

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-31

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2005 Survey Report

Lake Bryan

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SURVEY AND MANAGEMENT SUMMARY

The Lake Bryan fish community was surveyed from June 2005 through May 2006 using electrofishing, gill nets, and trap nets. A structural habitat survey and a vegetation survey were conducted in August 2005. Angler use and harvest information was collected using a roving-creel survey, which was conducted from March-May 2004. 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 rip-rap and scattered native emergent vegetation.
- **Management history:** Important sport fish in Lake Bryan include largemouth bass, channel catfish, and white and black crappie. A variety of sunfish species are also abundant. Most species are managed under statewide length and bag limits. Largemouth bass were placed under an 18-inch minimum length limit in 1996. Prey fish are sufficiently abundant in sizes available to largemouth bass.
- **Fish community**
 - **Prey species:** Sunfish make up the majority of prey fish in Lake Bryan. Gizzard 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 over the past few years. Only one individual was captured in the 2006 gill net survey. However, the creel survey indicates anglers do target and catch channel catfish. Growth of channel catfish at Lake Bryan is slow.
 - **Largemouth bass:** Largemouth bass are abundant in Lake Bryan with fish up to 21 inches collected in our electrofishing survey in 2005. The 18-inch minimum length limit has allowed the population to produce larger sized bass for anglers. The current lake record is over 7 pounds.
 - **Crappie:** Catches of crappie in our monitoring surveys are typically poor. Though directed angler effort for crappie was low in the 2004 creel survey, anglers did report catching and releasing crappie, with some harvest of black crappie. Hybrid crappie were stocked in 1997 in an attempt to increase the numbers of crappie available for harvest; however, none were collected in the present survey.
- **Management strategies:** Largemouth bass are the most important sport fish in Lake Bryan, and our management strategies will continue to focus on maintaining that component of the fishery. We propose a change from the 18-inch minimum length limit to a 16-inch maximum length limit in 2006. This regulation would provide continued angling opportunities for larger bass while allowing limited harvest of bass less than 16 inches. We will be working with BTU to continue a fertilization program designed to boost overall productivity benefiting production of all fish species. 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 in 2005-2006. 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 2005-2006 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. Angler and boat 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 rip-rap and scattered native emergent vegetation. The reservoir has a spawning population of tilapia that compete 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 2002) included:

1. Increase fertility of Lake Bryan.
Action: In conjunction with BTU, TPWD fertilized Lake Bryan with 800 gallons of 10-34-0 liquid fertilizer in spring 2003.
2. Increase littoral habitat for juvenile fish.
Action: Using mitigation funds from the City of Bryan, TPWD planted experimental plots of native vegetation in summer 2004.
3. High incidence of illegal harvest of fish.
Action: Inland Fisheries continues to work with Law Enforcement Division and City of Bryan and BTU personnel to enhance patrols and enforcement of regulations at Lake Bryan.
4. Channel catfish in Lake Bryan continue to grow slowly.
Action: Different possibilities for increasing organic matter in Lake Bryan have been explored, but no plan has been implemented.
5. Anglers are unfamiliar with angling opportunities at Lake Bryan.
Action: A brochure has been developed and distributed for Lake Bryan.

Harvest regulation history: Harvest regulations have always been in line with statewide regulations, with the exception that largemouth bass were put under an 18-inch minimum length limit in 1996 to increase the relative abundance of larger fish available to anglers (Table 2).

Stocking history: Recent stockings at Lake Bryan have included Florida largemouth bass in 1993, threadfin shad in 1992, and hybrid crappie in 1997. 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 rip-rap is the most common habitat available to juvenile fish. Native emergent plants including cattails, bulrush, and spikerush provide additional littoral habitat. Very little submersed vegetation occurs, but efforts to establish a diverse native plant community are ongoing.

5
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 2005).

A sub-sample of 36 age-1 largemouth bass was collected to determine genotypes (pure Florida, pure northern, F1, and Fx hybrids), and Florida and northern largemouth bass allele frequencies. Samples were sent to A. E. Wood Fish Hatchery in San Marcos for analysis.

A roving creel survey was conducted during the spring quarter (March-May) 2004. Nine creel days were sampled with each creel day defined as a 12-hour day. 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 Stock Density (PSD), Relative Stock Density (RSD)], and condition indices [Relative Weight (Wr)] 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: Rip-rap and native emergent vegetation (cattails, bulrush, and spike rush) remain the most important juvenile fish habitat in Lake Bryan. Little submersed vegetation occurs in the reservoir, and native vegetation planted in 2004 has not spread beyond the areas planted. Because of its situation on high ground with a small watershed, Lake Bryan is nutrient poor. Past pre-fertilization chl- α levels have been below 20 mg/m³. The lake was fertilized by TPWD and BTU in 2003 to boost primary productivity. Additional fertilization may be conducted in spring of 2007.

Creel: The results of a creel survey conducted in the spring of 2004 are presented in Tables 5 and 6. Most directed effort is spent seeking largemouth bass (44%) and catfish (25%). Total fishing effort estimated for the period was almost 10,000 hours with expenditures by anglers of \$39,000.

Prey species: The prey fish community is composed primarily of bluegill and other sunfish (longear, green, and hybrids). The electrofishing catch rate of bluegills was slightly lower in 2005 than in 2002 but higher than in 2003 (Figure 1). Most bluegill are less than 6 inches total length, and are available as prey to largemouth bass. Gizzard and threadfin shad were also present in the 2005 sample but in very small numbers (Appendix A). The total electrofishing catch rate of all prey fish species combined was 144.0 fish/h.

The creel survey conducted in spring 2004 indicated no directed pressure for sunfish; however, angler catches of sunfish were observed in the creel.

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. The creel survey, however, indicates that anglers do target channel catfish at Lake Bryan (Table 8). During the period March-May 2004, it was estimated that anglers spent almost 2,500 hours seeking catfish. Five channel catfish were observed in the creel (Figure 3) with total harvest estimated for the period at 584 fish. The directed angler catch rate was 0.31 fish/h. Although gill net sampling has indicated a channel catfish population made up of individuals < 12 inches, anglers harvested fish up to 24 inches in length (Figure 3).

Largemouth bass: The electrofishing catch rate of largemouth bass in fall 2005 increased to 95.0/h from 86.0/h in 2004 and 40.0/h in 2003 (Figure 4). This is the highest catch rate for bass since 1995 when 113.0/h were captured (Webb and Henson 2002). Bass out to 21 inches were observed in the sample, and the length frequency data indicates that the size distribution of the bass population is well-balanced (PSD = 40, RSD-16 = 8.0) with good numbers of larger bass available to anglers. It was estimated that during the period March-May 2004 anglers spent over 4,400 hours seeking largemouth bass (Table 9). The total directed angler catch rate was estimated at 0.17fish/h with a total harvest of 62 bass. According to the creel estimates, anglers released 32% of all legal-sized largemouth bass caught. Only one largemouth bass was actually observed harvested during the creel period (Figure 5).

Table 10 summarizes the results of genetic analysis of the largemouth bass population. The sub-sample of 36 age-1 bass from 2005 indicates a high influence of Florida largemouth bass alleles with the proportion of pure Florida genotypes estimated at 21%. Although Florida bass were stocked only once in 1993, they appear to have saturated the population genetically.

Crappie: Crappie were not well represented in the fall trap net surveys at Lake Bryan (Figures 6 and 7). Trap nets in fall 2005 captured only 6 white crappie and 2 black crappie. Anglers spent an estimated 712 hours seeking crappie during the period March-May 2004 (Table 11). The total directed angler catch rate was estimated to be 0.51 fish/h with an estimated harvest of 125 crappie. All legal-sized crappie were retained by anglers. Only one crappie was actually observed during the creel period (Figure 8).

Fisheries management plan for Lake Bryan, Texas

Prepared – July 2006.

ISSUE 1 Lake Bryan is situated on top of a hill and subsequently has virtually no watershed. Due to the lack of runoff into the reservoir, Lake Bryan is naturally infertile. TPWD, BTU, and the City of Bryan introduced liquid fertilizer into the reservoir in 1992 and in 2003. After fertilization, productivity increased, peaked, and has now declined again.

MANAGEMENT STRATEGIES

1. Work with BTU and TCEQ to obtain authorization to fertilize Lake Bryan in March 2007. Apply a liquid fertilizer (10-34-0 or similar analysis) purchased by BTU at a rate of 1 gallon per acre. Monitor nitrogen and phosphorus levels as well as chlorophyll- α in the reservoir monthly for one year to determine the impact of the fertilization.

ISSUE 2 Although fertilization will help increase overall fish production at Lake Bryan, rip-rap provides most of the available habitat for juvenile littoral fishes. An increase in the coverage of native macrophytes in shallow water areas should increase survival of juvenile largemouth bass and sunfishes as well as help stabilize eroding shorelines, thereby leading to greater water clarity.

MANAGEMENT STRATEGIES

1. As mitigation for a fish kill in March 2000 (caused by a ruptured sewer main), the City of Bryan funded a project to plant native submersed vegetation seedlings (enclosed in protective cages) in protected, shallow water areas of Lake Bryan during 2004. We will continue to monitor these plantings and add additional plants to insure establishment of native vegetation in founder colonies.

ISSUE 3 Directed effort for largemouth bass is high. Most largemouth bass anglers prefer catch and release angling for larger bass, but a good number of consumptive anglers also fish for bass and would like some fish available for harvest.

MANAGEMENT STRATEGIES

1. Propose a change from the 18-inch minimum length limit to a 16-inch maximum length limit. This will provide continued angling opportunities for larger bass while allowing limited harvest of bass less than 16 inches.

ISSUE 4 Fish population data and observations made by Law Enforcement personnel (TPWD and City of Bryan) indicate a high incidence of illegal harvest under minimum length limits at Lake Bryan that may be contributing to a lack of legally harvestable channel catfish, largemouth bass, and crappie.

MANAGEMENT STRATEGIES

1. Continue to encourage law enforcement agencies to enforce fish harvest regulations at Lake Bryan.
2. Continue efforts to educate anglers concerning harvest regulations at Lake Bryan by encouraging the controlling authority to post signs.

ISSUE 5 Channel catfish in Lake Bryan continue to grow slowly. The situation may be due to a lack of organic matter on the lake bottom for invertebrates to colonize. Without these benthic invertebrates, the channel catfish population's food supply may be limited.

MANAGEMENT STRATEGIES

1. Survey benthic invertebrate community at Lake Bryan in summer of 2006. If organic matter is not adequate to support a benthic invertebrate community, efforts will be made in conjunction with the controlling authority to add organic matter (hay, cottonseed meal, etc.) to the lake bottom. Also, growth may be increased in small areas of the lake by the regular use of supplemental catfish feed.

ISSUE 6 Many anglers are unfamiliar with angling opportunities and fisheries management strategies and goals.

MANAGEMENT STRATEGIES

1. Work with the controlling authority to construct angler information boards for use at major access points by summer 2007. Boards will be used to display information on species present, harvest regulations, TPWD Angler Recognition Programs, and cooperative efforts between TPWD Inland Fisheries and Bryan Texas Utilities.

SAMPLING SCHEDULE JUSTIFICATION: Gill netting for catfish species, trap netting for crappie, an angler access and facilities survey, and a structural habitat survey will be conducted once every four years. A spring creel survey will also be conducted every four years to monitor angler catch, harvest, and expenditures. A fall electrofishing survey will be conducted annually to monitor largemouth bass and forage species. A vegetation survey will be conducted annually to monitor the spread of native vegetation from founder colonies (Table 12).

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.
- Webb, M. A. and J. C. Henson. 2002. Statewide freshwater fisheries monitoring and management program survey report for Lake Bryan, 2001. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-27, 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, 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
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 2005. A linear shoreline distance (miles) was recorded for each habitat type found. Surface area (acres) and percent of reservoir surface area were determined for each type of aquatic vegetation found.

Shoreline habitat type	Shoreline Distance		Surface Area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Rip-rap	2.4	24		
Non-descript	0.3	3		
Non-descript/ Native emerged	5.0	50		
Non-descript/ Native submerged/ Native emerged	2.1	21		
Native submerged	0.2	2		
Native emerged			55	8

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

Species	Year
	2004
Crappies	7.9
Catfish	24.6
Largemouth bass	44.4
Anything	13.7

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

Creel statistic	Year
	2004
Total fishing effort (h)	9,920.4 (30.8)
Total directed expenditures	\$38,989 (212.5)

Bluegill

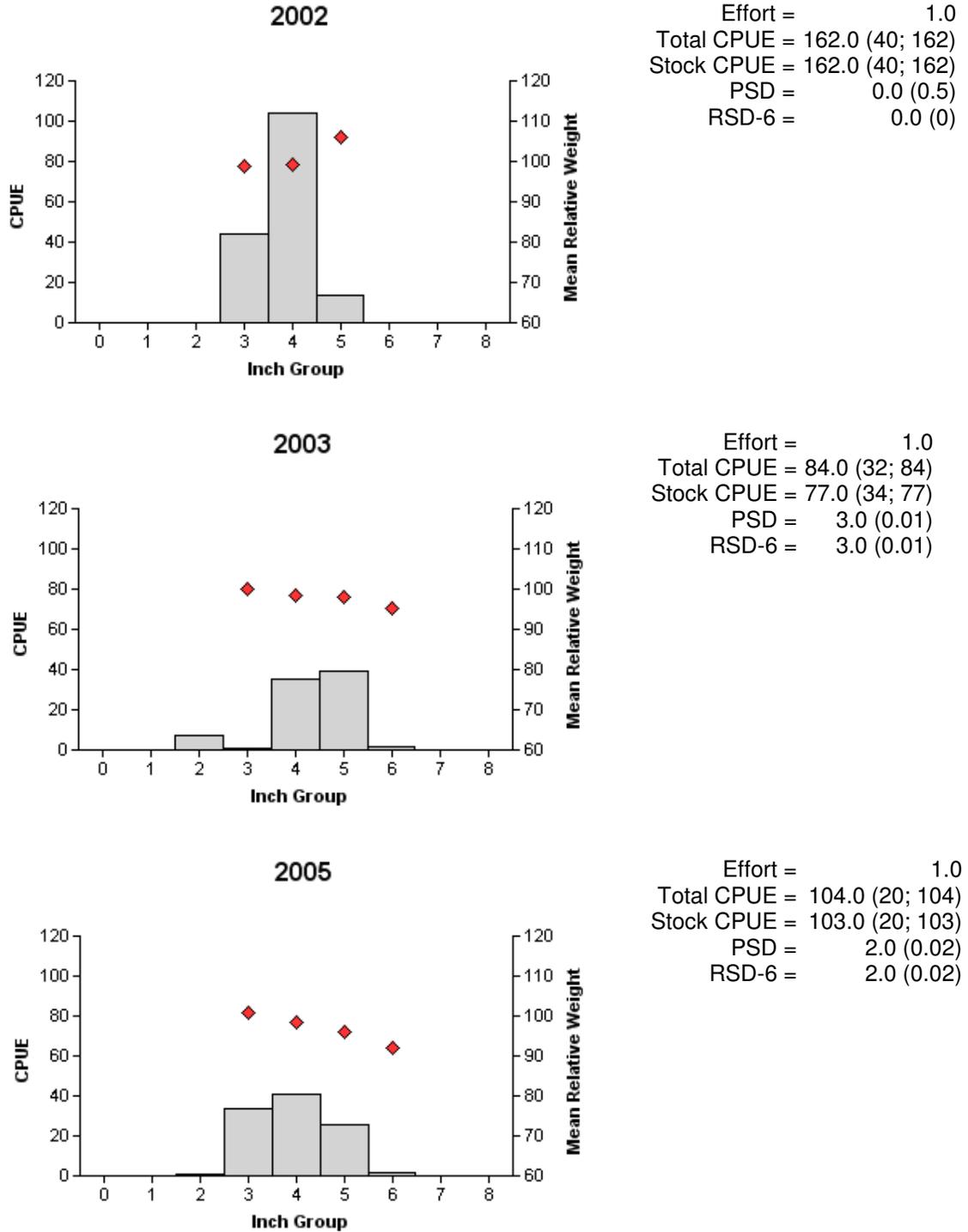


Figure 1. Number of bluegill caught per hour (CPUE), mean Relative Weight (W_r , diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Bryan, Texas, 2002, 2003, and 2005.

Channel Catfish

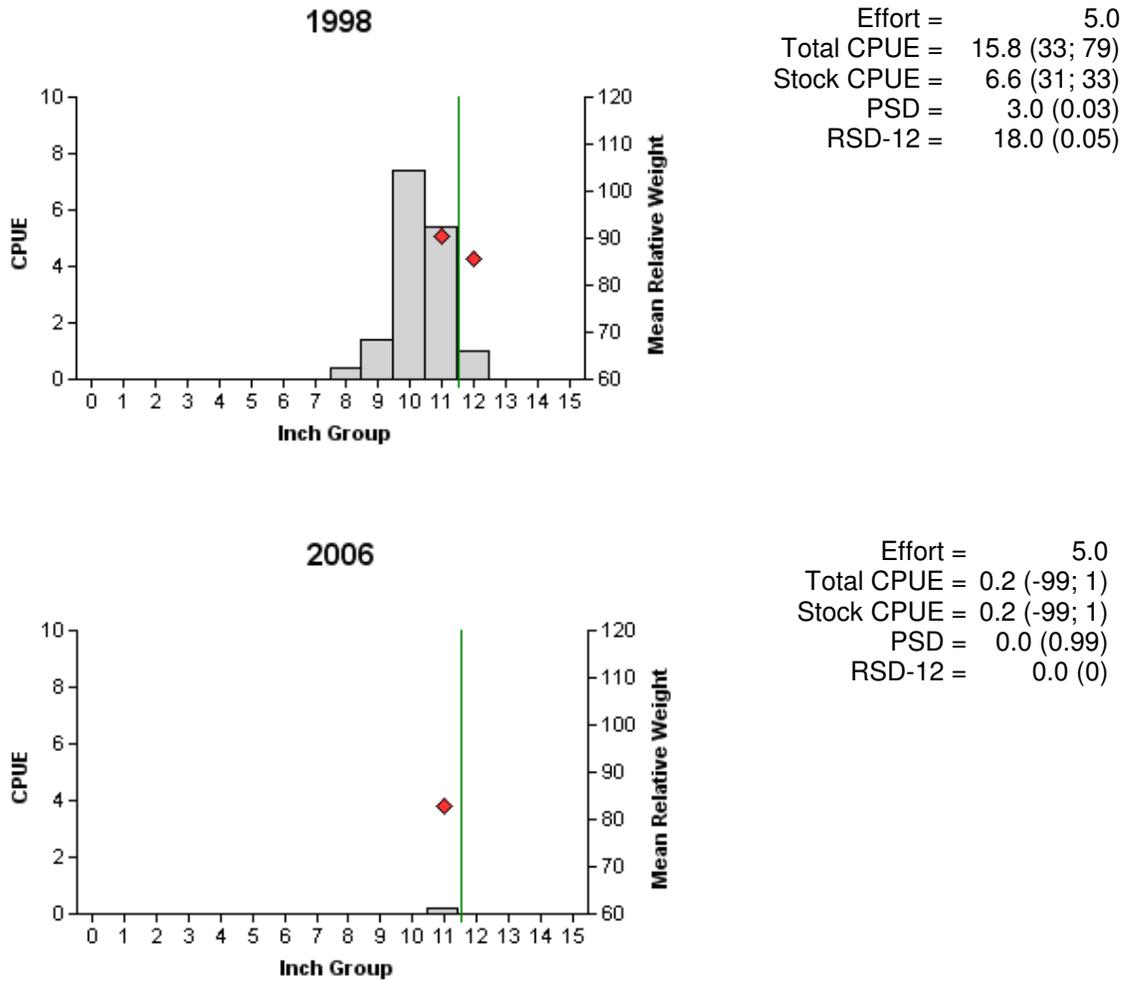


Figure 2. Number of channel catfish caught per net night (CPUE), mean Relative Weight (W_r , diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Bryan, Texas, 1998 and 2006. No channel catfish were captured in the 2002 gill net survey.

Channel Catfish

Table 8. Creel survey statistics for channel catfish at Lake Bryan from March through May 2004, 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
Directed effort (h)	2,436 (44.4)
Directed effort/acre	3.33 (44.4)
Total catch per hour	0.31 (58.2)
Harvest/acre	0.80 (73.9)
Total harvest	586.5 (73.9)
Percent legal released	4.6

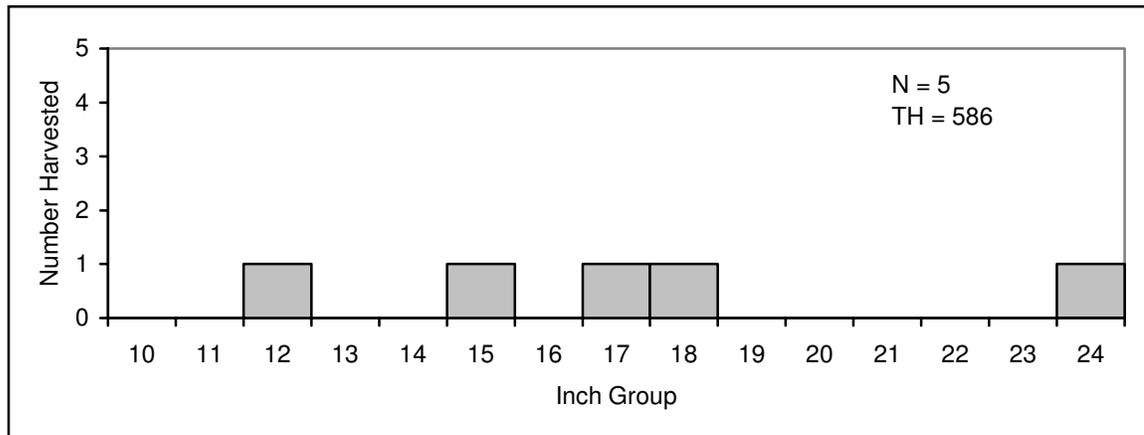
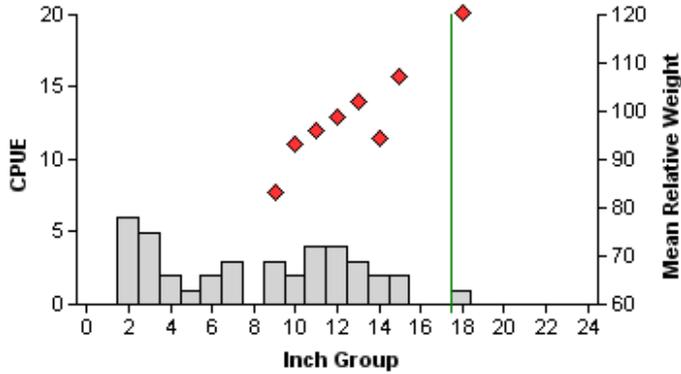


Figure 3. Length frequency of harvested channel catfish observed during creel surveys at Lake Bryan, Texas, March through May 2004, all anglers combined. N is the number of harvested channel catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

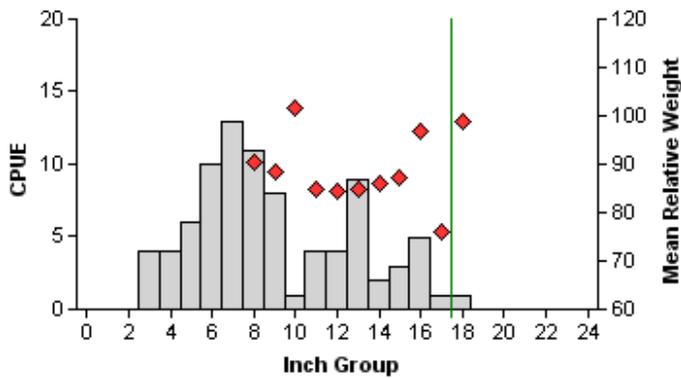
Largemouth Bass

2003



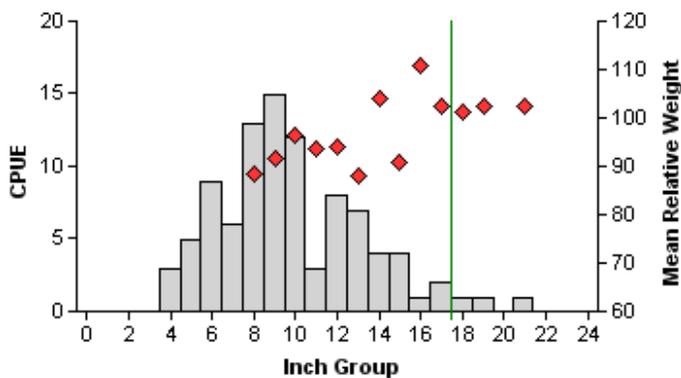
Effort = 1.0
 Total CPUE = 40.0 (13; 40)
 Stock CPUE = 21.0 (18; 21)
 PSD = 57.0 (0.13)
 RSD-18 = 5.0 (0.05)

2004



Effort = 1.0
 Total CPUE = 86.0 (15; 86)
 Stock CPUE = 49.0 (22; 49)
 PSD = 51.0 (0.08)
 RSD-18 = 2.0 (0.02)

2005



Effort = 1.0
 Total CPUE = 95.0 (15; 95)
 Stock CPUE = 72.0 (19; 72)
 PSD = 40.0 (0.1)
 RSD-18 = 4.0 (0.03)

Figure 4. Number of largemouth bass caught per hour (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 electrofishing surveys, Lake Bryan, Texas, 2003, 2004, and 2005.

Largemouth Bass

Table 9. Creel survey statistics for largemouth bass at Lake Bryan from March through May 2004, 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
Directed effort (h)	4,404 (36.9)
Directed effort/acre	6.02 (36.9)
Total catch per hour	0.17 (75.0)
Harvest/acre	0.08 (94.4)
Total harvest	62 (94.4)
Percent legal released	31.8

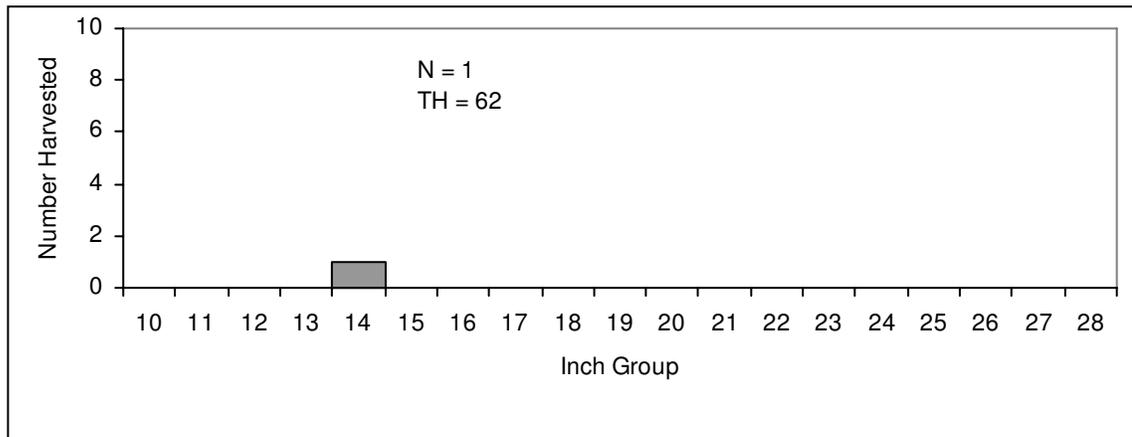


Figure 5. Length frequency of harvested largemouth bass observed during creel surveys at Lake Bryan, Texas, March through May 2004, all anglers combined. N is the number of harvested largemouth bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

Largemouth Bass

Table 10. Results of genetic analysis of largemouth bass collected by fall electrofishing, Lake Bryan, Texas, 1993-2005. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass, F1 = first generation hybrid between a FLMB and a NLMB, Fx = second or higher generation hybrid between a FLMB and a NLMB.

Year	Sample size	Genotype				% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	NLMB		
1993	29	14	2	7	6	59.2	48.3
1994	15	1	2	4	8	26.8	6.7
1995	30	1	4	18	4	46.2	3.3
1996	30	12	11	2	5	63.3	40.0
1997	30	8	6	13	3	63.3	26.7
1998	23	11	5	6	1	78.2	47.8
1999	50	28	11	11	0	83.5	56.0
2005	36	7	1	28	0	81.9	21.0

White Crappie

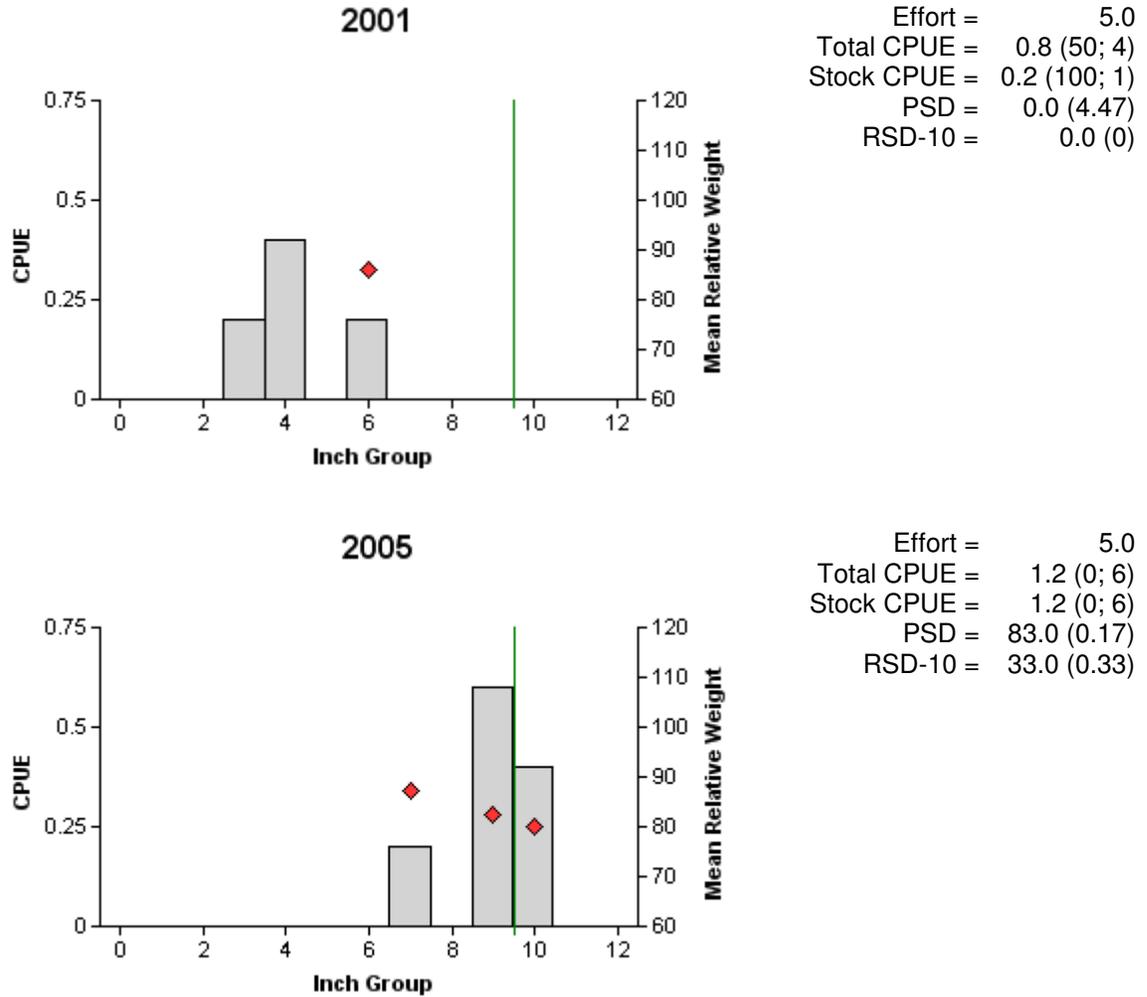


Figure 6. Number of white crappie caught per net night (CPUE, bars), mean Relative Weight (Wr, diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Bryan, Texas, 2001 and 2005. No white crappie were capture in 1997.

Black Crappie

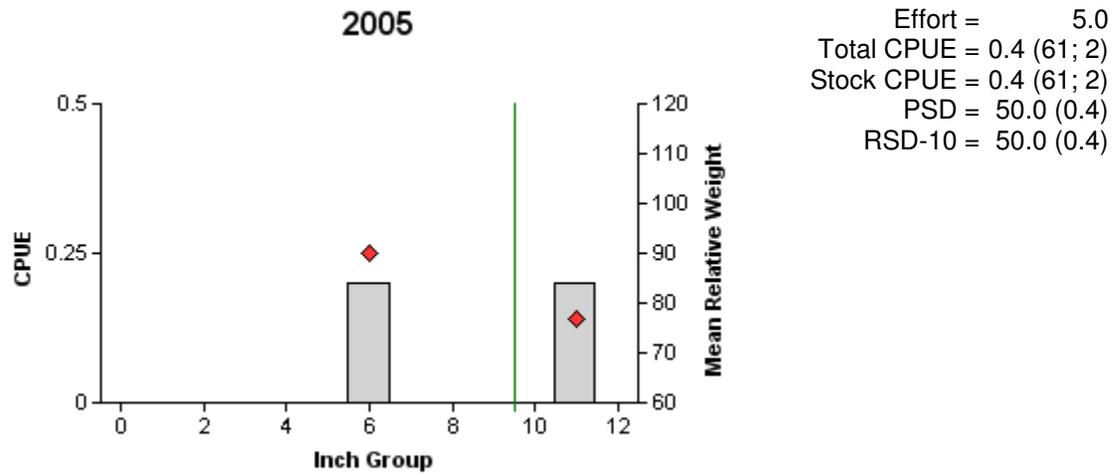


Figure 7. Number of black crappie caught per net night (CPUE, bars), mean Relative Weight (W_r , diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Bryan, Texas, 2005. No black crappie were captured in 1997 or 2001.

Crappies

Table 11. Creel survey statistics for crappies (species combined) at Lake Bryan, Texas, from March through May 2004, where total catch per hour is for anglers seeking crappie and total harvest is the estimated number of black crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year
	2004
Directed effort (h)	782 (57.6)
Directed effort/acre	1.06 (57.6)
Total catch per hour	0.51 (111.2)
Harvest/acre	0.00 (0.0)
Total harvest	0 (0.0)
Percent legal released	0

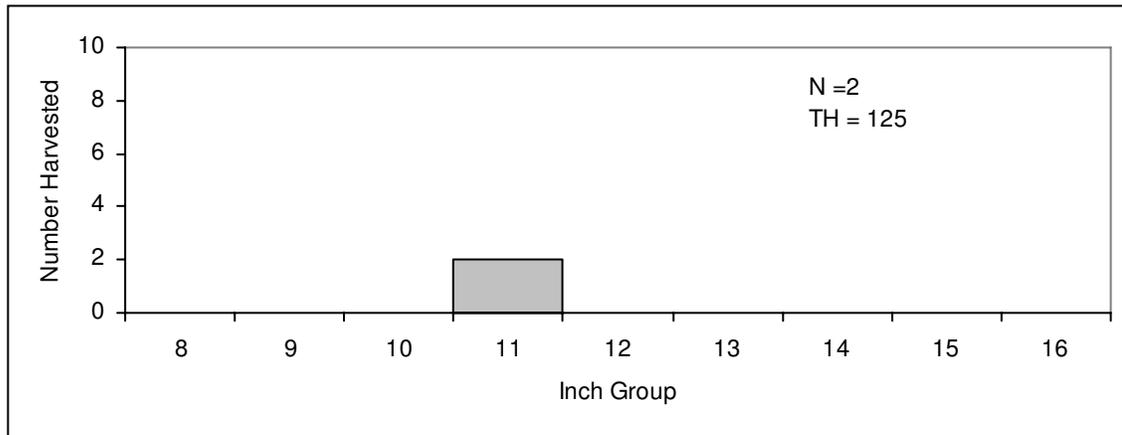


Figure 8. Length frequency of harvested black crappie observed during creel surveys at Lake Bryan, Texas, March through May 2004, all anglers combined. N is the number of harvested black crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 12. 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 survey denoted by S and additional survey denoted by A.

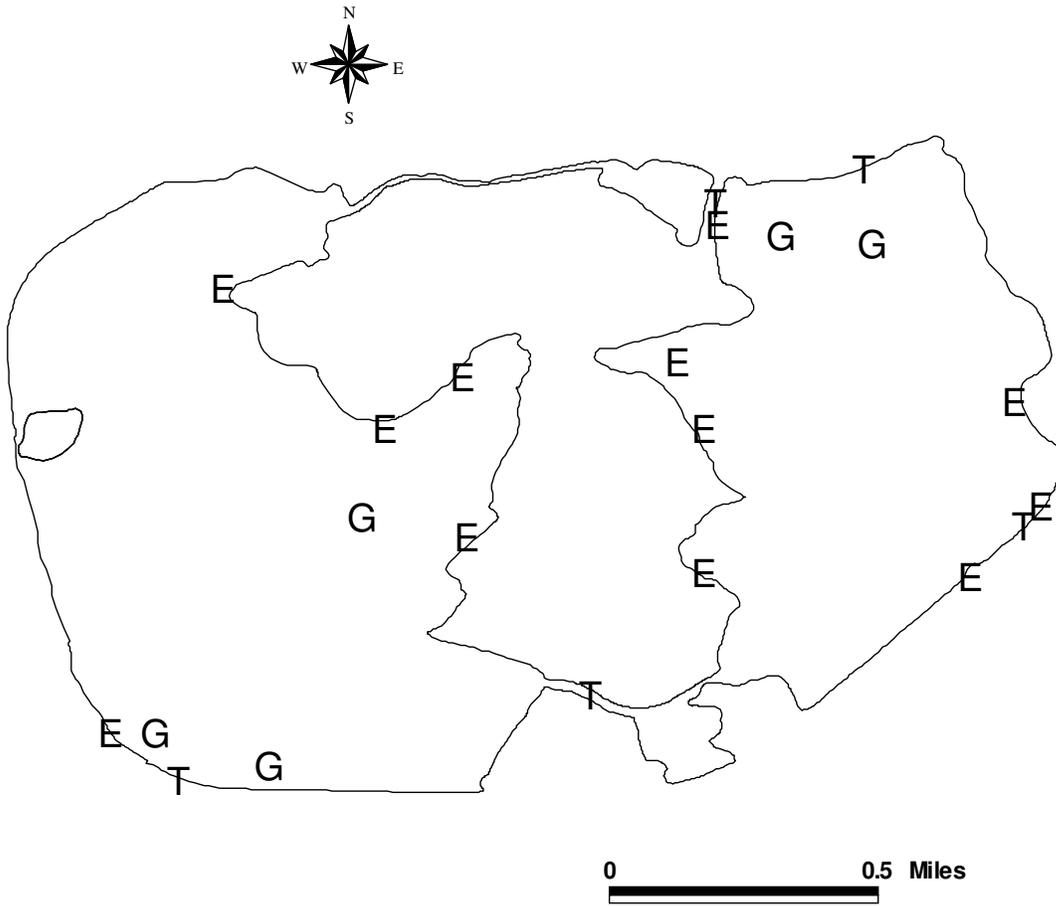
Survey Year	Electrofishing	Trap Net	Gill Net	Creel Survey	Vegetation Survey	Habitat Survey	Access Survey	Report
Fall 2006-Spring 2007	A				A			
Fall 2007-Spring 2008	A			A	A			
Fall 2008-Spring 2009	A				A			
Fall 2009-Spring 2010	S	S	S		S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Lake Bryan, Texas, 2005-2006.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					1	1.0
Threadfin shad					10	10.0
Channel catfish	1	0.2				
Green sunfish					14	14.0
Bluegill					104	104.0
Longear sunfish					15	15.0
Largemouth bass					95	95.0
White crappie	14	2.8	6	1.2	5	5.0
Black crappie			2	0.4		

APPENDIX B



Location of sampling sites, Lake Bryan, Texas, 2005-2006. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively.