

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-34

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2008 Survey Report

Mill Creek Reservoir

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TABLE OF CONTENTS

Survey and management summary.....	2
Introduction	4
Reservoir description	4
Management history.....	4
Methods.....	5
Results and discussion	5
Fisheries management plan	7
Literature cited	8
Figures and tables	8-18
Reservoir characteristics (Table 1).....	8
Harvest regulations (Table 2)	8
Stocking history (Table 3)	9
Habitat and vegetation surveys (Table 4).....	10
Gizzard shad (Figure 1)	11
Bluegill (Figure 2).....	12
Redear sunfish (Figure 3)	13
Largemouth bass (Figure 4; Table 5)	14
White crappie (Figure 5)	16
Black crappie (Figure 6).....	17
Proposed sampling schedule (Table 6).....	18
Appendix A	
Catch rates for all species from all gear types.....	19
Appendix B	
Map of 2008-2009 sampling locations.....	20

SURVEY AND MANAGEMENT SUMMARY

Fish populations in Mill Creek Reservoir were surveyed in 2008 using electrofishing and trap netting, and in 2009 using gill netting. Aquatic vegetation and habitat surveys were conducted on Mill Creek Reservoir during July 2008. Additional electrofishing surveys were conducted in spring 2006, 2008 and 2009 to monitor stocked Florida largemouth bass as part of a special research project (Operation World Record). This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Mill Creek Reservoir is a 237-acre impoundment located in Van Zandt County, Texas, on Mill Creek, a tributary of the Sabine River. The reservoir was constructed by the City of Canton in 1976 for municipal water supply. Fish habitat consists mostly of emergent aquatic vegetation. Native submerged vegetation was scarce. Angler access facilities consisted of only one public boat ramp and parking lot and were in need of improvements.
- **Management history:** Largemouth bass and crappie species are the most important sport fishes present. Recent management activities include the evaluation of survival, growth, and performance of advanced fingerling (6 inches) offspring of selectively-bred Florida largemouth bass. Hydrilla, an exotic aquatic plant, has been present, but no treatments have been conducted.
- **Fish community**
 - **Prey species:** Historically, clupeids have been moderate in abundance in Mill Creek Reservoir. With the exception of 2000 when gizzard shad abundance was high, the predominant prey species in the reservoir include bluegill, redear sunfish, and other less-abundant sunfish species. Electrofishing catch of gizzard shad was very low, but represented a wide size range of individuals collected. A small number of threadfin shad were also collected. Electrofishing catch of bluegill was high, but few bluegills were over 6 inches in length. Redear sunfish are also present in the reservoir in moderate abundance, with many greater than or equal to 6 inches.
 - **Catfishes:** No channel or blue catfish were collected in the spring 2009 gill netting survey. In 2005, only a few, large, blue catfish were collected, and no channel catfish were observed. These species are suffering from lack of reproduction and recruitment. Yellow bullheads are overabundant in the reservoir.
 - **Largemouth bass:** Largemouth bass were relatively abundant. Size structure was favorable with fish measuring near the upper end of the 14- to 21-inch slot limit well represented. Largemouth bass exhibited robust body condition, indicating adequate prey availability.
 - **Crappies:** Both white and black crappies were present in the reservoir, with neither species consistently dominating in abundance. Both crappie species exhibited adequate size and body condition.

Management strategies: Conduct fall electrofishing surveys every other year to monitor the largemouth bass population. In addition, spring electrofishing will be conducted in 2011 and 2013 to collect and evaluate performance of age-4 stocked largemouth bass as part of a special research study. Continue working with the city of Canton to maintain and improve the existing angler access facilities. Continue with standard fisheries monitoring using a habitat and vegetation survey, as well as trap and gill netting surveys in 2012-2013.

INTRODUCTION

This document is a summary of fisheries data collected from Mill Creek Reservoir from June 2008 through May 2009. 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 fishes and important prey species. Historical data are presented with the 2008 and 2009 data for comparison.

Reservoir Description

Mill Creek Reservoir is a 237-acre impoundment constructed in 1976 on Mill Creek, a tributary of the Sabine River. The reservoir is located in Van Zandt County approximately 34 miles west of Tyler, Texas, and is operated and controlled by the city of Canton. The reservoir is primarily used for municipal water supply. Habitat at time of sampling consisted of natural shoreline with limited submerged timber and native emergent vegetation. Bank fishing access was limited and confined to the area adjacent to the public boat ramp, and along the city park. Other descriptive characteristics for Mill Creek Reservoir are in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Jubar and Storey 2005) included:

1. Monitor the largemouth bass population, in particular the Sharelunker offspring that were stocked in fall 2005 and 2007.

Action: Mill Creek Reservoir was sampled using electrofishing in fall 2006 and 2008. Sharelunker offspring advanced-fingerlings (6 inches) were stocked in fall 2005 and again in 2007. No genetic analysis of age-0 LMB was conducted in 2006 due to the stocking of Sharelunker offspring the previous fall. An age-0 bass sample collected in fall 2008 was collected for genetic analysis; 52% contained Florida alleles, but it is unknown if any Sharelunker progeny contributed to the sample.
2. Native aquatic plant communities along with the exotic species, hydrilla, had reached excessive levels that could potentially impede fishing and boating access, and persistent excessive cover would be detrimental to the health of fish populations.

Action: In 2006 and 2007, district staff noted submersed aquatic vegetation was greatly suppressed. The loss of submersed vegetation may have been due to extensive drought conditions in 2005 and 2006. Therefore, no action was taken to control aquatic vegetation.
3. Improve angler access facilities and promote angling and utilization of the fisheries resources at Mill Creek Reservoir.

Action: Canton city officials were contacted by TPWD staff regarding the need for upgrades to the existing access area, but no improvements were made to the public boat ramp.

Harvest regulation history: Sport fishes in Mill Creek Reservoir are currently managed with statewide regulations (Table 2), with the exception of largemouth bass. Largemouth bass harvest is regulated with a 14- to 21-inch slot-length limit, with a five-fish bag of which only one fish may exceed 21 inches.

Stocking history: Florida largemouth bass (FLMB) were initially introduced in 1976 and stocked six more times between 1978 and 1999. Two stockings of advanced-fingerling (6 inches) Sharelunker (largemouth bass \geq 13 pounds caught and donated by anglers) offspring (as part of the Operation World Record project) were introduced in fall 2005 and 2007. Blue catfish were introduced in 1992, but none were

sampled in 2009. Channel catfish were introduced in 1978 and stocked again in 1991 and 1993. Channel catfish have exhibited limited recruitment in the reservoir and none were collected in the 2009 sample. Neither blue nor channel catfish have developed into a fishery. In 1976, 9,000 northern pike–muskellunge hybrids (aka tiger muskies) were introduced, but the stocking failed to establish a fishery. The complete stocking history is in Table 3.

Vegetation/habitat history: Historically, Mill Creek Reservoir contained substantial amounts of native submerged vegetation. Following the extended drought of 2005-2006 when the reservoir experienced unprecedented low water levels, submerged vegetation declined. When lake levels returned to conservation pool, the vegetation failed to rebound. However, newly flooded terrestrial and native emergent vegetation have provided important habitat for prey and juvenile sport fishes. Structural habitat in the reservoir is limited to scattered areas of standing timber.

METHODS

Fishes were collected by electrofishing in fall 2006 and 2008 (1 hour at 12, 5-min stations), trap netting in fall 2008 (5 net nights at 5 stations) and gill netting in spring 2008 (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 nets and gill nets, as the number of fish caught per net night (fish/nn). All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (Texas Parks and Wildlife Department (TPWD), Inland Fisheries Division, unpublished manual revised 2005). Aquatic vegetation and littoral habitat surveys were performed according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2008).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)], and relative weight (W_t) 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 ($RSE = 100 \times SE \text{ of the estimate/estimate}$) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. Ages were determined for largemouth bass using otoliths from 15 specimens with lengths ranging from 13 to 15 inches. Ages were determined for white crappie using otoliths from 17 specimens with lengths ranging from 9 to 11 inches. Age-0 largemouth bass were collected by electrofishing in fall 2008 and subjected to genetic analysis using DNA microsatellite analysis in accordance with Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2008). Largemouth bass genetic data from 1994-2004 were derived from electrophoresis.

RESULTS AND DISCUSSION

Vegetation/habitat: Structural habitat consisted primarily of inundated timber and overhanging brush. Very little submerged aquatic vegetation was found in the reservoir (Table 4). Only 1.3% (3.03 acres) of the lake surface area was covered with aquatic vegetation with alligatorweed (2.3 acres) and native emergent vegetation (0.53 acres) being the dominant plant forms (Table 4). Hydrilla was also found in trace amounts.

Prey species: Sunfishes dominate the prey base in Mill Creek Reservoir. Electrofishing catch rates of bluegill and redear sunfish were 320.0/h and 106.0/h, respectively (Appendix A). Total CPUE of gizzard shad was low, with fish too large to function as prey (Figure 1). Moderate numbers of threadfin shad were also collected. Total CPUE of bluegill in 2008 (320/h) was much higher than 2004 (87/h), but similar to 2000 (308/h) (Figure 2). The majority of bluegill collected were of suitable size for predators (Figure 2), but ample bluegill ≥ 6 inches were present and capable of supporting a fishery. Redear sunfish CPUE was considerably lower than bluegill CPUE. Redear sunfish provide an additional prey species and offer recreational opportunities (Figure 3), with the majority of the population measuring longer than 6 inches. The lack of submerged aquatic vegetation in the lake and the prominence of bluegill in the prey base

seem counterintuitive. Apparently, bluegill and other sunfishes are utilizing available habitat such as shallow emergent vegetation and brush.

Catfishes: Historically low catches of blue and channel catfish likely result from low recruitment. Historically extensive aquatic vegetation, high water clarity, and consequent predation by largemouth bass may also limit growth of these fish populations.

Largemouth bass: The electrofishing catch rate of largemouth bass was 70/h in 2008, lower than in 2006 (85/h), but slightly higher than 2004 (64/h) (Figure 4). Nearly half (48%) of the fish collected in 2008 were stock size (8 inches) or above, with many of these fish within the protective slot (14–21 inches). Body condition in fall 2008 was sufficient (W_r ranged from 82 to 113) for all size classes of fish, indicating an ample prey supply. Electrofishing conducted in fall 2006 provided fish exhibiting adequate W_r values and moderate abundance (Figure 4). Growth of largemouth bass in Mill Creek Reservoir was moderate. Average age at 14 inches (13.3 to 15.7 inches) was 2.3 years (N=15; range=2–4 years).

Crappies: The trap net catch rate of white crappie was 9.2/nn in 2008, higher than in 2004 (0.8/nn) but lower than in 2000 (31.0/nn). All white crappie collected in recent surveys have been stock-sized (5 inches) or greater. Growth of white crappie in Mill Creek Reservoir was moderate. Average age at 10 inches (9.1 to 11.8 inches) was 1.1 years (N=17; range=1–2 years). Black crappie are also present in the reservoir, but in lower abundance than white crappie in the 2008 sample. The trap net catch rate of black crappie was 1.0/nn in 2008, lower than in 2004 (4.6/nn) and considerably lower than in 2000 (109.8/nn). Insufficient numbers of black crappie were collected to conduct age-growth analysis. The trap net catches have historically been highly variable, indicative of erratic recruitment patterns, inefficient sampling methodology, or a combination of these two factors.

Fisheries management plan for Mill Creek Reservoir, Texas

Prepared – July 2009

ISSUE 1: The largemouth bass population in Mill Creek Reservoir received two stockings of largemouth bass Sharelunker offspring (fall 2005 and 2007). The bass population is characterized by sufficient body condition and moderate numbers of fish within the slot limit (14–21 inches). Due to the inclusion of the reservoir in the Operation World Record project, additional sampling will be required to monitor the performance of Sharelunker offspring.

MANAGEMENT STRATEGIES

1. Monitor largemouth bass abundance, condition, and population size structure by conducting electrofishing surveys every other year beginning in 2010.
2. Target age-4 largemouth bass, with emphasis on collecting Sharelunker offspring, using spring electrofishing every other year beginning in 2009.
3. Continue to monitor Florida largemouth bass allele frequency through collection of fin samples from age-0 largemouth bass every four years. No additional stockings of Florida largemouth bass will be recommended until the Operation World Record project is completed.

ISSUE 2 There is a lack of structural habitat in Mill Creek Reservoir, which may limit growth, reproduction, and recruitment of sport fishes. Efforts on other similar reservoirs within District 3B to establish native vegetation and add structural habitat have proven successful and those techniques may benefit Mill Creek Reservoir.

MANAGEMENT STRATEGIES

1. Contact the city of Canton and other interested parties who may be interested in improving the habitat of the reservoir.
2. Coordinate with interested parties in an effort to establish submerged structure that can be used by catfish species for spawning and refuge.
3. Experiment with materials other than hardwood brush and pine branches, both of which may settle and decay rapidly, limiting their utility as long-term habitat for fishes. Reefs composed of bamboo have shown some potential as long-term structures and can be used as an alternative to pine and hardwood structures.

ISSUE 3 Aquatic vegetation in the lake is limited to emergent vegetation, primarily alligator-weed, maidencane, and common reed.

MANAGEMENT STRATEGIES

1. Increase the diversity of aquatic vegetation by introducing native plant species, such as waterwillow and pickerelweed, which will provide additional fish habitat.
2. Coordinate with local interest groups that can assist in the procurement, transportation, and distribution of native aquatic vegetation.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes additional fall electrofishing in 2010, and mandatory monitoring in 2012-2013 (Table 6). Special spring electrofishing will take place in 2011 and 2013 to collect age-4 largemouth bass and assess Sharelunker offspring that were stocked in fall 2007. Gill net and trap net surveys will be conducted every four years to monitor catfish and crappie recruitment, condition, and relative abundance.

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.
- 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.
- Jubar, A., and K. Storey. 2005. Statewide freshwater fisheries monitoring and management program survey report for Mill Creek Reservoir, 2004. Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Performance Report, Project F-30-R-30, Job A, 23 pages.

Table 1. Characteristics of Mill Creek Reservoir, Texas.

Characteristic	Description
Year constructed	1976
Controlling authority	City of Canton
Surface area	237 acres
Counties	Van Zandt
Reservoir type	Off-Stream type
Mean depth	10.0 ft.
Maximum depth	25.0 ft.
Shoreline development index (SDI)	2.8
Conductivity	75 μ mho / cm
Secchi disc range	1 – 4 ft.

Table 2. Harvest regulations for Mill Creek Reservoir.

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 (1 fish 21 inches or longer)	14 – 21 slot length limit
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 - No limit

Table 3. Stocking history of Mill Creek Reservoir, Texas. Size categories are: FRY =<1 inch; FGL = 1-3 inches; AFGL = 8 inches, and ADL = adults.

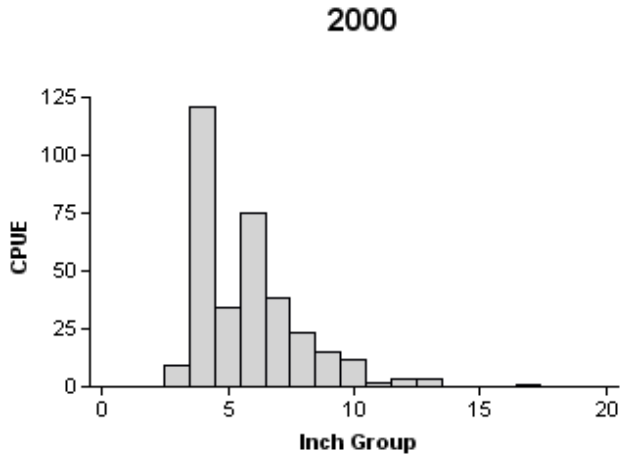
Species	Year	Number	Size
Threadfin shad	1982	4,000	ADL
	1983	<u>1,000</u>	ADL
	Total	5,000	
Northern pike x Muskellunge	1976	9,000	FGL
	Total	9,000	
Blue catfish	1992	<u>577</u>	ADL
	Total	577	
Channel catfish	1978	15,500	
	1991	9,120	FGL
	1993	<u>9,090</u>	FGL
	Total	33,710	
Florida largemouth bass	1976	26,400	FGL
	1978	1,085	AFGL
	1980	39,845	FGL
	1983	52,902	FGL
	1998	168	ADL
	1998	36,603	FGL
	1999	<u>36,000</u>	FGL
	Total	193,003	
	2005*	5,949	AFGL
2007*	5,928	AFGL	

*2005 and 2007 Florida largemouth bass stockings were composed of Operation World Record advanced fingerlings.

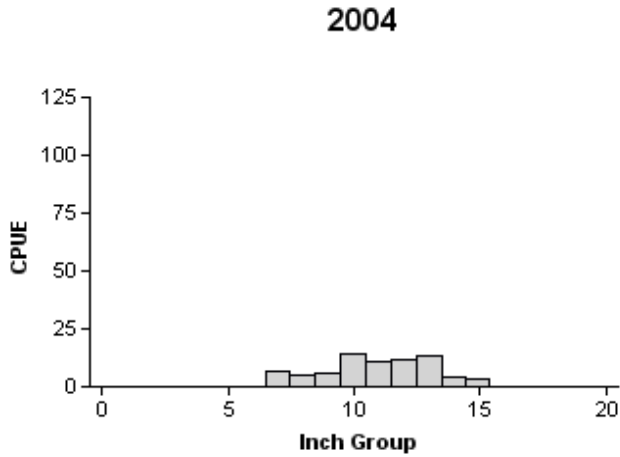
Table 4. Survey of littoral zone and physical habitat types, Mill Creek Reservoir, Texas, July 2008. A linear shoreline distance (miles) was recorded for each habitat type found. The sum of shoreline distances exceeds the lake perimeter because of overlap of habitat types.

Shoreline habitat type / Aquatic vegetation species	Shoreline Distance		Surface Area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Natural shoreline	7.3	100.0		
Overhanging brush	2.6	35.5		
Native emergent (<i>common reed</i> , <i>bulrush</i> , <i>maidencane</i>)	1.3	17.6	0.5	
Native submerged (<i>coontail</i> , <i>bushy pondweed</i>)	0.3	4.0	0.2	
Alligatorweed	2.0	27.5	2.3	
Hydrilla	0.1	0.7	<0.1	
Total			3.0	1.3

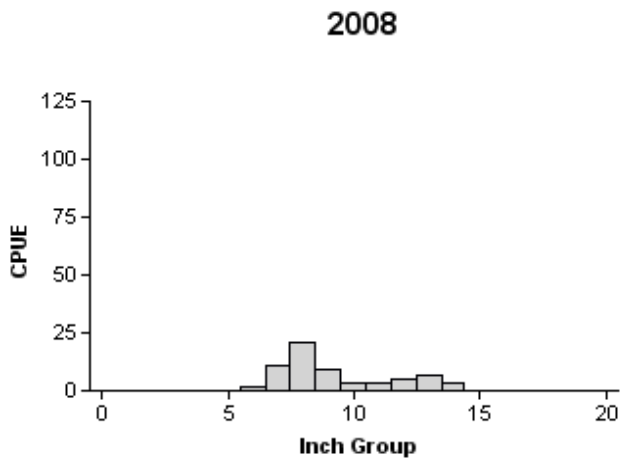
Gizzard shad



Effort = 1.0
 Total CPUE = 336.0 (10; 336)
 Stock CPUE = 97.0 (15; 97)
 PSD = 9 (2.7)
 IOV = 82.4 (3.7)



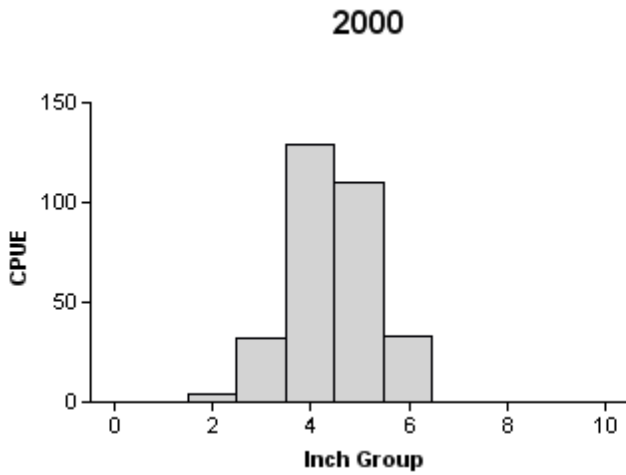
Effort = 1.0
 Total CPUE = 75.0 (19; 75)
 Stock CPUE = 75.0 (19; 75)
 PSD = 57 (6.2)
 IOV = 9.3 (3.8)



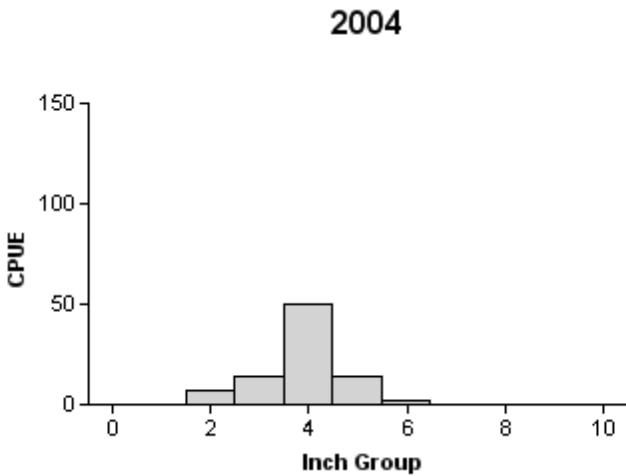
Effort = 1.0
 Total CPUE = 64.0 (20; 64)
 Stock CPUE = 62.0 (21; 62)
 PSD = 29 (5.3)
 IOV = 20.3 (7.7)

Figure 1. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Mill Creek Reservoir, Texas, 2000, 2004 and 2008.

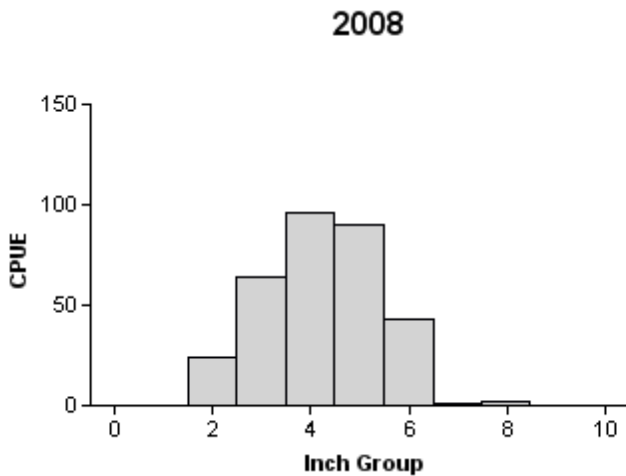
Bluegill



Effort = 1.0
 Total CPUE = 308.0 (23; 308)
 Stock CPUE = 304.0 (23; 304)
 PSD = 11 (3.8)
 RSD-P = 0 (0)



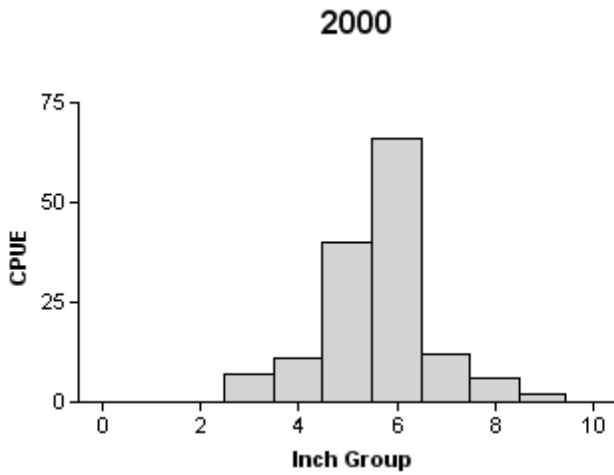
Effort = 1.0
 Total CPUE = 87.0 (18; 87)
 Stock CPUE = 80.0 (19; 80)
 PSD = 2 (1.7)
 RSD-P = 0 (0)



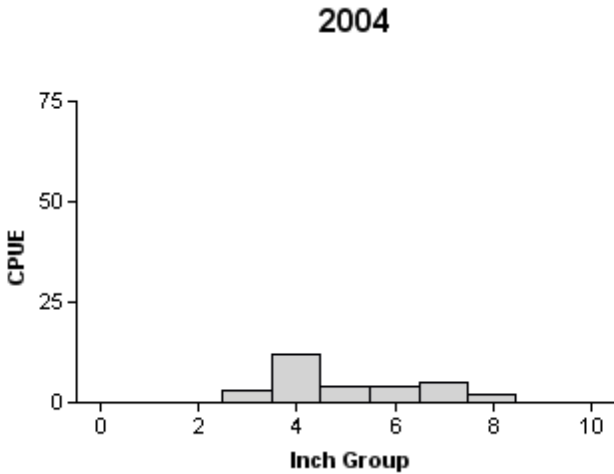
Effort = 1.0
 Total CPUE = 320.0 (14; 320)
 Stock CPUE = 296.0 (12; 296)
 PSD = 16 (3.9)
 RSD-P = 1 (0.7)

Figure 2. 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, Mill Creek Reservoir, Texas, 2000, 2004, and 2008.

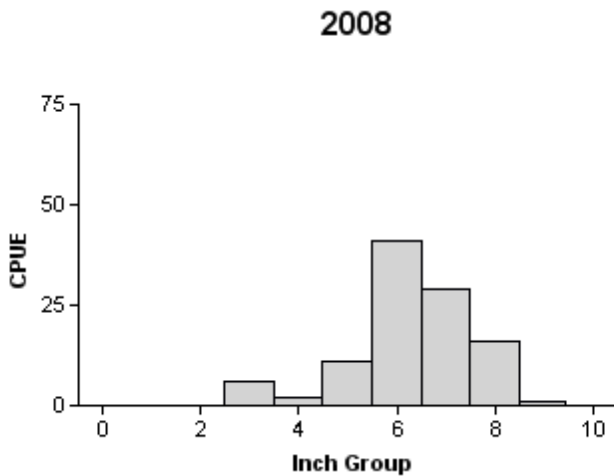
Redear sunfish



Effort = 1.0
 Total CPUE = 144.0 (35; 144)
 Stock CPUE = 137.0 (37; 137)
 PSD = 15 (2.2)
 RSD-P = 1 (1.1)



Effort = 1.0
 Total CPUE = 30.0 (36; 30)
 Stock CPUE = 27.0 (35; 27)
 PSD = 26 (10.1)
 RSD-P = 0 (0)



Effort = 1.0
 Total CPUE = 106.0 (13; 106)
 Stock CPUE = 100.0 (13; 100)
 PSD = 46 (7.9)
 RSD-P = 1 (1)

Figure 3. 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, Mill Creek Reservoir, Texas, 2000, 2004, and 2008.

Largemouth bass

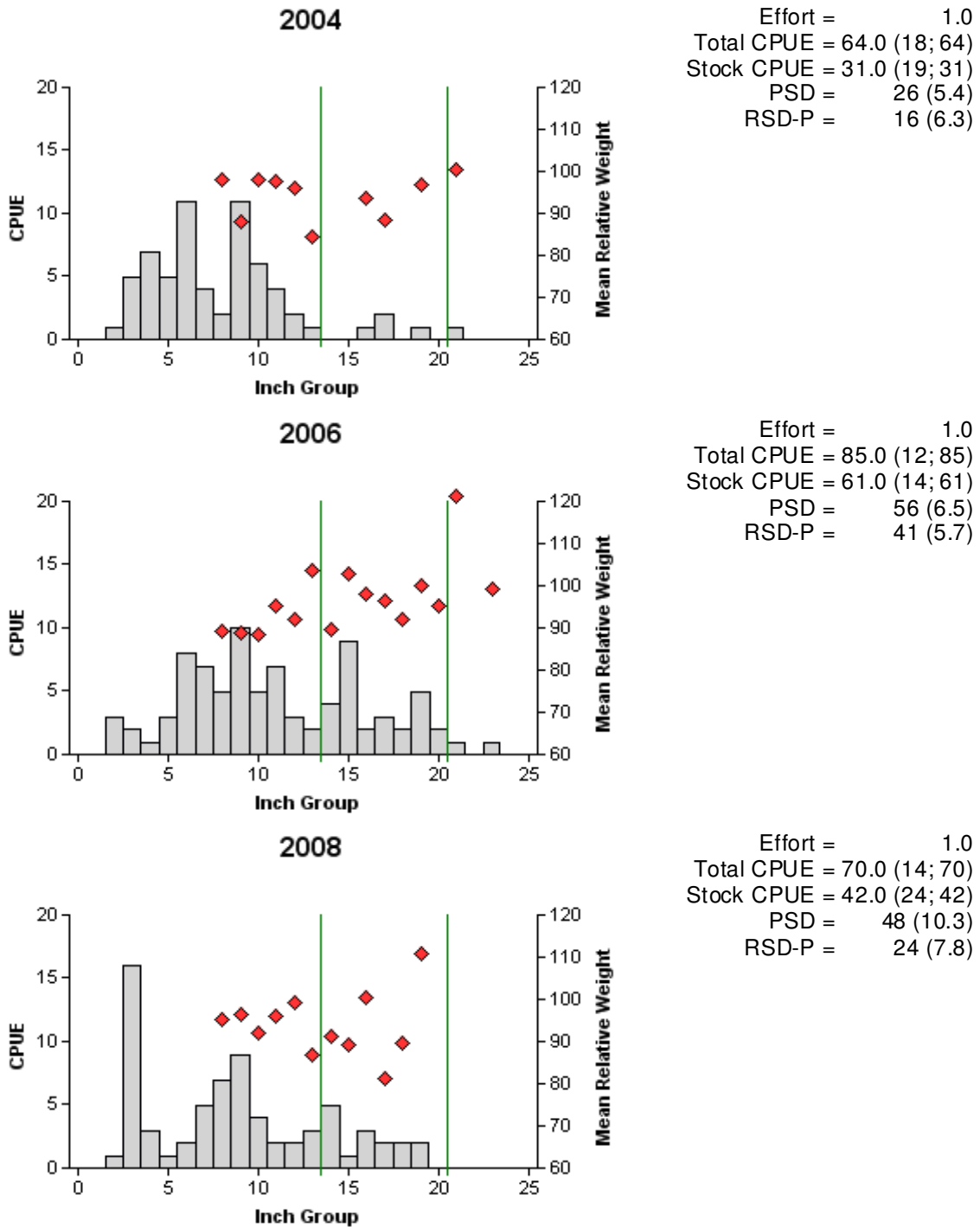


Figure 4. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Mill Creek Reservoir, Texas, 2004, 2006, and 2008. Vertical lines indicate minimum length limit at time of survey.

Table 5. Results of genetic analysis of largemouth bass collected by fall electrofishing, Mill Creek Reservoir, Texas, 1994, 1997, and 2004. Data from 1994 through 2004 are derived from starch-gel electrophoresis. 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		
1994	35	5	10	18	2	62.9	14.3
1997	40	3	6	30	1	55.6	7.5
2004	18	6	4	6	2	59.7	33.3
2008	30	1	2	*	0	52.0	3.0

* Numbers of Fx and Combined hybrids were not provided in 2008.

White crappie

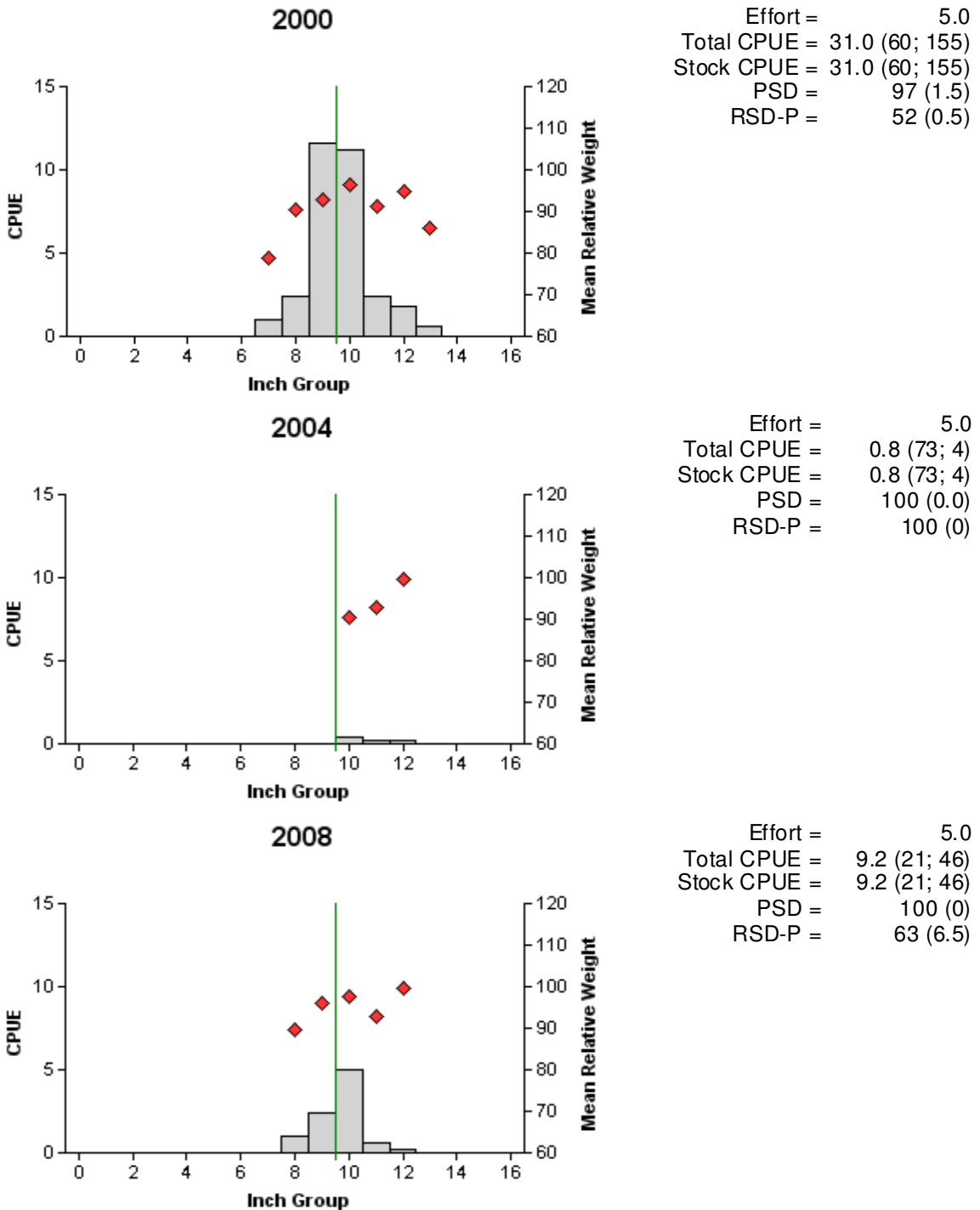


Figure 5. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure) for fall trap net surveys, Mill Creek Reservoir, Texas, 2000, 2004, and 2008. Vertical lines indicate minimum length limit at time of survey.

Black crappie

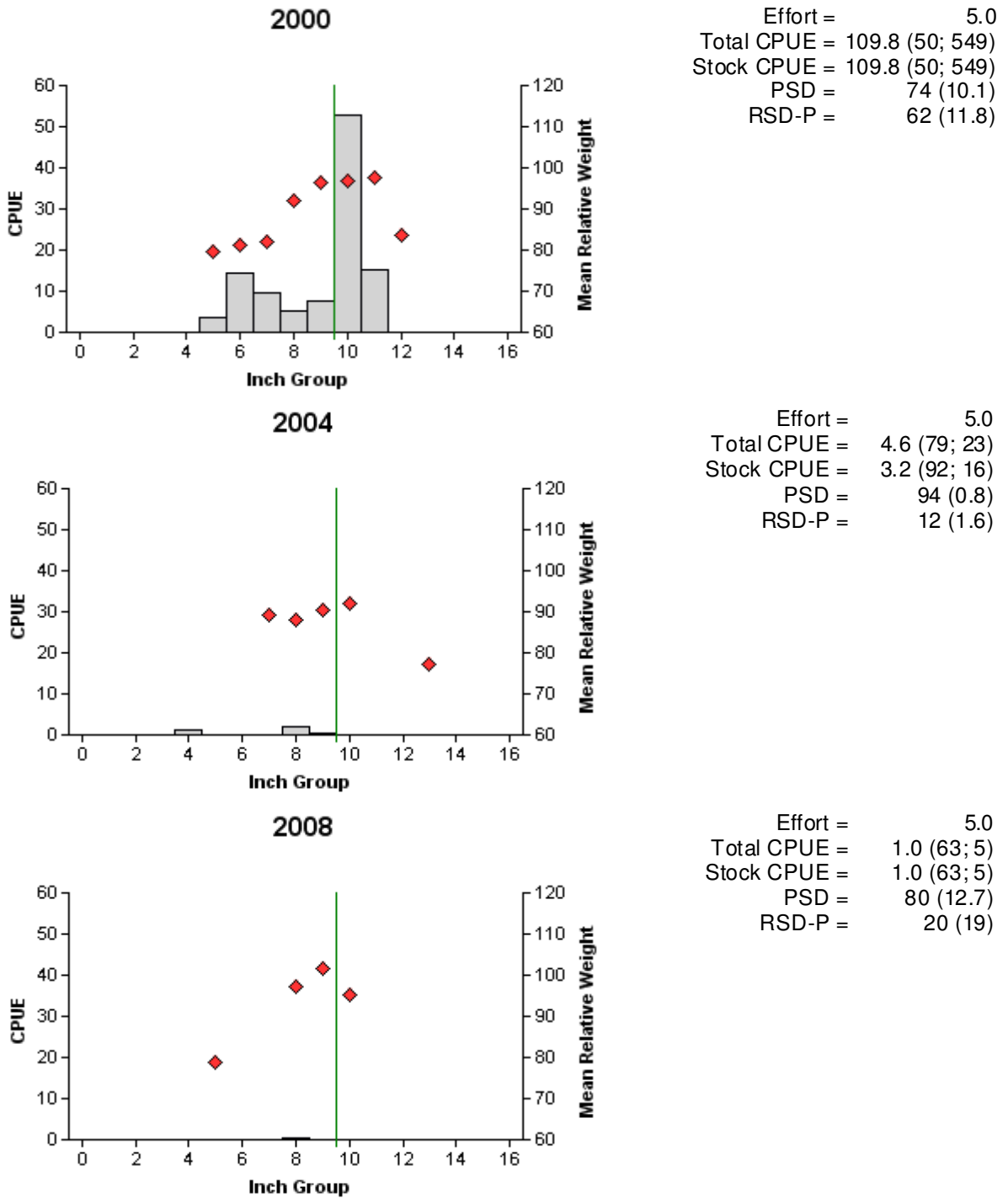


Figure 6. Number of black crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure) for fall trap net surveys, Mill Creek Reservoir, Texas, 2000, 2004, and 2008. Vertical lines indicate minimum length limit at time of survey.

Table 6. Proposed sampling schedule for Mill Creek Reservoir, Texas. Gill netting surveys are conducted in the spring, while electrofishing is conducted in the fall. Standard survey denoted by S, additional survey denoted by A, and survey to collect Operation World Record largemouth bass denoted by OWR.

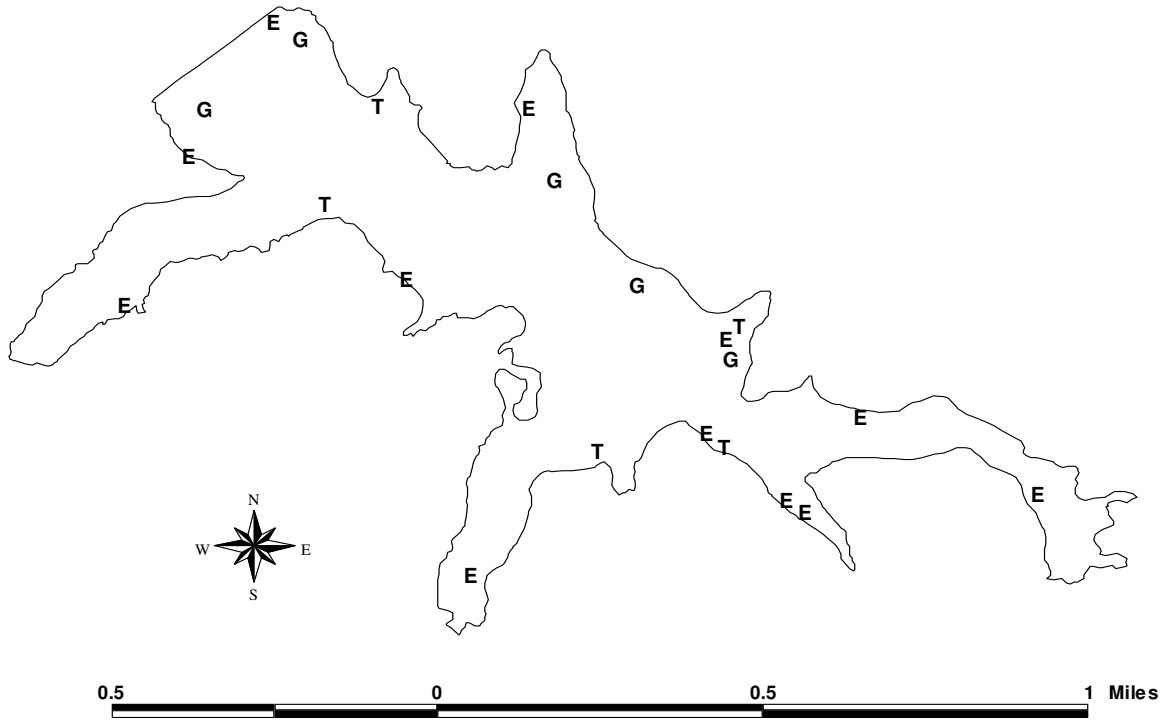
Survey Year	Fall Electrofishing	Spring Electrofishing	Trap netting	Gill netting	Vegetation/ Habitat	Report
Summer 2009-Spring 2010						
Summer 2010-Spring 2011	A	OWR				
Summer 2011-Spring 2012						
Summer 2012-Spring 2013	S	OWR	S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected by fall electrofishing and trap netting from Mill Creek Reservoir, Texas, 2008.

Species	Electrofishing		Trap Netting	
	N	CPUE		
Gizzard shad	64	64.0		
Threadfin shad	46	46.0		
Warmouth	12	12.0		
Bluegill	320	320.0		
Longear sunfish	5	5.0		
Redear sunfish	106	106.0		
Largemouth bass	70	70.0		
White crappie			46	9.2
Black crappie			5	1.0

APPENDIX B



Location of electrofishing (E), trap net (T), and gill net (G) stations, Mill Creek Reservoir, Texas, 2008-2009.