

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-33

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2007 Survey Report

**Lake Wood**

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## SURVEY AND MANAGEMENT SUMMARY

Lake Wood (H-5) was surveyed in fall 2007 using trap nets and electrofishing and in spring 2008 using gill nets to assess important sport fish populations. This report summarizes the results of these surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Lake Wood (448 acres) is located on the Guadalupe River in Gonzales County, and was constructed in 1931 by the Texas Hydroelectric Commission. Its main utility is for water supply, hydro-power production and recreational purposes. Angler and boat access is adequate with two public boat ramps; however there are no handicap-specific facilities at either location. Habitat consisted of boat docks, rocks, floating-leaved vegetation, limited emergent vegetation, exotic vegetation (water hyacinth, water lettuce, and recently East Indian hygrophylla) and stumps. Hydrilla has not been observed in the reservoir since 2004. However, water hyacinth is still present and creates access problems. Floating fragments of East Indian hygrophylla were present in the reservoir.
- **Management History:** Important sport fish include channel and flathead catfish, largemouth bass, and crappie. White bass are present in this reservoir but in low abundance. Blue catfish have been stocked in this reservoir but are not the dominant catfish species. The 2004 management plan focused on largemouth bass genetics, monitoring and controlling nuisance aquatic vegetation, and enhancing fish habitat. Florida largemouth bass were not stocked into the reservoir as recommended in the 2004 management plan. Guadalupe Blanco River Authority (GBRA) contracted a certified commercial applicator to control nuisance vegetation, specifically water hyacinth. Beginning in 2007, GBRA and TPWD began working cooperatively towards a better focused control of water hyacinth. A nuisance aquatic management plan was drafted in January 2008 and mechanical removal of water hyacinth was initiated in the spring of 2008. No hydrilla has been observed in the reservoir since 2004. Enhancement of fish habitat was put on hold until water hyacinth is controlled. The controlling authority was concerned that brush piles would break loose and possibly damage the dam and its gates.
- **Fish Community**
  - **Prey species:** Gizzard shad continued to be present in the reservoir whereas few threadfin shad were collected. Although gizzard shad catches were lower than previous years, the majority present were small enough to be utilized by predators. As with gizzard shad, bluegill abundance was lower than previous surveys. However, all bluegill sampled were less than 7-inches and thus susceptible to predation.
  - **Catfish:** Survey catch data of channel catfish indicated few fish less than 12-inches in length, while the majority collected were greater than the minimum length limit of 12-inches, providing adequate angling opportunities. Flathead catfish were present in the reservoir with a significant proportion (63%) greater than or equal to the minimum 18-inch size limit.
  - **Largemouth bass:** Largemouth bass are present in the reservoir but in low numbers. Few largemouth bass were collected as reproductive success may be limited due to a lack of complex habitat such as submersed vegetation and timber stands.
  - **White crappie:** White crappie is present in the reservoir but the relative abundance is quite low.
- **Management Strategies:** Continue to manage sport fisheries under existing regulations. Continue cooperative efforts with GBRA to monitor and control nuisance aquatic vegetation (i.e. water hyacinth and hygrophylla). Floating fragments of East Indian hygrophylla were observed and the spread of this plant will be monitored. Potential habitat enhancement projects will continue to be explored with GBRA and home-owners via introduction of native submersed vegetation once water hyacinth control is established. Expand sampling to include exploratory spring electrofishing due to decreased catch rates and relative abundance for most species.

## INTRODUCTION

This document is a summary of fisheries survey data collected from Lake Wood in 2007-2008. The purpose of the document is to provide fisheries information critical in making management recommendations to protect and improve economically and recreationally important sport fisheries. While information on other species of fishes was collected, this report deals primarily with the major sport fishes and important prey species present in the reservoir. Management strategies are included to address existing problems and/or opportunities. Historical data is presented with the 2007-2008 data for comparison.

### *Reservoir Description*

Lake Wood is a 448-acre reservoir impounded on the Guadalupe River in Gonzales County and was constructed in 1931 by the Texas Hydroelectric Commission. Its main utility is for water supply, hydro-power production and recreational purposes. Angler and boat access is adequate with two public boat ramps; however there are no handicap-specific facilities at either location. Lake Wood is surrounded by private property; thus public bank access and angling opportunities from the shoreline are limited to one location (GBRA Park). At the time of sampling, habitat primarily consisted of boat docks, rocks, floating-leaved vegetation, limited emergent vegetation, and stumps. Littoral habitat included native aquatic vegetation (spatterdock, American lotus, and cattail), overhanging terrestrial brush, and boat docks. Substrate included sand, clays, and deep loam soils. Non-native aquatic vegetation (water hyacinth and water lettuce) have historically created access problems in the reservoir. A small stand of hydrilla was observed at the GBRA park boat ramp in 2004, however, it was not observed in 2007. Water hyacinth was observed during the 2003 and 2007 vegetation surveys and GBRA has hired a private contractor to mechanically remove water hyacinth starting in spring 2008.

### *Management History*

**Previous management actions and strategies:** Management strategies and actions from the previous survey report (Findeisen and Walters 2004) included:

1. The Florida largemouth bass genotype for Lake Wood in 2003 comprised less than 20 percent of the population, indicating a low prevalence of trophy largemouth bass genetics.  
**Action:** Florida largemouth bass were not stocked into the reservoir due to lack of suitable habitat.
2. Hydrilla and water hyacinth created access problems throughout the reservoir in the early to mid 90's. Both biological (triploid grass carp) and chemical control techniques were initiated.  
**Action:** District staff monitored water hyacinth during routine fisheries surveys and assisted GBRA with control ideas. A lake-wide vegetation treatment plan was prepared in January 2008 and submitted to GBRA concerning the control of water hyacinth through biological, mechanical, and chemical methodologies. GBRA implemented the mechanical treatment in April 2008 and began the chemical applications in May 2008.
3. Littoral habitat appears limited at Lake Wood. The 2003 vegetation survey indicated that only 5% of the reservoir was covered by desirable aquatic vegetation which provided marginal habitat at best. The lack of fish habitat may be a cause of limited recruitment for sport fish populations.  
**Action:** Until water hyacinth is controlled, native vegetation plantings would be useless as the water hyacinth mats would cover introduced plants. Once water hyacinth is controlled, native plant introductions will be revisited. GBRA expressed concerns about created brushpiles breaking loose and damaging the dam and its gates.

**Harvest regulation history:** Sport fish populations in Lake Wood are currently managed with statewide regulations presented in Table 2.

**Stocking history:** No new stockings have occurred since the previous report. A complete stocking history is in Table 3.

**Vegetation/habitat history:** Historically, Lake Wood has supported native emergent, native floating, and native submersed, as well as various exotic species. 2.64 miles of the reservoir shoreline contains boat docks and piers. Water hyacinth has been a nuisance and problematic species since the early 90's; prior to 1998 TPWD staff controlled water hyacinth through herbicide treatments. Since then, GBRA has been the controlling authority for vegetation management and in 2001 hired a private contractor to conduct herbicide treatments but only in limited and problematic sections of the reservoir. These efforts have been ineffective as far as long-term control and management of water hyacinth. Water hyacinth weevils, *Neochetina eichorniae* and *Neochetina bruchi*, are present but as yet have provided little control. Water lettuce has also been present, but it had limited distribution and its abundance is low. Thus, water lettuce has not been as problematic as water hyacinth. Water lettuce weevils, *Neohydronomous affinis*, have been introduced into the reservoir but shortly after introduction a massive flood hit the region which flushed most water lettuce downstream. Hydrilla, once present in the reservoir, has not been observed since 2004. Primary fish habitat includes stands of native floating vegetation providing marginal habitat at best. Submersed vegetation and woody debris are lacking in the reservoir and this void of complex habitat and structure could explain consistent weak year classes and poor recruitment of sport fishes, particularly centrarchids.

## METHODS

Fishes were collected by electrofishing (1.0 hour at 12 5-minute stations), trap nets (5 net nights at 5 stations), and gill nets (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 trap and gill nets, as the number of fish caught in one net set overnight (fish/nn). Access, littoral habitat, and aquatic vegetation surveys were conducted in August 2007. 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).

Sampling statistics (CPUE for various length categories) and structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)] and condition indices [relative weight ( $W_t$ )] were calculated for target fishes according to Anderson and Neumann (1996). The Index of Vulnerability (IOV) was calculated for gizzard shad according to DiCenzo et. al. (1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. Growth parameters were estimated using the von Bertalanffy growth equation utilizing non-linear least squares methodology (Haddon 2001). Mean length-at-age was described by:  $L_a = L_\infty (1 - e^{-K(t - t_0)})$ ; where  $L_a$  = length-at-age,  $L_\infty$  = average asymptotic length,  $K$  = metabolic growth coefficient, and  $t_0$  = hypothetical age where the fish has a length of zero.

## RESULTS AND DISCUSSION

**Habitat:** Littoral zone habitat consisted primarily of eroded bank, bulkhead, native floating vegetation (spatterdock and American lotus), native emergent vegetation (cattail), exotic vegetation (water hyacinth), and boat docks and piers adjacent to the shoreline (Table 4). Fish habitat for centrarchid species is limited and most structure is poor quality. The lack of native submerged vegetation is likely attributed to extensive coverage of water hyacinth and this species ability to shade out native vegetation and absorb available nutrients. The lack of woody debris and timber stands in the reservoir is a concern and when combined with the lack of desirable aquatic vegetation may explain the limited recruitment for centrarchid species.

**Prey species:** Electrofishing catch rates for gizzard shad were 34.0/h, considerably lower than previous surveys in 2003 (126.0/h) and 2005 (55.0/h) (Figure 1). The Index of vulnerability (IOV) for gizzard shad was reasonable (65) and up from previous years, indicating that 65% of the gizzard shad were less than eight inches in length and thus susceptible to predation. Electrofishing catch rates for bluegill and redear sunfish were 75.0/h and 21.0/h, respectively. The catch rate for bluegill was substantially lower than previous surveys in 2003 (265.0/h) and 2005 (169.0/h) (Figure 2). Redear catch rates were marginally lower than previous surveys in 2003 (30.0/h) and 2005 (56.0/h) (Figure 3). The size structure for both *Lepomis* species was dominated by small individuals that are vulnerable to predation (Figures 2-3).

**Channel catfish:** The 2008 gill net catch rate of channel catfish was 2.4/nn down from 12.8/nn in 2004 and 5.6/nn in 1997, possibly indicating low relative abundance (Figure 4). Channel catfish of stock size and greater indicated average condition with mean relative weights at or near 100.

**Flathead catfish:** Total CPUE for flathead catfish was 1.6/nn while the catch rate of stock-length fish was 1.4/nn (Figure 5).

**Largemouth bass:** The electrofishing catch rate of stock-length largemouth bass was 13.0/h in 2007, higher than the 3.0/h in 2005 and similar to 12.0/h in 2003 (Figure 6). Size structure was not adequate as PSD values were 33 and 38 in 2005 and 2007, respectively. There appeared to be poor recruitment in 2007 as indicated by few sub-stock bass collected. Body condition for nearly all size-classes in 2007 was below average with mean relative weights at or below 90.

**White crappie:** The 2007 trap net catch rate of white crappie was 2.6/nn, greater than the 2005 catch rate of 1.0/nn, but substantially lower than the 13.4/nn in 2003 (Figure 7). Based on von Bertalanffy growth model, white crappie in Lake Wood reached the 10-inch minimum size limit by age-2 in 2005 (Figure 8), where  $L_{\infty} = 376$  and  $K = 0.34$ .

## **Fisheries management plan for Lake Wood, Texas.**

Prepared – June 2008

**ISSUE 1:** Water hyacinth has been a problematic species on this reservoir for many years. Post 2001 control efforts have been limited to certain areas of the reservoir rather than control throughout the reservoir. Until April 2008, sufficient funds necessary for complete control efforts were not available, however, GBRA was scheduled to receive a 3:1 cost-share funding for a total of \$52,000 to be used for the treatment of water hyacinth in 2008.

### **MANAGEMENT STRATEGIES**

1. Continue to work with GBRA to meet the goals of the nuisance aquatic management plan.
2. Conduct a post-treatment water hyacinth survey in September annually to assess the effects of control efforts.
3. Meet with stakeholders every year to discuss results of treatment efforts.
4. Construct and implement a new nuisance aquatic vegetation management plan for 2009.
5. Continue to assist GBRA in acquiring cost-share funding.

**ISSUE 2:** Water lettuce and East Indian hygrophylla while currently not problematic species in this reservoir, have the potential to create problems once the water hyacinth is controlled.

### **MANAGEMENT STRATEGIES**

1. Monitor water lettuce and East Indian hygrophylla.
2. Work with GBRA if treatment becomes necessary.

**ISSUE 3:** Survey results from fall electrofishing suggest limited recruitment and possibly low survival may be issues concerning largemouth bass and sunfish populations. Additional electrofishing surveys conducted during the spring may provide better insight into population dynamics for these species.

### **MANAGEMENT STRATEGIES**

1. Conduct spring electrofishing surveys at randomly selected and possibly fixed sites in the same year as the standard fall electrofishing surveys.

### **SAMPLING SCHEDULE JUSTIFICATION:**

The proposed sampling schedule includes routine electrofishing and trap netting in the fall 2009, additional spring electrofishing surveys in spring 2009 and 2011, and mandatory monitoring in 2010/2011 (Table 6). Routine electrofishing and trap net surveys are necessary to monitor largemouth bass, sunfish, shad, and crappie. Additional spring electrofishing surveys in 2009 and 2011 are necessary to provide additional data for largemouth bass, sunfish, and shad. Gill net surveys are only necessary once every four years at this point to ensure presence or absence of catfish species. A Federal Aid report will be prepared in 2012.

## LITERATURE CITED

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- DiCenzo, V.J., M.J. Maceina, and M.R. Stimpert. 1996. Relationships between reservoir trophic state and gizzard shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.
- Findeisen, J. A. and A. Walters. 2004. Statewide freshwater fisheries monitoring and management program survey report for: Lake Wood, 2003. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.
- Haddon, M. 2001. Modeling and quantitative methods in fisheries. Chapman and Hall, New York.



Table 1. Characteristics of Lake Wood, Texas.

Characteristic	Description
Year constructed	1931
Controlling authority	Guadalupe-Blanco River Authority
County	Gonzales
Reservoir type	Mainstream
Shoreline Development Index	2.46
Access: Boat	Adequate – 2 pay-to-use ramp
Bank	Fair – public bank access at GBRA park
Handicapped	Inadequate – no handicapped access

Table 2. Harvest regulations for Lake Wood, Texas.

Species	Bag Limit (per person)	Minimum (inches)
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12
Catfish, flathead	5	18
Bass, white	25	10
Bass, striped	5	18
Bass, palmetto	5	18
Bass, smallmouth	5	14
Bass, largemouth	5	14
Bass, spotted and Guadalupe	5	None
	(in any combination)	
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10

Table 3. Stocking history of Lake Wood, Texas. Sizes categories are: FGL = 1-3 inches and ADL = adult (sexually mature fish).

Year	Number	Size
<b>Blue catfish</b>		
1985	4,620	FGL
1986	4,500	FGL
1988	16	ADL
1994	45,638	FGL
1995	44,800	FGL
1997	44,800	FGL
1998	<u>44,960</u>	FGL
Species Total	189,334	
<b>Channel catfish</b>		
1972	35,000	FGL
1991	<u>60</u>	ADL
Species Total	35,060	
<b>Striped bass</b>		
1978	<u>4,225</u>	FGL
Species Total	4,225	
<b>Florida largemouth bass</b>		
1978	<u>17,900</u>	FGL
Species Total	17,900	
<b>Triploid grass carp</b>		
1996	<u>11</u>	ADL
Species Total	11	

Table 4. Survey of littoral zone and physical habitat types, Lake Wood, Texas, 2007. A linear shoreline distance (miles) was recorded for each habitat type found. Surface area and percent of reservoir surface acre were determined for each type of aquatic vegetation found. Surface area estimates are based on the acreage of water containing a specific vegetation type not the total acreage of vegetation.

Habitat type	Shoreline Distance		Surface Area of Water with Vegetation	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Shoreline habitat				
Overhanging brush	0.27	1.3		
Eroded bank	17.99	86.9		
Bulkhead	1.27	6.2		
Non-descript	0.89	4.3		
Concrete	0.28	1.4		
Total	20.7	100		
Vegetation				
Native floating vegetation			61.7	27.1
American lotus			0.85	0.37
Spatterdock			60.9	26.7
Native emergent vegetation			12.9	5.7
Cattail			12.9	5.7
Exotic vegetation			63.4	27.7
Water hyacinth			49.5	21.6
Water lettuce			13.9	6.1
Adjacent to shoreline				
Piers and boat docks	2.64	12.7		

## Gizzard shad

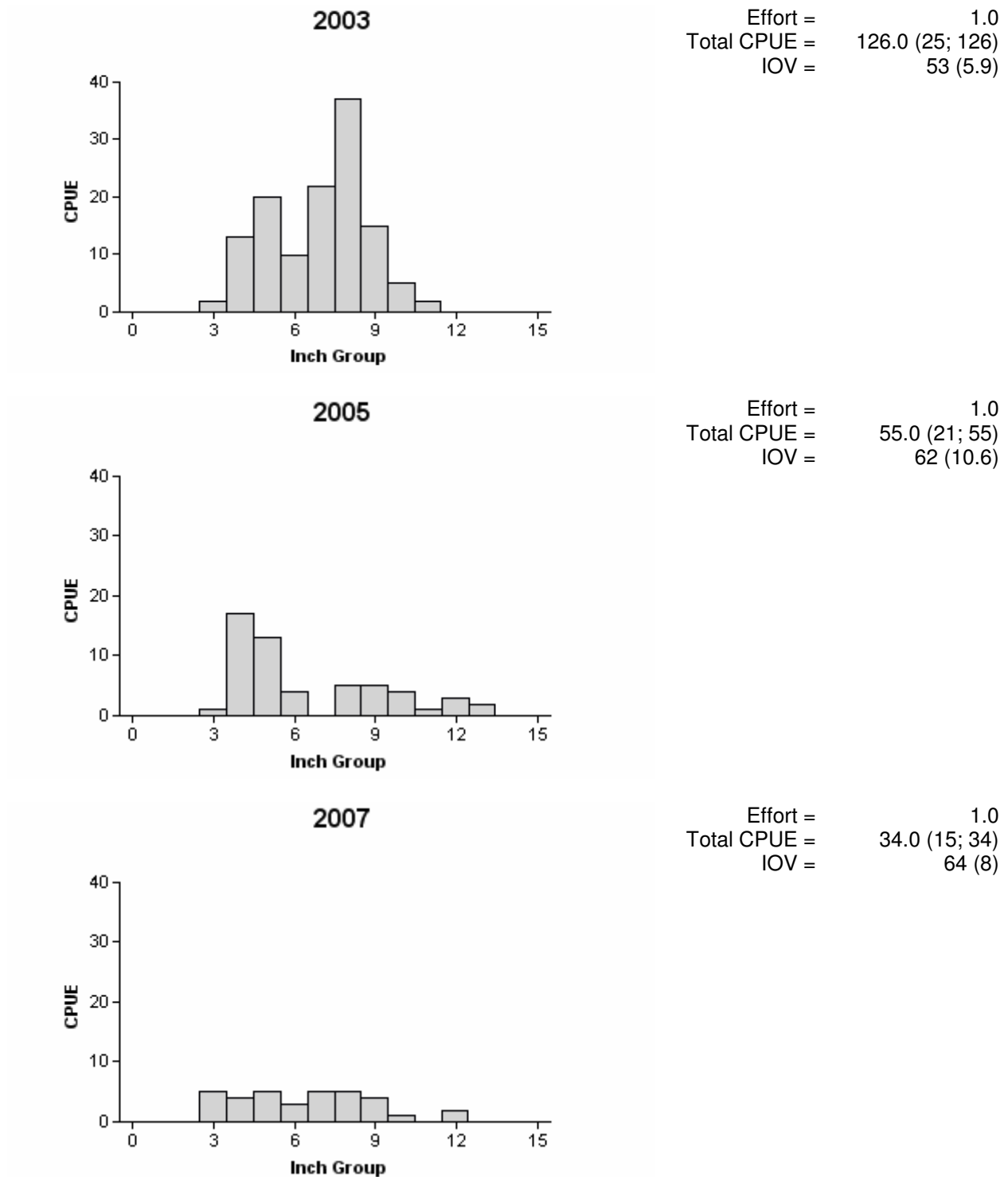


Figure 1. Comparison of the number of gizzard shad caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Wood, Texas, 2003, 2005, and 2007.

## Bluegill

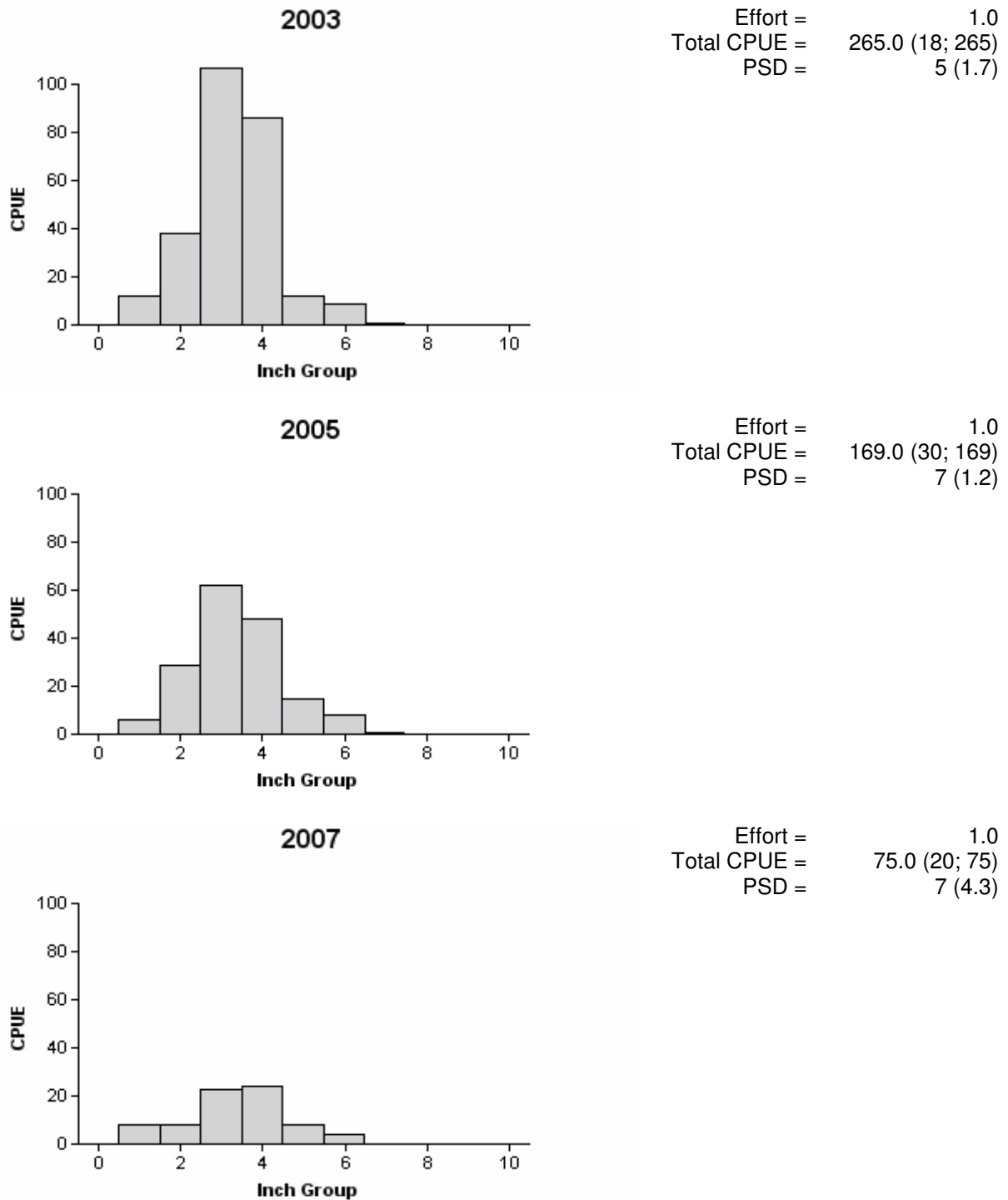


Figure 2. Comparison of the number of bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Wood, Texas, 2003, 2005, and 2007.

## Redear sunfish

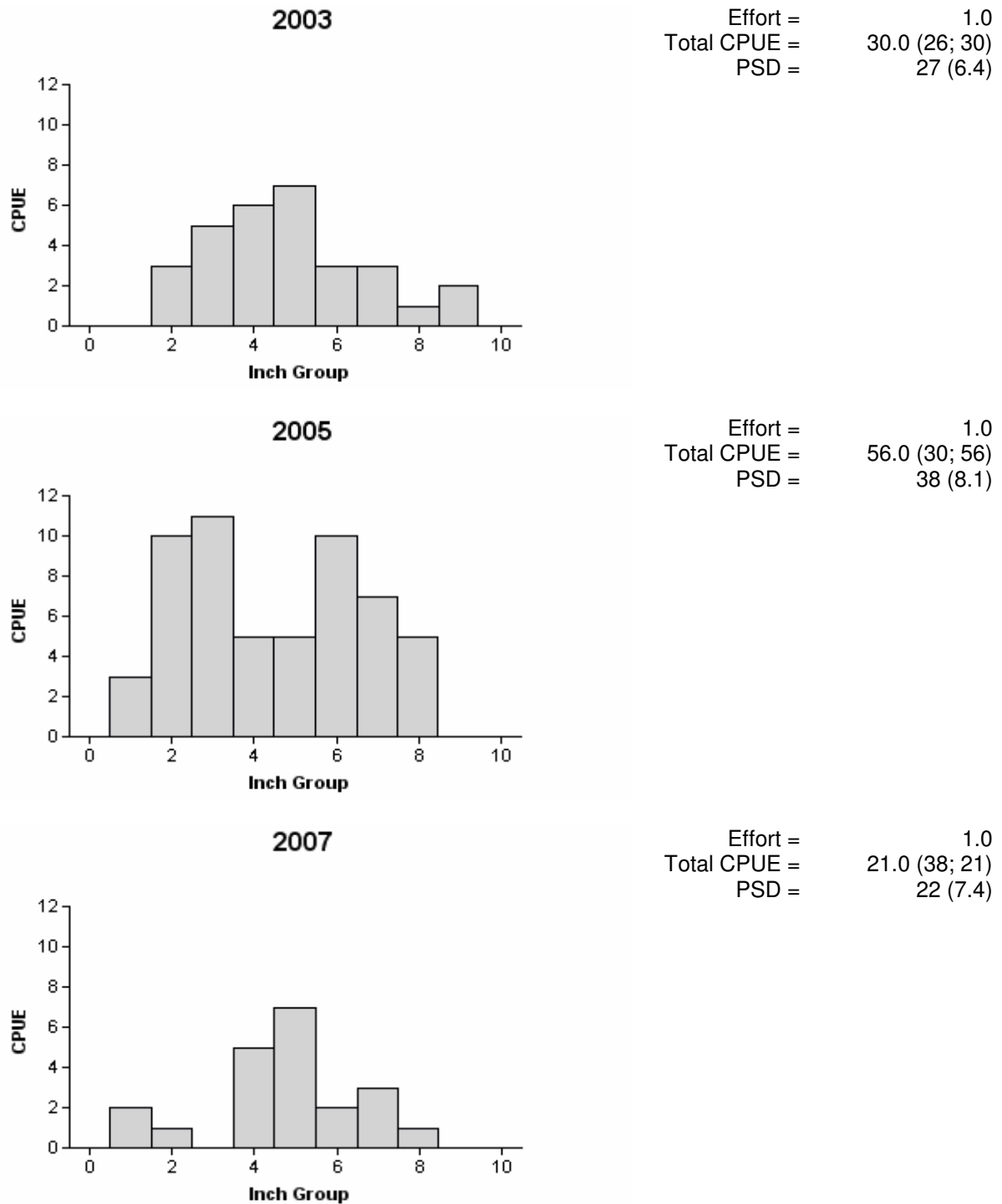


Figure 3. Comparison of the number of redear sunfish caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Wood, Texas, 2003, 2005, and 2007.

## Channel catfish

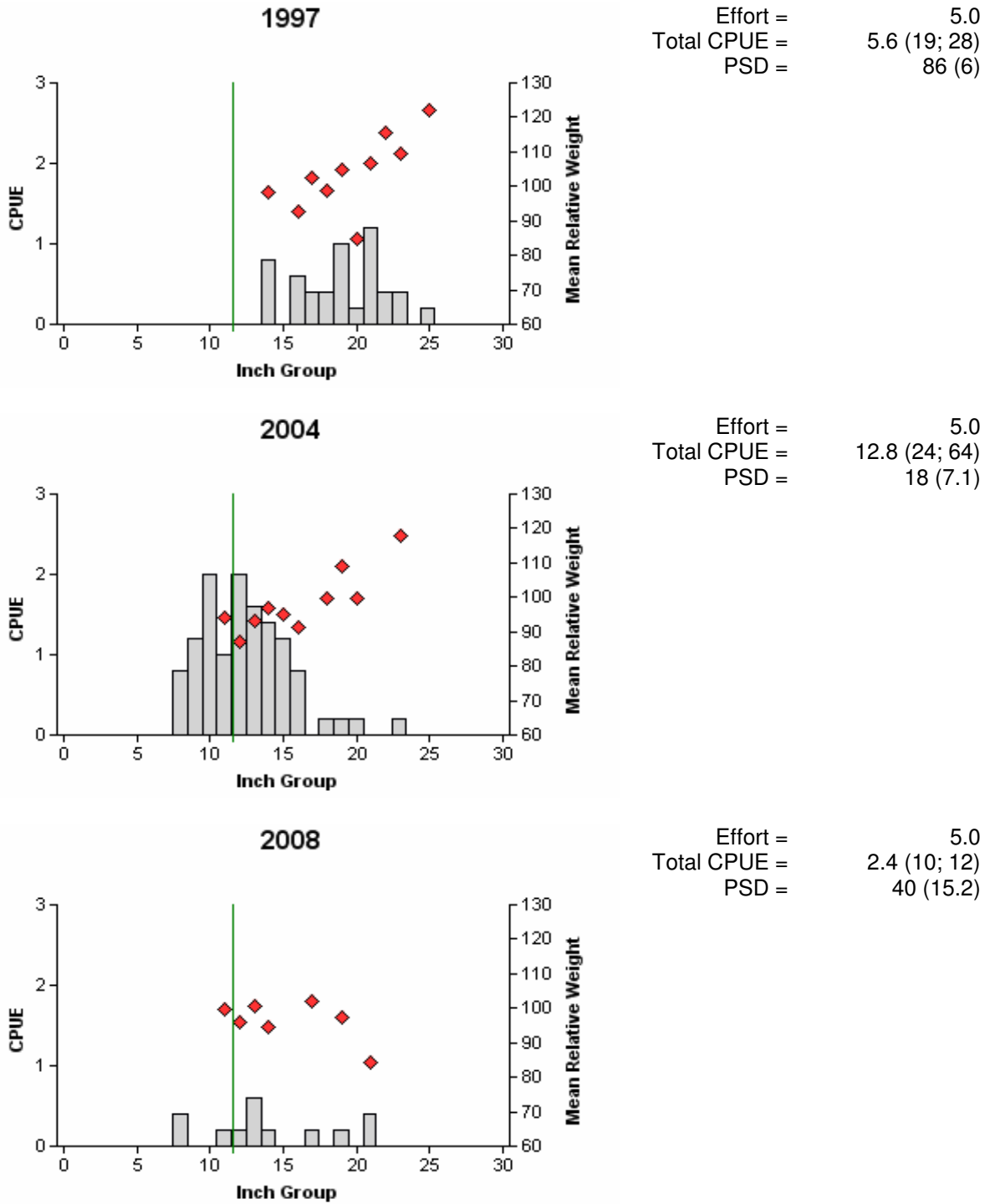


Figure 4. Comparison of the number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Wood, Texas, 1997, 2004, and 2008. Vertical lines denote 12-inch minimum length limit.

## Flathead catfish

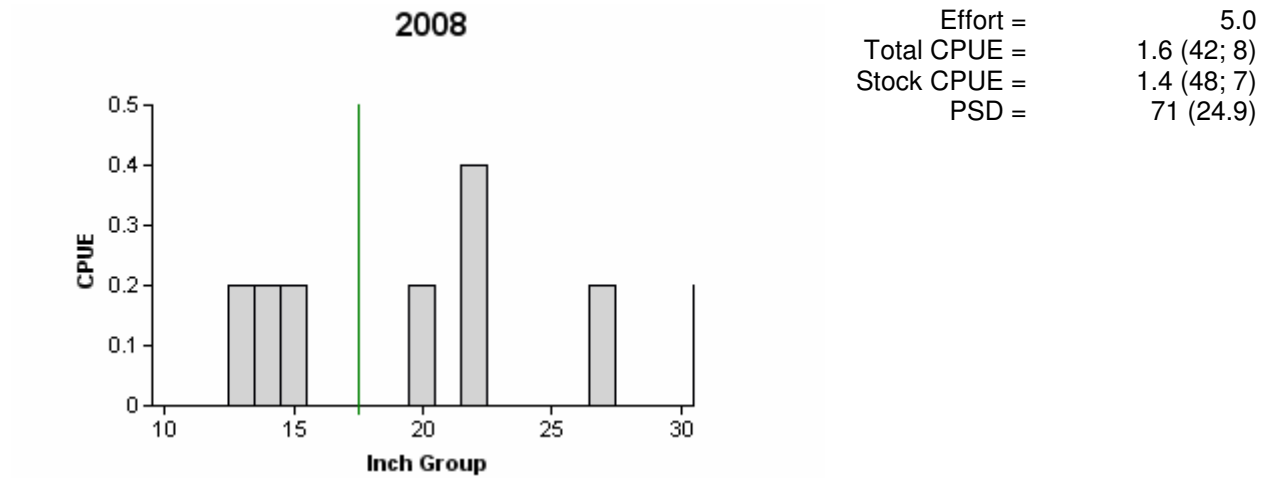


Figure 5. Number of flathead catfish caught per net night (CPUE, bars), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Wood, Texas, 2008. Vertical lines denote 18-inch minimum length limit.



## Largemouth bass

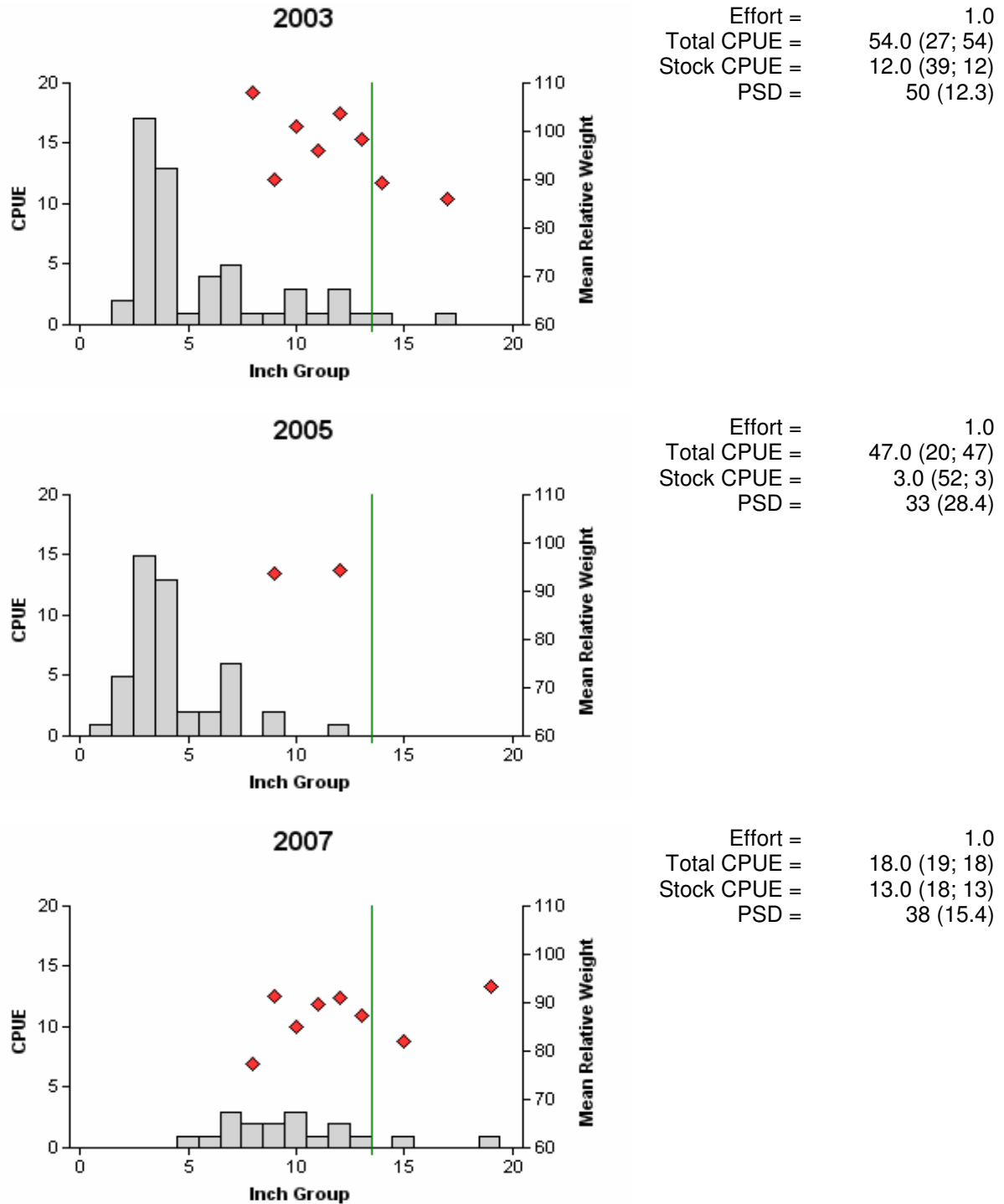


Figure 6. Comparison of the number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Wood, Texas, 2003, 2005, and 2007. Vertical lines denote 14-inch minimum length limit.

## White crappie

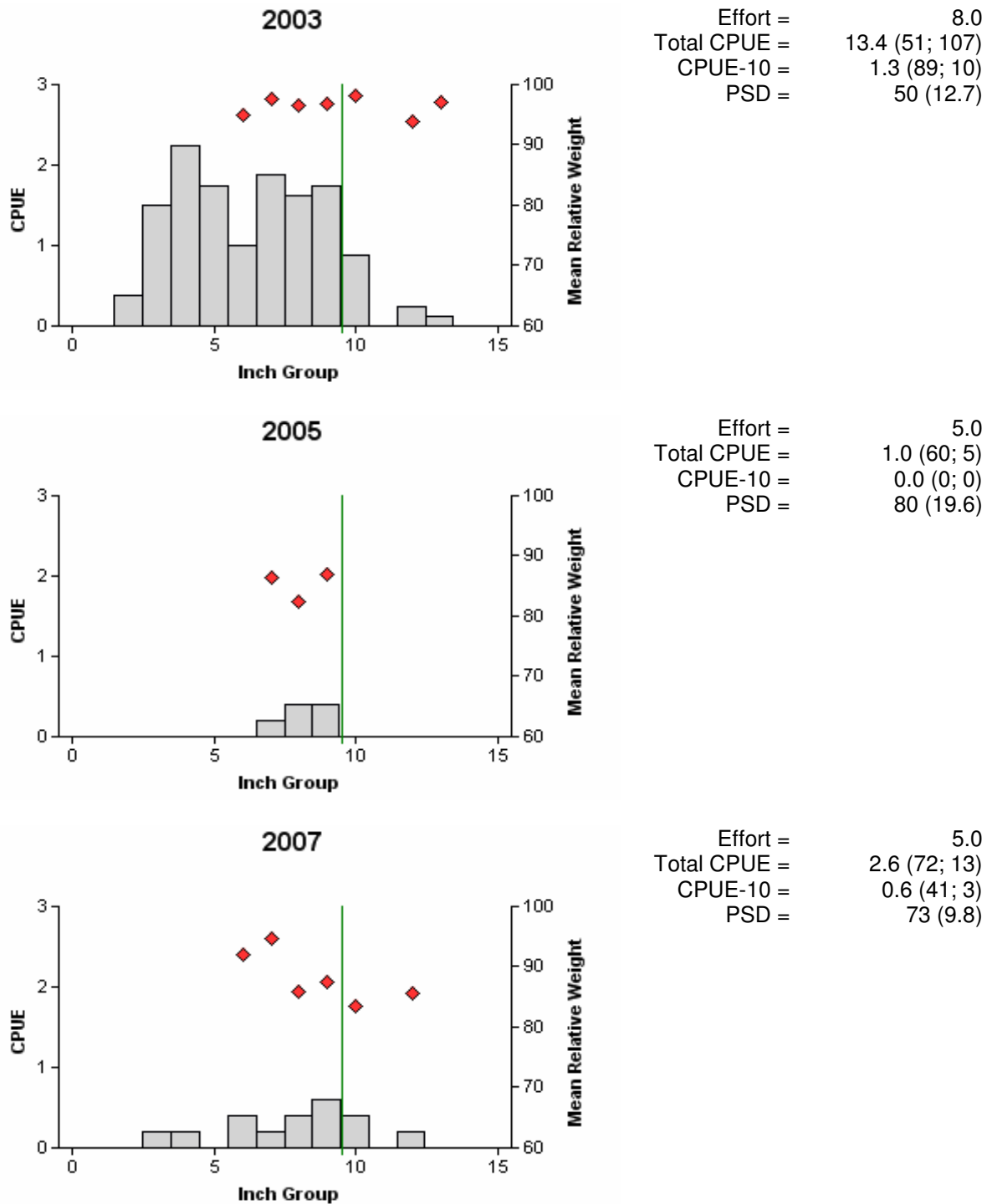


Figure 7. Comparison of the number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, H-4 Reservoir, Texas, 2003, 2005, and 2007. Vertical lines denote 10-inch minimum length limit.

## White crappie

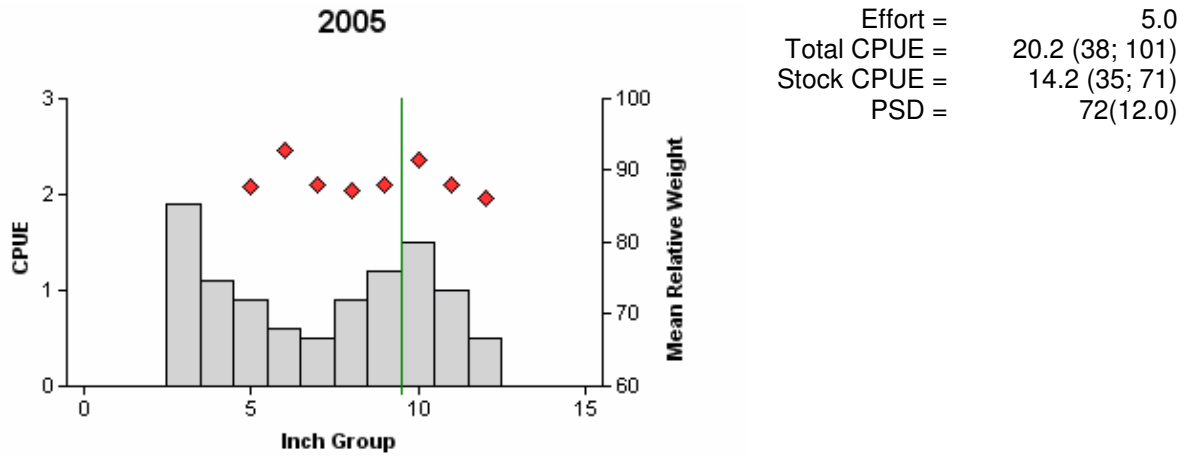


Figure 8. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for biologist selected fall trap net surveys, Lake Wood Reservoir, Texas, 2005. Vertical lines denote 10-inch minimum length limit.

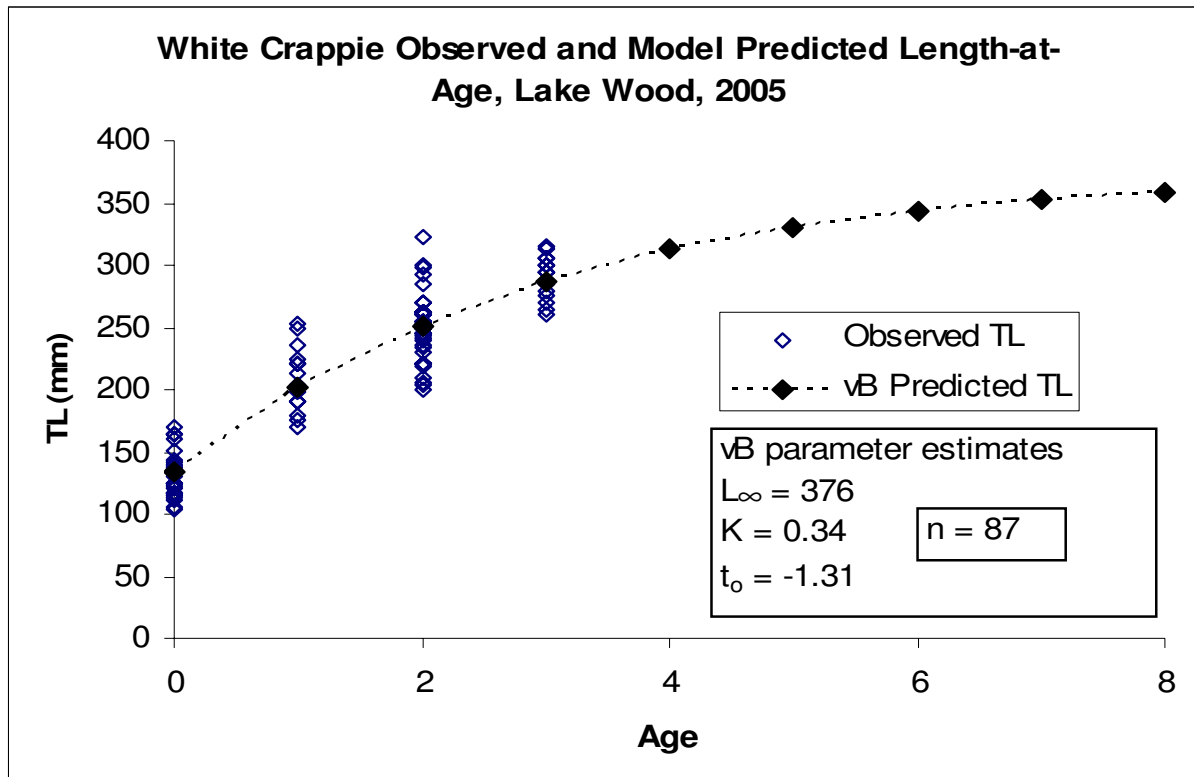


Figure 9. Observed and predicted lengths-at-age from von Bertalanffy growth model, Lake Wood, Texas, 2005. Growth model was generated with fish sampled from both random and fixed sample sites.

Table 5. Proposed survey schedule for Lake Wood, Texas. Trap net and electrofishing surveys are conducted in the fall and the gill net survey is conducted in the spring. Standard surveys are denoted by S.

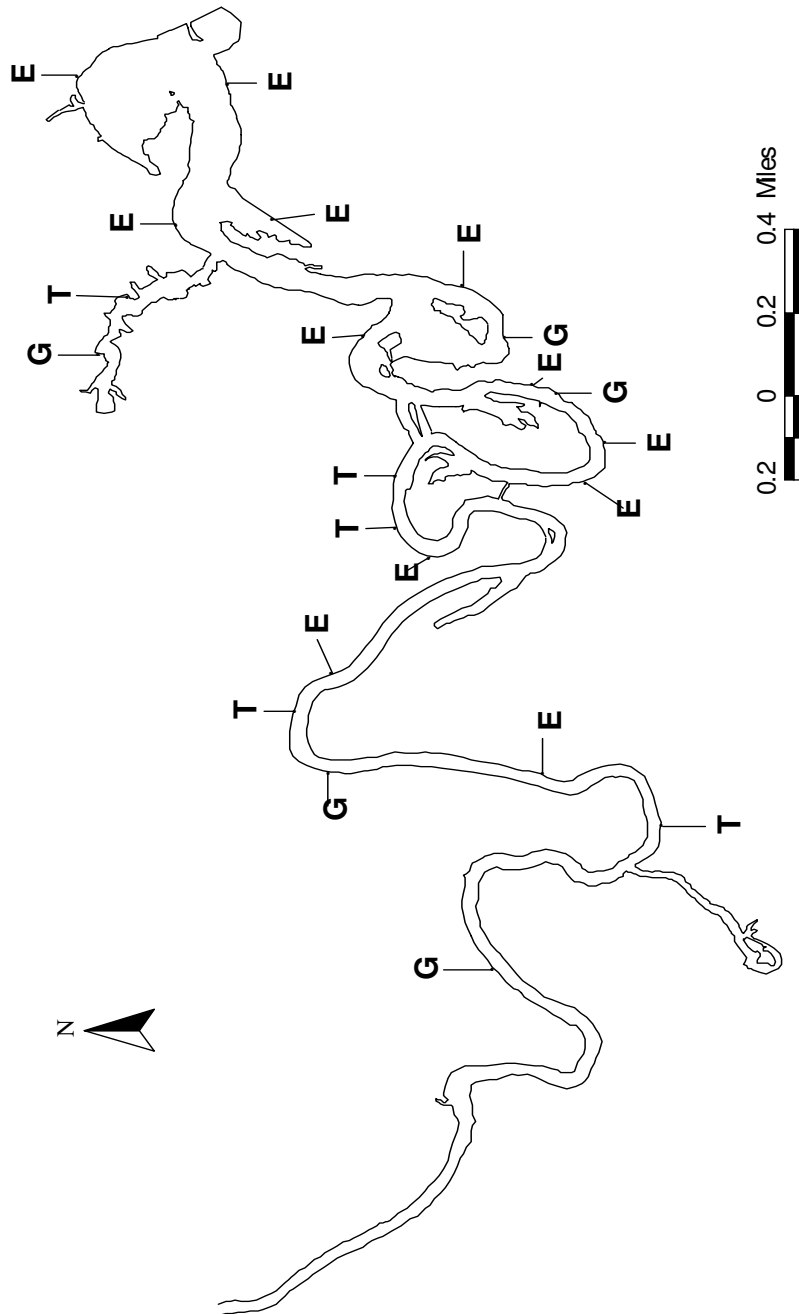
<b>Survey Year</b>	<b>Electrofishing</b>	<b>Trap Netting</b>	<b>Gill Netting</b>	<b>Report</b>
Fall 2008-Spring 2009				
Fall 2009-Spring 2010	S	S		
Fall 2010-Spring 2011				
Fall 2011-Spring 2012	S	S	S	S

**APPENDIX A**

Number (N) and catch rate (CPUE) of all species collected from all gear types from Lake Wood, Texas, 2007-2008.

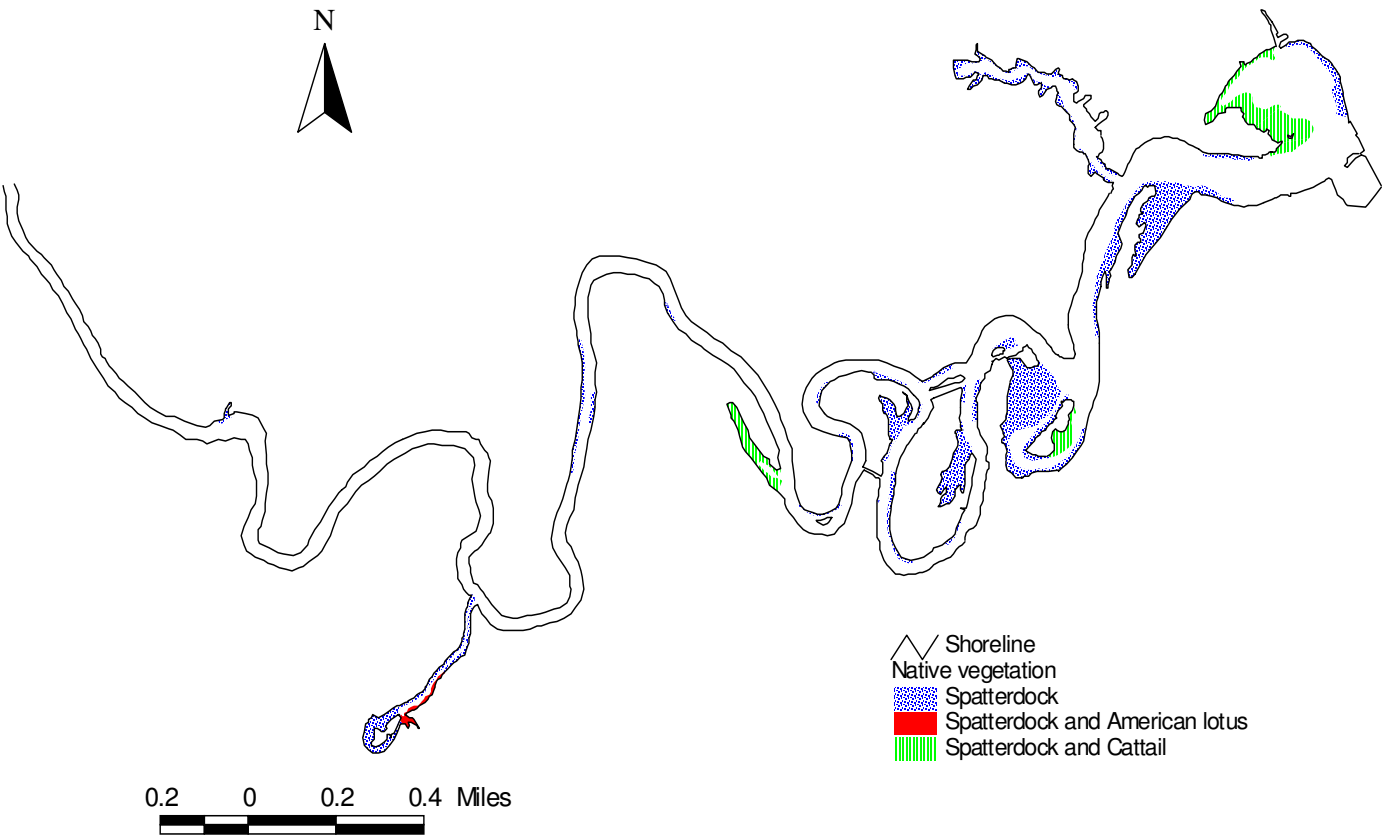
Species	Electrofishing		Trap netting		Gill netting	
	N	CPUE	N	CPUE	N	CPUE
Spotted gar					1	0.2
Longnose gar					1	0.2
Gizzard shad	34	34.0			70	14
Threadfin shad	9	9.0				
Golden shiner					2	0.4
Bullhead minnow	5	5.0				
Inland silverside	1	1.0				
Smallmouth buffalo					31	6.2
Gray redhorse					1	0.2
Blue catfish					7	1.4
Channel catfish					12	2.4
Flathead catfish					8	1.6
Warmouth	10	10.0	1	0.2		
Bluegill	75	75.0	14	2.8		
Longear sunfish	25	25.0	23	4.6		
Redear sunfish	21	21.0				
Spotted bass	3	3.0				
Largemouth bass	18	18.0			1	0.2
Guadalupe bass	1	1.0				
White crappie	4	4.0	13	2.6	6	1.2
Rio Grande cichlid	19	19.0		1.9		

## APPENDIX B



Location of sampling sites, Lake Wood, Texas, 2007-2008. Electrofishing, trap net, and gill net stations indicated by E, T, and G respectively.

## APPENDIX C



## APPENDIX D

