded fish habitat and chronic low primary productivity.

Prey species: The prey fish community is composed primarily of bluegill and other sunfish (longear sunfish and green sunfish), but declining relative abundance indicates the prey base is inadequate to support a quality largemouth bass sport fishery. The electrofishing catch rate of bluegill has decreased dramatically since 2005 (Figure 1). Only 21/h were captured in 2007 and 14/h in 2009 compared to 104/h in 2005. Threadfin shad were also present in the 2009 sample but in very small numbers (Appendix A). The total electrofishing catch rate of all prey fish species combined was only 29/h. The decline in prey fish numbers is likely the result of low primary productivity and low water levels.

The creel survey conducted in spring 2008 indicated no directed pressure for nor harvest of sunfishes.

Channel catfish: The gill net catch rates of channel catfish have greatly declined since 1998 (Figure 2). No channel catfish were captured in 2002, and only one channel catfish was captured in 2006, and 15 in 2010. The creel survey, however, indicated that anglers target channel catfish at Lake Bryan (Table 7). During the period March through May 2008, it was estimated that anglers spent approximately 2,900 hours seeking catfish, representing 37% of all directed effort. Seven channel catfish were observed in the creel (Figure 3) with total harvest estimated for the period at 542 fish. The directed angler catch rate was 0.16 fish/h, about half that observed in 2004. Anglers harvested fish up to 14 inches in length (Figure 3).

Largemouth bass: In fall 2009, only one 9-inch largemouth bass was captured in the electrofishing survey. In the previous two surveys conducted in 2007 and 2008, the CPUEs were 46.0/h and 36.0/h, respectively (Figure 4). Very low water in 2009 hampered sampling efficiency; however, creel survey results in 2008 do corroborate a population decline. Creel survey estimates of directed effort for largemouth bass fell from 44% (4,404 hours) in 2004 to only 14% (1,111 hours) in 2008 (Table 8). An estimated 77 largemouth bass were harvested by anglers with only one 19-inch bass observed during the creel period (Figure 5). Low primary productivity, lack of adequate prey, and poor recruitment due to lack of habitat are the likely causes of the largemouth bass population decline. Lake Bryan was last fertilized in 2003. After that treatment, the population of both largemouth bass and sunfish showed considerable improvements by 2004 which carried over into 2007. Additional fertilization would likely have the same result.

Crappie: Crappie have never been well represented in fall trap net surveys at Lake Bryan (Figures 6 and 7). Trap nets in fall 2009 captured only 6 white crappie and 1 black crappie. Anglers spent an estimated 1,652 hours seeking crappie during the period March through May 2008, more than twice the effort observed in 2004 (Table 9). The estimated total directed angler catch rate was 0.87 fish/h with an estimated harvest of 774 white crappie and 77 black crappie. Crappie to 12 inches were harvested with no legal-sized crappie released (Figure 8).

Fisheries management plan for Lake Bryan, Texas

Prepared – July 2010.

ISSUE 1 Due to low primary productivity, the largemouth bass and sunfish populations have greatly declined. Until BTU becomes interested in assisting TPWD with additional fertilizations to improve the fishery, little else can be done to effectively manage the largemouth bass population

MANAGEMENT STRATEGIES

1. Continue attempts to increase BTU's interest in the fishery management efforts at Lake Bryan.

ISSUE 2 Crappie provide angling opportunities for harvest. Creel results from 2008 indicate a greater interest in this fishery.

MANAGEMENT STRATEGIES

1. Attempt to promote the crappie fishery to consumptive anglers through news releases.

SAMPLING SCHEDULE JUSTIFICATION: Largemouth bass and their prey will be monitored every four years by electrofishing. Catfish will be monitored every four years with gill nets. Crappie will be monitored every four years with trap nets. Vegetation and habitat/access survey will be conducted every four years (Table 10).

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.
- 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.
- Henson, J. C. and M. A. Webb. 2006. Statewide freshwater fisheries monitoring and management program survey report for Lake Bryan, 2005. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-31, Austin.

Table 1. Characteristics of Lake Bryan, Texas.

Characteristic	Description
Year constructed	1973
Controlling authority	Bryan Texas Utilities
Counties	Brazos
Reservoir type	Power-plant
Shoreline Development Index (SDI)	1.8
Conductivity	1,200 μ mhos/cm

Table 2. Harvest regulations for Lake Bryan.

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

Table 3. Stocking history of Lake Bryan, Texas. Size Categories are FRY =<1 inch, FGL = 1-3 inches, AFGL = 8 inches, and ADL = adults.

Species	Year	Number	Size
Threadfin shad	1992	2,000	ADL
Blue catfish	2009	100,011	FGL
Channel catfish	1974	120,000	FGL
Florida largemouth bass	1993	83,401	FGL
Hybrid crappie	1997	80,490	FGL
Walleye	1974	200,000	FGL
	1976	90,000	ADL
	Total	290,000	
Red drum	1983	39,800	FGL

Table 4. Survey of littoral zone and physical habitat types, Lake Bryan, Texas. Abiotic habitat survey and biotic habitat survey of littoral zone vegetation was conducted in September 2009. A linear shoreline distance (miles) was recorded for each habitat type found.

Shoreline habitat type	Shoreline Distance		Surface Area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Rock	2.4	24		
Natural	7.6	76		

* The lake was four feet low at the time of the survey.

Table 5. Percent directed angler effort by species for Lake Bryan, Texas, March through May 2004 and 2008.

Species	Year	
	2004	2008
Crappies	7.9	21.3
Catfish	24.6	37.4
Largemouth bass	44.4	14.3
Anything	13.7	26.9

Table 6. Total fishing effort (h) for all species and total directed expenditures at Lake Bryan, Texas, March through May 2004 and 2008. Relative standard errors (RSE) are in parentheses.

Creel statistic	Year	
	2004	2008
Total fishing effort (h)	9,920.4 (30.8)	7,740.2 (21.8)
Total directed expenditures	\$38,989 (212.5)	\$25,991 (52.5)

Bluegill

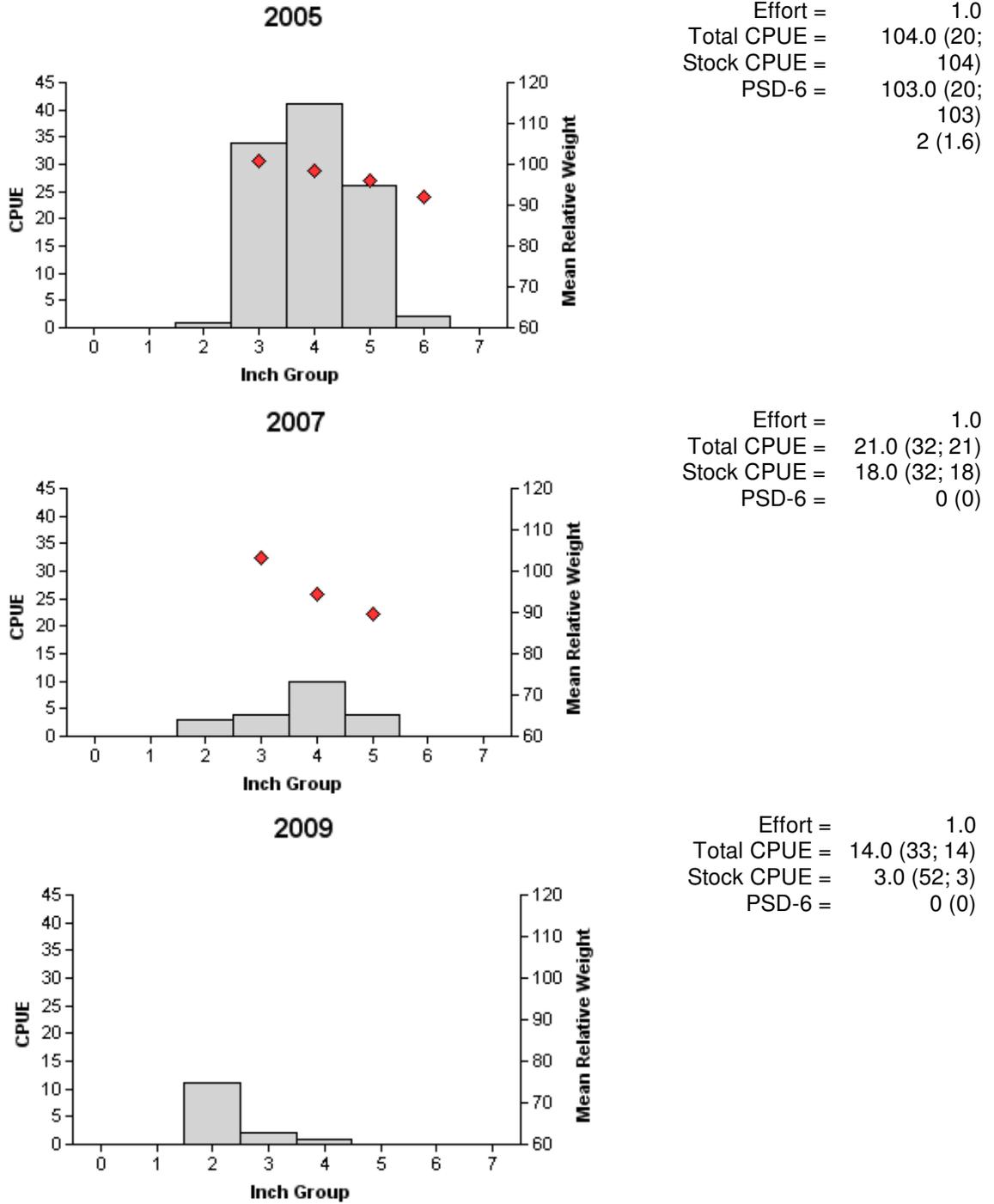
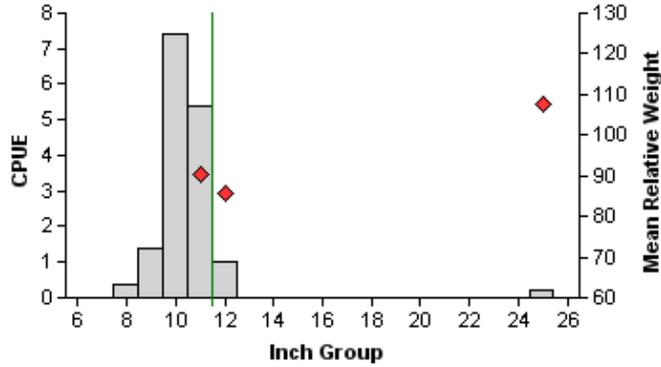


Figure 1. Number of bluegill caught per hour (CPUE), mean Relative Weight (W_r , diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Bryan, Texas, 2005, 2007, and 2009. Relative weights were not calculated in 2009.

Channel catfish

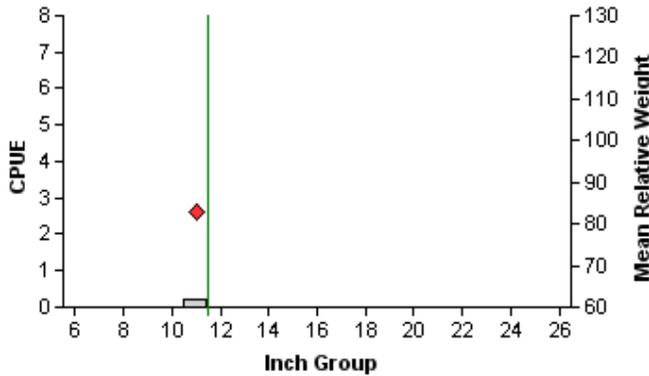
1998

Effort = 5.0
 Total CPUE = 15.8 (33; 79)
 Stock CPUE = 6.6 (31; 33)
 PSD-12 = 18 (4.8)



2006

Effort = 5.0
 Total CPUE = 0.2 (100; 1)
 Stock CPUE = 0.2 (100; 1)
 PSD-12 = 0 (0)



2010

Effort = 5.0
 Total CPUE = 3.0 (53; 15)
 Stock CPUE = 3.0 (53; 15)
 PSD-12 = 73 (17.3)

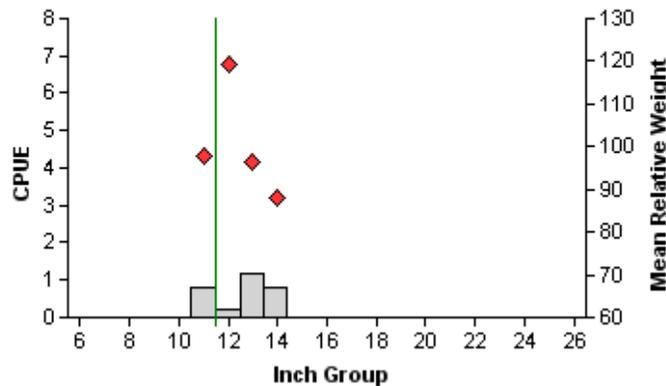


Figure 2. Number of channel catfish caught per net night (CPUE), mean Relative Weight (W_r , diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Bryan, Texas, 1998, 2006, and 2010.

Channel Catfish

Table 7. Creel survey statistics for channel catfish at Lake Bryan from March through May 2004 and 2008 where total catch per hour is for anglers targeting channel catfish and total harvest is the estimated number of channel catfish harvest by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year	
	2004	2008
Directed effort (h)	2,436 (44.4)	2,893 (34.4)
Directed effort/acre	3.33 (44.4)	3.95 (34.4)
Total catch per hour	0.31 (58.2)	0.16 (100.8)
Harvest/acre	0.80 (73.9)	0.74 (67.9)
Total harvest	586.5 (73.9)	542 (67.9)
Percent legal released	4.6	16.1

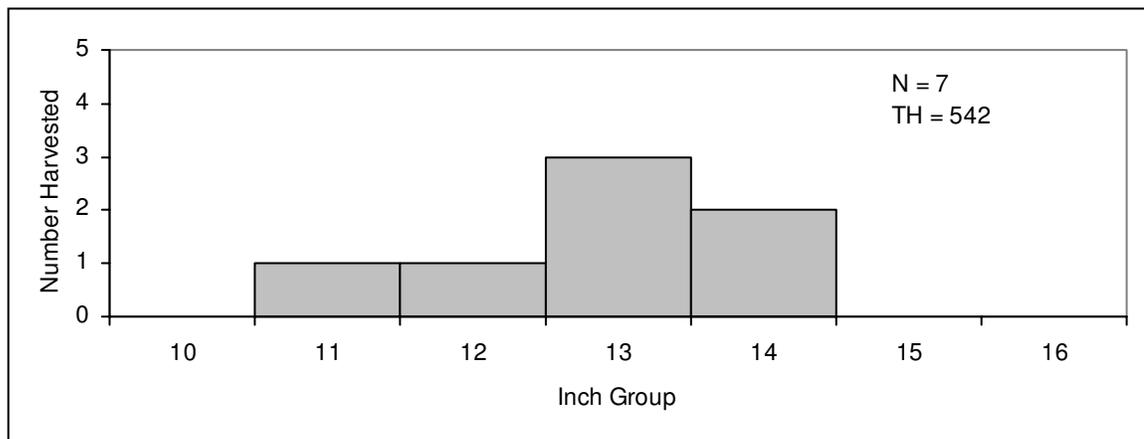


Figure 3. Length frequency of harvested channel catfish observed during creel surveys at Lake Bryan, Texas, March through May 2008, all anglers combined. N is the number of harvested channel catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

Largemouth bass

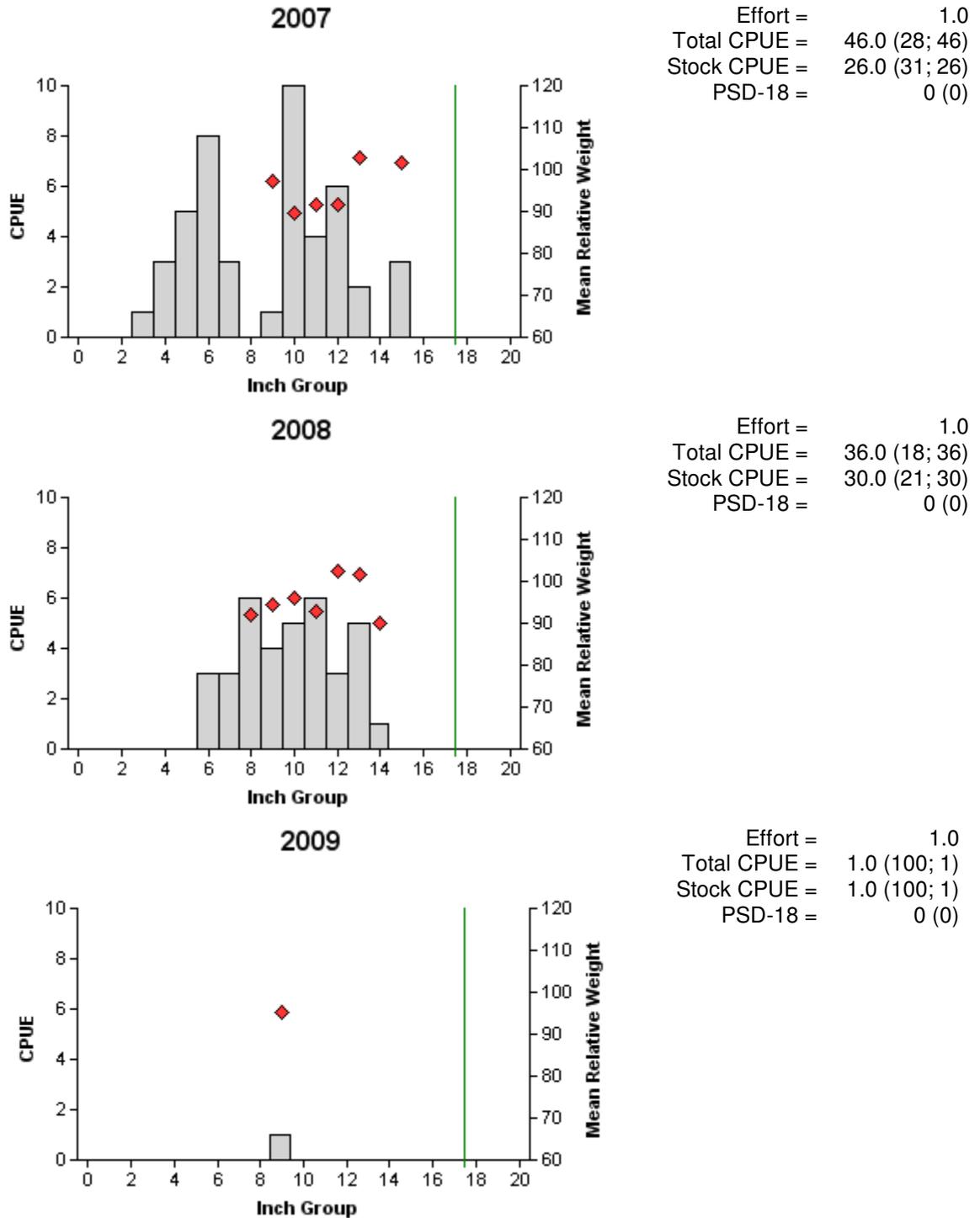


Figure 4. Number of largemouth bass caught per hour (CPUE), mean Relative Weight (W_r , diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Bryan, Texas, 2007, 2008, and 2009. Vertical lines represent the minimum length limit at the time of the survey.

Largemouth Bass

Table 8. Creel survey statistics for largemouth bass at Lake Bryan from March through May 2004 and 2008 where total catch per hour is for anglers targeting largemouth bass and total harvest is the estimated number of largemouth bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year	
	2004	2008
Directed effort (h)	4,404 (36.9)	1,111 (55.5)
Directed effort/acre	6.02 (36.9)	1.52 (55.5)
Total catch per hour	0.17 (75.0)	0
Harvest/acre	0.08 (94.4)	0.12 (362.6)
Total harvest	62 (94.4)	77 (362.6)
Percent legal released	31.8	0

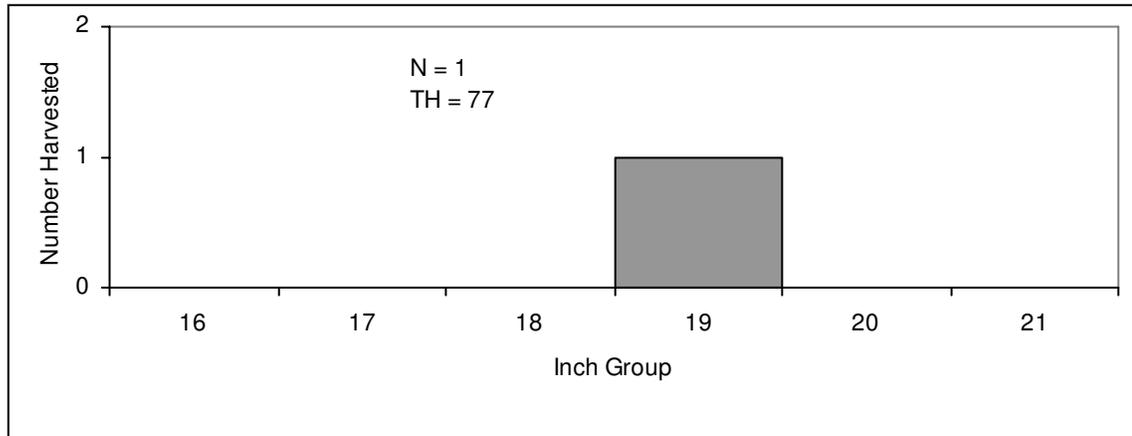
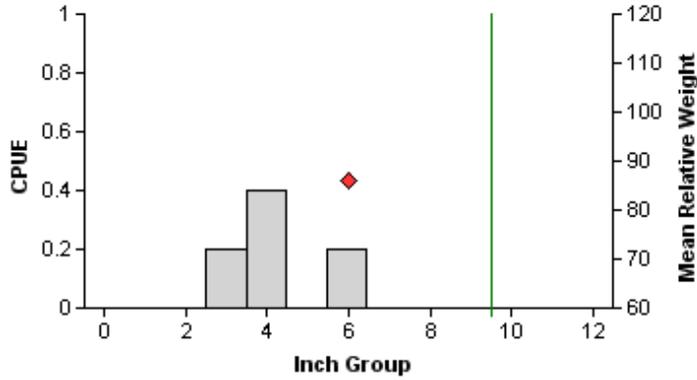


Figure 5. Length frequency of harvested largemouth bass observed during creel surveys at Lake Bryan, Texas, March through May 2008, all anglers combined. N is the number of harvested largemouth bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

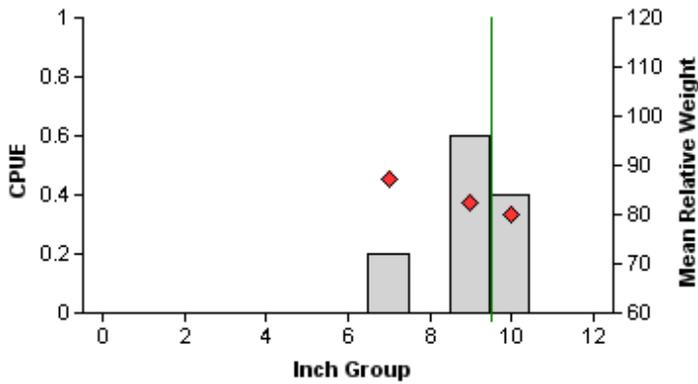
White Crappie

2001



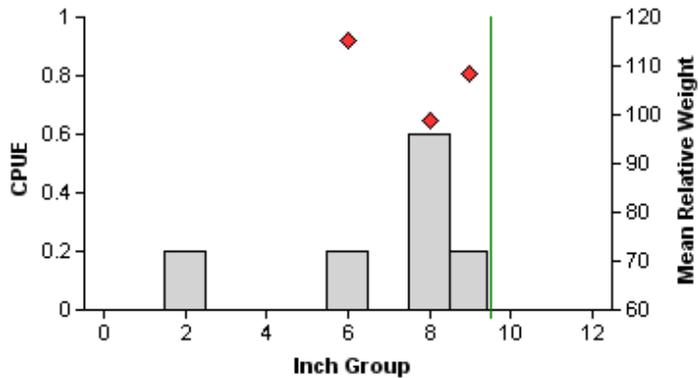
Effort = 5.0
 Total CPUE = 0.8 (73; 4)
 Stock CPUE = 0.2 (100; 1)
 PSD-10 = 0 (0)

2005



Effort = 5.0
 Total CPUE = 1.2 (61; 6)
 Stock CPUE = 1.2 (61; 6)
 PSD-10 = 33 (26.4)

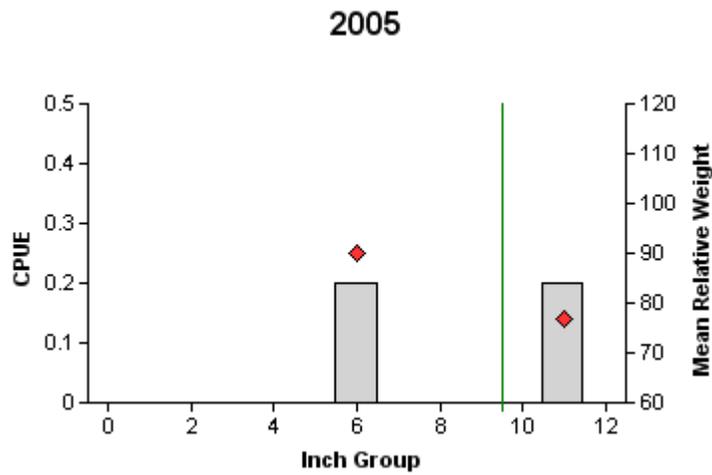
2009



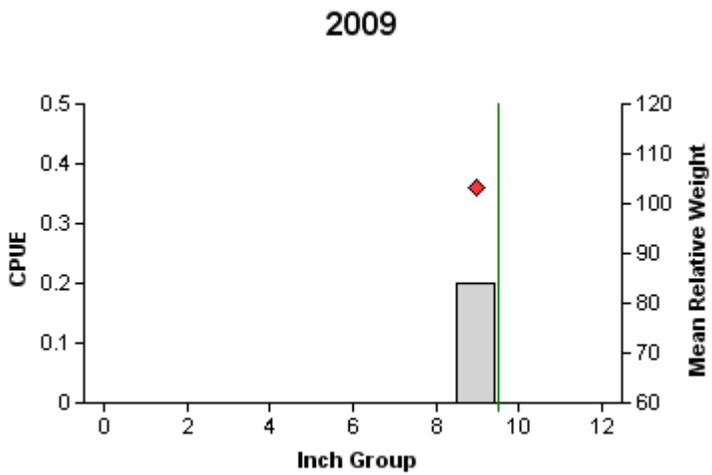
Effort = 5.0
 Total CPUE = 1.2 (31; 6)
 Stock CPUE = 1.0 (32; 5)
 PSD-10 = 0 (0)

Figure 6. Number of white crappie caught per net night (CPUE, bars), mean Relative Weight (W_r , diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Bryan, Texas, 2001, 2005, and 2009. Vertical lines represent the minimum length limit at the time of the survey.

Black Crappie



Effort = 5.0
 Total CPUE = 0.4 (61; 2)
 Stock CPUE = 0.4 (61; 2)
 PSD-10 = 50 (39.5)



Effort = 5.0
 Total CPUE = 0.2 (100; 1)
 Stock CPUE = 0.2 (100; 1)
 PSD-10 = 0 (0)

Figure 7. Number of black crappie caught per net night (CPUE, bars), mean Relative Weight (W_r , diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Bryan, Texas, 2005 and 2009. No black crappie were captured in 2001.

Crappies

Table 9. Creel survey statistics for crappies at Lake Bryan, Texas, from March through May 2004 and 2008 where total catch per hour is for anglers seeking crappie (species combined) and total harvest is the estimated number of black crappie and white crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year	
	2004	2008
Directed effort (h)	782 (57.6)	1,652 (44.4)
Directed effort/acre	1.06 (57.6)	2.26 (44.4)
Total catch per hour	0.51 (111.2)	0.87 (74.1)
Harvest/acre	0.00 (0.0)	
Black crappie	0	0.12 (259.1)
White crappie	0	1.06 (61.4)
Total harvest		
Black crappie	0	77 (259.1)
White crappie	0	774 (61.4)
Percent legal released	0	0

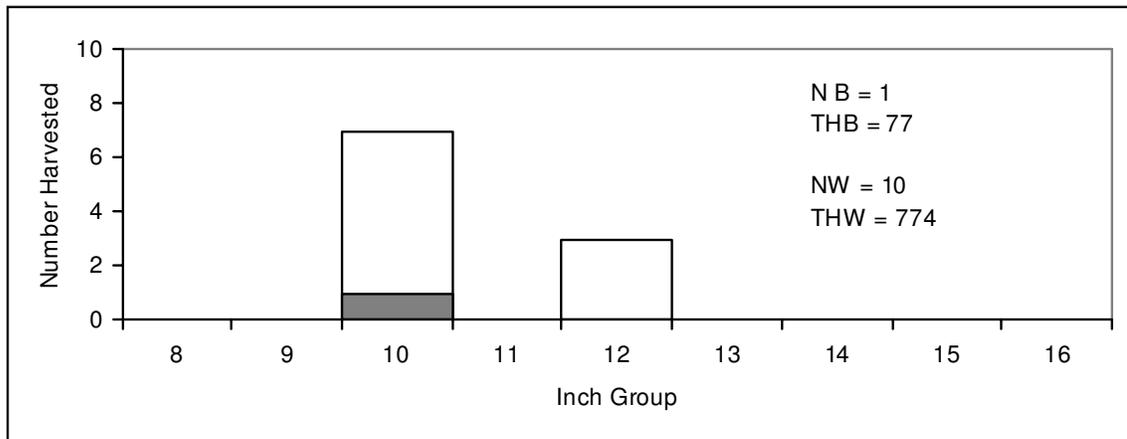


Figure 8. Length frequency of harvested black crappie (black bar) and white crappie (white bars) observed during creel surveys at Lake Bryan, Texas, March through May 2008, all anglers combined. NB and NW is the number of harvested black crappie and white crappie, respectively, observed during creel surveys, and THB and THW is the total estimated harvest of black crappie and white crappie, respectively, for the creel period.

Table 10. Proposed sampling schedule for Lake Bryan, 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.

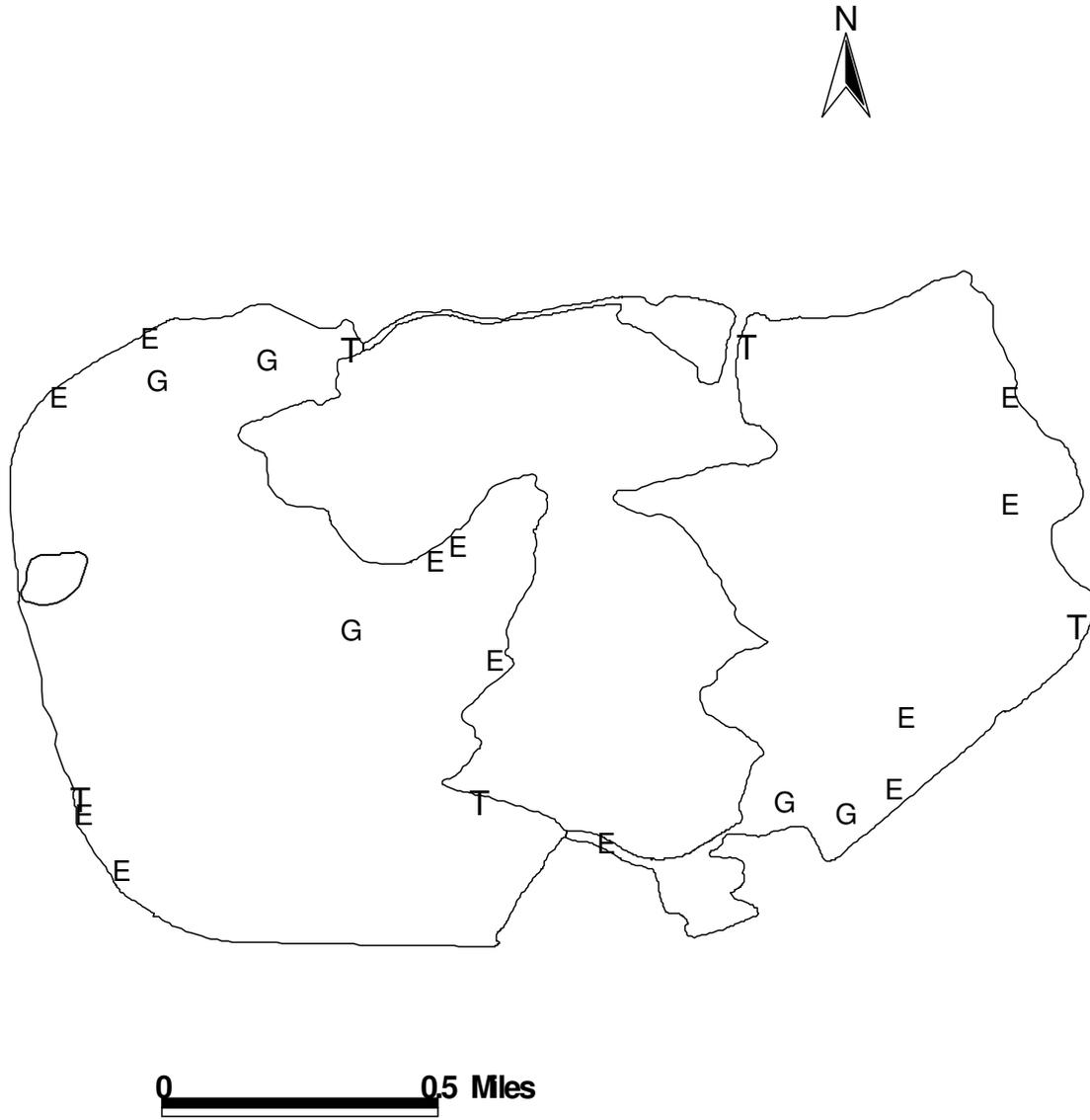
Survey Year	Electrofishing	Trap Net	Gill Net	Vegetation Survey	Habitat Survey	Access Survey	Report
Fall 2010-Spring 2011							
Fall 2011-Spring 2012							
Fall 2012-Spring 2013							
Fall 2013-Spring 2014	S	S	S	S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Lake Bryan, Texas, 2009 through 2010.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Threadfin shad					10	10.0
Bullhead minnow					2	2.0
Pugnose minnow					2	2.0
Channel catfish	15	3.0				
Green sunfish					1	1.0
Bluegill					14	14.0
Longear sunfish					2	2.0
Largemouth bass					1	1.0
White crappie			6	1.2		
Black crappie			1	0.2		

APPENDIX B



Location of sampling sites, Lake Bryan, Texas, 2009 through 2010. Electrofishing, trap netting, and gill netting stations are indicated by E, T, and G respectively.