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

Delta Lake

Prepared by:

John Findeisen
and
Greg Binion

Inland Fisheries Division
District 1-E, Mathis, Texas

Carter Smith
Executive Director

Phil Durocher
Director, Inland Fisheries

July 31, 2009

TABLE OF CONTENTS

SURVEY AND MANAGEMENT SUMMARY

Fish populations in Delta Lake were surveyed in fall 2008 using trap nets and electrofishing and in spring 2009 using gill nets. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Delta Lake is a 2,261-acre reservoir located in Hidalgo County, 2.5 miles north of Monte Alto. The reservoir is divided into a public section (approximately 1,500 acres, east side) and a private section (approximately 761 acres, west side). The two sections of the reservoir are divided by State Highway 88 and are only connected via a pipeline. The reservoir is used for water supply, irrigation and recreation. The lake is very shallow and turbid. Substrate is composed primarily of small rock, clay, sand and silt. Littoral habitat consists of periodically flooded terrestrial vegetation, large stands of bulrush and cattail, and standing timber.

- **Management history:** Important sport fish species included channel catfish, white bass, largemouth bass, and white crappie. Exotic species include grass carp and suckermouth catfish collected from the reservoir since the last report. The previous fisheries management plan focused on rebuilding the fisheries following the 2004 reservoir renovation projects, habitat enhancement, and the construction of a boat ramp. During summer 2004, the Delta Lake Irrigation District began draining the reservoir to begin a bank stabilization project and construct a canal on the east side of the reservoir for the purposes of moving water around the reservoir for irrigation needs during drought years. Both projects were completed in March 2006, however, the reservoir was reduced to approximately 300 acre-feet throughout the project. Fisheries enhancement included stocking both predator (i.e., largemouth bass and channel catfish) and prey species as needed, and monitoring the fisheries with supplemental surveys. Reservoir enhancement projects consisted of flooding terrestrial vegetation in the spring and initiating the process to construct a boat ramp.

- **Fish Community**

  - **Prey species:** Gizzard and threadfin shad were the primary prey species and appeared to have recovered following the renovation project. Nearly all shad were of sizes available to most predators. Sunfish, were present in the reservoir but not abundant. Sunfish abundance appeared to still be recovering following the renovation project. Bluegill were stocked in 2007.

  - **Catfishes:** Blue catfish, not previously established in the reservoir, appeared to be expanding. Channel catfish, once abundant in the reservoir, appeared to still be recovering following the renovation project. Channel catfish were stocked in 2007.

  - **White bass:** White bass were not as abundant as they were before the renovation projects.

  - **Largemouth bass:** Despite two stockings of Florida largemouth bass (2007 and 2008), few largemouth bass were collected and a fishery failed to develop, suggesting problems with survival and possibly recruitment to larger sizes.

  - **Crappie:** White crappie were not as abundant as they were before the renovation projects.

- **Management strategies:** Continue managing the fish populations under current regulations. Continue to work with the Delta Lake Irrigation District on optimizing water level fluctuations as a method for enhancing fish habitat and possibly controlling exotic flora and fauna. Consider stocking advanced fingerling largemouth bass. Continue to monitor recovery of sport fish populations and exotic fish species population growth in the reservoir. Write and distribute press releases concerning the blue catfish angling opportunities.

INTRODUCTION

This document is a summary of fisheries data collected from Delta Lake in 2008-2009. 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. Management strategies are included to address existing problems or opportunities. Data from 2000 - 2001 is presented with the 2008-2009 data and serves as baseline fisheries data for comparison to data collected after the 2004 renovation project was completed.

Reservoir Description

Delta Lake is a 2,261-acre reservoir constructed in 1937 and located in Hidalgo County, 2.5 miles north of Monte Alto. The reservoir is divided into a public section (approximately 1,500 acres, east side) and a private section (approximately 761 acres, west side). The two sections of the reservoir are divided by State Highway 88 and are only connected via a pipeline. The reservoir is used for water supply, irrigation and recreation and undergoes frequent water level fluctuations (Figure 1). The lake is very shallow and turbid. Substrate is composed primarily of small rock, clay, sand and silt. Littoral habitat consists of periodically flooded terrestrial vegetation, large stands of bulrush and cattail, and standing timber. Angling access is limited to the bank, as there is no public boat ramp on the reservoir. During summer 2004, the Delta Lake Irrigation District (DLID) began draining the reservoir to begin a bank stabilization project and construct a canal on the east side of the reservoir for the purposes of moving water around the reservoir for irrigation needs during drought years. Both projects were completed in March 2006. Conservation pool for Delta Lake is 50 ft MSL, however, the reservoir's elevation fell below 44ft MSL (approximately 300 acre-feet) during the initial stages of the bank stabilization and canal construction projects. The reservoir remained at this level throughout the duration of the projects. Other descriptive characteristics for Delta Lake are in Table 1.

Management History

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

1. Conduct non-standard surveys (biologist-selected stations) when the reservoir refills to assess condition of remaining fish populations and stock both prey species and sport fishes as needed.

   Action: Delta Lake refilled in March 2006 and was sampled with non-standard electrofishing, trap net and gill net surveys in May 2006. Catch rates of gizzard shad from non-standard surveys indicated adequate abundance and did not warrant additional stockings. Catch rates of sunfish were relatively low and approximately 119,455 bluegill were stocked in 2007. Largemouth bass were stocked in 2007 (N=118,584) and 2008 (N=108,165) and 118,617 channel catfish in 2007. Crappie were not stocked.

2. Monitor the status of the populations through additional gill net (the first spring following stocking of channel catfish), electrofishing, and trap net surveys (the fall following the first stocking of largemouth bass and crappie) and through standard surveys as listed on the four-year sampling rotation schedule.

   Action: An additional electrofishing survey was conducted in December 2007. The additional trap net survey was not conducted since crappie were not stocked and the additional gill net survey was not conducted as it was thought that catfish had not recruited to the gear.

3. Enhance habitat through the introduction of native aquatic vegetation.
   Action: Plans have been discussed by the DLID to divide the reservoir into three different sections to better manage water for irrigation needs. All habitat enhancement projects are delayed until plans are finalized.

4. Encourage the Delta Lake Irrigation District to apply for a boat ramp grant.
   Action: District staff forwarded a boat ramp grant application to the Delta Lake Irrigation District as well as discussed the option with DLID staff. Boat ramps will be considered once new reservoir renovation plans are finalized.

Harvest regulation history: Sport fish in Delta Lake are currently managed with statewide harvest regulations (Table 2).

Stocking history: Recent stockings included 119,455 fingerling bluegill in September 2007, 118,617 fingerling channel catfish in June 2007, and 118,584 and 108,165 fingerling bass in April 2007 and April 2008, respectively. A complete stocking history is in Table 3.

Vegetation/habitat history: Delta Lake supported large stands of native emergent vegetation (cattail and bulrush). Sparse water hyacinth communities have been observed in the reservoir but have yet to become problematic. Submersed stumps and timber also provide habitat in the reservoir.

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 2008. Non-standard electrofishing, trap net, and gill net surveys (spring, biologist-selected sites) were conducted in May 2006, while standard surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2008) for the 2008-2009 sampling year.

Sampling statistics (CPUE for various length categories) and structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)] and condition indices [relative weight (W_r)] 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.

RESULTS AND DISCUSSION

Habitat: Shoreline habitat consisted of both rocky and natural shorelines with a limited amount of bulkhead. Standing timber, at or just below the surface, is located reservoir-wide. Total aquatic vegetation was measured at 328.1 acres and consisted of native emergent vegetation (328.0 acres) and water hyacinth (0.1 acres). Water hyacinth has been present in the reservoir since 1999 and has yet to become a problematic species possibly due to the water level fluctuations. Results of the habitat survey can be found in Table 4.

Prey species: The 2008 electrofishing catch rate of gizzard and threadfin shad were 73.0/h (Figure 2) and 143/h, respectively. The gizzard shad IOV was 99, indicating a high percentage of the shad were of sizes available to predatory fishes. Both shad species were well represented in the fall 2008 trap net survey as well and appeared to have recovered following the renovation project.

The 2008 electrofishing catch rate of bluegill was 20.0/h (Figure 3). Bluegill catch rates were expected to be higher than 20.0/h, as a result of both stocking and natural reproduction. Sizes of bluegill

indicated most were available to predatory fishes. Bluegill appeared to be recovering following the renovation project.

Blue catfish: Blue catfish were first collected from Delta Lake with trap nets in 2001. The 2009 gill net catch rate for blue catfish was 19.0/nn (Figure 4). Size structure was good, as approximately one-half of the fish were legal size (12-inch minimum length limit). Body condition was excellent as mean W_r values of inch groups averaged above 100. Natural reproduction and recruitment appeared to be good as indicated by sub-stock size fish collected.

Channel catfsh: The 2009 gill net catch rate of channel catfish was 7.0/nn (Figure 5). Channel catfish size structure was good with a few legal-size fish (12-inch minimum length limit) being available for harvest. Mean relative weight was adequate and averaged in the mid-90s. Channel catfish were stocked in 2007 (N=118,617) and the fishery appeared to still be recovering from the renovation project as channel catfish relative abundance has yet to reach pre-renovation levels.

White bass: The 2009 gill net catch rate for white bass was 1.0/nn (Figure 6). Body condition was good as mean relative weights averaged in the mid-90s. White bass are not as abundant as they were before the renovation project.

Largemouth bass: The 2008 electrofishing catch rate of largemouth bass was 2.0/h (Figure 7). This catch rate was lower than expected as the reservoir was stocked with Florida LMB fingerling in 2007 (N=118,584) and 2008 (N=108,165). Electrofishing catch rates of largemouth bass have historically been low (<10/h). Despite supplemental stockings, this population failed to increase in abundance, suggesting low survival of stocked fingerlings and limited natural recruitment. The population remained similar to what it was before the renovation project.

White crappie: The 2008 trap net catch rate of white crappie was 1.8/nn (Figure 8), lower than catches of crappie prior to reservoir renovation. Body condition of the few crappie collected was excellent with mean relative weights near 115. Historically, crappie have maintained a robust fishery in this reservoir.

Fisheries management plan for Delta Lake, Texas

Prepared – July 2009.

ISSUE 1: Sunfish and white crappie populations were still recovering from the renovation project. Despite post-project stockings of both largemouth bass and bluegill, relative abundance remained low for these species as a result of poor survival of stocked fingerlings and limited natural recruitment.

MANAGEMENT STRATEGIES

1. Work with the Delta Lake Irrigation District on the timing of water level fluctuations, such as winter drawdowns and spring floods, in an attempt to increase survival and recruitment.
2. Consider Delta Lake as a site for a research project investigating the affect of stocking advanced fingerling largemouth bass.
3. Continue to monitor centrarchid populations through routine surveys.

ISSUE 2: Exotic flora and fauna are present in this reservoir, some such as the suckermouth catfish, of which have become overly abundant. The impact of such species has yet to be determined in this reservoir.

MANAGEMENT STRATEGIES

1. Work with DLID on winter drawdowns to attempt to control exotic flora and fauna.
2. Monitor the establishment of exotic species through routine surveys.

ISSUE 3: Channel catfish were not as abundant as they were prior to the renovation project. However, blue catfish have become established in the reservoir and provide anglers with excellent angling opportunities.

MANAGEMENT STRATEGIES

1. Write and distribute press releases concerning the developing blue catfish fishery and its regulations.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes routine electrofishing and trap netting in the fall 2012 and gill netting in the spring 2013 (Table 5) to assess all sport fish populations present in the reservoir. Habitat will be monitored in the summer 2012 using the digital shapefile method in order to continue monitoring native and exotic vegetation.

LITERATURE CITED

Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, second edition. American Fisheries Society, Bethesda, Maryland.

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. 2005. Statewide freshwater fisheries monitoring and management program survey report for: Delta Lake, 2004. Texas Parks and Wildlife Department, Austin.

Figure 1. Mean monthly water level elevations recorded in feet above mean sea level (msl) for Delta Lake Reservoir, Texas, January 2002 through October 2004 and January 2005 through April 2005. Mean monthly water level data for November 2004 and December 2004 was not available due to the water level being below the bottom of the gauge, 44 feet msl.

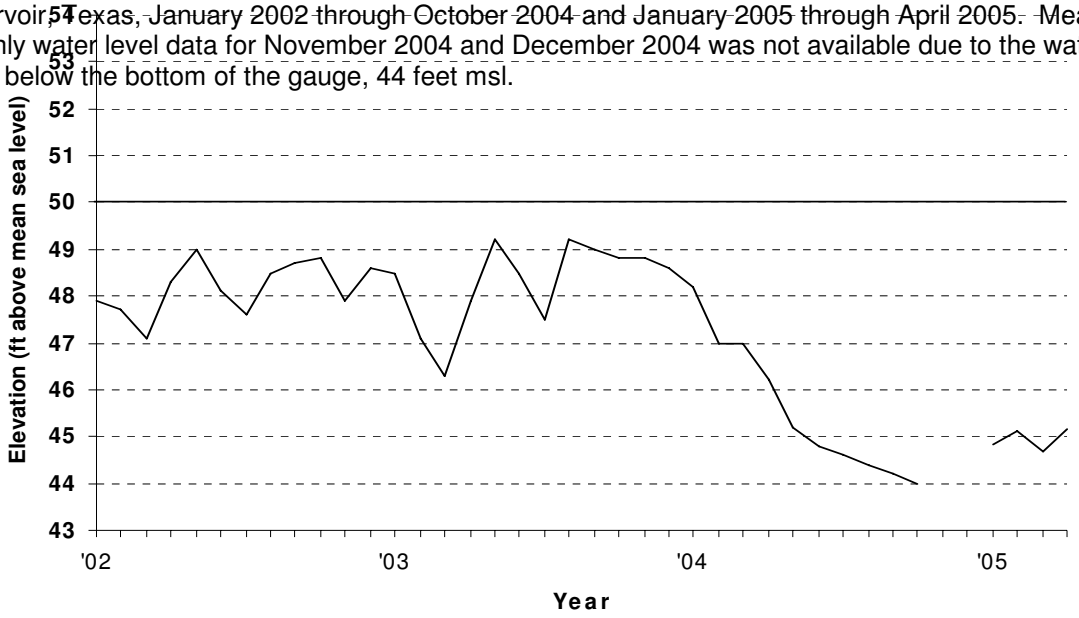


Table 1. Characteristics of Delta Lake, Texas.

Characteristic	Description
Year constructed	1937
Controlling authority	Delta Lake Irrigation District
County	Hidalgo
Reservoir type	Reservoir/County Park
Shoreline Development Index	1.3
Conductivity	896
Access: Boat	None
Bank	Adequate
Challenged	Inadequate – one short pier

Table 2. Harvest regulations for Lake Delta.

Species	Bag Limit (per person)	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, white	25	10 – No Limit
Bass, largemouth	5	14 – No Limit
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 – No Limit

Table 3. Stocking history of Delta Lake, Texas. Sizes categories are: FRY = <1 inch and FGL = 1-3 inches.

Year	Number	Size
Channel catfish		
1967	10,000	FGL
1973	12,350	FGL
1990	24,778	FGL
1991	24,000	FGL
2007	118,617	FGL
Species total	191,745	
Palmetto bass		
1978	11,000	FRY
1979	35,933	FRY
Species total	46,933	
Bluegill		
2007	119,455	FGL
Species total	119,455	
Largemouth bass		
1966	10,000	FGL
1967	22,200	FGL
1971	2,500	FGL
Species total	34,700	
Florida largemouth bass		
2007	118,584	FGL
2008	108,165	FGL
Species total	226,749	

Table 4. Survey of littoral zone and physical habitat types, Delta Lake, Texas, 2008. 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				
Bulkhead	0.1	1.6		
Natural shoreline	5.4	62.9		
Rocky shoreline	3.0	35.5		
Total	8.6	100		
Vegetation				
Native emergent vegetation			328.0	17.2
Bulrush			134.1	7.0
Cattail			193.9	10.2
Exotic vegetation			0.1	<0.1
Water hyacinth			0.1	<0.1
Adjacent to shoreline				
Piers and Boat docks	<0.1	<0.1		

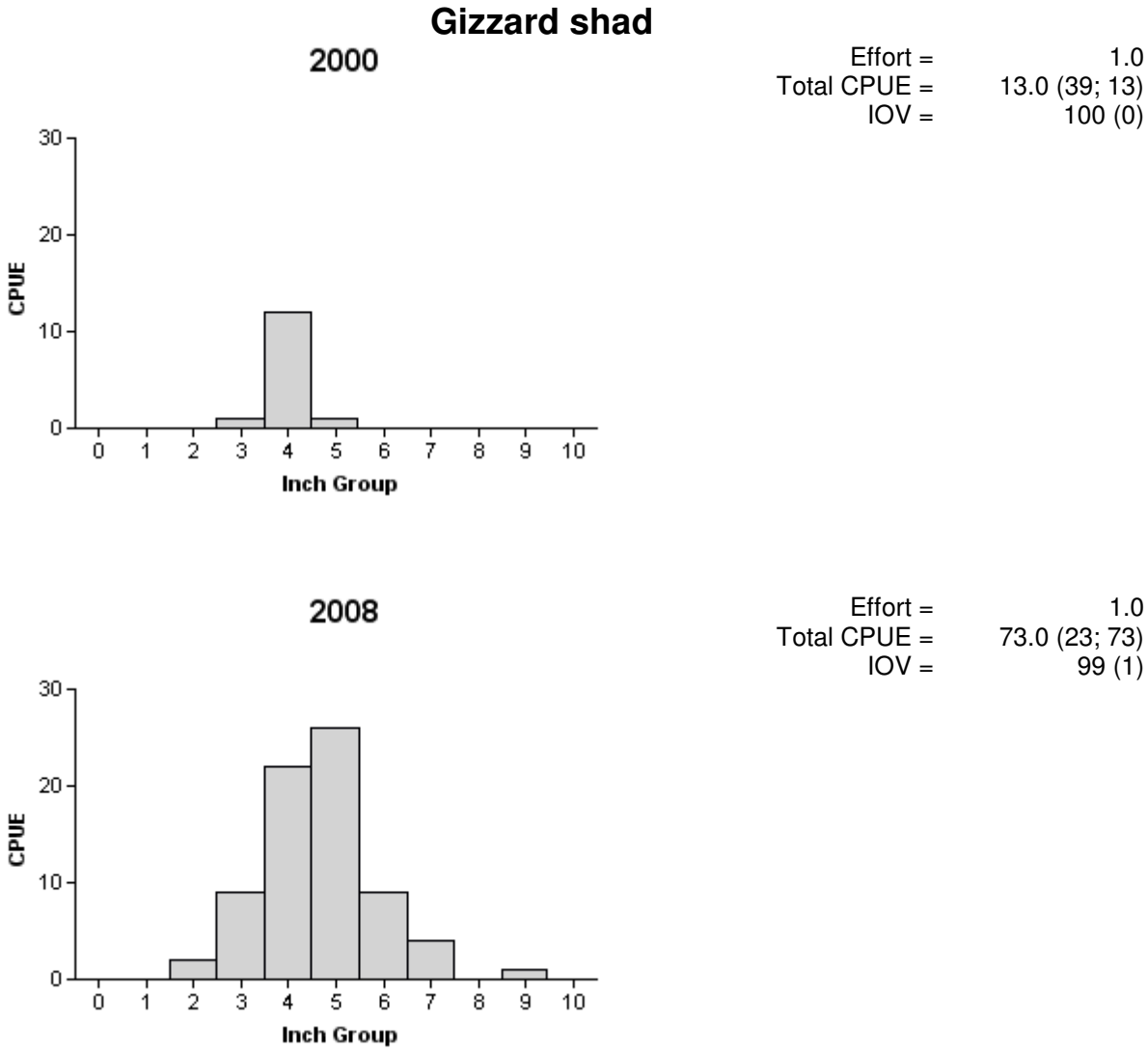


Figure 2. Comparison of the number of gizzard shad caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for the fall electrofishing surveys, Delta Lake, Texas, 2000 and 2008.

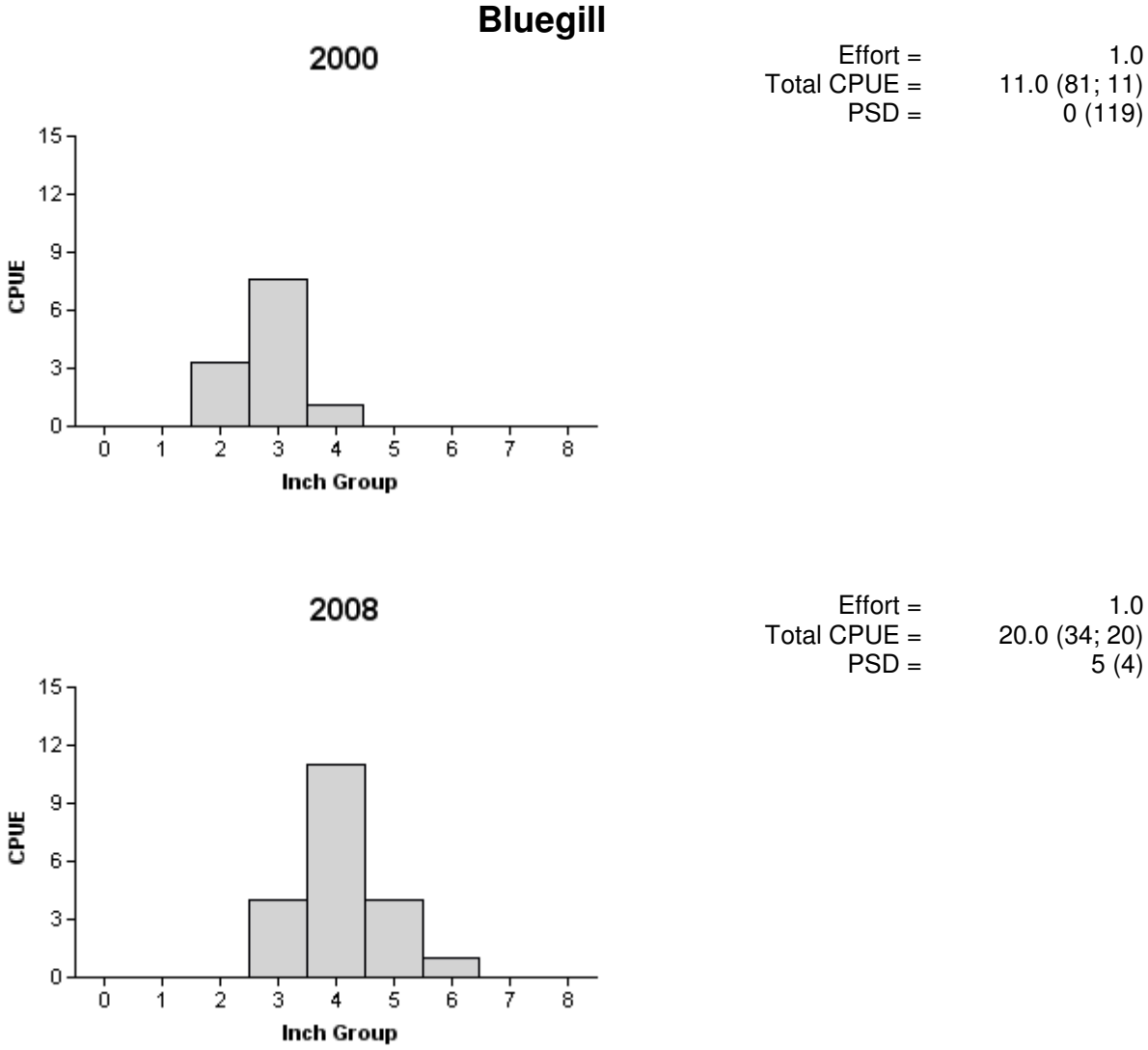
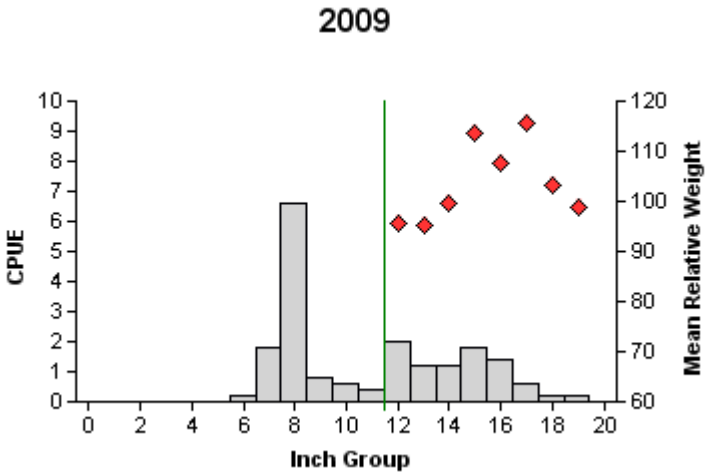


Figure 3. Comparison of the number of bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for the fall electrofishing survey, Delta Lake, Texas, 2000 and 2008.

Blue catfish

Effort =	5.0
Total CPUE =	0.0 (0; 0)
Stock CPUE =	0.0 (0: 0)
PSD =	0 (0)

No blue catfish were collected in the 2001 gill net survey.



Effort =	5.0
Total CPUE =	19.0 (40; 95)
Stock CPUE =	8.6 (27; 43)
PSD =	0 (142)

Figure 4. Comparison of the number of blue catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and populations indices (RSE and N for CPUE and SE for size structure are in parentheses) for the spring gill net survey, Delta Lake, Texas, 2001 and 2009. Vertical lines denote 12-inch minimum length limit.

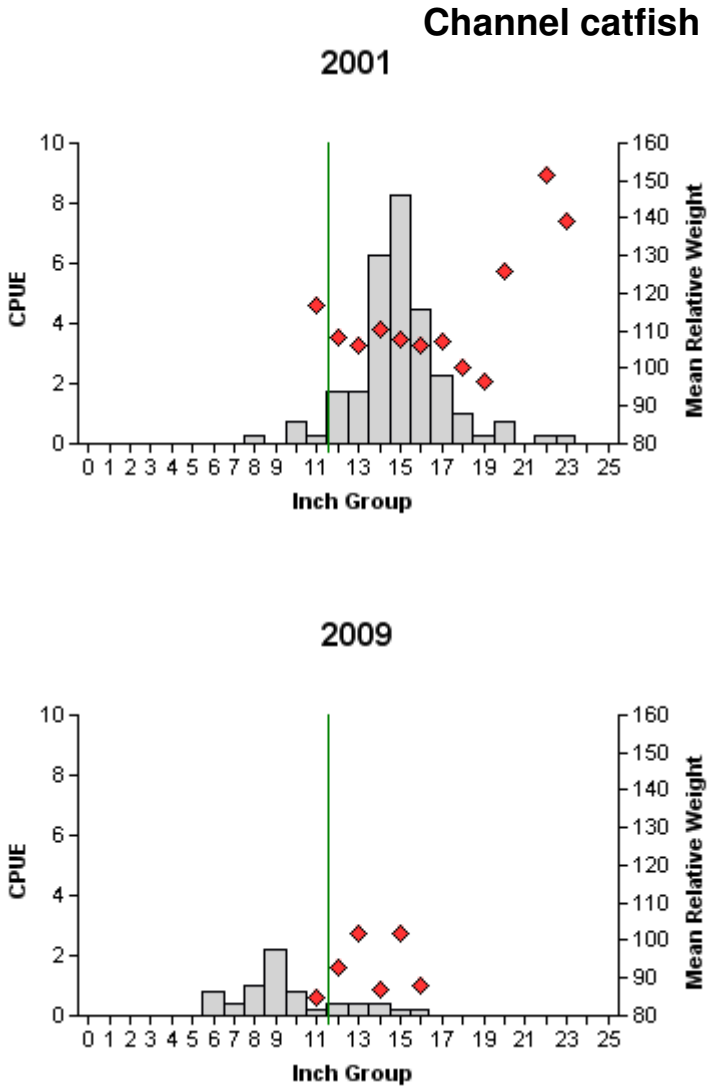


Figure 5. Comparison of the number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and populations indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Delta Lake, Texas, 2001 and 2009. Vertical lines denote 12-inch minimum length limit.

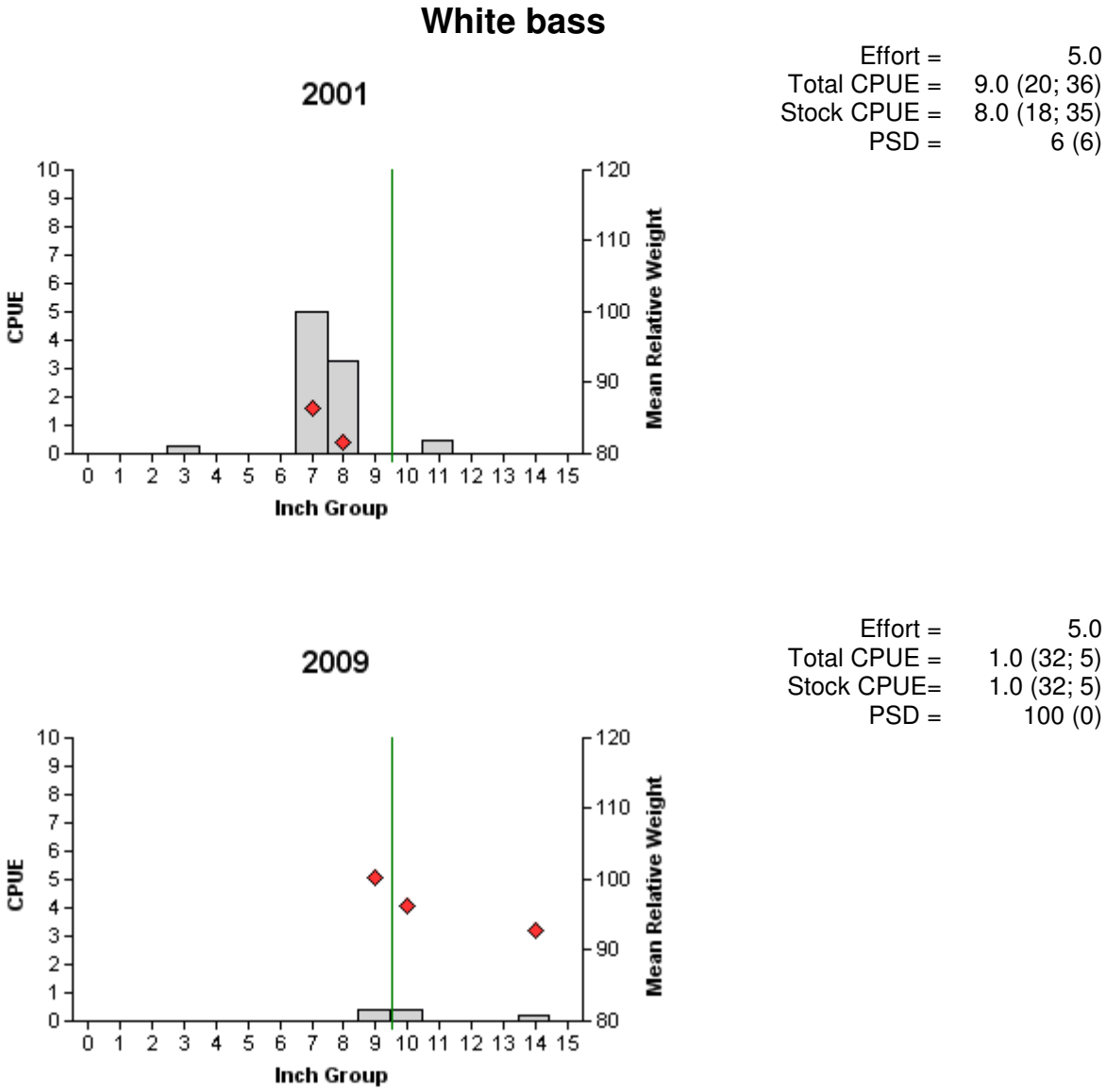
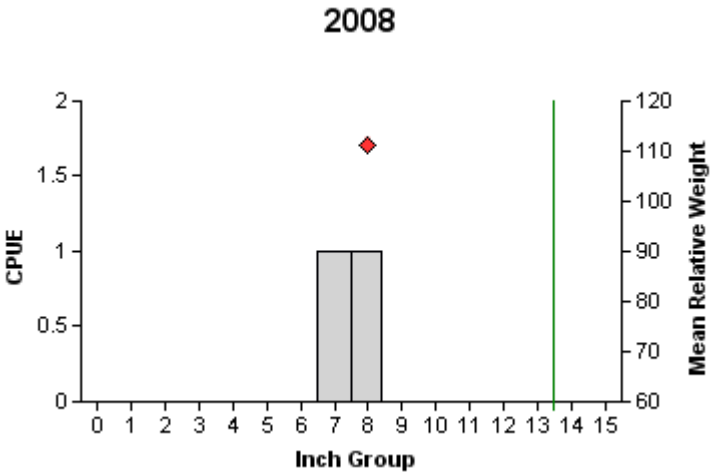


Figure 6. Comparison of the number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and populations indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Delta Lake, Texas, 2001 and 2009. Vertical line denotes 10-inch minimum length limit.

Largemouth bass

Effort =	1.0
Total CPUE =	0.0 (0; 0)
Stock CPUE =	0.0 (0; 0)
PSD =	0 (0)

No largemouth bass were collected during the fall 2000 electrofishing survey.



Effort =	1.0
Total CPUE =	2.0 (67; 2)
Stock CPUE =	1.0 (100; 1)
PSD =	0 (147)

Figure 7. 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 the fall electrofishing survey, Delta Lake, Texas, 2008. Vertical line denotes 14-inch minimum length limit.

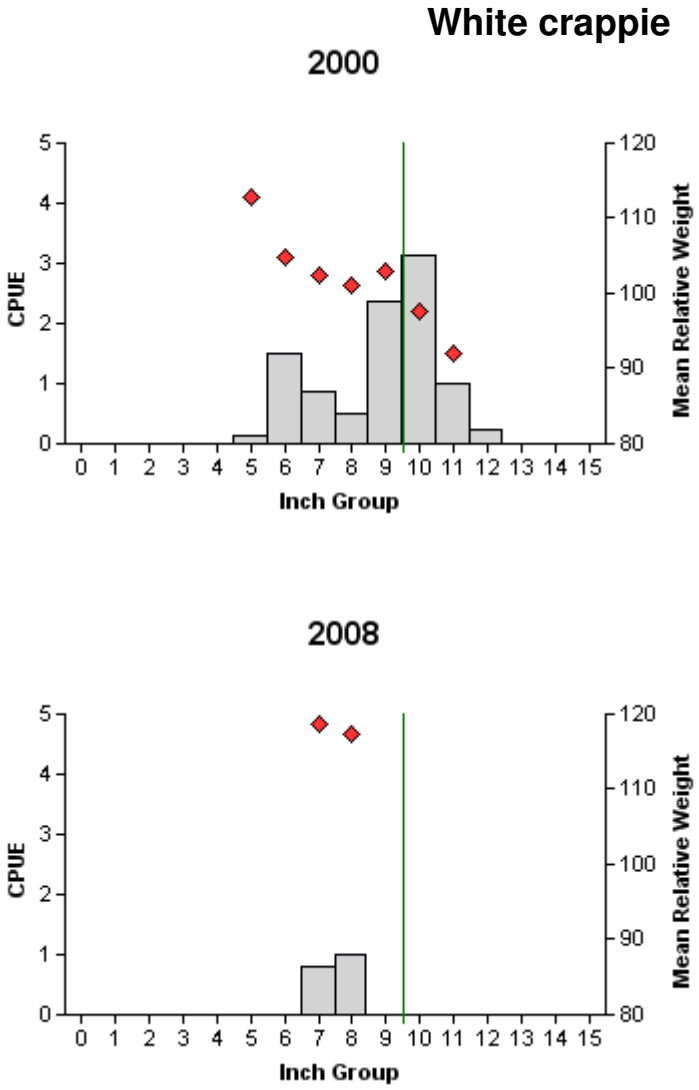


Figure 8. Comparison of the number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for the fall trap net survey, Delta Lake, Texas, 2008. Vertical lines denote 10-inch minimum length limit.

Table 5. Proposed survey schedule for Delta Lake, 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.

Survey Year	Vegetation	Electrofishing	Trap Netting	Gill Netting	Report
Fall 2009-Spring 2010					
Fall 2010-Spring 2011					
Fall 2011-Spring 2012					
Fall 2012-Spring 2013	S (Digital shapefille)	S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected from all gear types from Delta Lake, Texas, 2008-2009.

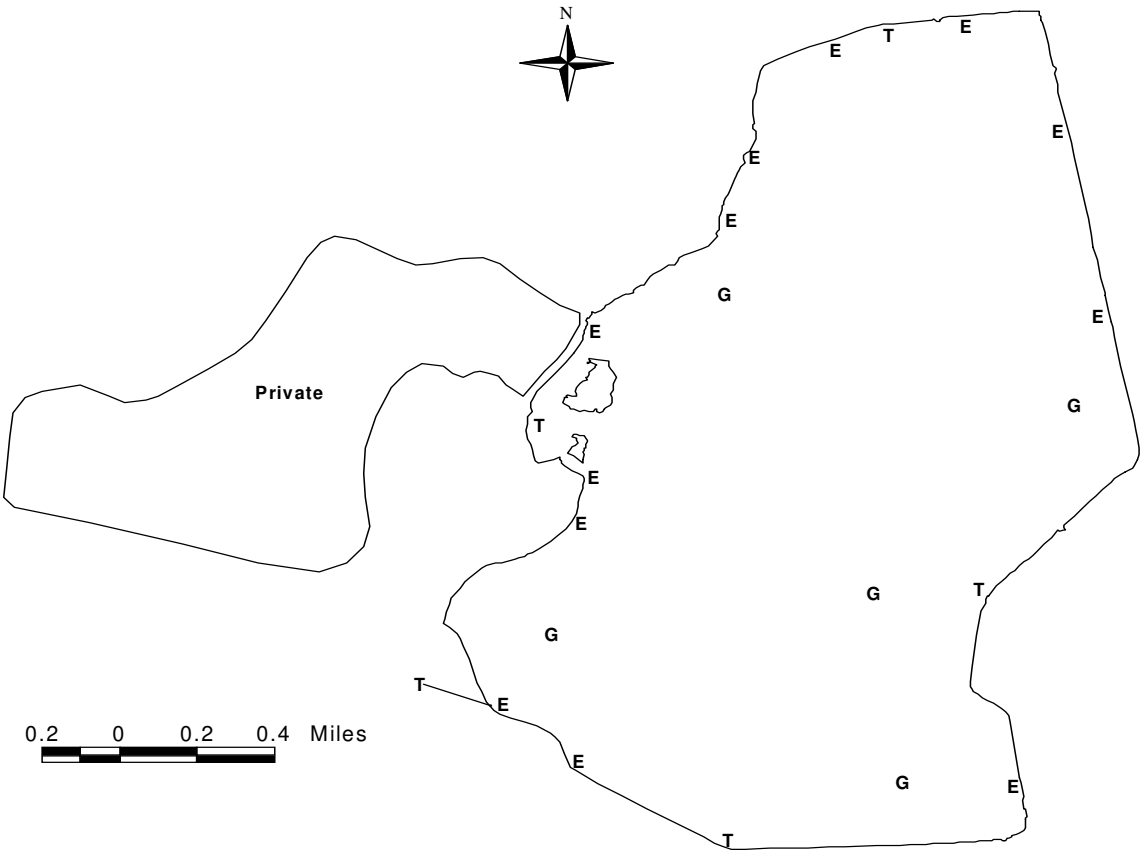
	Electrofishing		Trap Netting		Gill netting	
Species	N	CPUE	N	CPUE	N	CPUE
Longnose gar					3	0.6
Alligator gar			7	1.4	4	0.8
Gizzard shad	73	73.0	237	47.4	26	5.2
Threadfin shad	143	143.0	1036	207.2		
Common carp	2	2.0			18	3.6
Red shiner	1	1.0				
Inland silverside	47	47.0				
Smallmouth buffalo					1	0.2
Blue catfish					95	19.0
Channel catfish			6	1.2	35	7.0
Mexican tetra	5	5.0	16	3.2		
Suckermouth catfish	3	3.0	886	177.2		
White bass	3	3.0			5	1.0
Warmouth	2	2.0	1	0.2		
Bluegill	20	20.0	22	4.4		
Largemouth bass	2	2.0	4	0.8		
White crappie			9	1.8	10	1.2
Freshwater drum	6	6.0	2	0.4	41	8.2
Blue tilapia	32	32.0	36	7.2		
Gulf killifish	9	9.0				

APPENDIX B

Number (N) and catch rate (CPUE) of all species collected from all gear types from Delta Lake, Texas, during the May 2006 non-standard surveys.

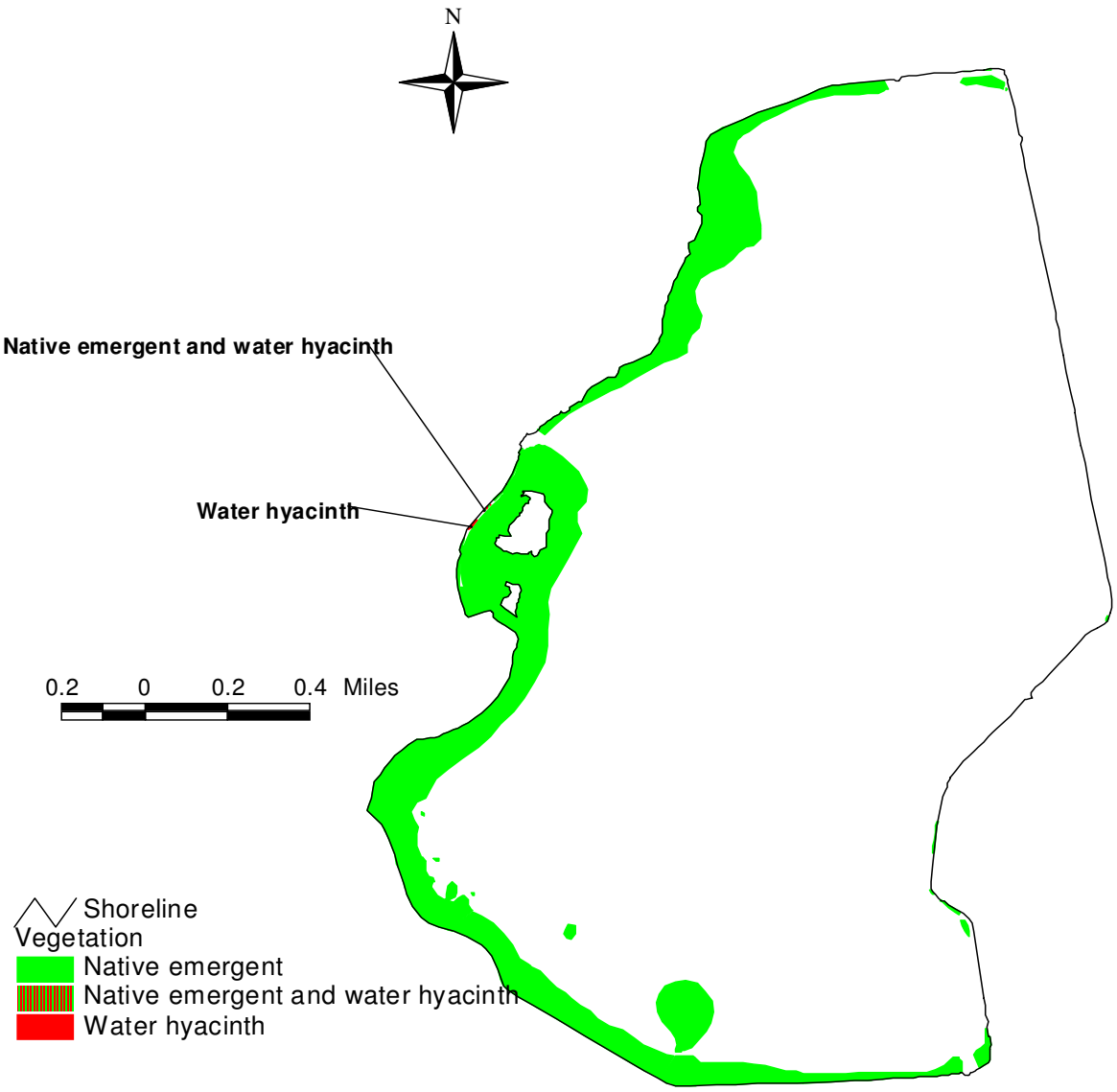
	Electrofishing		Trap Netting		Gill netting	
Species	N	CPUE	N	CPUE	N	CPUE
Longnose gar					1	0.2
Alligator gar					1	0.2
Gizzard shad	844	844.0	632	126.4	48	9.6
Threadfin shad	16	16.0	47	9.4		
Common carp	24	24.0	4	0.8	29	5.8
Inland silverside	30	30.0				
Blue catfish			4	0.8	3	0.6
Channel catfish	19	19.0			14	2.8
Suckermouth catfish					2	0.4
White bass	1	1.0			2	0.4
Bluegill	9	9.0	6	1.2		
Largemouth bass			1	0.2		
White crappie	1	1.0	11	2.2	5	1.0
Freshwater drum			5	1.0	98	19.6

APPENDIX C



Location of sampling sites, Delta Lake, Texas, 2008-2009. Electrofishing, trap net, and gill net stations are indicated by E, T, and G, respectively.

APPENDIX D



Aquatic vegetation map for Delta Lake, Texas, 2008.