

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-30-R-33

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2007 Survey Report

**Lake Buchanan**

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## SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake Buchanan were surveyed in 2007 using electrofishing and in 2008 using gill nets. This report summarizes the results of the surveys and contains a fisheries management plan for the reservoir based on those findings.

- **Reservoir Description:** Lake Buchanan is a 22,211-acre impoundment of the Colorado River located in Burnet and Llano counties. It was constructed in 1937 by the Lower Colorado River Authority (LCRA) for purposes of hydroelectric power, water supply, flood control, and recreation. The reservoir lies within the Edwards Plateau ecological area. Its drainage area is approximately 31,250 square miles. Shoreline length is approximately 140.6 miles. Only small amounts (<1 acre) of aquatic vegetation have ever been documented in the reservoir.
- **Management History:** Important sport fish include white bass, striped bass, largemouth bass, and catfish species. The management plans for 2003 were to: continue annual stockings of striped bass; monitor the striped bass population with additional gill netting; and, permit the stocking of sunshine bass by the Lake Buchanan Conservation Corporation. Striped bass have been stocked almost annually since 1977, and the reservoir is regarded as one of the best striped bass fisheries in Texas. The Florida subspecies of largemouth bass was stocked in the reservoir in the late 1970's to increase Florida largemouth bass genetic influence in the population. Blue catfish were stocked in 1989 and 1990 to help establish a sustainable population. White bass were managed under an experimental 12-inch minimum length limit from 1995 to 2003. The regulation was rescinded after analysis indicated environmental factors, not angler harvest, were probably more influential in determining white bass population density.
- **Fish Community**
  - **Prey species:** Gizzard shad, redbreast sunfish and bluegill were the predominant sources of forage. Threadfin shad were also available.
  - **Catfishes:** Channel catfish was the dominant catfish species, but blue catfish abundance continues to increase. Flathead catfish were present in low densities.
  - **Temperate basses:** White bass abundance improved in 2008. The gill net catch rate was the highest since 1997. Striped bass gill net catch improved slightly since the last survey, but was still below average. Stress due to high water temperature and low dissolved oxygen in the summer months may be causing decreased body condition and growth of striped bass. Sunshine bass from stockings in 2006 and 2007 were collected in the 2007 and 2008 gill net survey.
  - **Black basses:** Largemouth bass were abundant. A strong year class was produced in 2007, probably the result of increased water elevation. Largemouth bass reach 14 inches by age-2.

### Management Strategies

The reservoir should continue to be managed with existing fishing regulations. Striped bass should continue to be stocked and the population monitored in an effort to maintain the popular fishery. Sunshine bass should continue to be annually stocked to build a fishery for this species. Gill netting should be conducted annually to monitor *Morone* sp. abundance.

## INTRODUCTION

This document is a summary of fisheries data collected from Lake Buchanan in 2007 and 2008. 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 species of fishes was collected, this report deals primarily with major sport species and important prey species. Fisheries management strategies are included to address existing problems or opportunities. Historical data is presented with the 2007 and 2008 data for comparison.

### *Reservoir Description*

Lake Buchanan is a 22,211-acre impoundment of the Colorado River located in Burnet and Llano counties. It was constructed in 1937 by the Lower Colorado River Authority (LCRA) for purposes of hydroelectric power, water supply, flood control, and recreation. The reservoir lies within the Edwards Plateau ecological area. Its drainage area is approximately 31,250 square miles. Shoreline length is approximately 140.6 miles. This reservoir experiences extreme water level fluctuations (Figure 1). Shoreline habitat at the time of sampling consisted mostly of sandy and rocky bank. No aquatic vegetation was present. Angler access was adequate for boat anglers when the water level was at least 1004 feet above mean sea level. When water level fell below this elevation, boat access was poor, since most of the public ramps became unusable. Four public boat ramps were available. The Llano County boat ramp is being improved to be more accessible at low water levels. Bank fishing was available at four public parks. Handicapped access was poor with no specific handicap accessible fishing sites available. Other descriptive characteristics for Lake Buchanan are in Table 1.

### *Management History*

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

1. Stock striped bass and monitor the population with additional gill net surveys.

**Action:** Striped bass were stocked and additional gill net sampling was conducted in 2006, 2007 and 2008. Additional gill netting effort (N = 15 net/nights) was expended to improve the precision of relative abundance.

2. Permit the stocking of sunshine bass by the Lake Buchanan Conservation Corporation.

**Action:** Sunshine bass were stocked in 2006 (fry) and 2007 (fingerlings).

**Harvest Regulation History:** Sport fish in Lake Buchanan are currently managed with statewide regulations (Table 2). The white bass minimum length limit was reduced to 10 inches in September 2003 since analyses suggested that population densities were probably determined by environmental factors rather than angler harvest.

**Stocking History:** Annual striped bass stockings at a rate of 15/acre have been requested since 2004 to maintain this popular fishery. Florida largemouth bass were introduced in 1978 to increase Florida largemouth bass genetic influence and an additional stocking was recommended for spring 2008. A complete stocking history is in Table 3.

**Aquatic Vegetation/habitat history:** Lake Buchanan had no aquatic vegetation coverage. Most of the shoreline habitat was comprised of sand and broken rocks (Table 4).

## METHODS

Fishes were collected by electrofishing (2.0 hours at 24 stations) and gill netting (30 net nights at 30 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 netting as the number of fish caught in one net set overnight (fish/nn). All survey sites were randomly selected and all surveys were conducted according to the Texas Parks and Wildlife Department Inland Fisheries Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual, revised 2005). Trap netting for white crappie was not performed due to historically low catch rates and high cost associated with collecting these data. A habitat survey has not been conducted since 2004. No large scale structural habitat changes have occurred in the interim.

Sampling statistics (CPUE for various length categories) and structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)], and condition indices [relative weights (Wr)] were calculated for target fishes according to Anderson and Neumann (1996). No weight data was collected for largemouth bass in 2008, so relative weight could not be calculated. The Index of Vulnerability (IOV) was used to determine the percentage of gizzard shad vulnerable to predation (DiGenzo et al. 1996). Relative standard error ( $RSE = 100 \times SE \text{ of the estimate/estimate}$ ) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. Ages for temperate basses were obtained using otoliths from all individuals sampled. Ages were determined for LMB using otoliths from 177 individuals (category 4 age analysis for 14-inch LMB; (TPWD, Inland Fisheries Division, unpublished manual, revised 2005). Largemouth bass electrophoresis samples were collected according to the Texas Parks and Wildlife Department Inland Fisheries Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2005). Genotype identification of F1 hybrid LMB was omitted in 2007 due to high probability of misidentification resulting from low numbers of loci available for analysis. Water level data was provided by the LCRA.

## RESULTS AND DISCUSSION

**Habitat:** In 2004 shoreline habitat was comprised mostly of sand and broken rock (Table 4).

**Prey species:** Electrofishing catch rates of gizzard shad, redbreast sunfish and bluegill were 268.0/hour, 45.5/hour and 107.0/hour, respectively. Index of Vulnerability (IOV) for gizzard shad was 91, indicating that 91% of gizzard shad were vulnerable to existing predators (Figure 2). Total CPUE of gizzard shad was also considerably higher in 2007 (268.0/nn) than in 2003 (132/nn) (Figure 2). Threadfin shad were also present. Total CPUE of redbreast sunfish in 2007 was 45.5/h, much lower than the CPUE from the 2003 survey (259.0/h), but similar to the 1999 survey (46.5/h) (Figure 3). Total CPUE of bluegill in 2007 was 107.0/h, lower than total CPUE from the 2003 survey (187.5/h) and size structure continued to be dominated by small individuals (< 5 inches) (Figure 4).

**Blue catfish:** Blue catfish abundance has increased (Figure 5). Total gill netting catch has increased each year since 2002 (Appendix A). The gill net catch rate of blue catfish was 2.7/nn in 2008. Body condition in 2007 was sub-optimal (relative weights less than 100) for many size classes of fish, but remained similar to body condition from previous surveys (Figure 5).

**Channel catfish:** The total gill net catch rate of channel catfish was 3.1/nn in 2008. The channel catfish population continued to show good abundance, with most individuals exceeding 12 inches (Figure 6). Body condition in 2007 was sub-optimal (relative weights below 100) for nearly all size classes, which was similar to previous surveys (Figure 6).

**Flathead catfish:** The total gill net catch rate for flathead catfish was 0.4/nn in 2008. The flathead catfish population continued to show low relative abundance, with a population structure dominated by large

individuals (Figure 7). Body condition in 2007 was sub-optimal (relative weights under 100) for many size classes of fish, and remained similar to body condition from the 2007 survey (Figure 7).

**White bass:** The total gill net catch rate of white bass was 7.3/nn in 2008. This catch rate was much higher than previous surveys (Figure 8) and was the highest catch rate since 1997 (Appendix B). The increase in abundance can be attributed to a strong year class produced in 2007, probably as a result of high river inflows (Dicenzo and Duval 2002) and increased reservoir elevation (Figure 1). Age and growth data revealed that many white bass reach harvest size (10 inches) by age 1 (Figure 9), which is considered fast growth compared to other eco-regions of Texas (Prentice 1987).

**Striped bass:** The total gill net catch rate of striped bass was 2.6/nn in 2008, which was slightly improved from the previous two surveys (Figure 10). However, this catch rate was still below the mean catch rate since 1996 (3.4/nn) (Appendix C). Reduced total gill net catch may be the result of a missed stocking in 2001 and decreased stocking rates (6-7/a) from 2003 through 2005. The missed stocking and reduced stocking rates were the result of lost striped bass hatchery production due to golden alga (*Prymnesium parvum*). Gill net sampling methodology changes (subjective versus random sampling site selection), which were first implemented at Lake Buchanan in 2004, may also be responsible for decreased gill net catch rate in the last four samples.

The 2002 stocking, which was more than double previous rates (26/A versus about 11/A), accounted for most of the striped bass caught in the 2006 and 2007 surveys (Appendices D and E). While this stocking accounted for a large percentage of the population, striped bass catch rate did not increase. Increased stocking rates in 2006 (12.2/a) and 2007 (15.1/a) may improve total gill netting catch in future years as these individuals become more susceptible to gill netting gear. In 2008 these year classes accounted for 58% of the striped bass collected in gill nets (Appendix E). Age and growth data revealed that striped bass reached legal length (18 inches) during their second growing season (Figure 11). Growth beyond age three was slow and might be attributed to stress in the summer months from high water temperatures and low dissolved oxygen levels (Appendix F). Adult striped bass will seek water temperature less than 25 C and oxygen levels greater than 3-4 mg/L (Coutant 1985), but they can tolerate higher temperatures for brief periods if dissolved oxygen concentrations remain above 2 mg/l (Farquhar and Gutreuter 1989; Zale et al. 1990). Bettoli (2005) indicated that preferred temperatures might be even lower than previously reported in the literature (18-24 C), with a mean preferential temperature during the growing season of only 17.5 C. Adult striped bass seek out lower temperatures as they age, and are often "squeezed" between their thermal and dissolved oxygen preferences (Coutant 1985). Adults often seek cooler water that is low in dissolved oxygen, which causes stress. At Lake Buchanan it appeared that August and September conditions at the dam, where one would expect the best temperature and dissolved oxygen-at-depth, were stressful to adult striped bass (Appendix F). Body condition for most inch groups was much better in 2008 than previous surveys (Figure 10), but as reported previously (Bonds and Magnelia 2004) body condition for larger fish (>20 inches), while better, was still suboptimal. Chronic poor body condition of older adult striped bass may also be a symptom of annual temperature/dissolved oxygen squeeze, rather than high stock densities of predators or prey deficiencies as reported in 2004 (Bonds and Magnelia 2004).

**Sunshine bass:** Sunshine bass were stocked in 2006 (fry) and 2007 (fingerlings). Almost all (91%) of these were from the 2007 stocking. So few individuals were collected (N = 11) that a precise estimate of growth could not be calculated, although it appeared sunshine bass reached 10-12 inches by age-1 and 17 inches by age-2.

**Largemouth bass:** The total electrofishing catch rate of largemouth bass was 125.0/h in 2007, which was much higher than the previous two surveys (Figure 14). Size structure was dominated by sub-legal individuals. It appears a strong year class was produced in spring 2007, which was probably the result of higher reservoir elevation after low elevation (drought) conditions in 2006 (Figure 1). The number of legal length bass in the reservoir will probably increase in the next few years as a result of this strong year

class. Legal length (14 inches) was attained between 1 and 2 growing seasons (Figure 15). The percentage of alleles from the Florida sub-species of largemouth bass has increased over the last two surveys (Table 5).

## Fisheries management plan for Lake Buchanan, Texas

Prepared - July 2008.

**ISSUE 1:** Striped bass abundance is lower than years prior to 2004. Striped bass fishing guides and resort owners have complained of poor fishing for striped bass.

### MANAGEMENT STRATEGY

1. Request striped bass fingerlings be stocked once per year at a rate of 15/acre.
2. Annual gill netting should be conducted to monitor striped bass abundance.

**ISSUE 2:** Despite what appears to be a high density gizzard shad population striped bass body condition has historically been sub-optimal. This may be the effects of summer temperature/oxygen stress. Anecdotal reports from striped bass guides indicate catch rates for striped bass in the summer are poor. Sunshine bass may provide better fishing opportunities in the summer months as they are not as temperature sensitive as striped bass.

### MANAGEMENT STRATEGY

1. Continue granting a permit to the Lake Buchanan Conservation Corporation (LBCC) for stocking sunshine bass.
2. Encourage LBCC to annually stock sunshine bass until data (abundance and growth) can be gathered on the sunshine bass population.
3. Monitor the development of the sunshine bass population with annual gill netting.
4. Age all sunshine bass collected to monitor year class strength and growth.

**ISSUE 3:** Lake Buchanan has good populations of three species of catfish. Blue catfish abundance has increased and trophy size (>30 inches in length) individuals are available for anglers. Anglers may be unaware of these fisheries.

### MANAGEMENT STRATEGY

1. A news release should be prepared promoting the catfish fishery.

### **SAMPLING SCHEDULE JUSTIFICATION:**

The proposed sampling schedule will constitute mandatory sampling in 2011/2012; with additional gill netting surveys each year to assess the abundance and condition of striped and sunshine bass (Table 6).

## 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.
- Bettoli, P.W. 2005. The fundamental thermal niche of adult landlocked striped bass. Transactions of the American Fisheries Society 134:305-314.
- Bonds, C.C., and S.J. Magnelia. 2004. 2003 survey report for Buchanan Reservoir. Texas Parks and Wildlife Department, Federal Aid in Sportfish Restoration Project F-30-R, Job No. 29. Austin. 34 pp.
- Coutant, C.C. 1985. Striped bass, temperature, and dissolved oxygen: A speculative hypothesis for environmental risk. Transactions of the American Fisheries Society 114:31-61.
- 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.
- DiCenzo, V.J., and M.C. Duval. 2002. Importance of reservoir inflow in determining white bass year-class strength in three Virginia reservoirs. North American Journal of Fisheries Management 22:620-626.
- Farquhar, B.W., and S. Gutreuter. 1989. Distribution and migration of adult striped bass in Lake Whitney, Texas. Transactions of the American Fisheries Society 118:523-532.
- Prentice, J.A. 1987. Length-weight relationships and average growth rates of fishes in Texas. Texas Parks and Wildlife Department, Inland Fisheries Management Data Series Number 6. Austin, TX.
- Zale, A.V., J.D. Wiechman, R.L. Lochmiller, and J. Burroughs. 1990. Limnological conditions associated with summer mortality of striped bass in Keystone Reservoir, Oklahoma. Transactions of the American Fisheries Society 119:72-76.



Table 2. Harvest regulations for Lake Buchanan.

Species	Bag limit	Length limit (inches)
Bass: largemouth	5*	14 minimum
Bass: Guadalupe	5*	No minimum limit
Striped bass	5	18 minimum
Sunshine bass	5	18 minimum
White bass	25	10 minimum
Flathead catfish	5	18 minimum
Catfish: channel and blue catfish	25 (in any combination)	12 minimum

\*Five largemouth and Guadalupe bass in any combination.

Table 3. Stocking history of Buchanan Reservoir, Texas. Life stages are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL), adults (ADL) and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species mean total length (Mean TL; in) is given. For years where there were multiple stocking events for a particular species and life stage the mean TL is an average for all stocking events combined.

<b>Species</b>	<b>Year</b>	<b>Number</b>	<b>Life Stage</b>	<b>Mean TL (in)</b>
Blue catfish	1989	230,662	FGL	2.3
	1990	235,378	FGL	2.1
	Total	466,040		
Channel catfish	1969	61,410	AFGL	7.9
	Total	61,410		
Florida Largemouth bass	1978	32,000	FGL	2.0
	1978	318,400	FRY	0.9
	2008	116,334	FGL	1.8
	Total	466,734		
Largemouth bass	1969	500,000	FRY	0.7
	Total	500,000		
Striped bass	1977	231,726	UNK	UNK
	1978	153,400	UNK	UNK
	1979	69,228	UNK	UNK
	1980	285,046	UNK	UNK
	1983	229,638	UNK	UNK
	1984	343,178	FGL	2.0
	1985	587,950	FGL	2.0
	1986	37,300	FGL	2.0
	1986	260,172	FRY	1.0
	1987	232,608	FRY	1.0
	1988	230,728	FRY	1.0
	1989	232,608	FGL	1.2
	1990	238,908	FGL	1.6
	1991	350,706	FGL	1.5
	1992	93,450	ADL	31.7
	1992	60,223	FGL	1.4
	1993	117,410	FGL	1.3
	1993	145,119	FRY	1.0
	1994	1,000	AFGL	7.4
1994	464,297	FGL	1.2	
1995	236,210	FGL	1.2	
1996	128,052	FGL	1.3	
1997	232,705	FGL	1.2	

<b>Species</b>	<b>Year</b>	<b>Number</b>	<b>Life Stage</b>	<b>Mean TL (in)</b>
	1998	215,000	FGL	1.3
	1999	239,870	FGL	1.4
	2000	235,733	FGL	1.6
	2002	580,900	FGL	1.4
	2003	137,472	FGL	1.5
	2004	127,512	FGL	1.6
	2005	150,100	FGL	1.1
	2006	270,729	FGL	1.8
	2006	1,070,311	FRY	0.3
	2007	333,549	FGL	1.7
	2007	1,333,875	FRY	0.2
	Total	9,656,713		
Sunshine Bass (white bass x striped bass hybrid)	2006	500,000	FRY	0.2
	2007	128,400	FGL	0.9
	Total	628,400		
Walleye	1975	265,000	FRY	0.2
	1976	205,000	FRY	0.2
	1977	4,843,332	FRY	0.2
	Total	5,313,332		

Table 4. Survey of shoreline habitat types, Lake Buchanan, Texas, 2004. A linear shoreline distance (miles) was recorded for each habitat type found.

Shoreline habitat type	Shoreline distance	
	Miles	Percent of total
Sandy bank	45.0	62
Broken rock	25.0	35
Rock bluff	1.9	3
Concrete	0.2	<1

## Gizzard Shad

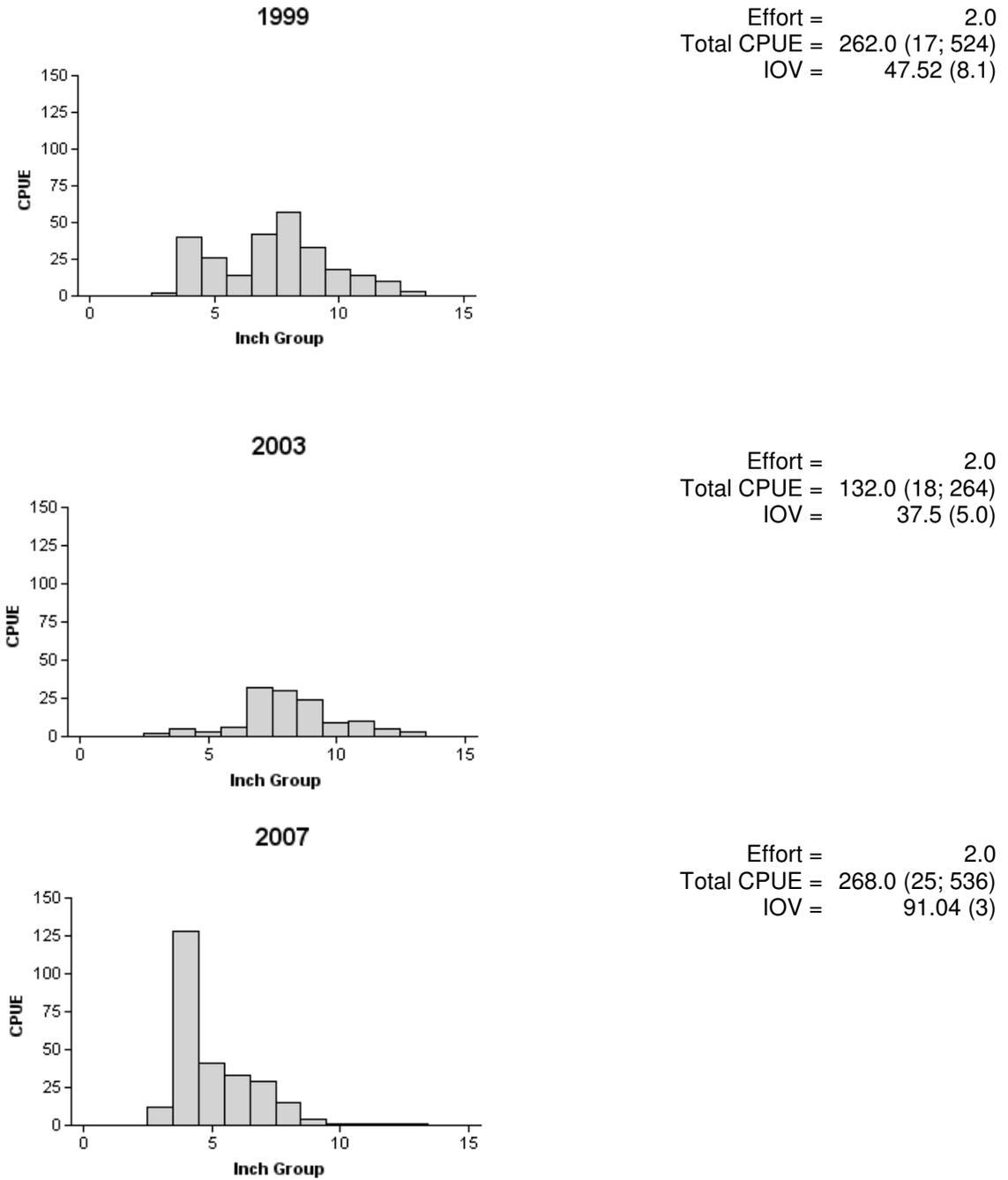


Figure 2. Number of gizzard shad caught per hour (CPUE) population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Buchanan, Texas, 1999, 2003 and 2007.

## Redbreast Sunfish

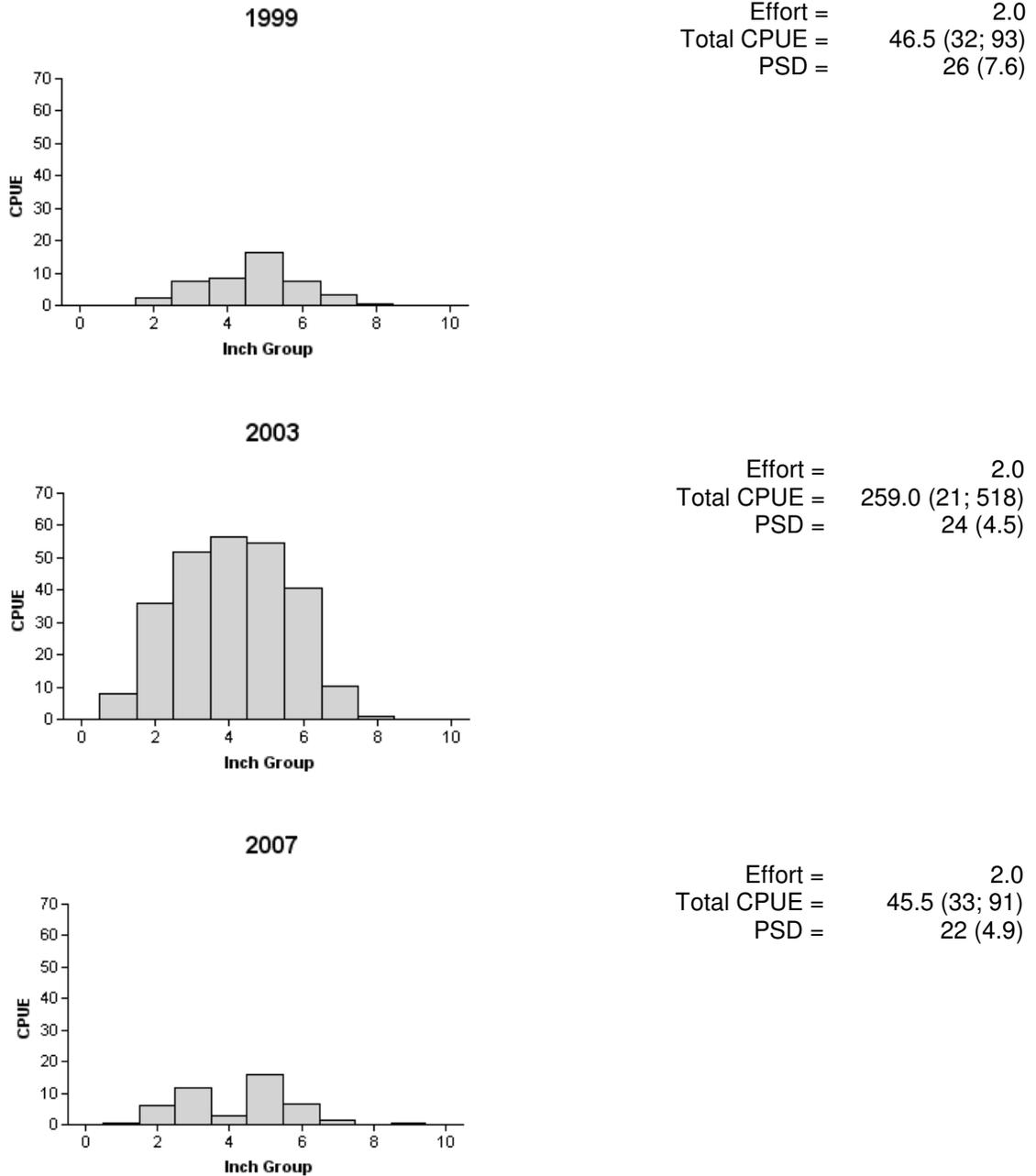


Figure 3. Number of redbreast sunfish caught per hour (CPUE) population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Buchanan, Texas, 1999, 2003 and 2007.

# Bluegill

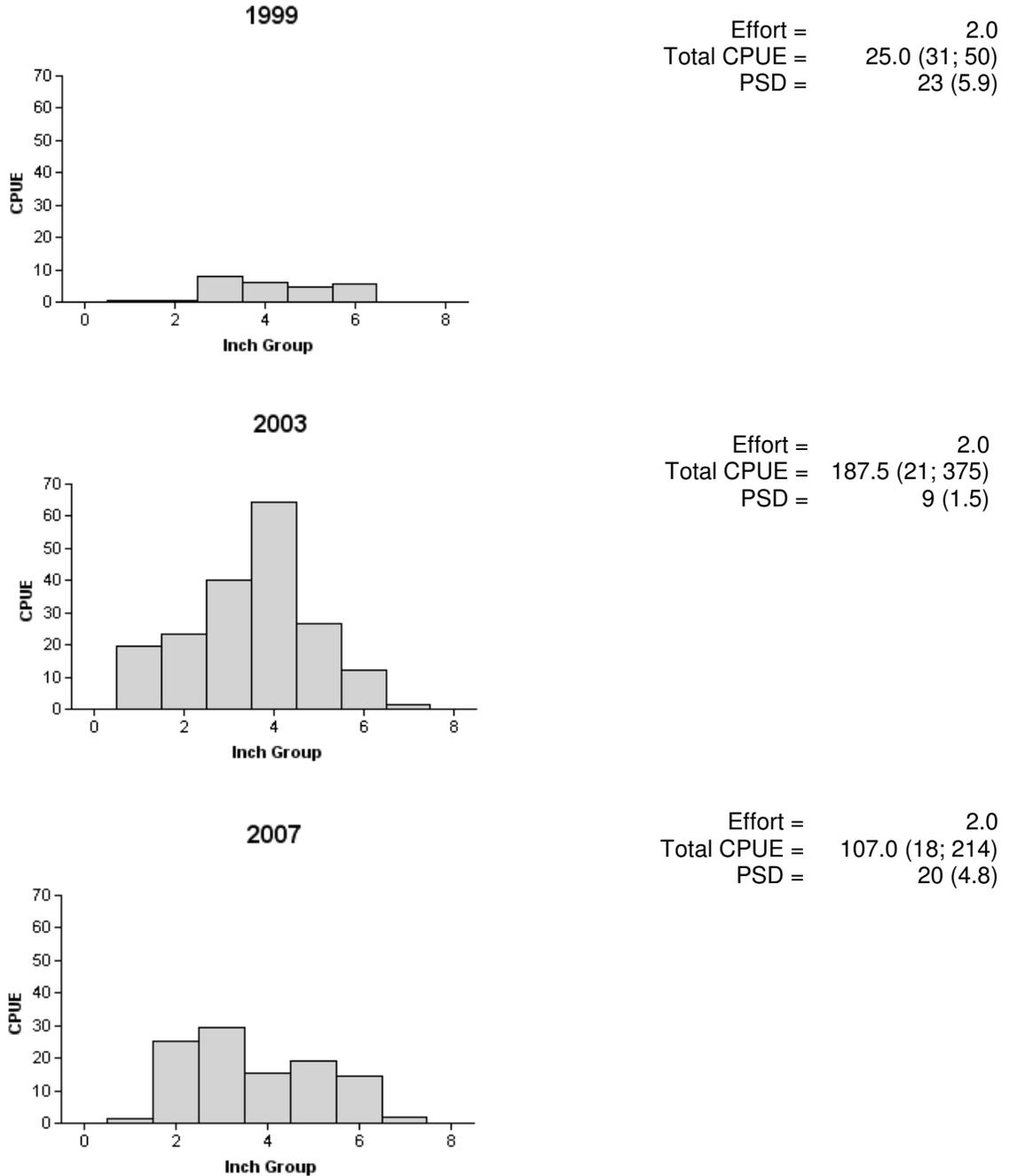


Figure 4. Number of bluegill caught per hour (CPUE) population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Buchanan, Texas, 1999, 2003 and 2007.

## Blue Catfish

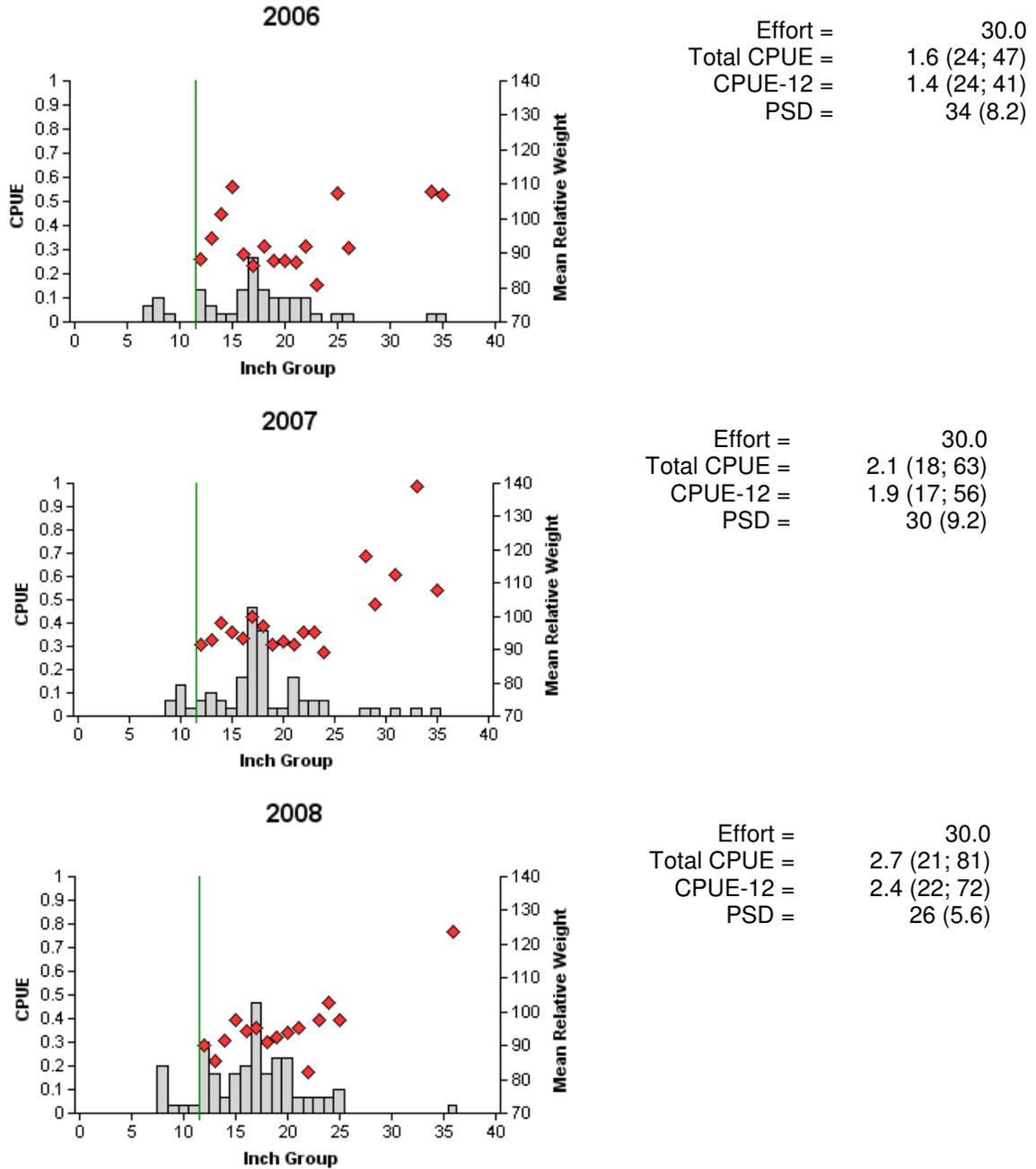


Figure 5. Number of blue catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Buchanan, Texas, 2006, 2007 and 2008. Minimum length limit indicated by vertical line.

## Channel Catfish

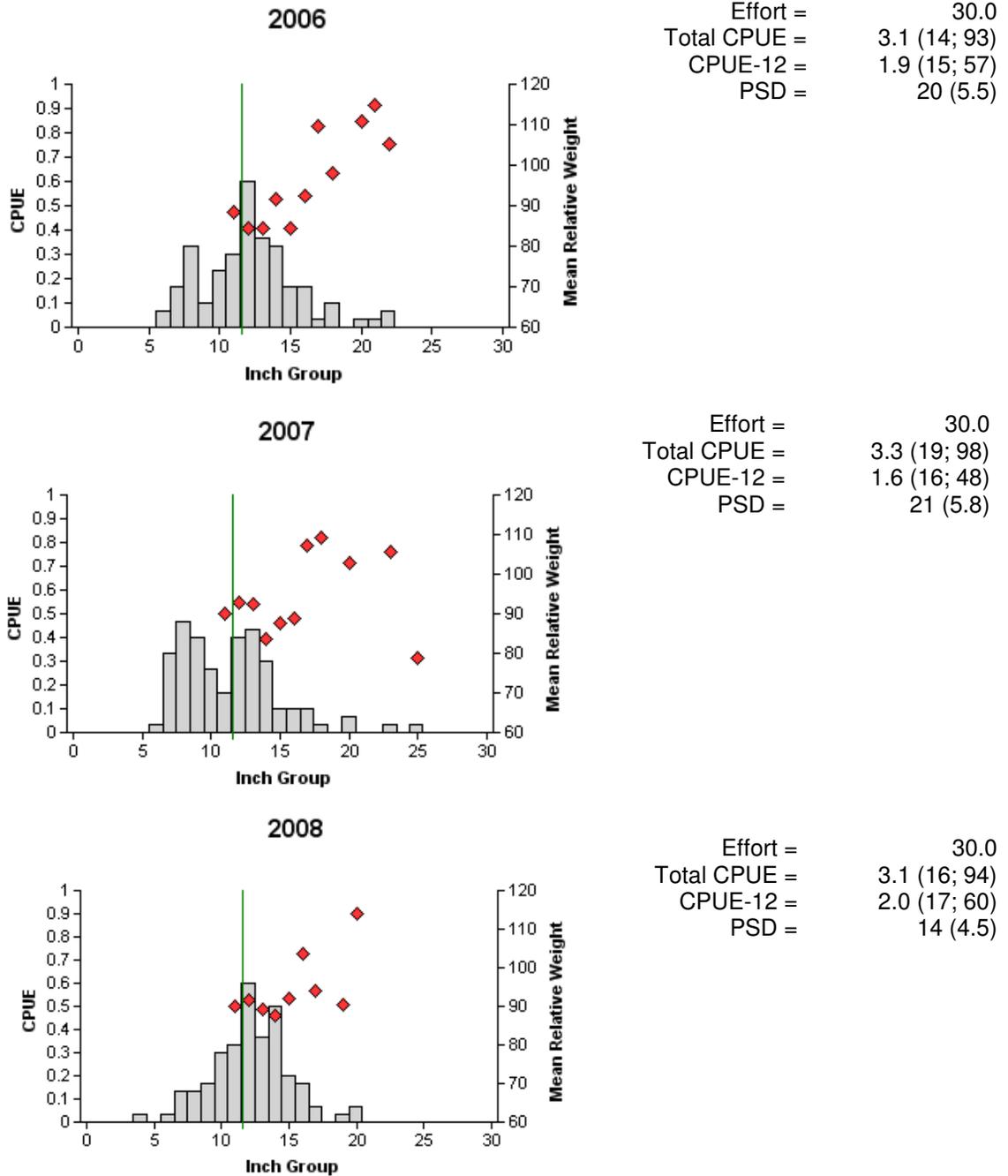


Figure 6. Number of channel catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Buchanan, Texas, 2006, 2007 and 2008. Minimum length limit indicated by vertical line.

## Flathead Catfish

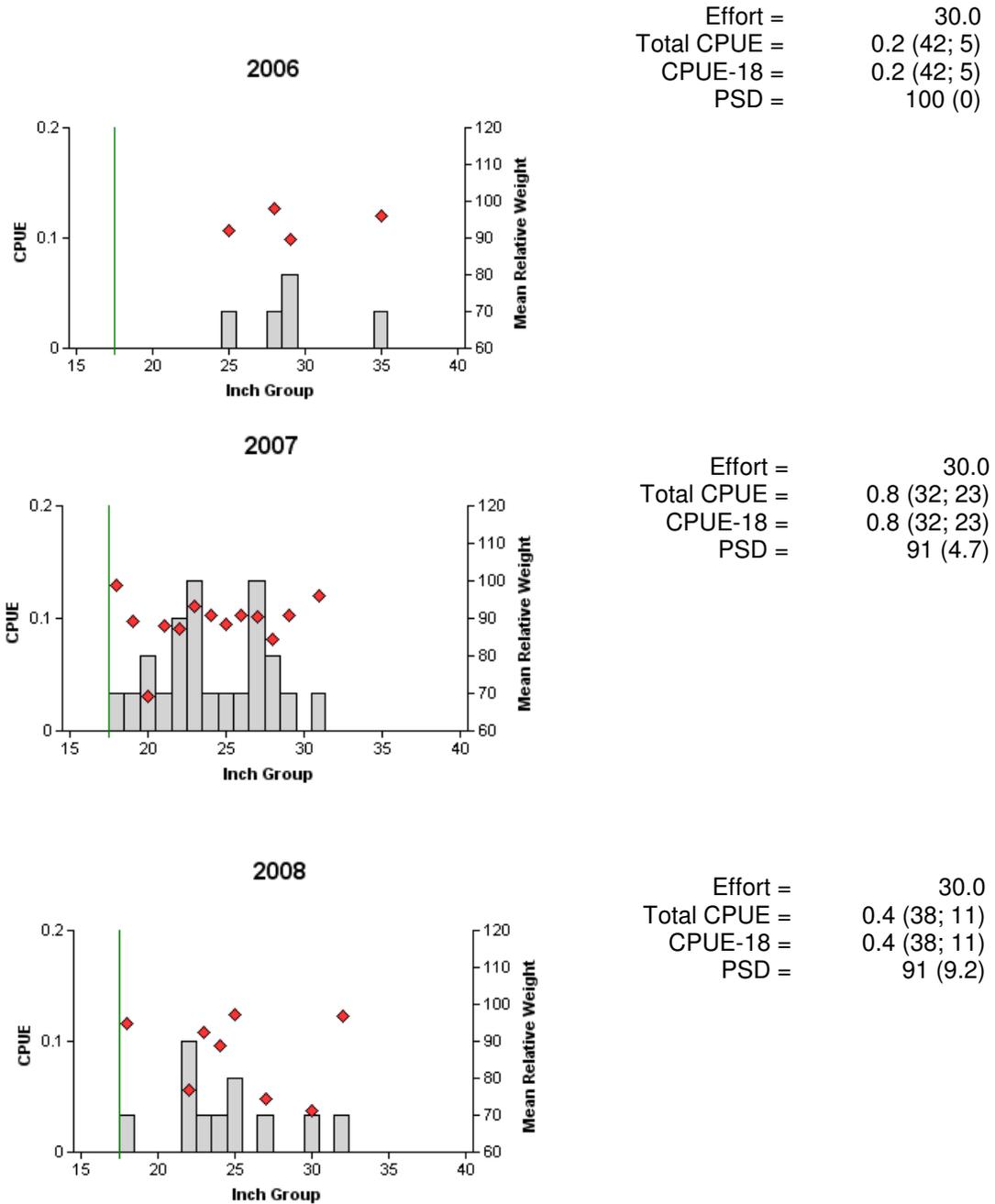


Figure 7. Number of flathead catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Buchanan, Texas, 2006, 2007 and 2008. Minimum length limit indicated by vertical line.

## White Bass

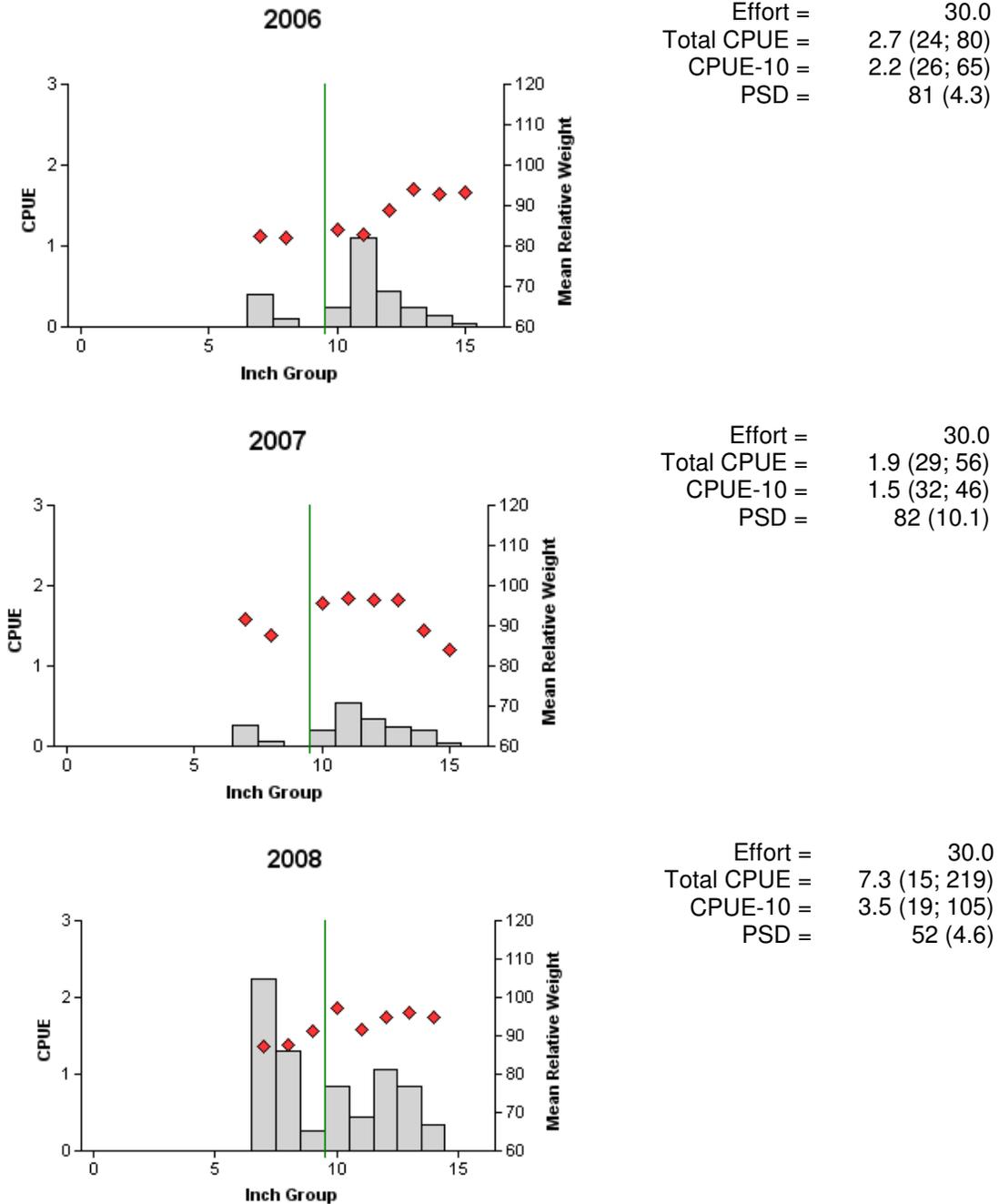


Figure 8. Number of white bass caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Buchanan, Texas, 2006, 2007 and 2008. Minimum length limit indicated by vertical line.

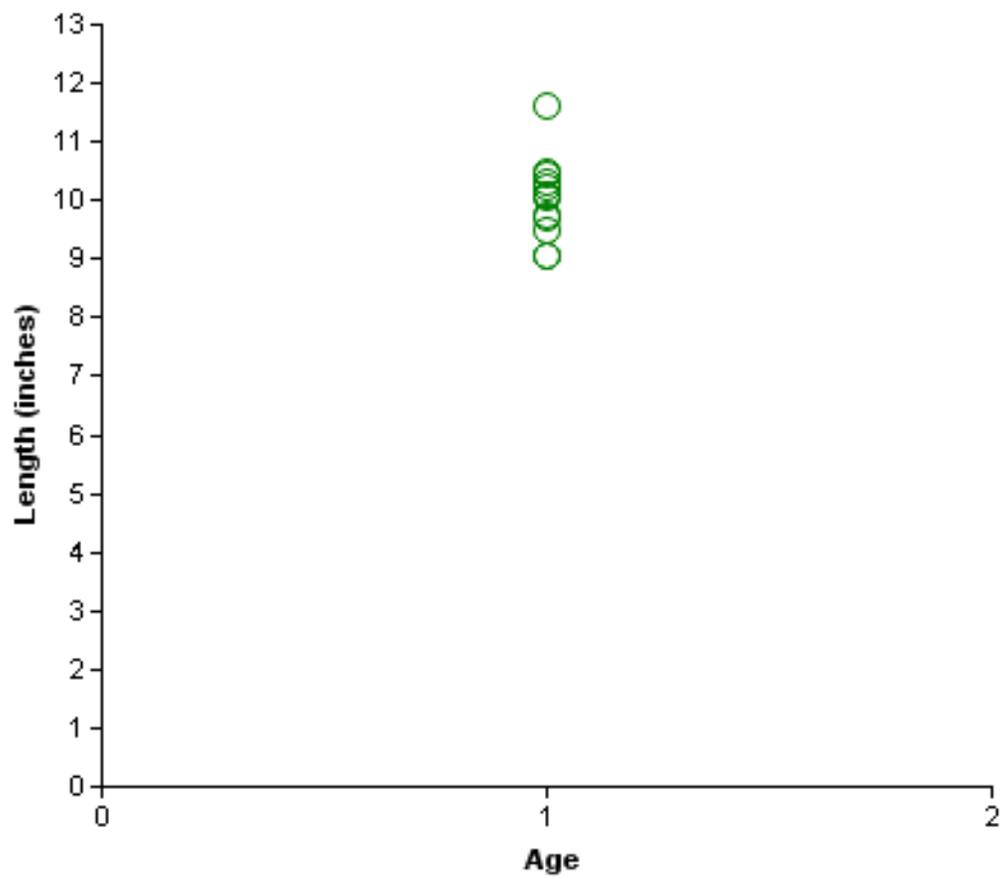


Figure 9. Length at age for white bass collected by gill nets at Lake Buchanan, Texas, March 2008 (N = 13).

## Striped Bass

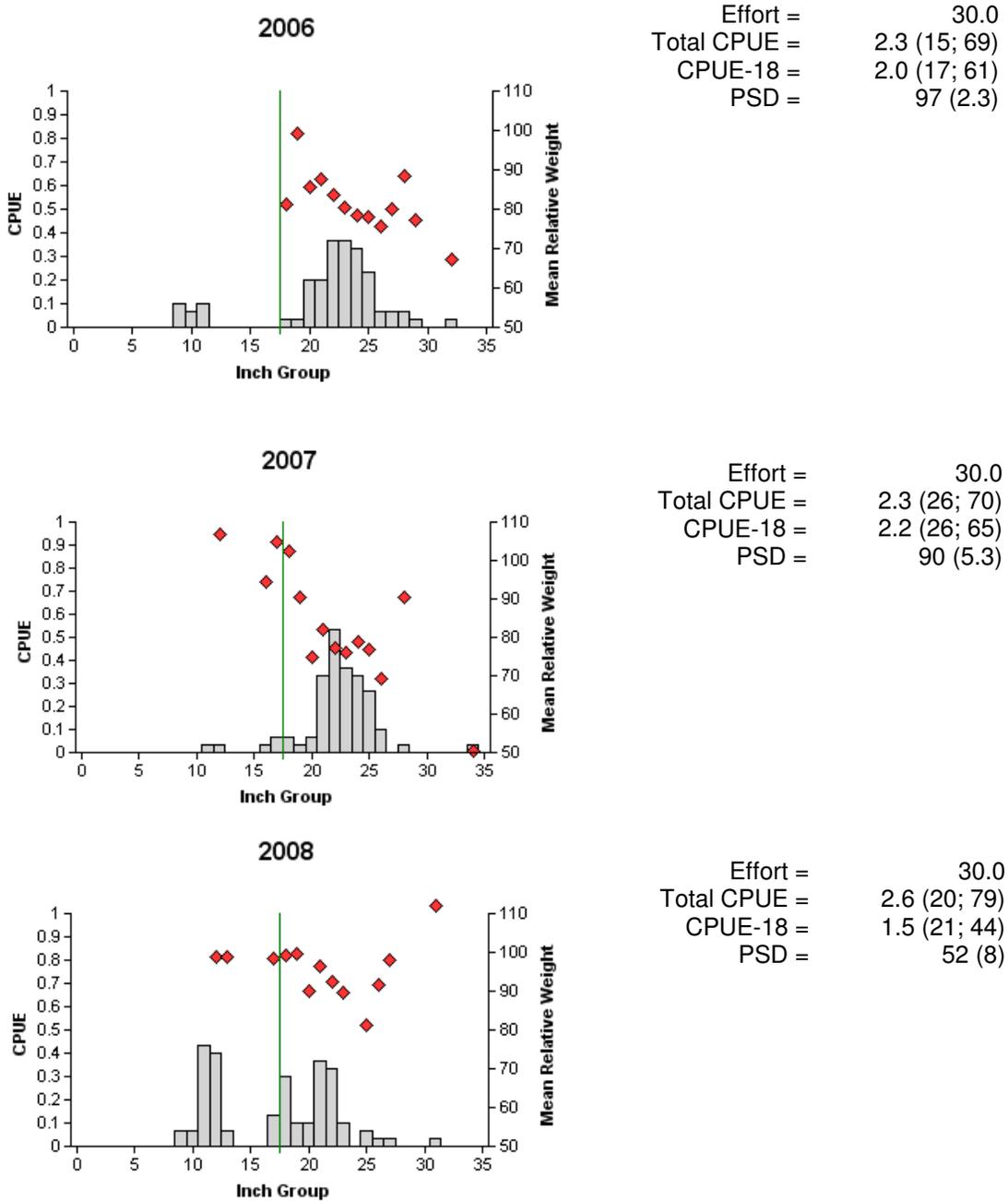


Figure 10. Number of striped bass caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Buchanan, Texas, 2006, 2007 and 2008. Minimum length limit indicated by vertical line.

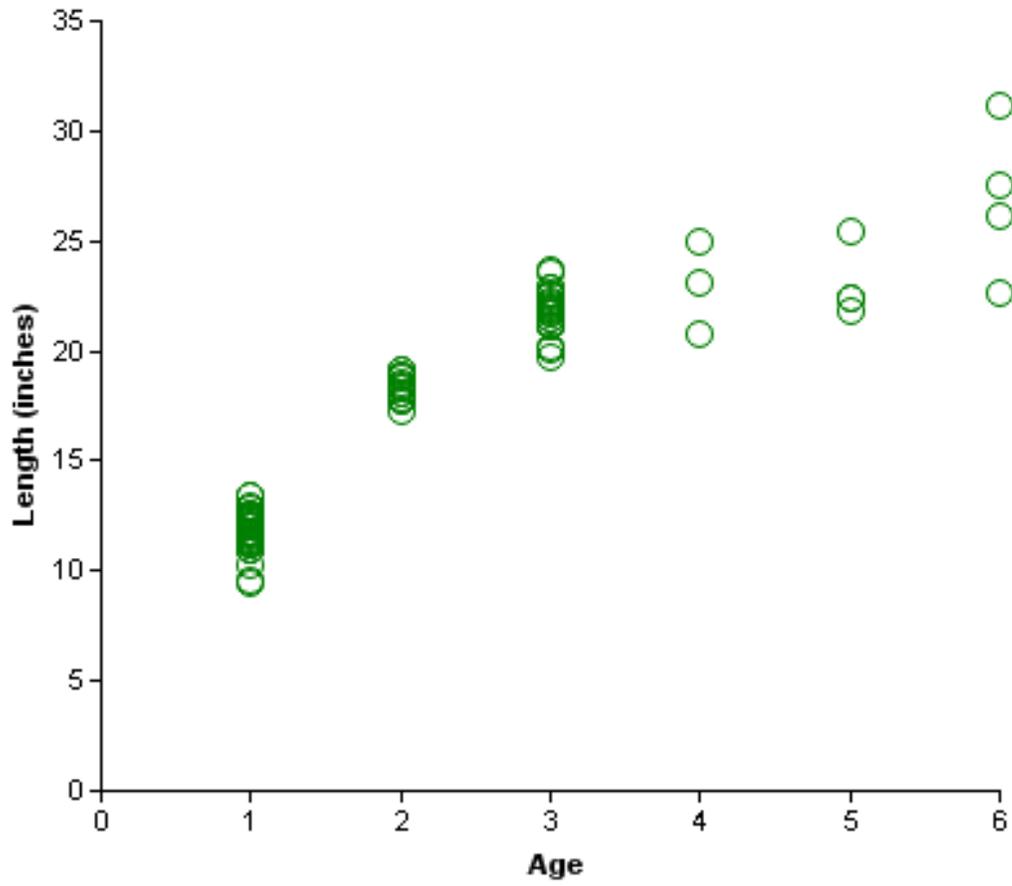


Figure 11. Length at age for striped bass collected by gill nets at Lake Buchanan, Texas, March 2007 (N = 79)

## Sunshine Bass

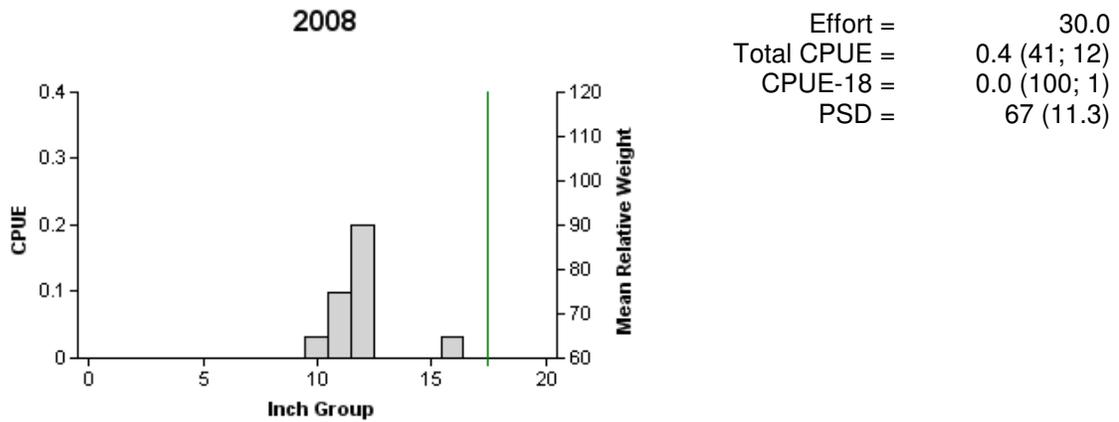


Figure 12. Number of sunshine bass caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Buchanan, Texas, 2008. Minimum length limit indicated by vertical line.

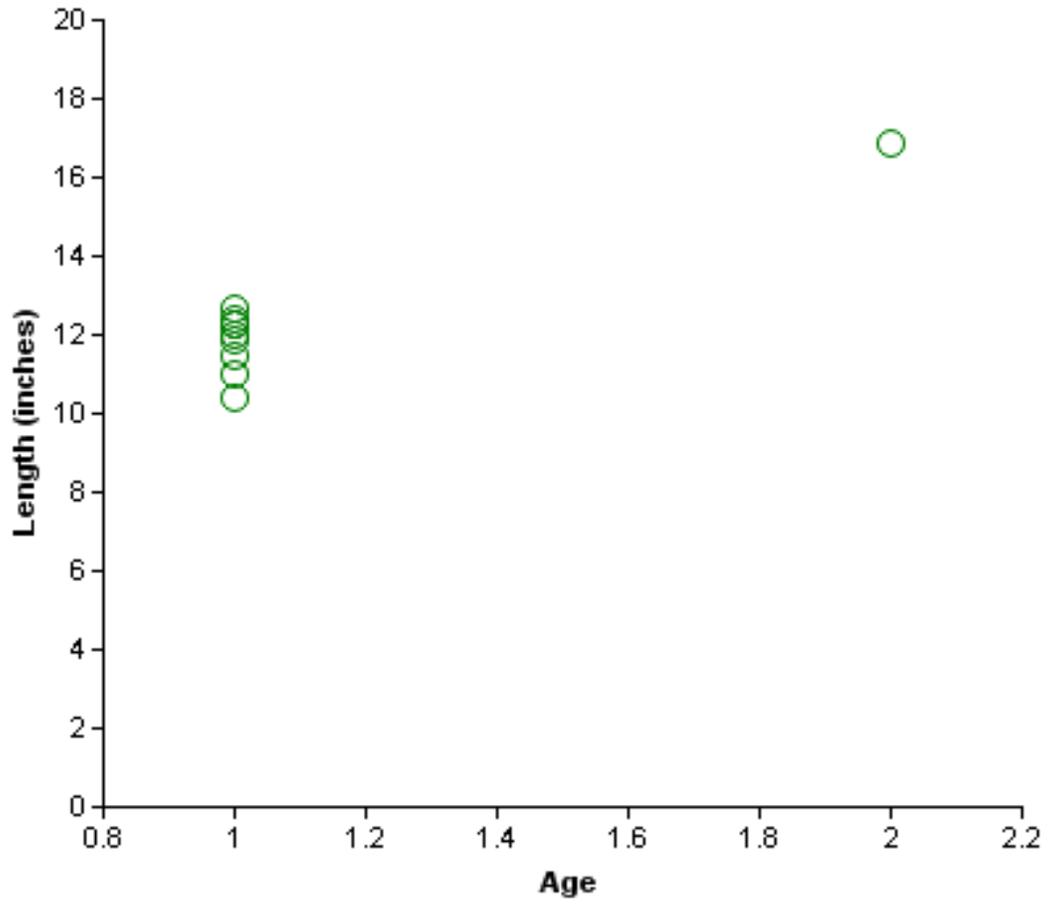


Figure 13. Length at age for sunshine bass collected by gill nets at Lake Buchanan, Texas, March 2007 (N = 11)

## Largemouth Bass

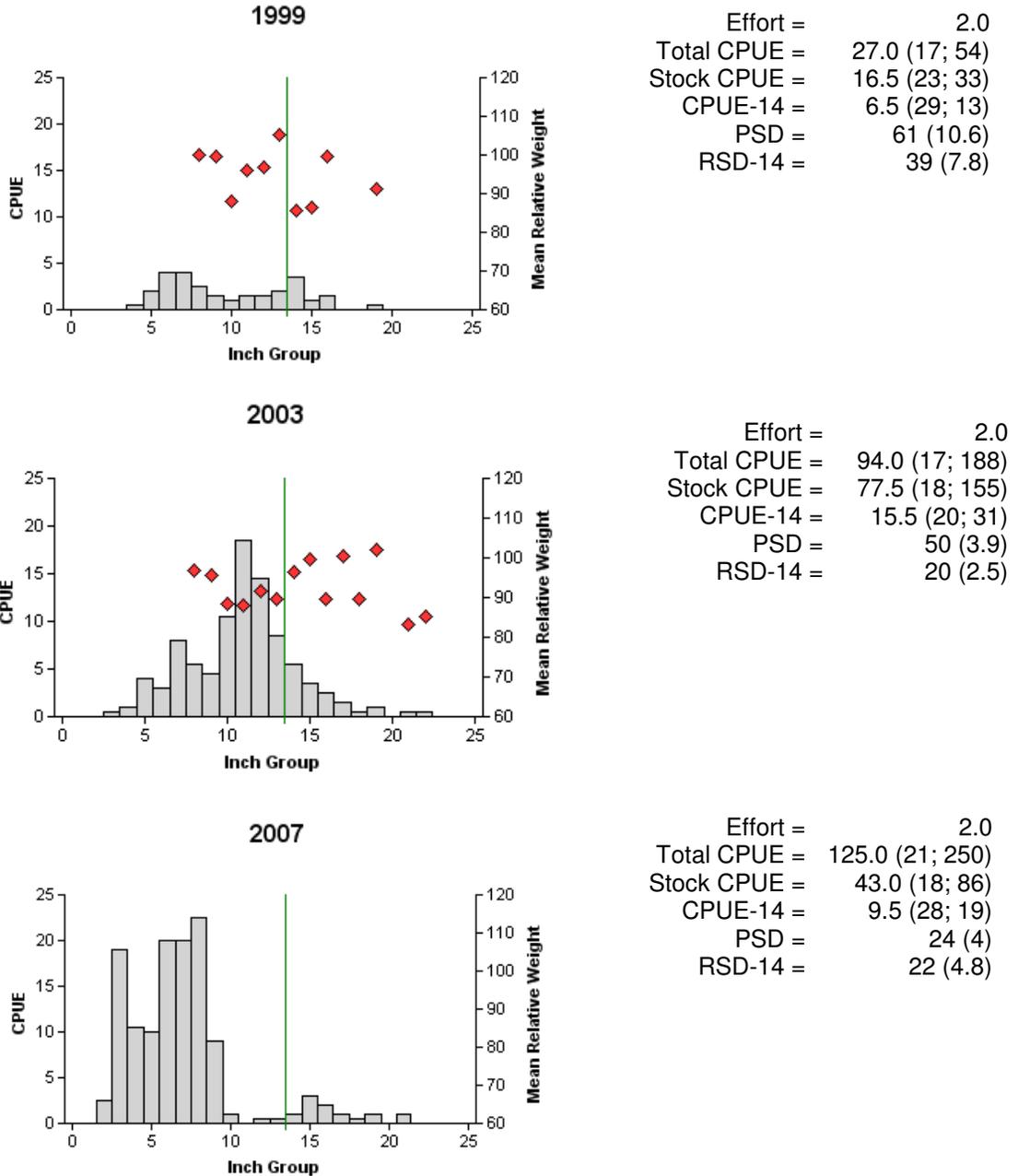


Figure 14. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Buchanan, Texas, 1999, 2003 and 2007. Minimum length limit indicated by vertical line. No weight data was collected in 2007.

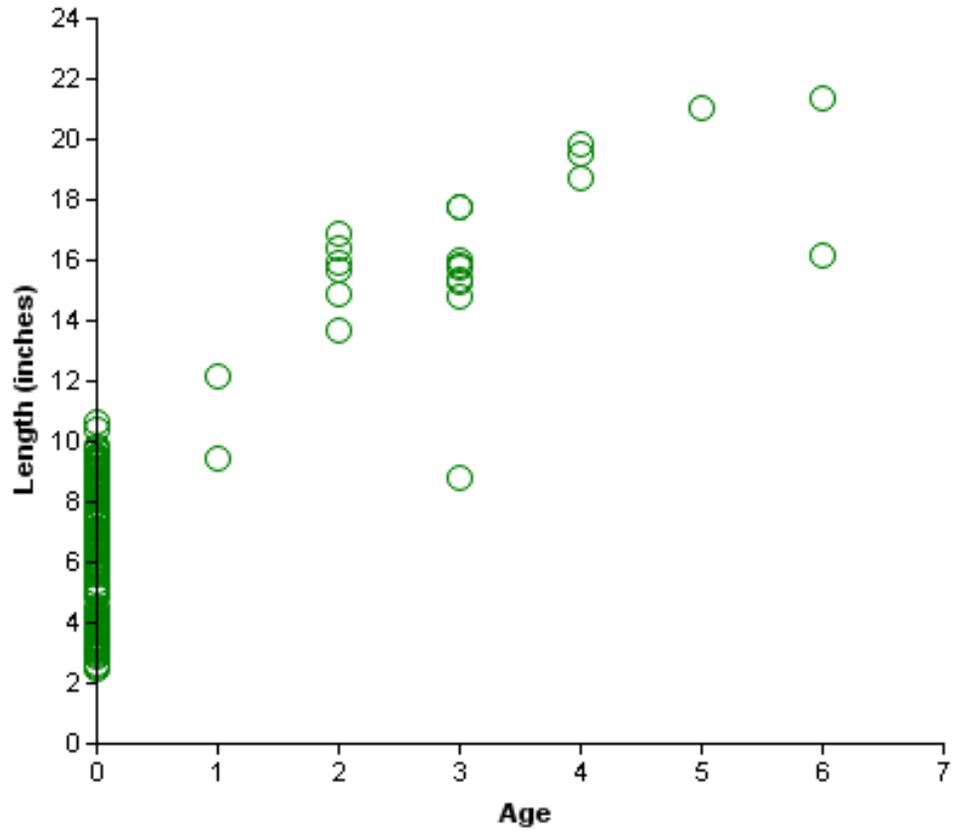


Figure 15. Length at age for largemouth bass collected by electrofishing at Lake Buchanan, Texas, November 2006 (N = 177; range 0-6 years).

Table 5. Results of genetic analysis of largemouth bass collected by electrofishing, Lake Buchanan, Texas, 1999, 2003 and 2007. FLMB = Florida largemouth bass, Fx = second or higher generation hybrid between FLMB and NLMB, and NLMB = northern largemouth bass.

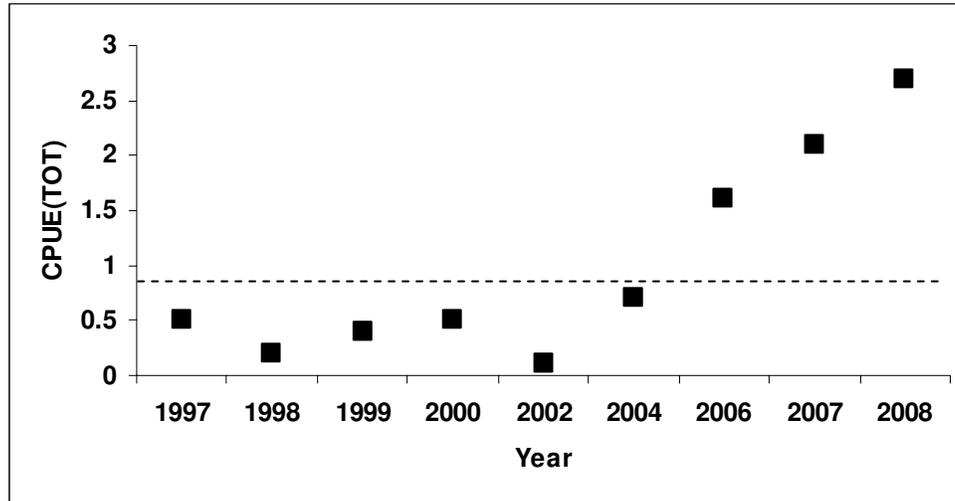
Year	Sample size	Genotype			% FLMB alleles	% pure FLMB
		FLMB	Fx	NLMB		
1999	28	2	24	2	43	7
2003	30	4	25	1	57	13
2007	30	3	26	1	63	10

Table 6. Proposed sampling schedule for Lake Buchanan, 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. Additional survey denoted by A.

Survey Year	Electrofisher	Gill Net	Creel Survey	Report
Fall 2008-Spring 2009		A		
Fall 2009-Spring 2010		A		
Fall 2010-Spring 2011		A		
Fall 2011-Spring 2012	S	S		S

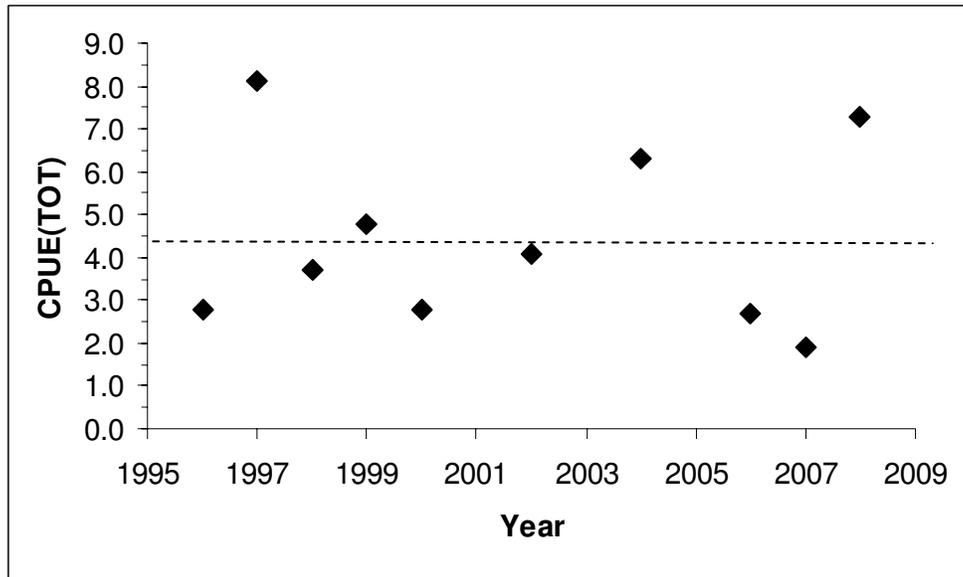
**Appendix A**

Historical trend of blue catfish total catch rate [CPUE(TOT)] from gill netting surveys conducted on Lake Buchanan from 1997 to 2008. Blue catfish were stocked by TPWD in 1989 and 1990. Dashed line represents the mean total catch rate for all samples collected from 1997 to 2008.



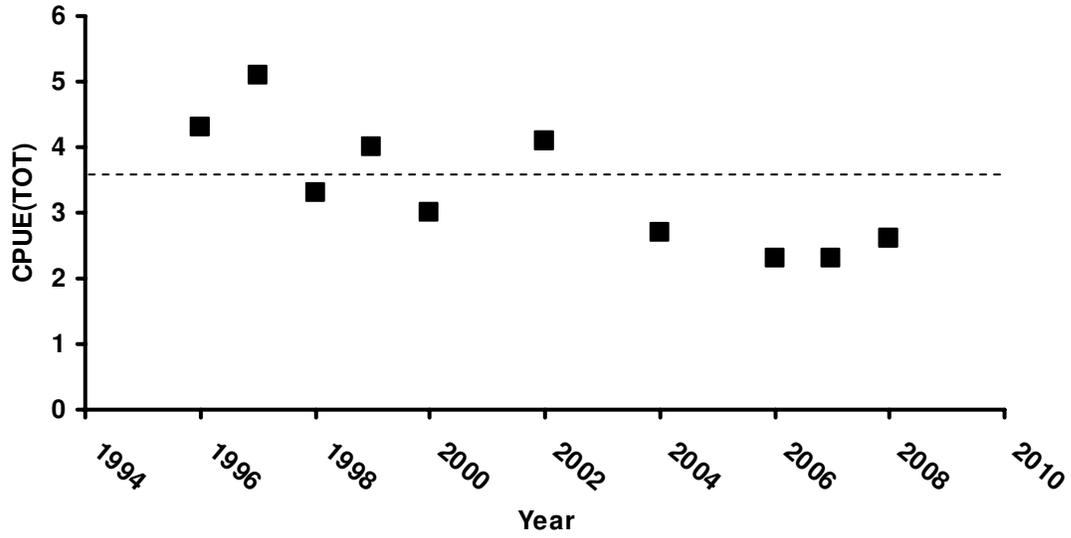
**Appendix B**

Historical trend of white bass total catch rate [CPUE(TOT)] from gill netting surveys conducted on Lake Buchanan from 1996 to 2008. Dashed line represents the mean total catch rate for all samples collected.



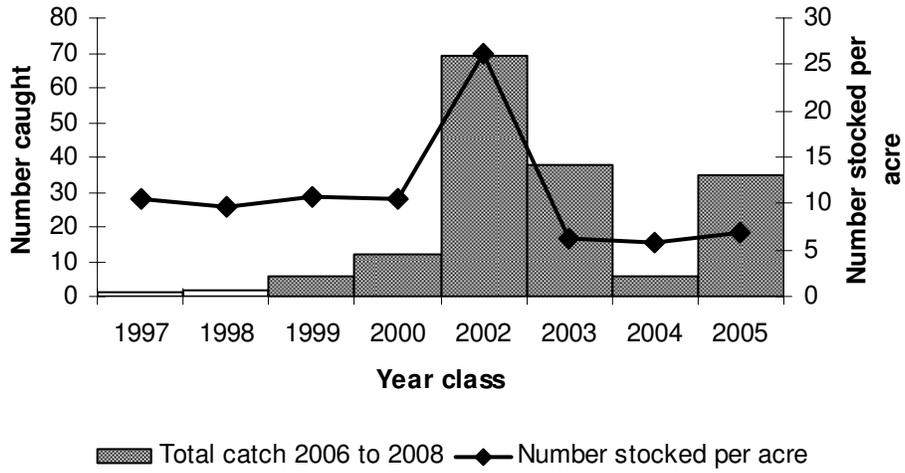
Appendix C

Historical trend of striped bass total catch rate [CPUE(TOT)] from gill netting surveys conducted on Lake Buchanan from 1996 to 2008. Dashed line represents the mean total catch rate for all samples collected.



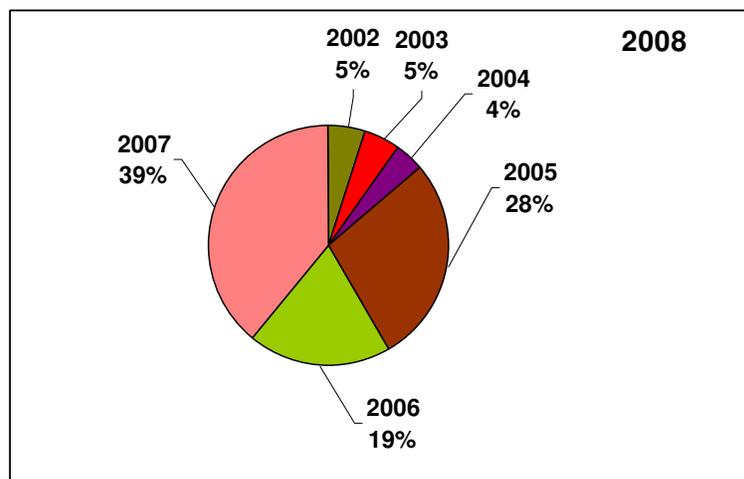
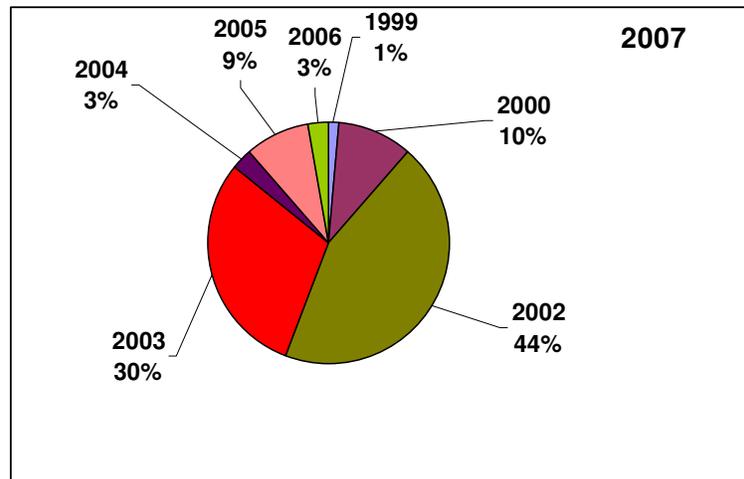
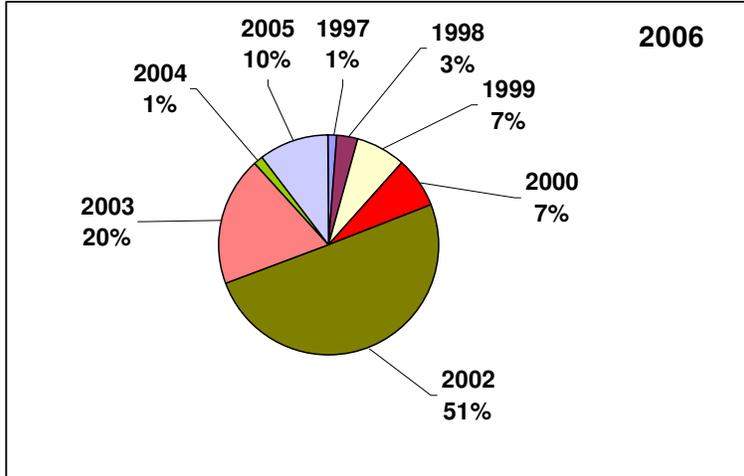
33  
Appendix D

Total number of striped bass caught in 2006, 2007 and 2008 gill net surveys by year class and number stocked per acre in each year. All striped bass caught in these three surveys were aged and are accounted for in the number caught.



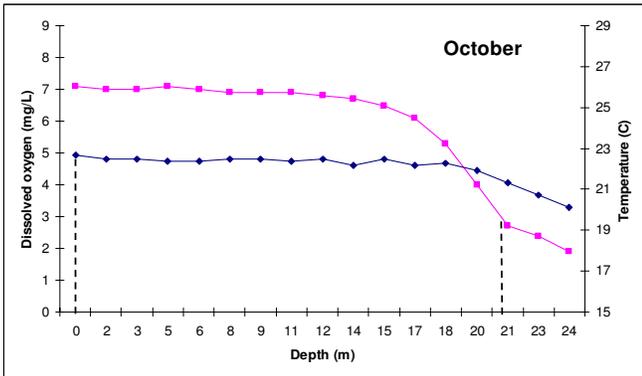
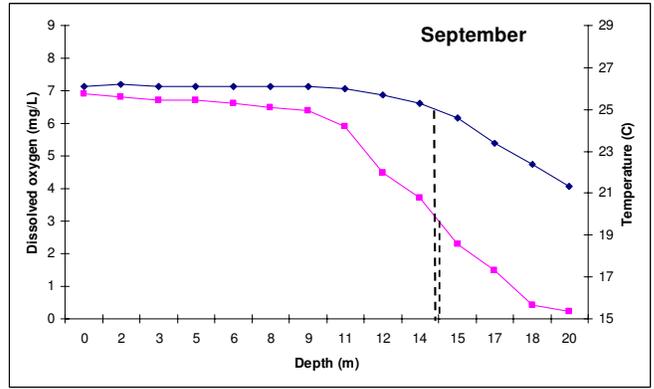
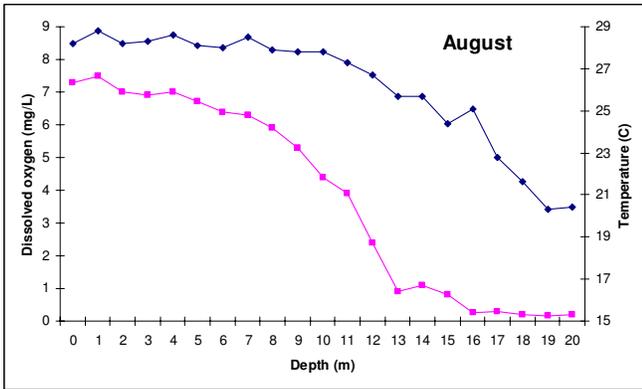
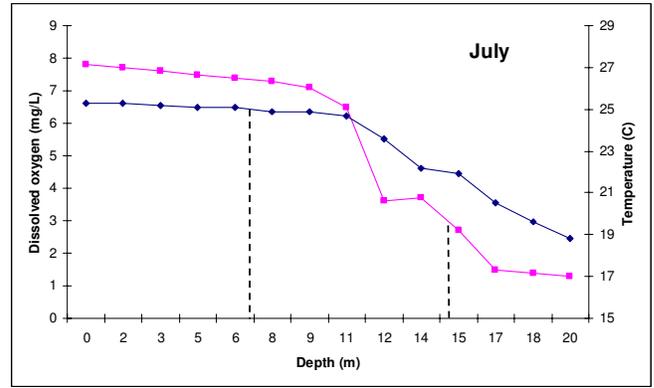
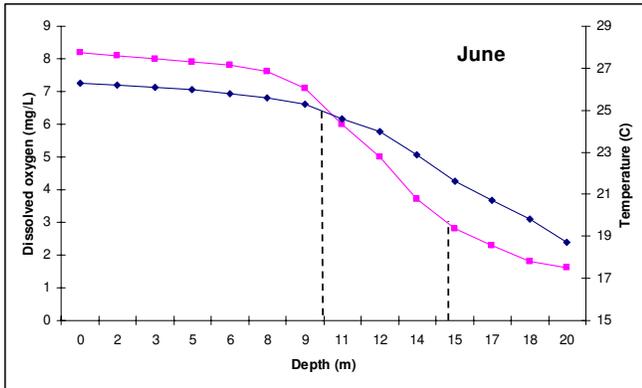
34  
Appendix E

Percentage of all striped bass collected gill netting in Lake Buchanan by year class in 2006, 2007 and 2008.



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**Appendix F**

Monthly means by depth (m) for water temperature (C) (diamonds) and dissolved oxygen (mg/L) (squares), June through October, 1983-2005, Lake Buchanan, TX. All data was recorded near the dam. Data was supplied by the Lower Colorado River Authority. Depths between the dashed lines have water temperature (<25 C) and dissolved oxygen (>3 mg/L) conditions preferred by striped bass. In August there was no water available that had preferred temperature and dissolved oxygen levels.

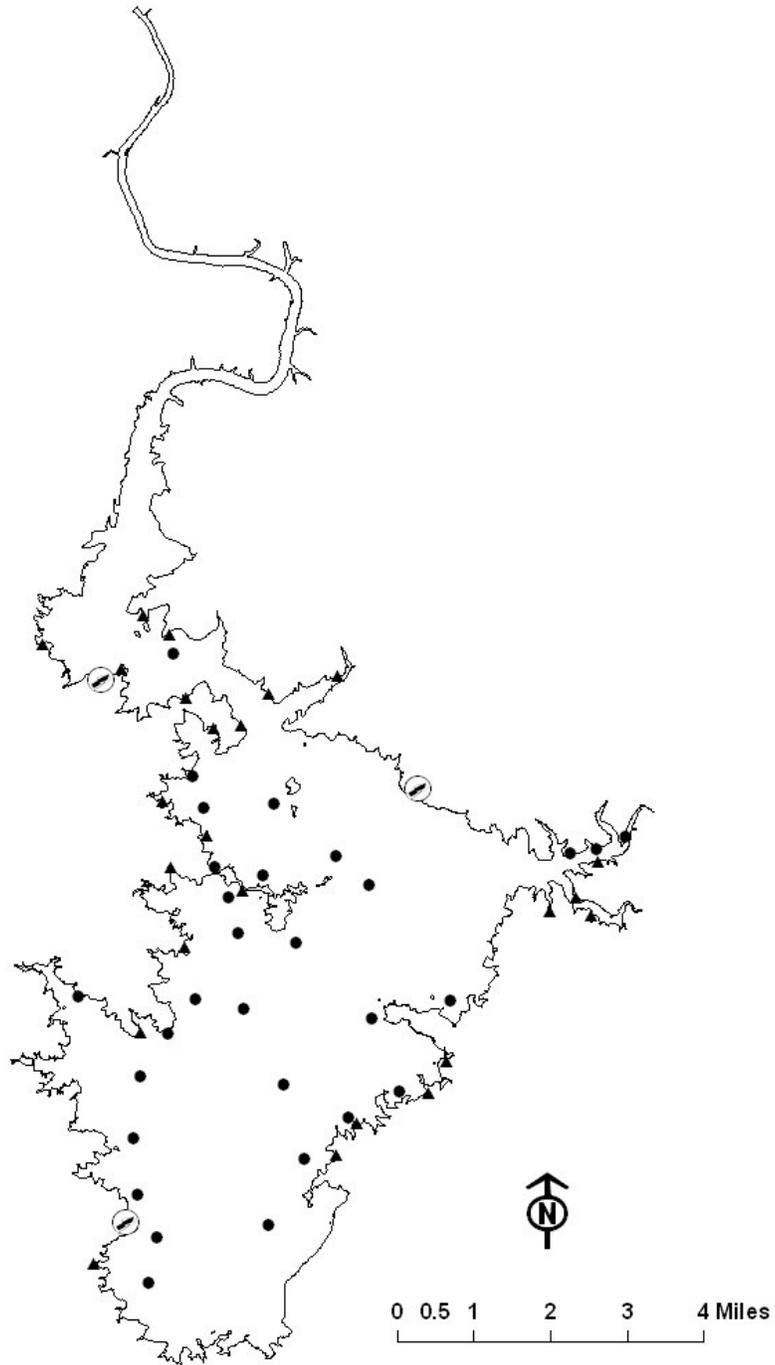


**Appendix G**

Number (N) and catch rate (CPUE) of all target species collected by electrofishing in October 2007 and gill netting in March 2008 from Lake Buchanan, Texas.

Species	Gill Netting		Electrofishing	
	N	CPUE	N	CPUE
Gizzard shad			536	268.0
Threadfin shad			1	0.5
Blue catfish	81	2.7		
Channel catfish	94	3.1		
Flathead catfish	11	0.4		
White bass	219	7.3		
Striped bass	79	2.6		
Sunshine bass	12	0.4		
Redbreast sunfish			91	45.5
Green Sunfish			21	10.5
Warmouth			1	0.5
Bluegill			214	107.0
Longear sunfish			126	63.0
Redear sunfish			39	19.5
Largemouth bass			250	125.0

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Appendix H



Location of sampling sites, Lake Buchanan, Texas, 2007-2008. Gill netting and electrofishing stations indicated by darkened circles and triangles, respectively. Boat ramps are indicated by open circles.