

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-35

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2009 Survey Report

**Gladewater City Lake**

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## TABLE OF CONTENTS

Survey and management summary .....	2
Introduction .....	3
Reservoir description.....	3
Management history.....	3
Methods .....	4
Results and discussion .....	4
Fisheries management plan .....	6
Literature cited.....	7
Figures and Tables .....	8-22
Water level (Figure 1).....	8
Reservoir characteristics (Table 1) .....	8
Harvest regulations (Table 2) .....	9
Stocking history (Table 3) .....	10
Habitat survey (Table 4).....	11
Percent directed angler effort per species (Table 5) .....	11
Total fishing effort and fishing expenditures (Table 6).....	11
Gizzard shad (Figure 2) .....	12
Sunfishes (Figures 3-4) .....	13
Channel catfish (Figure 5).....	15
Black bass (Figures 6-8; Table 7).....	16
Crappie (Figures 9-11; Table 8) .....	19
Proposed Sampling Schedule.....	22
Appendix A	
Catch rates for all species from all gear types.....	23
Appendix B	
Map of 2009-2010 sampling locations .....	24

## SURVEY AND MANAGEMENT SUMMARY

Fish populations in Gladewater City Lake were surveyed in 2009 using electrofishing and trap netting and in 2010 using gill netting. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Gladewater City Lake is a 481-acre reservoir on Glade Creek, and was constructed in 1953 by the City of Gladewater for use as municipal and industrial water supply. Habitat features consisted of inundated timber, brush, creek channels, and riprap. The lake has a history of limited aquatic vegetation. Water hyacinth, a non-native invasive plant, was detected at the reservoir in 2005. Periodic herbicide treatments have prevented the spread of water hyacinth in the reservoir.
- **Management history:** Important sport fish include largemouth bass, channel catfish, bluegill, redear sunfish, and crappie. TPWD Inland Fisheries District 3A staff stocked threadfin shad in 2008 to improve the prey fish community. Even though the largemouth bass population has not met the requirements for Florida largemouth bass stocking by TPWD, the City of Gladewater has purchased (from a private fish retailer) and stocked the reservoir with 15,000 pure Florida largemouth bass fingerlings each of the past three years.
- **Fish Community**
  - **Prey species:** Threadfin shad continued to be present in the reservoir. Electrofishing catch of gizzard shad was higher than the previous survey but few fish were small enough to be available as prey to most sport fish. Bluegill catch was lower in 2009 than in the previous two surveys, but are still adequate as prey to most sport fish. Redear sunfish serve as an additional prey source for predators and also grow to sizes desirable to anglers.
  - **Catfishes:** The channel catfish population contains many fish above legal size and provides good angling opportunities. Gill net catch rates of channel catfish were higher in 2010 than the previous survey.
  - **Temperate basses:** No white bass were collected by gill nets in 2010. This reservoir has never contained white bass, but yellow bass were present.
  - **Black basses:** Largemouth bass electrofishing catch rates were lower in 2009 than previous surveys. Growth of largemouth bass in this reservoir is good. Fish reach the 14-inch minimum length limit in an average of 2.9 years. Largemouth bass were collected to 20 inches and body condition was good. Spotted bass abundance was higher in 2009 than previous years. These fish provide additional angling opportunities.
  - **Crappie:** White crappie catch rates in trap nets have increased since 2001. The average age of 10-inch white crappie was 2 years, which indicates good growth. Black crappie were also present, but not as abundant as white crappie.
- **Management Strategies:** Conduct water hyacinth surveys annually from 2010-2013. Conduct general monitoring with trap netting, electrofishing, and aquatic vegetation surveys in 2013 and gill netting in 2014.

## INTRODUCTION

This document is a summary of fisheries data collected from Gladewater City Lake from June 2009 through May 2010. 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 2009-2010 data for comparison.

### *Reservoir Description*

Gladewater City Lake is located in Upshur County on Glade Creek. It was constructed in 1953 by the City of Gladewater for use as a municipal and industrial water supply and for public recreation. The lake has a drainage area of approximately 35 square miles. Shoreline length is 10 miles with a shoreline development ratio of 2.7:1. Water level has been relatively stable in the last three years (Figure 1). Aquatic plant densities have been historically low. However, water hyacinth was discovered in the reservoir during the 2005 vegetation survey. The upper third of the reservoir contains flooded timber and the majority of the aquatic vegetation, including the water hyacinth. Abundant residential development exists along the lower half of the reservoir. The City of Gladewater operates a boat ramp on the reservoir and bank angling access is limited. Other descriptive characteristics for Gladewater City Lake are in Table 1.

### *Management History*

**Previous management strategies and actions:** Management strategies and actions from the previous survey report (Bister and Brice 2006) included:

1. Monitor water hyacinth infestation and work with Gladewater city officials regarding management efforts.
 

**Action:** Annual surveys of water hyacinth have been conducted and indicated coverage has not increased. Herbicide treatments have been conducted by TPWD Aquatic Habitat Enhancement Team using herbicides purchased by the City of Gladewater. Periodic physical removal of water hyacinth has been conducted by the City when plants have floated to the lower portion of the reservoir.
2. Monitor genetic composition of the largemouth bass population and stock Florida largemouth bass if electrophoresis results indicate <20% Florida largemouth bass alleles. Conduct electrofishing survey during fall 2007 to monitor largemouth bass and prey populations.
 

**Action:** Electrofishing was conducted in 2007. However, no genetic analysis was conducted. The City of Gladewater has stocked Florida largemouth bass in 2008, 2009, and 2010.
3. Keep anglers and other stakeholders aware of fisheries management activities, fishing opportunities, and other fisheries-related topics.
 

**Action:** Fisheries-related information has been shared with the lake advisory board during the survey period.
4. Increase diversity of the aquatic plant community to benefit fish populations.
 

**Action:** No action has been taken to improve the aquatic plant community at this time. However, the development of an aquatic plant nursery has been implemented by TPWD. Further research is required at Gladewater City Lake to determine if substrate and lake morphology are conducive to the establishment of additional aquatic plant species. Also, any native plant establishment program should be discussed with the City of Gladewater, the Gladewater City Lake Advisory Board, and other stakeholders prior to implementation.

**Harvest regulation history:** Sport fishes in Gladewater City Lake are currently managed with statewide regulations (Table 2). Largemouth bass have been managed with a 14-inch minimum length and 5-fish daily bag since 1986. Other black bass were included under this regulation in 1988. The minimum length

limit on spotted bass was removed in 2000, but the daily bag for black bass in any combination remains at 5 fish/day. The 12-inch minimum length limit and 25 fish daily bag for channel catfish and blue catfish (in any combination) has been in effect since 1995. The minimum length limit for flathead catfish was reduced from 24 inches to 18 inches in 1995. There is a 5-fish daily bag on flathead catfish.

**Stocking history:** Channel catfish were stocked from the early 1970s to the mid 1990s in order to maintain a fishable population. The population has maintained itself since the last stocking in 1996. Florida largemouth bass were last stocked by TPWD in 1992. Since then, the largemouth bass population has maintained sufficient Florida largemouth bass alleles to meet fisheries management objectives. However, the Gladewater City Lake Advisory Board has stocked additional Florida largemouth bass obtained from a private fish retailer since 2008 to further improve the fishery. TPWD stocked threadfin shad in 2008 to improve the prey fish community. The complete stocking history is in Table 3.

**Vegetation/habitat history:** Previous habitat surveys have suggested that the recruitment of sunfishes, largemouth bass, and crappie has been limited by the lack of preferred habitat. The upper end of the reservoir has had abundant spatterdock. The discovery of water hyacinth during the 2005 aquatic vegetation survey was the first case of a non-native species present in this water body. Total estimated aquatic plants observed can be found in Table 4.

## METHODS

Data 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), and a roving angler creel survey from March through May 2008. 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). A roving angler creel survey consisting of 9 survey days (4 weekdays, 5 weekend days from March through May 2008) was conducted to estimate angler catch and harvest rates and angling effort. 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 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). 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 and IOV. Average age at length was determined using otoliths for largemouth bass from 13 fish (13.1-14.5 inches) and white crappie from 10 fish (9.1 – 10.9 inches). Source for water level data was the United States Geological Survey (USGS) website.

## RESULTS AND DISCUSSION

**Habitat:** Littoral zone habitat consisted primarily of native submersed vegetation (primarily *Chara* spp.; rooted algae) and native floating-leaf vegetation (spatterdock) (Table 4). *Chara* is not the most desirable form of fish habitat; therefore, fish populations could benefit from a more diverse aquatic plant community. The water hyacinth infestation has been kept at manageable levels with periodic herbicide treatments. However, this invasive plant is still a cause for concern as this species can grow rapidly, restrict access to portions of the lake or boat docks, and cause water quality problems.

**Creel:** The roving angler creel survey conducted from March through May 2008 included both boat and bank anglers. Directed fishing effort was highest for black bass (54.4%), followed by anglers fishing for anything (23.4%), and crappie (20.6%) (Table 5). Total fishing effort during the 3-month period was 11,295 hours and anglers spent an estimated \$49,909 in direct expenditures (Table 6).

**Prey species:** Electrofishing catch rates of bluegill and gizzard shad were 399/h and 148/h, respectively. Index of vulnerability (IOV) for gizzard shad was low, indicating that only 20% of gizzard shad were available to most predator fish; this was lower than the IOV estimate in 2007 (Figure 2). Total CPUE of bluegill in 2009 was lower than total CPUE from surveys in 2005 and 2007, but remained adequate to support the largemouth bass population. The size structure of bluegill has shifted slightly to larger individuals and should be monitored in future surveys to document any consistent trends in this population (Figure 3). Redear sunfish were present at larger sizes and available to anglers (Figure 4). There was very little directed effort from anglers toward sunfish species in the spring 2008 creel survey (Table 5).

**Catfish:** The gill net catch rate of channel catfish was 7.8/nn in 2010, which was higher than catch rates in 2006 but lower than 2002. The channel catfish population continued to exhibit desirable size distribution, with moderate numbers of larger fish available to anglers. Body condition was adequate with mean  $W_r$  for most inch groups >100 (Figure 5). Bister and Brice (2006) reported growth of channel catfish was fast in previous surveys, in which the average age at 12 inches (11.8-14.6 inches) was 2.0 years ( $N = 7$ ; all were age 2). Only 1.3% of directed angling effort was from catfish anglers in the spring 2008 creel survey period (Table 5). None of the anglers targeting channel catfish during the creel survey reported catching a catfish.

**Black bass:** The total electrofishing catch rate of largemouth bass has declined over recent surveys. Total CPUE was 70.0/h in 2009 compared to 117.0/h in 2007 and 160.0/h in 2005 (Figure 7). However, the catch rate of stock-length largemouth bass (fish  $\geq 8$  inches) has not shown as much of a decline. Stock CPUE was 64.0/h in 2009 and 80.0/h in both 2007 and 2005. Population size structure has been stable. PSD was 42 in 2009, 45 in 2007, and 46 in 2005. Body condition in 2009 was moderate ( $W_r$  above 90) for most size classes of fish (Figure 7). Growth of largemouth bass in Gladewater City Lake was moderate. Average age at 14 inches (13.1-14.5 inches) was 2.9 years ( $N = 13$ ; range = 2 – 4 years), which was slightly older than the 2.5 years reported by Bister and Brice (2006). The relative abundance of spotted bass has increased since 2005 (Figure 6). Electrofishing catch rate of spotted bass was 69.0/h in 2009. Even though no spotted bass >14 inches were collected, they provide an additional opportunity for anglers. From March through May 2008, 54.4% of directed angling effort was for black bass (Table 5). Angling catch rates of black bass was high during the spring creel survey (1.9 fish/h) (Table 7). Almost 80% of legal-size black bass were released (Table 7).

**Crappie:** Trap net catch rates for white crappie were higher in 2009 (4.0/nn) than 2001 (1.6/nn) (Figure 9). Trap net catch rates for black crappie were 1.0/nn in 2009 compared to 0.6/nn in 2001. No legal ( $\geq 10$  inch) black crappie were collected in 2009 (Figure 10). Growth of white crappie was moderate. The average age at 10 inches (9.1 – 10.9 inches) was 2 years ( $N = 10$ ; all fish from 2007 year class). Age-and-growth analysis was not conducted for black crappie due to insufficient sample size. Twenty percent of directed angling effort was for crappie during the March through May 2008 angler creel survey (Table 5). All legal-size fish caught by anglers during the creel survey were harvested (Table 8, Figure 11).

## Fisheries management plan for Gladewater City Lake, Texas

Prepared – July 2010

**ISSUE 1:** Water hyacinth was discovered in Gladewater City Lake during the summer 2005 aquatic vegetation survey. This non-native floating plant can grow rapidly, restrict access to areas of the lake, and cause water quality problems. TPWD Inland Fisheries District 3A staff met with the Gladewater City Lake Advisory Board in December 2005 to present options for managing the water hyacinth infestation. Periodic herbicide treatments have been conducted by the TPWD Aquatic Habitat Enhancement Team with chemical purchased by the City of Gladewater. Annual application of herbicide should be continued to ensure water hyacinth will not reach uncontrollable levels.

### MANAGEMENT STRATEGIES

1. Conduct annual aquatic vegetation surveys to estimate coverage of water hyacinth, monitor trends, and to evaluate effectiveness of treatment efforts.
2. Continue to work with Gladewater city officials and the lake advisory board regarding water hyacinth management efforts.

**ISSUE 2:** Recruitment of sunfishes, black bass, and crappie may be limited by the availability of preferred habitat. *Chara* is the primary submersed aquatic habitat in the reservoir, which is not most desirable. Increasing the diversity of the native aquatic plant community may be beneficial to fish populations.

### MANAGEMENT STRATEGIES

1. Seek input from stakeholders (e.g. Gladewater City Lake Advisory Board, anglers, and waterfront homeowners) to assess acceptance of native aquatic plant community improvement project.
2. Evaluate substrate and lake morphology to recommend potential sites for establishment of additional native aquatic plant species.

**ISSUE 3:** Anglers and stakeholders might benefit from information about fisheries management activities, fishing opportunities, and other issues on Gladewater City Lake.

### MANAGEMENT STRATEGIES

1. Continue to provide news releases to the print and broadcast media.
2. Continue to provide fisheries presentations to public regarding issues/angling opportunities at Gladewater City Lake.

### **SAMPLING SCHEDULE JUSTIFICATION:**

The proposed sampling schedule includes annual aquatic vegetation surveys and required monitoring surveys in 2013/2014 (Table 9). Annual vegetation surveys are necessary to monitor coverage of waterhyacinth and to provide information to Gladewater city officials and the lake advisory board. Standard electrofishing, trap netting, and gill netting surveys are only required every four years at this time to monitor sport fish and prey fish populations. Structural habitat and angler access and facilities surveys are required once every 4 years.

## 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, 2<sup>nd</sup> edition. American Fisheries Society, Bethesda, Maryland.
- Bister, T. J., and M. W. Brice. 2006. Statewide freshwater fisheries monitoring and management program survey report for Gladewater City Lake, 2005. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.
- 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.



## Monthly Water Level

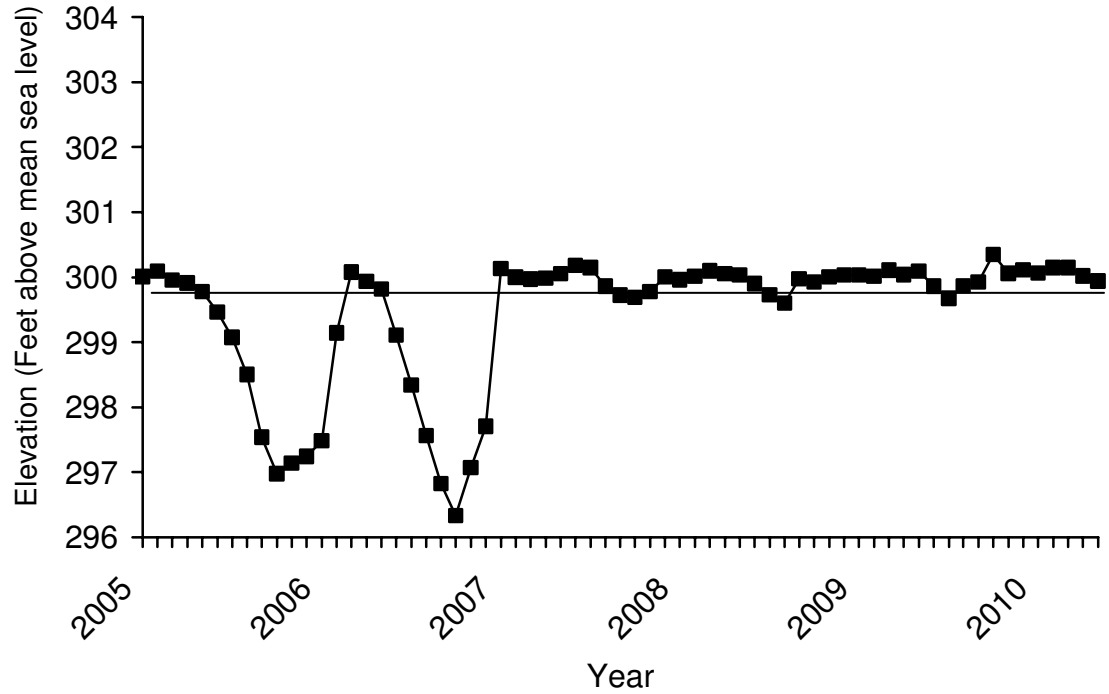


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Gladewater City Lake, Texas. Conservation water level is 299.78 feet.

Table 1. Characteristics of Gladewater City Lake, Texas.

Characteristic	Description
Year Constructed	1953
Controlling authority	City of Gladewater
Counties	Upshur
Reservoir type	Tributary
Shoreline Development Index (SDI)	2.7
Conductivity	78 umhos/cm

Table 2. Harvest regulations for Gladewater City Lake, Texas.

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, largemouth	5 <sup>a</sup>	14 – No Limit
Bass, spotted	5 <sup>a</sup>	No Limit - No Limit
Crappie, white and black crappie, their hybrids and subspecies	25 (in any combination)	10 - No Limit

<sup>a</sup> Daily bag for largemouth bass and spotted bass = 5 in any combination.

Table 3. Stocking history of Gladewater City Lake, Texas. Size categories are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL) and adults (ADL).

Species	Year	Number	Size
Channel catfish	1972	6,000	AFGL
	1974	3,000	AFGL
	1975	4,000	AFGL
	1976	2,000	AFGL
	1978	3,000	AFGL
	1979	3,000	AFGL
	1982	9,160	AFGL
	1983	10,000	AFGL
	1984	2,000	FGL
	1985	1,998	AFGL
	1986	2,000	FRY
	1989	2,193	FGL
	1991	10,005	FGL
	1992	5,100	FGL
	1993	9,420	FGL
1995	5,156	FGL	
1996	5,066	FGL	
Total		83,098	
Florida Largemouth bass	1976	84,000	FRY
	1977	3,000	FRY
	1979	2,499	FRY
	1989	6	ADL
	1992	13,667	FGL
	2008	15,000	FGL
	2009	15,000	FGL
	2010	15,000	FGL
Total		148,172	
Largemouth bass	1969	6,000	
	Total		6,000
Paradise bass (Yellow bass X Striped bass)	1977	40,000	
	Total		40,000
Redbreast sunfish	1985	3,438	
	Total		3,438
Threadfin shad	1982	2,600	
	2008	3,000	
	Total		5,600

Table 4. Survey of littoral zone and physical habitat types, Gladewater City Lake, Texas, 2009. 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 species found.

Habitat type	Shoreline distance		Surface area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Bulkhead	3.5	35		
Rocky shoreline	0.4	4		
Natural shoreline	6.1	61		
Standing timber			8.7	1.8
Native emerged vegetation			17.5	3.6
Native floating leaf			17.5	3.6
Native submersed			46.6	9.7
Water hyacinth			3.4	0.7

Table 5. Percent directed angler effort by species for Gladewater City Lake, Texas, March through May 2008.

Species/Group	Percent directed effort
Black basses	54.4
Sunfishes	0.2
Anything	23.4
Crappie	20.6
Catfish	1.3

Table 6. Total fishing effort (h) for all species and total directed expenditures at Gladewater City Lake, Texas, March through May 2008.

Creel statistic	March through May 2008
Total fishing effort (h)	11,295
Total directed expenditures	\$49,909

## Gizzard Shad

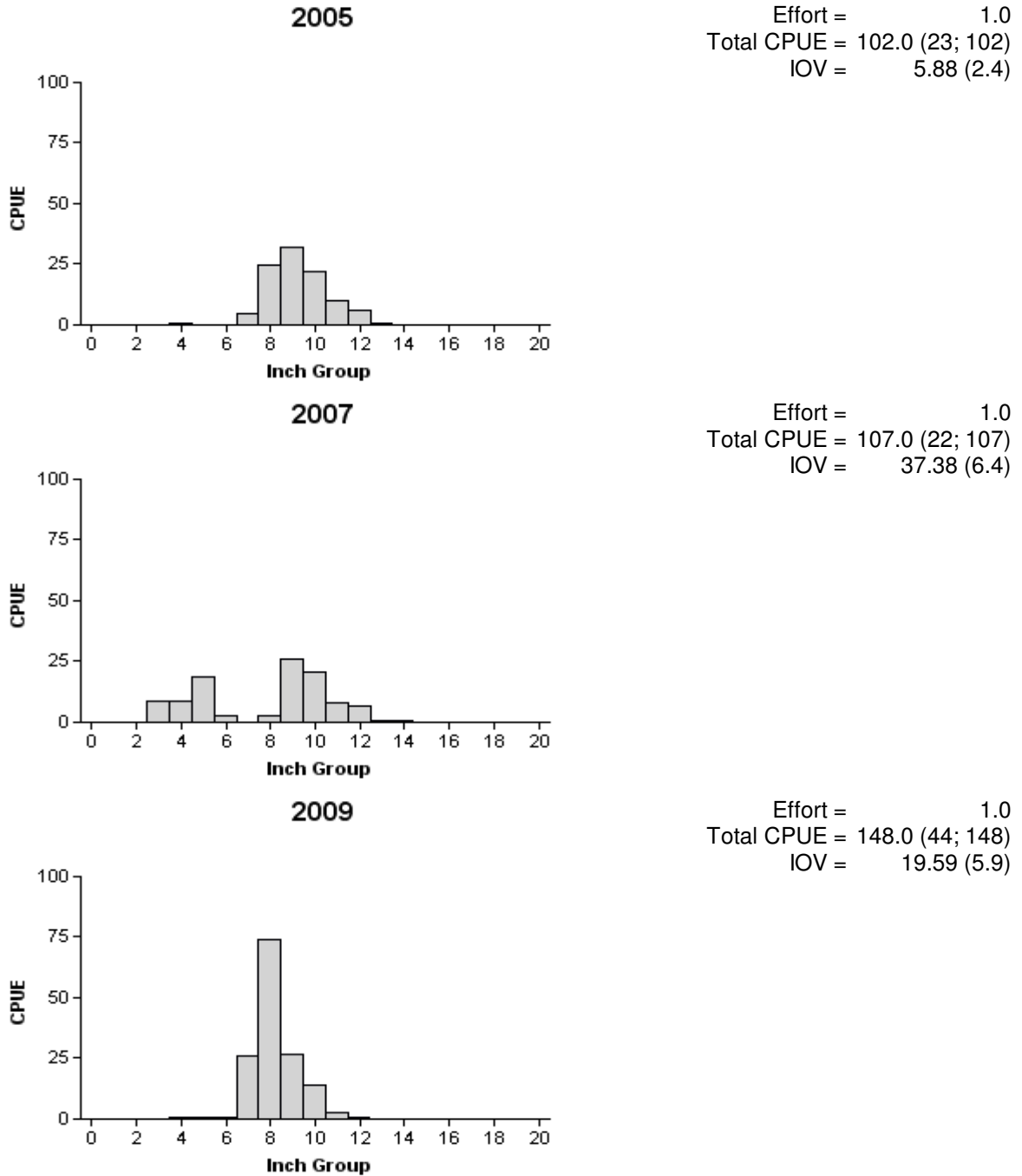


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for PSD and IOV are in parentheses) for fall electrofishing surveys, Gladewater City Lake, Texas, 2005, 2007, and 2009.

# Bluegill

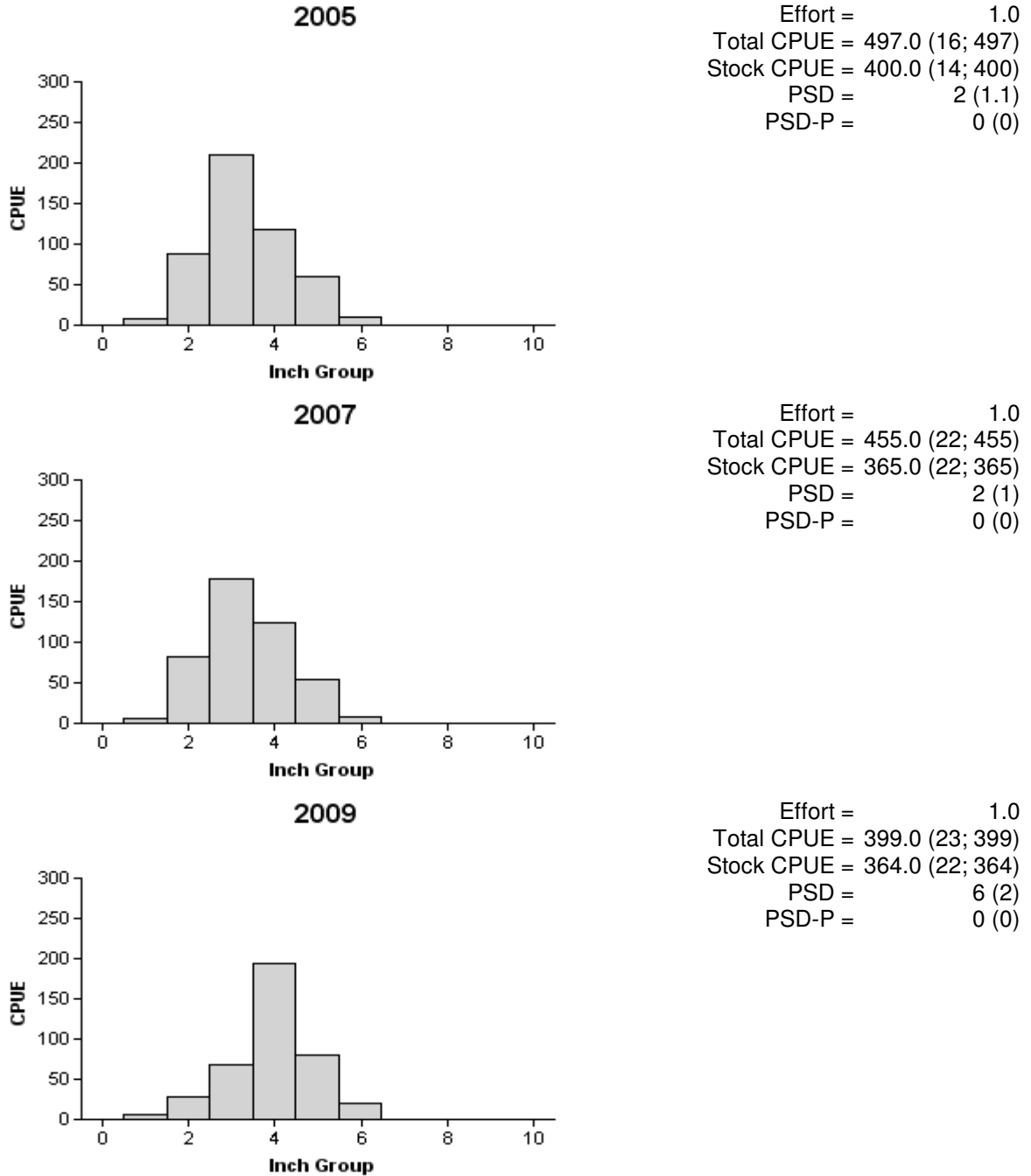


Figure 3. Number of bluegill caught per hour (CPUE), relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Gladewater City Lake, Texas, 2005, 2007, and 2009.

## Redear Sunfish

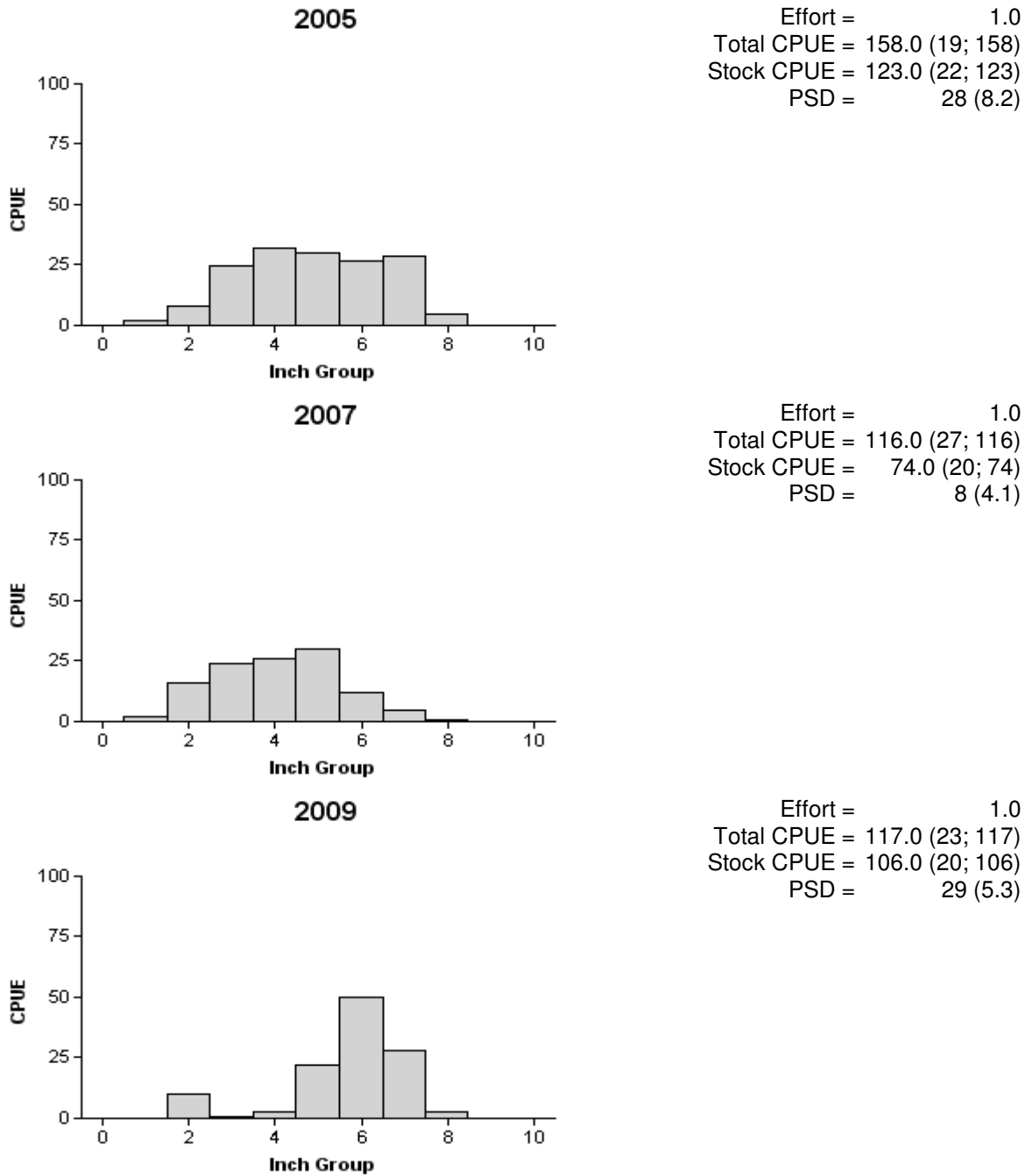


Figure 4. Number of redear sunfish caught per hour (CPUE), relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Gladewater City Lake, Texas, 2005, 2007, and 2009.

## Channel Catfish

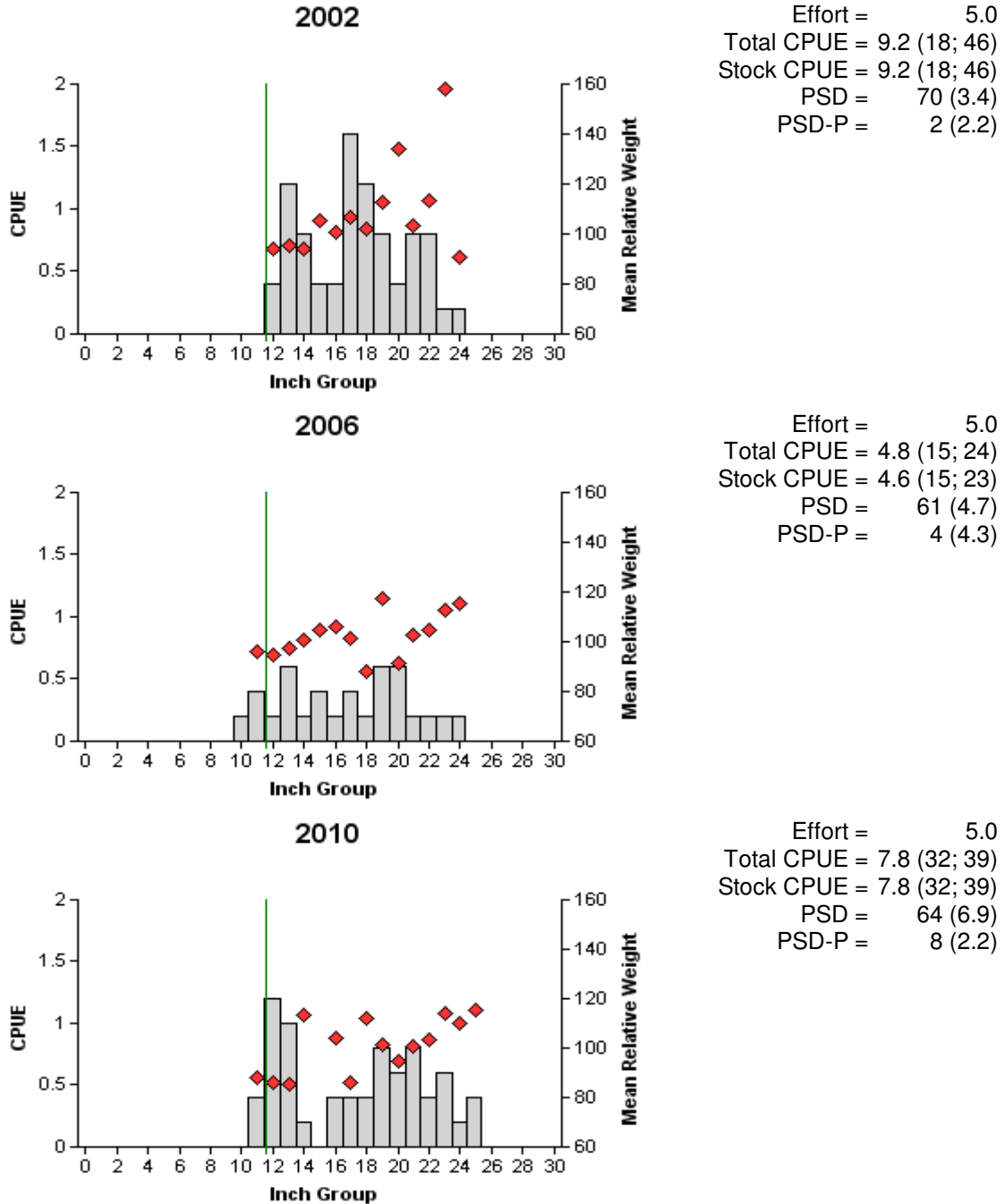


Figure 5. Number of channel catfish caught per net night (CPUE), relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Gladewater City Lake, Texas, 2002, 2006, and 2010. Vertical line indicates minimum length limit.



## Spotted Bass

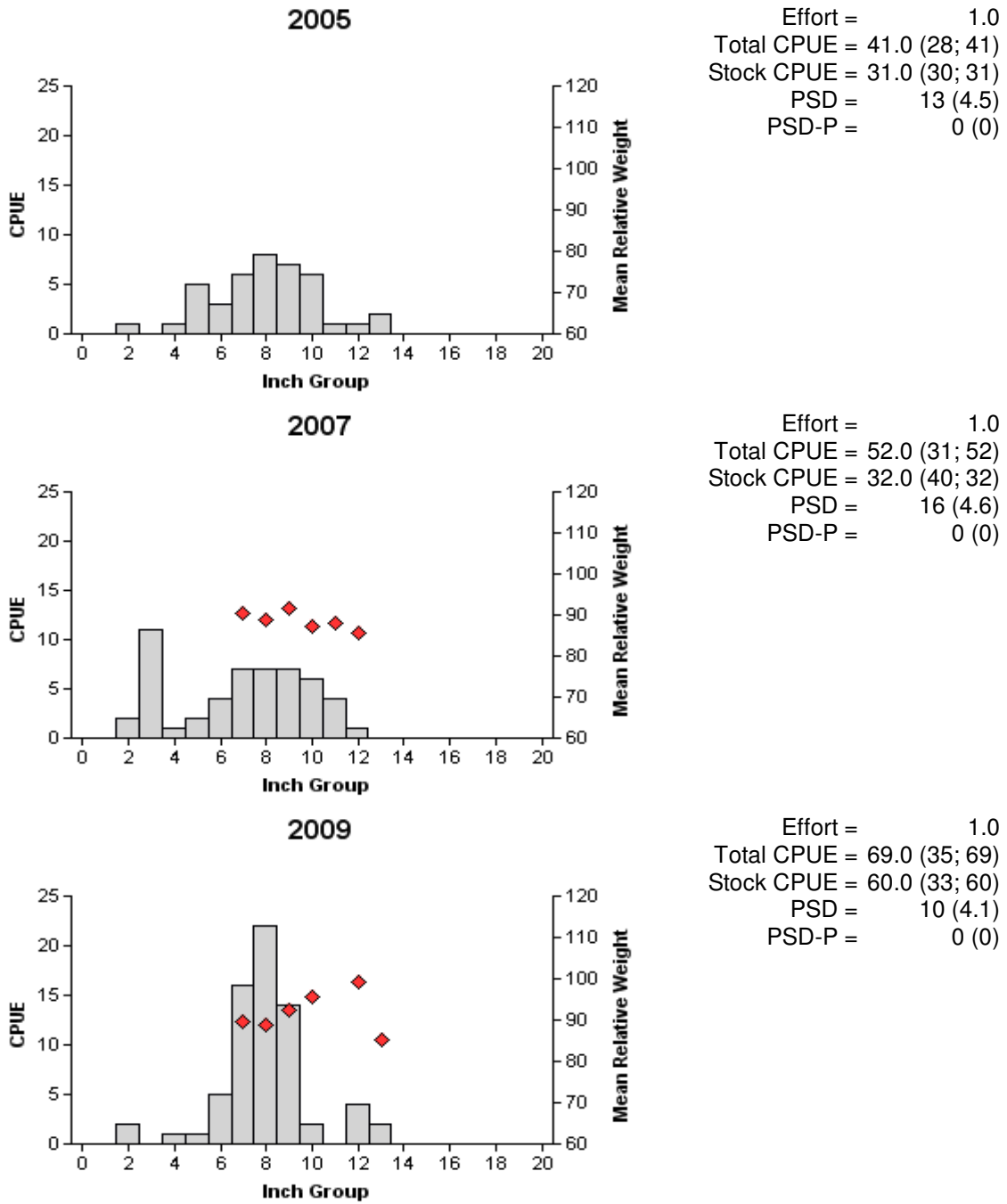


Figure 6. Number of spotted bass caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Gladewater City Lake, Texas, 2005, 2007, and 2009.

## Largemouth Bass

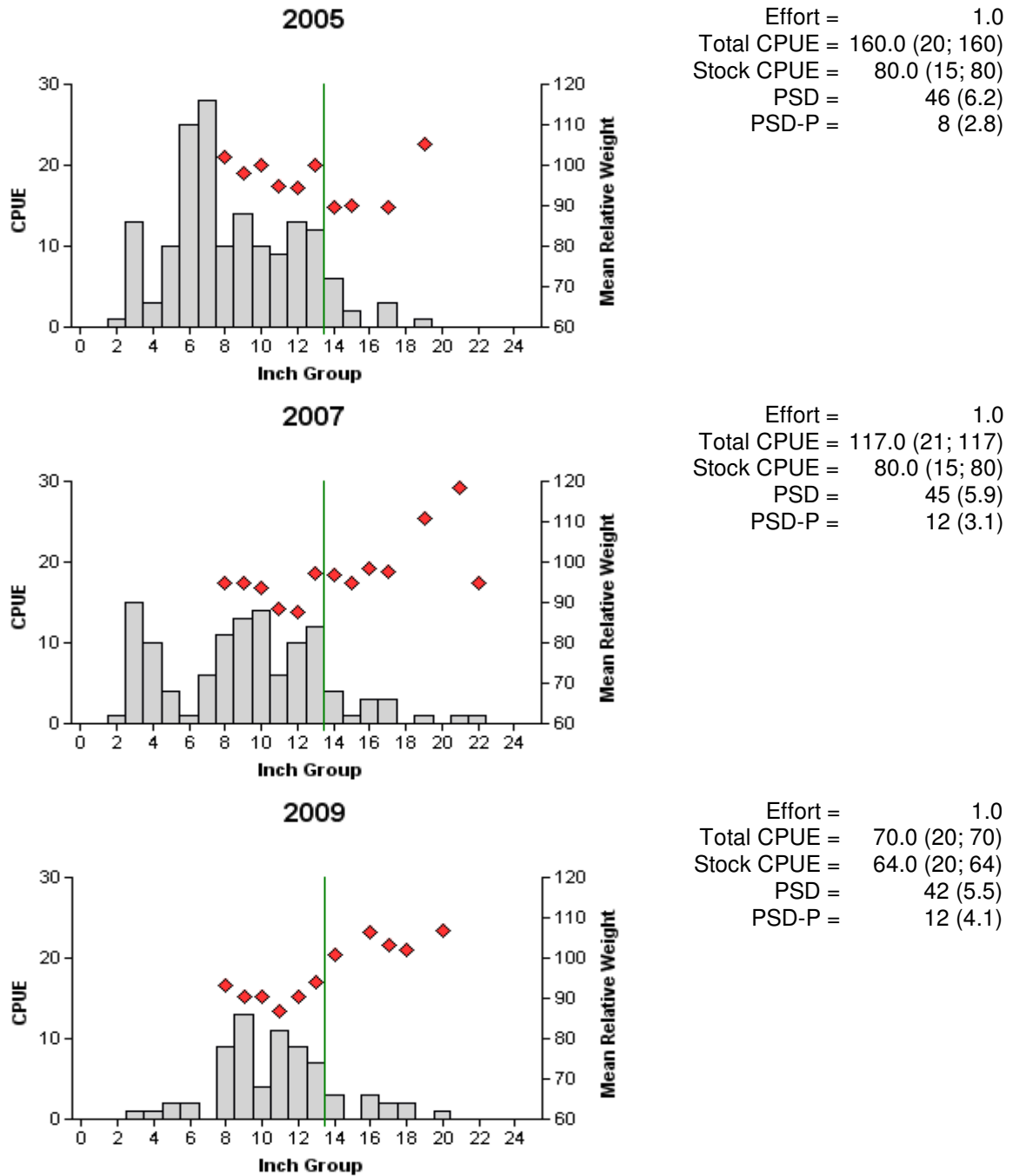


Figure 7. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Gladewater City Lake, Texas, 2005, 2007, and 2009. Vertical line denotes minimum length limit.

## Black Basses

Table 7. Creel survey statistics for black basses at Gladewater City Lake from March through May 2008, where total catch per hour is for anglers targeting black basses and total harvest is the estimated number of black basses harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year
	March through May 2008
Directed effort (h)	6,149 (58)
Directed effort/acre	12.8 (58)
Total catch per hour	1.87 (41)
Total harvest (all black basses)	860 (94)
Spotted bass	71 (475)
Largemouth bass	789 (60)
Harvest/acre (Total)	1.79 (94)
Percent legal released	79

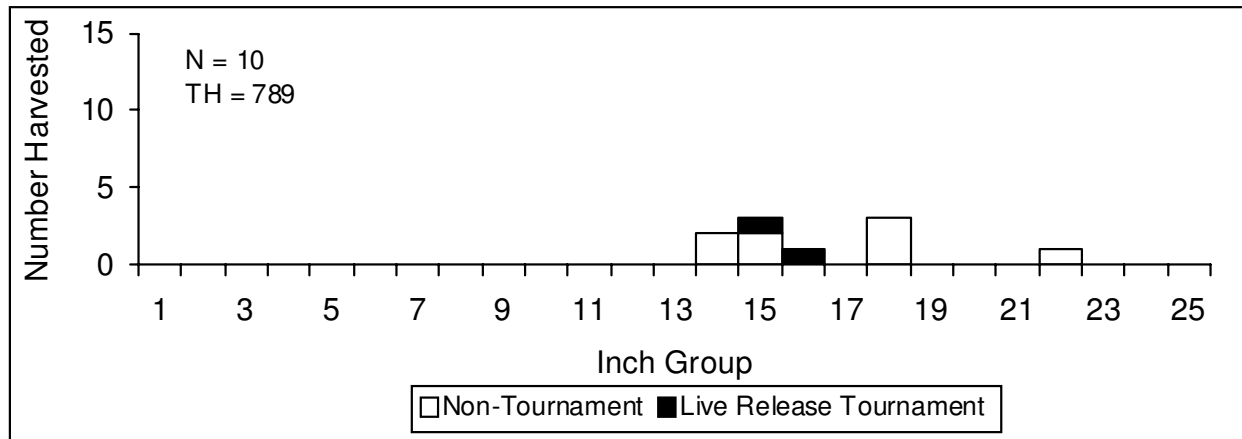


Figure 8. Length frequency of harvested largemouth bass observed during creel surveys at Gladewater City Lake, Texas, March through May 2008, all anglers combined. N is the number of harvested largemouth bass observed during creel surveys, and TH is the total estimated harvest of largemouth bass for the creel period.

## White Crappie

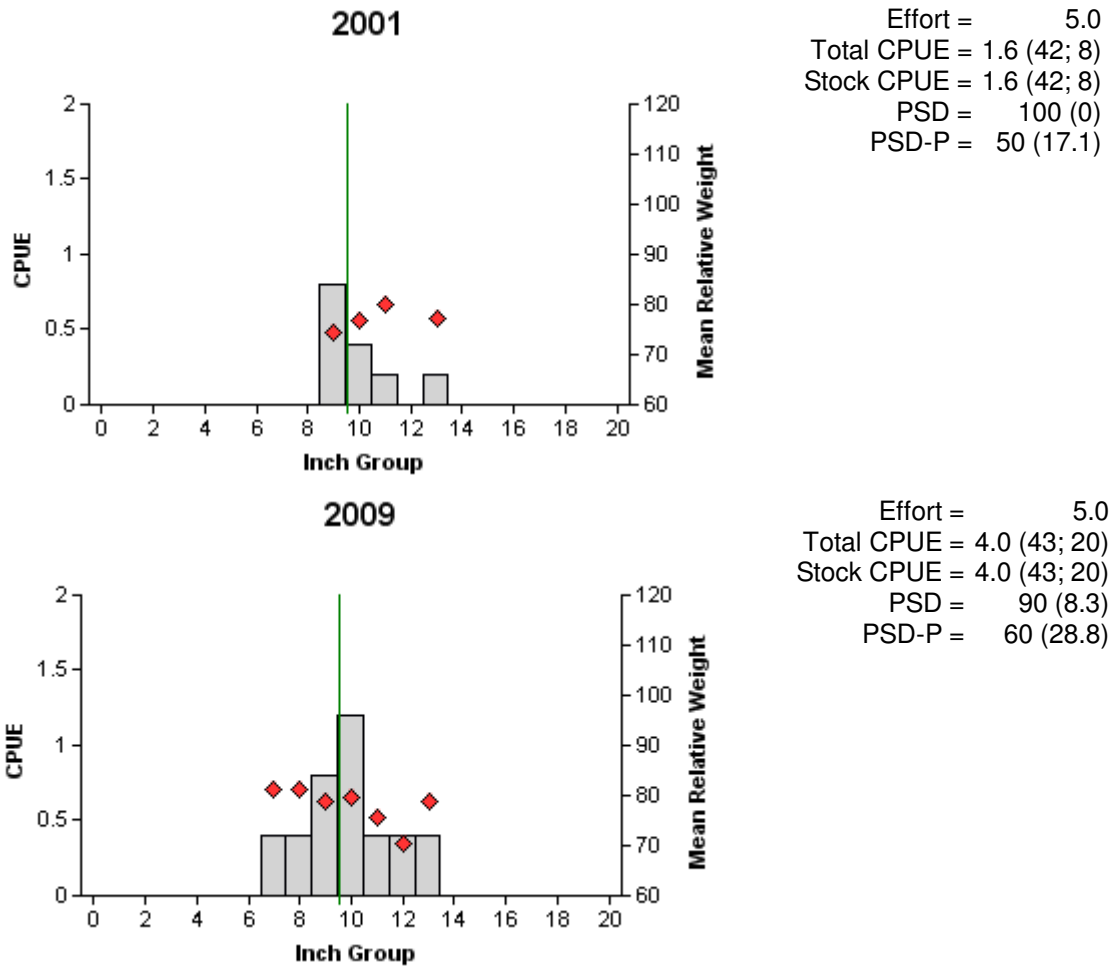


Figure 9. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Gladewater City Lake, Texas, 2001 and 2009. Vertical line denotes minimum length limit.

## Black Crappie

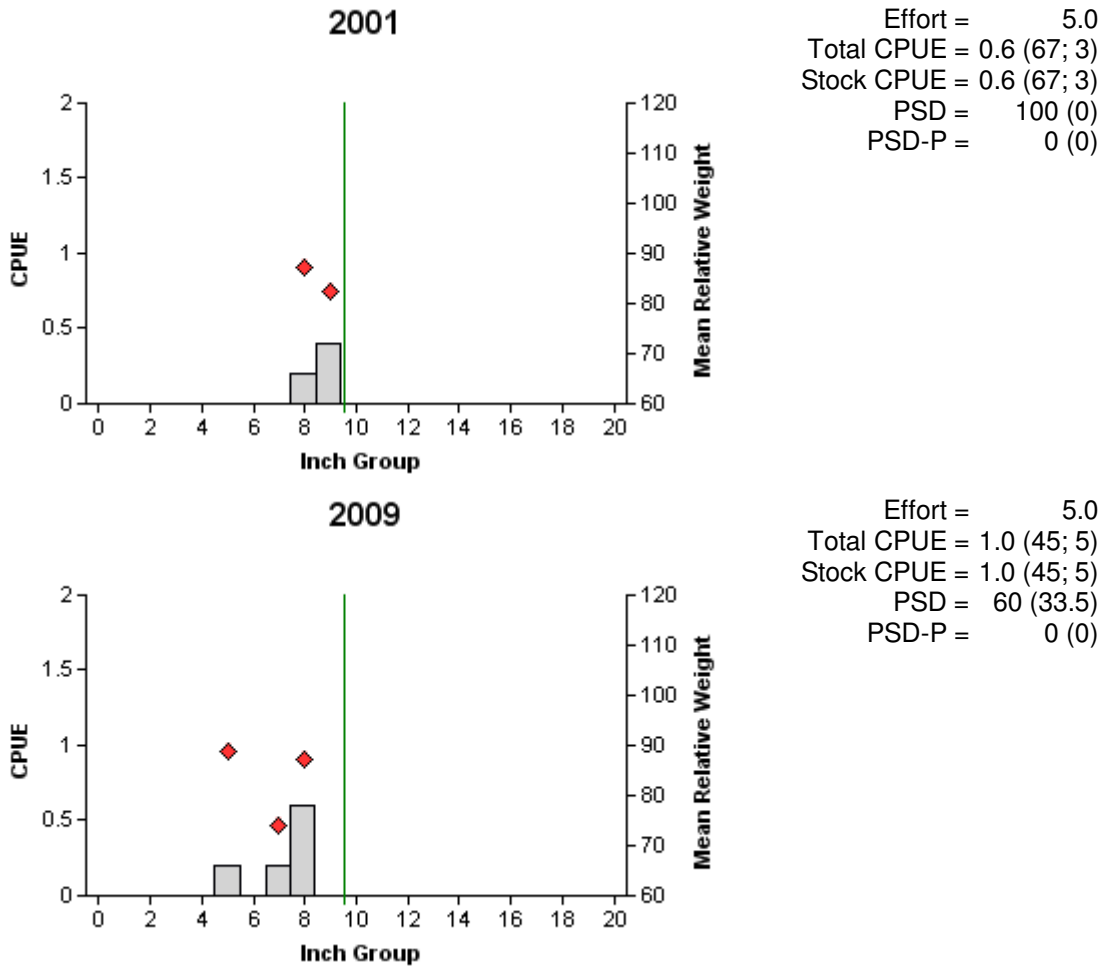


Figure 10. Number of black crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Gladewater City Lake, Texas, 2001 and 2009. Vertical line denotes minimum length limit.

## Crappie

Table 8. Creel survey statistics for black and white crappie at Gladewater City Lake from March through May 2008, where total catch per hour is for anglers targeting crappie and total harvest is the estimated number of crappies harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year
	March through May 2008
Directed effort (h)	2,322 (52)
Directed effort/acre	4.83 (52)
Total catch per hour	1.45 (64)
Total harvest	2,415 (69)
White crappie	2,303 (65)
Black crappie	112 (153)
Harvest/acre	5.02 (69)
Percent legal released	0

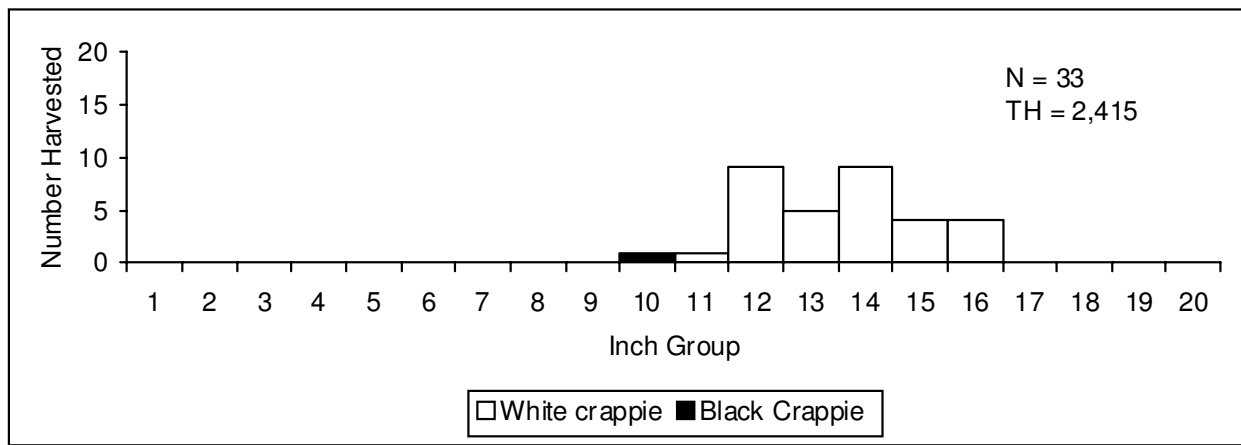


Figure 11. Length frequency of harvested crappie observed during creel surveys at Gladewater City Lake, Texas, March through May 2008, all anglers combined. N is the number of harvested crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 9. Proposed sampling schedule for Gladewater City Lake, Texas. Gill netting surveys are conducted in the spring, electrofishing and trap netting surveys are conducted in the fall, and vegetation/habitat surveys are conducted in the summer. Standard survey denoted by S and additional survey denoted by A.

Survey Year	Vegetation	Electrofishing	Trap Net	Gill Net	Report
June 2010- May 2011	A				
June 2011- May 2012	A				
June 2012- May 2013	A				
June 2013- May 2014	S	S	A	S	S

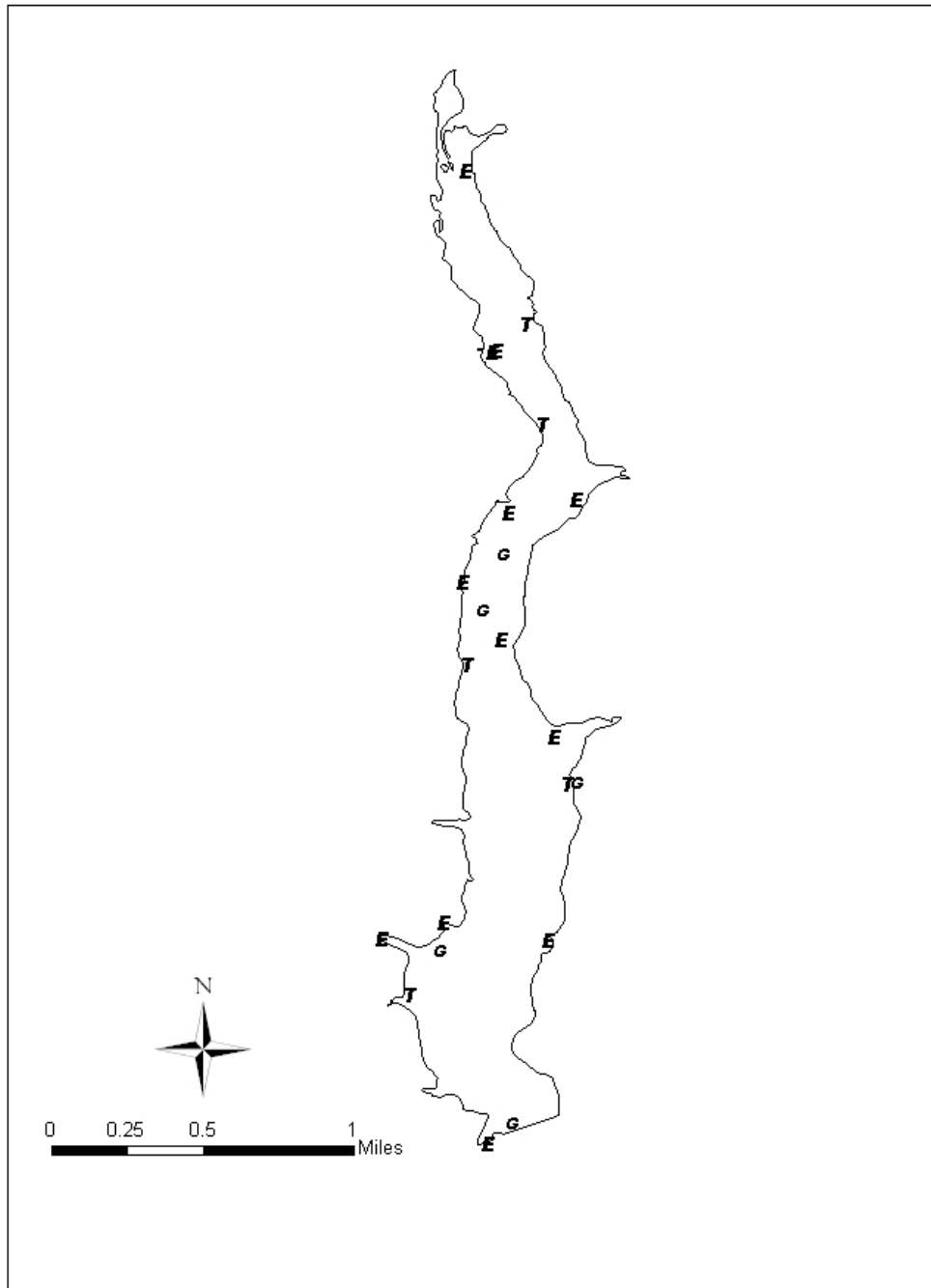
**APPENDIX A**

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

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					148	148.0
Threadfin shad					44	44.0
Channel catfish	39	7.8				
Warmouth					4	4.0
Bluegill					399	399.0
Longear sunfish					87	87.0
Redear sunfish					117	117.0
Spotted bass					69	69.0
Largemouth bass					70	70.0
White crappie			20	4.0		
Black crappie			5	1.0		



APPENDIX B



Location of sampling sites, Gladewater City Lake, Texas, 2009-2010. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level approximately at full pool at time of sampling.