

PERFORMANCE REPORT

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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

Mexia Reservoir

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July 31, 2008

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Mexia Reservoir were surveyed in 2007 using electrofishing and trap nets and in 2008 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:** Mexia Reservoir is an 897-acre impoundment located on the Navasota River within the Brazos River Basin, Limestone County. Water levels were within one foot of conservation pool (448.3 above MSL) during the time of sampling. Shoreline fish habitat consisted of boat docks, brush, overhanging trees, and emergent shoreline vegetation. Boat access (one ramp) on the reservoir is adequate, yet there are currently no handicap-specific facilities.
- **Management history:** Important sport fish include largemouth bass, white crappie, and catfish. The management plan from the 2004 survey report included evaluation of blue catfish recruitment and publicizing crappie angling. Florida largemouth bass were introduced in the mid to late 70s and stocked again in 1995 and 1998.
- **Fish Community**
 - **Prey species:** Threadfin shad continued to be present in the reservoir. Electrofishing catch of gizzard shad was good and most were available as prey to sport fish. The electrofishing catch of bluegills was fair to good; however none over 5-inches were collected.
 - **Catfishes:** Only one legal-sized blue catfish was collected in the spring 2008 gill net survey. The gill net catch of channel catfish was good in spring 2008, and condition increased with size. Length classes ranged from 12 to 25 inches.
 - **White bass:** No white bass were collected from Mexia in the spring 2008 gill net survey.
 - **Largemouth bass:** Largemouth bass were collected in very low numbers. Although the size structure indicated recent recruitment, only one legal-sized fish was observed. Condition was moderate.
 - **White crappie:** The recruitment, abundance, and body condition of white crappie continues to be good, although fewer legal-sized fish were collected.
- **Management Strategies:** Stock blue catfish to improve a poor blue catfish fishery. Conduct a general electrofishing survey and tier-IV trap net survey in 2011, and a general gill net survey in 2012. Also, perform a new littoral habitat survey prior to the 2012 report.

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INTRODUCTION

This document is a summary of fisheries data collected from Mexia Reservoir in 2007-2008. 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 fishes and important prey species. Historical data are presented with the 2007-2008 data for comparison.

Reservoir Description

Mexia Reservoir is supplied by the Navasota River within the Brazos River Basin, Limestone County. The reservoir is used as a municipal water supply and for recreation. The 897-acre impoundment has a drainage area of 200 square miles, a storage capacity of 10,000 acre-feet, and a shoreline length of 16 miles. Mean and maximum depths are 11.0 and 20.0 feet respectively. Moderate water level fluctuations have occurred since 2004, but levels remained within three feet of conservation pool which is currently 448.3 feet above mean sea level (Figure 1). Shoreline fish habitat consists of boat docks, rocky shoreline, and inundated stumps in the back of coves. Bank fishing is limited to only a few areas on the reservoir. Boat access (one ramp) on the reservoir is adequate, and there are currently no handicap-specific facilities. Other descriptive characteristics for Mexia Reservoir are in Table 1. Further information about Mexia Reservoir and its facilities can be obtained by visiting the Texas Parks and Wildlife Web site at <http://www.tpwd.state.tx.us/> and navigating within the fishing link.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Baird and Tibbs 2004) included:

1. Sample blue catfish population in 2008 with gill nets and consider supplemental stockings if necessary.
Action: A gill net survey was conducted in spring 2008 and the blue catfish catch rate remained poor; only a single blue catfish was collected. Recruitment will be evaluated again in 2012 using gill nets and supplementary stocking considered at that time.
2. Generate angling interest in Mexia by issuing a news release on the excellent crappie fishery.
Action: A news release was issued in July 2004 to draw attention to the great crappie fishing on Mexia Reservoir. Additional news releases will be issued after the tier IV crappie sampling survey scheduled in 2011, if applicable.

Harvest regulation history: Sportfishes in Mexia Reservoir are currently managed with statewide regulations.

Stocking history: Mexia Reservoir has not been stocked since 1998 when Florida largemouth bass were stocked at a rate of 156 fish per acre. To date, over half a million Florida largemouth bass have been stocked into the reservoir. Blue catfish were stocked in 1975 (n = 30, 000), 1995 (n = 140,000), and 1996 (n = 140,000). Additionally, single stockings of flathead catfish, green sunfish X redear sunfish hybrids, and northern largemouth bass occurred in 1969, 1980, and 1996 respectively. The complete stocking history is in Table 3.

Vegetation/habitat history: Mexia is a shallow, turbid reservoir with a secchi range less than one to two feet. Most species of vegetation associated with its littoral habitat are shoreline or emergent species such as water willow (*Justicia americana*), Buttonbush (*Cephalanthus occidentalis*), Spike rushes (*Eleocharis spp.*), Bulrushes (*Scirpus spp.*), and Cattail (*Typha spp.*). No noxious species of vegetation have been identified in the reservoir to date.

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METHODS

Fishes were collected by electrofishing (1 hour at 12 5-min stations), gill netting (5 net nights at 5 stations), and trap netting (5 net nights at 5 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for gill and trap nets, as the number of fish per net night (fish/nn). 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), 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). 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. No age and growth was conducted in 2007 and 2008. Source for water level data was the United States Geological Survey (USGS) website and Brazos River Authority (BRA).

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of boat docks, brush, overhanging trees, and emergent shoreline vegetation; however no habitat survey was conducted in 2007-2008 (Table 4). The last habitat survey was conducted by Sellers and Mitchell (1997).

Creel: No creel surveys were performed on Mexia Reservoir in the last four years.

Prey species: Electrofishing catch rates of gizzard shad and bluegill were 519.0/h and 143.0/h, respectively. Index of vulnerability (IOV) for gizzard shad was good, indicating 89% of gizzard shad were available to existing predators; this was similar to the IOV estimates from the previous two surveys. Total CPUE of gizzard shad was also similar to the 2004 survey (Figure 2). Total CPUE of bluegill in 2007 was considerably higher than total CPUE from the 1999 and 2003 surveys, with size structure dominated by small individuals (Figure 3).

Catfish: The gill net catch rate of blue catfish was 0.2/nn in 2008 – down from 1.8/nn in 1999 (Figure 4). The channel catfish population continues to do well with a catch rate of 4.6/nn in 2008 – down slightly from the 6.6/nn in 2004. Proportional stock density (PSD) values increased from 33 in 2004 to 61 in 2008, indicating a higher percentage of quality-sized fish in the population; the percentage of preferred-sized fishes (i.e., 24 inches) also increased from 0 in 2004 to 4 in 2008. Relative weights (i.e., condition) of channel catfish improved with increasing lengths (range 80 to 130), and were excellent for fishes in the 20-25 inch range (Figure 5).

White bass: The gill net catch rate of white bass was 1.0/nn in 1999 and 2.6/nn in 2004, however none were collected in 2008 (Figure 6). Low water levels during spring and summer 2005 and 2006 may have interfered with white bass recruitment (Figure 1).

Largemouth bass: The electrofishing catch rate of largemouth bass was 26.0/h in 2007, much lower than the 62.0/h in 2003. Size structure was poor as the PSD value decreased from 43 in 2003 to 38 in 2007 (40 indicates a balanced population) (Anderson and Neumann 1996). Body condition in 2007 was fair to good (relative weights ranging from approximately 88-98) for all size classes (Figure 7). No age and growth work was conducted on largemouth bass in Mexia Reservoir this report period. Also, genetics were not assessed for the 2007 survey due to an insufficient sample of fish.

White crappie: The trap net catch rate of white crappie was 59.2/nn in 2007, higher than in 2003 (36.4/nn) and 1999 (49.6/nn). The size structure indicates good recruitment and the PSD value of 32 indicates a balanced population (Figure 8). Mean relative weight was good - near 100 for all size classes.

Fisheries management plan for Mexia Reservoir, Texas

Prepared – July 2008.

ISSUE 1: The blue catfish stocked in 1995 and 1996 apparently failed to produce a viable fishery since none were collected in the 2004 gill net survey and only one was collected in the 2008 gill net survey.

MANAGEMENT STRATEGIES

1. Request supplemental stocking in 2009.
2. Sample the lake in 2012 with a gill net survey to evaluate recruitment of stocked fish.

ISSUE 2: The most recent habitat survey for Mexia reservoir is dated 1996.

MANAGEMENT STRATEGY

1. Conduct an aquatic vegetation and shoreline habitat survey in summer 2011.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes standard electrofishing in fall 2011 and gill netting in spring 2012. Additionally, a tier IV trap net sample will be conducted in fall 2011 in order to better understand this excellent crappie fishery (Table 5).

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.
- Baird, M. and J. Tibbs. 2003. Statewide freshwater fisheries monitoring and management program survey report for Mexia Reservoir, 2003. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.
- Sellers, K. and J. Mitchell. 1997. Statewide freshwater fisheries monitoring and management program survey report for Mexia Reservoir, 1997. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.
- DiCenzo, V. J., M. J. Maceina, and M. R. Stimert. 1996. Relations between reservoir trophic state and gizzard shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.

Mexia Reservoir Mean Daily Water Level

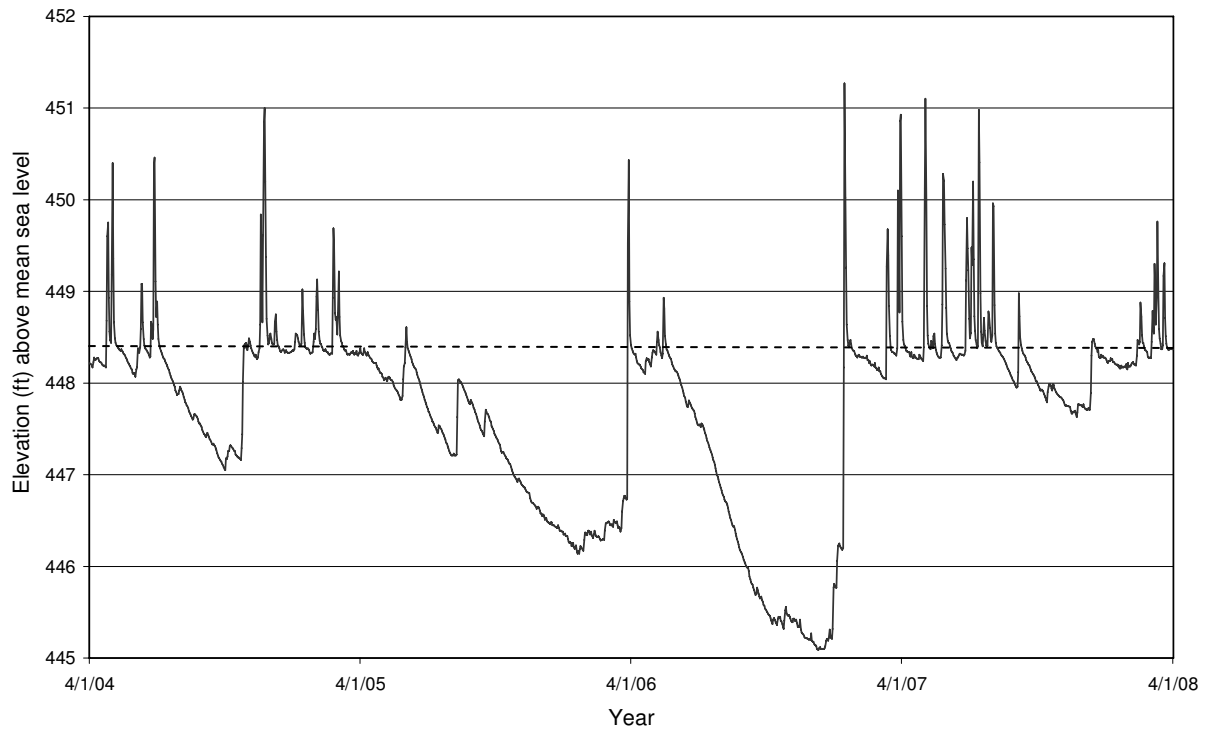


Figure 1. Daily mean water level elevations in feet above mean sea level (MSL) recorded for Mexia Reservoir, Texas.

Table 1. Characteristics of Mexia Reservoir, Texas.

Characteristic	Description
Year Constructed	1961
Controlling authority	Bistone Municipal Water District
County	Limestone
Reservoir type	Tributary
Shoreline Development Index (SDI)	8.0
Conductivity	280 umhos/cm

Table 2. Harvest regulations for Mexia 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, 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 Mexia, 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.

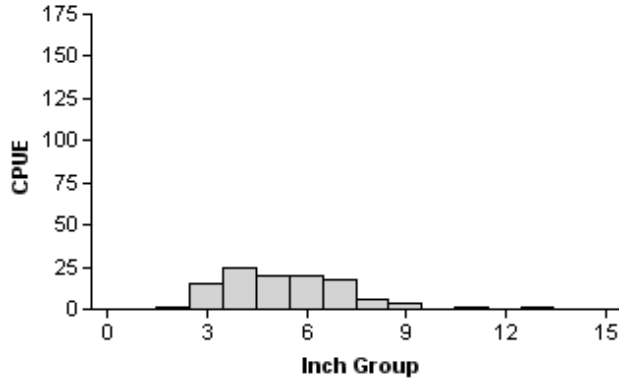
Species	Year	Number	Life Stage	Mean TL (in)
Blue catfish	1975	30,000	UNK	UNK
	1995	140,000	FGL	1.9
	1996	140,000	FGL	1.9
	Total	310,000		
Flathead catfish	1969	3,806		UNK
	Total	3,806		
Florida Largemouth bass	1974	63,745	FGL	2.2
	1974	11,375	FRY	1.0
	1976	70,000	FRY	1.0
	1977	140,340	FRY	1.0
	1995	142,384	FGL	1.3
	1998	140,668	FGL	1.3
	Total	568,512		
Green sunfish x redear sunfish	1980	1,000		UNK
	Total	1,000		
Largemouth bass	1996	43	ADL	12.0
	Total	43		

Table 4. Survey of littoral zone and physical habitat types, Mexia Reservoir, Texas, 1996. A linear shoreline distance (miles) was recorded for each habitat type found. Surface area (acres) and percent of reservoir surface area was determined for each type of aquatic vegetation found.

Shoreline habitat type	Shoreline distance	
	Miles	Percent of total
Rocky shoreline	10.4	65.0
Cut bank	0.3	1.7
Dead trees, stumps	3.2	20.0
Featureless	0.5	3.3
Overhanging brush	1.3	8.3
Eroded bank	0.3	1.7

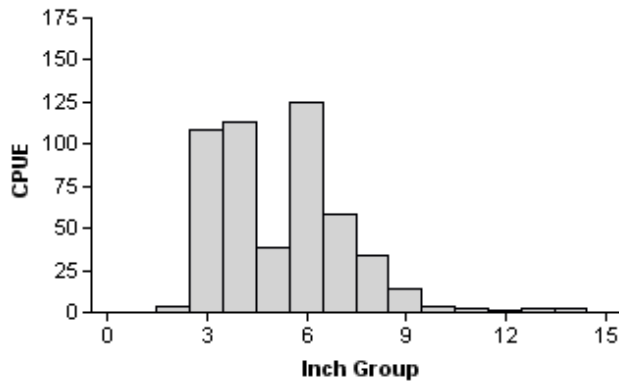
Gizzard Shad

1999



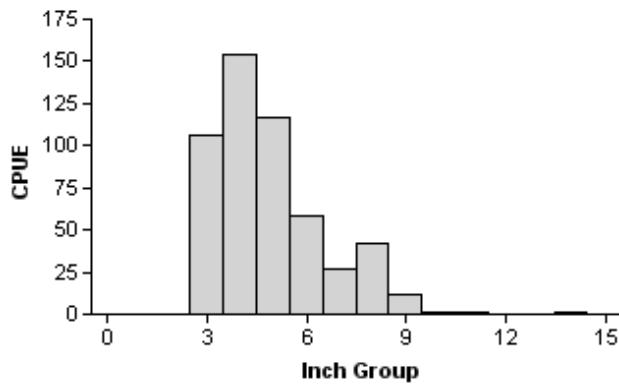
Effort = 1.5
 Total CPUE = 107.3 (11; 161)
 Stock CPUE = 28.0 (22; 42)
 IOV = 90.06 (2.7)

2003



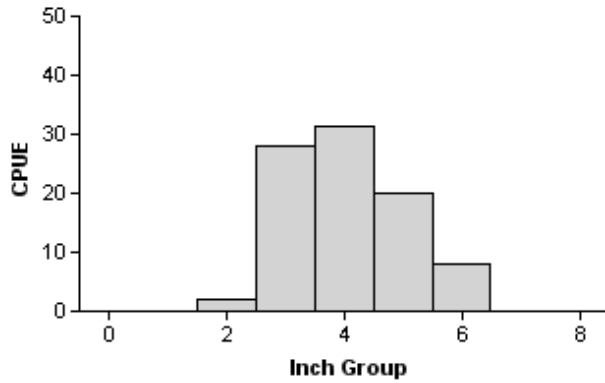
Effort = 1.0
 Total CPUE = 505.0 (10; 505)
 Stock CPUE = 117.0 (16; 117)
 IOV = 88.32 (2.5)

2007

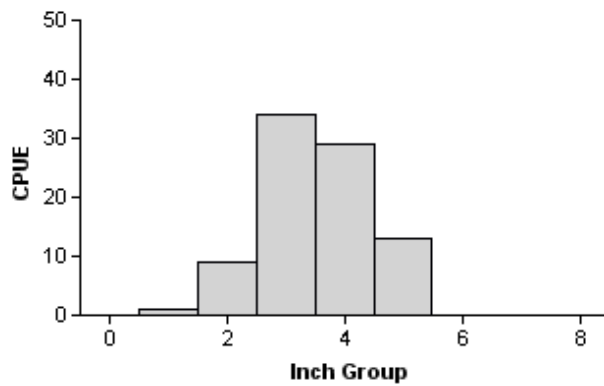


Effort = 1.0
 Total CPUE = 519.0 (18; 519)
 Stock CPUE = 84.0 (28; 84)
 IOV = 89.02 (2.5)

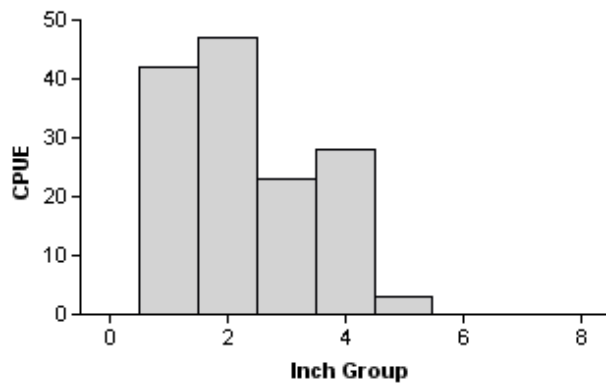
Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Mexia Reservoir, Texas, 1999, 2003, and 2007.

Bluegill**1999**

Effort = 1.5
 Total CPUE = 89.3 (17; 134)
 Stock CPUE = 87.3 (17; 131)
 PSD = 9 (3)
 RSD-P = 0 (0)

2003

Effort = 1.0
 Total CPUE = 86.0 (18; 86)
 Stock CPUE = 76.0 (20; 76)
 PSD = 0 (39.8)
 RSD-P = 0 (0)

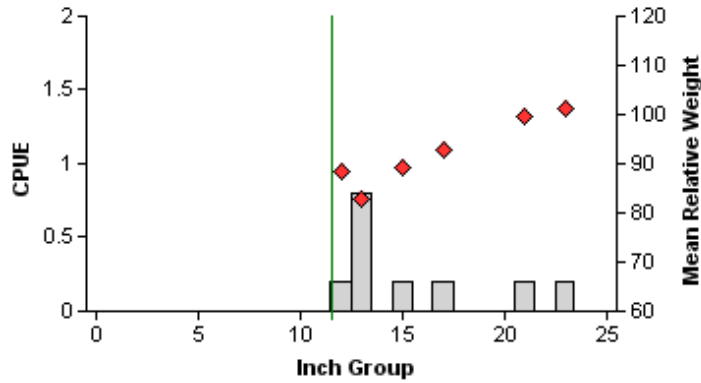
2007

Effort = 1.0
 Total CPUE = 143.0 (58; 143)
 Stock CPUE = 54.0 (45; 54)
 PSD = 0 (172.5)
 RSD-P = 0 (0)

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

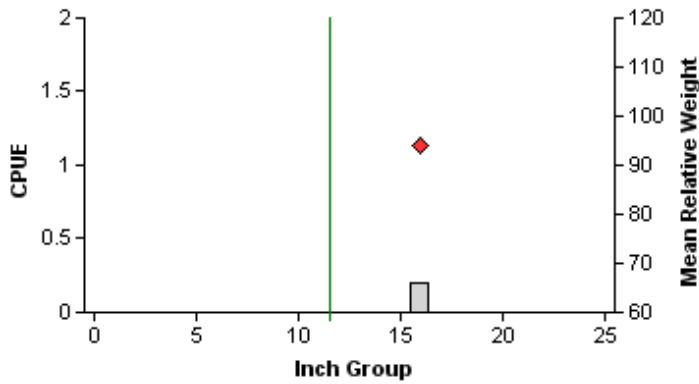
Blue Catfish

1999



Effort = 5.0
 Total CPUE = 1.8 (32; 9)
 Stock CPUE = 1.8 (32; 9)
 PSD = 22 (14.5)
 RSD-P = 0 (0)

2008

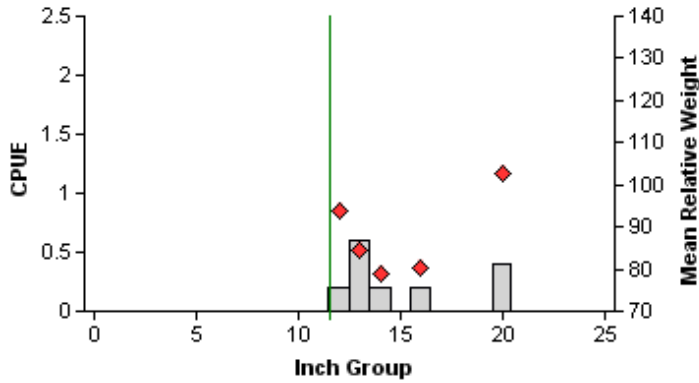


Effort = 5.0
 Total CPUE = 0.2 (100; 1)
 Stock CPUE = 0.2 (100; 1)
 PSD = 0 (111.8)
 RSD-P = 0 (0)

Figure 4. Number of blue catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Mexia Reservoir, Texas, 1999 and 2008. No blue catfish were collected in 2004.

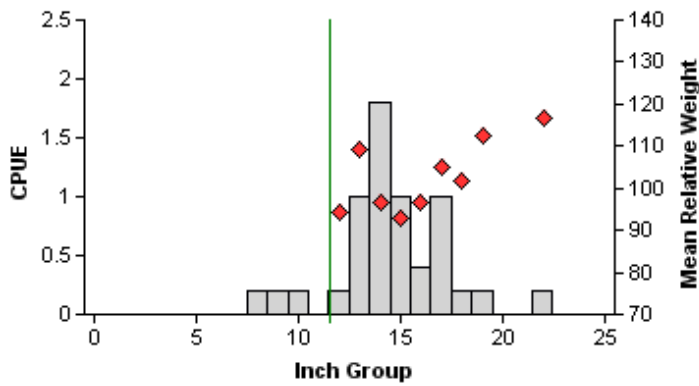
Channel Catfish

1999



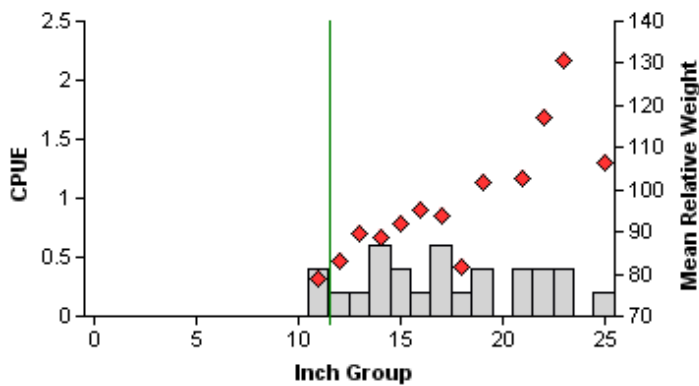
Effort = 5.0
 Total CPUE = 1.6 (51; 8)
 Stock CPUE = 1.6 (51; 8)
 PSD = 38 (15)
 RSD-P = 0 (0)

2004



Effort = 5.0
 Total CPUE = 6.6 (27; 33)
 Stock CPUE = 6.0 (24; 30)
 PSD = 33 (7.5)
 RSD-P = 0 (0)

2008

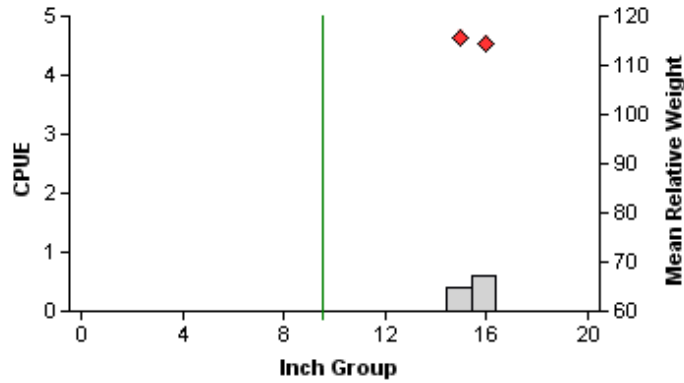


Effort = 5.0
 Total CPUE = 4.6 (39; 23)
 Stock CPUE = 4.6 (39; 23)
 PSD = 61 (3.1)
 RSD-P = 4 (3.9)

Figure 5. Number of channel catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Mexia Reservoir, Texas, 1999, 2004, and 2008.

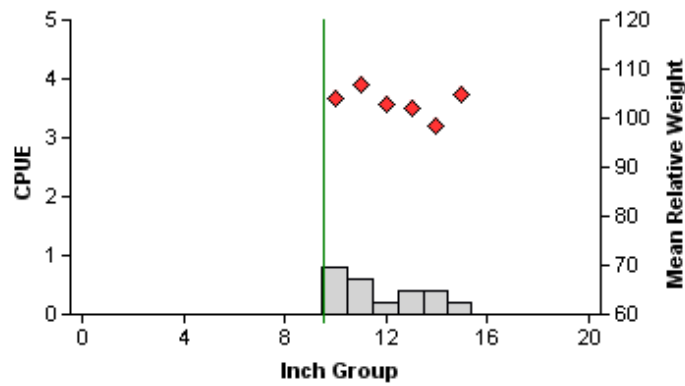
White Bass

1999



Effort = 5.0
 Total CPUE = 1.0 (45; 5)
 Stock CPUE = 1.0 (45; 5)
 PSD = 100 (0)
 RSD-P = 100 (0)

2004

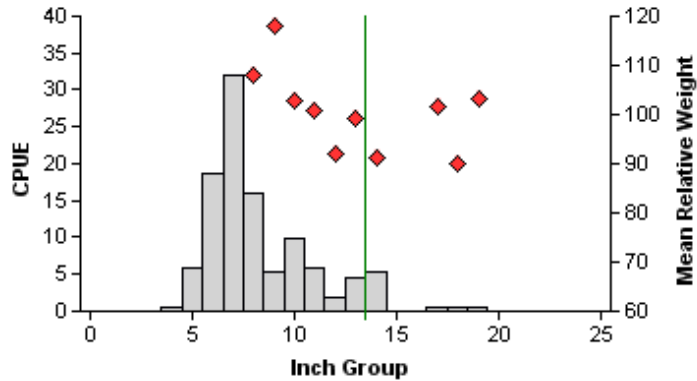


Effort = 5.0
 Total CPUE = 2.6 (43; 13)
 Stock CPUE = 2.6 (43; 13)
 PSD = 100 (0.0)
 RSD-P = 46 (24)

Figure 6. Number of white bass caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Mexia Reservoir, Texas, 1999, and 2004. No white bass were collected in 2008.

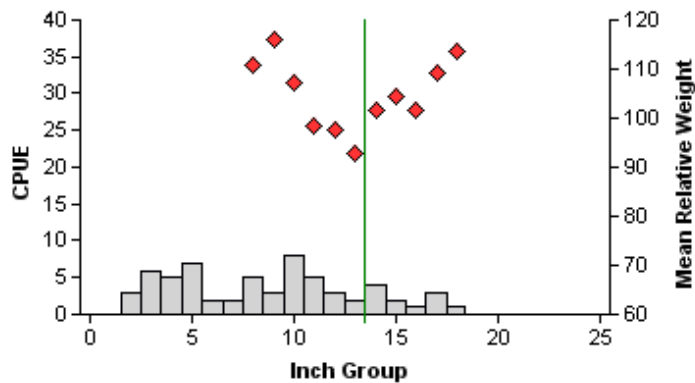
Largemouth Bass

1999



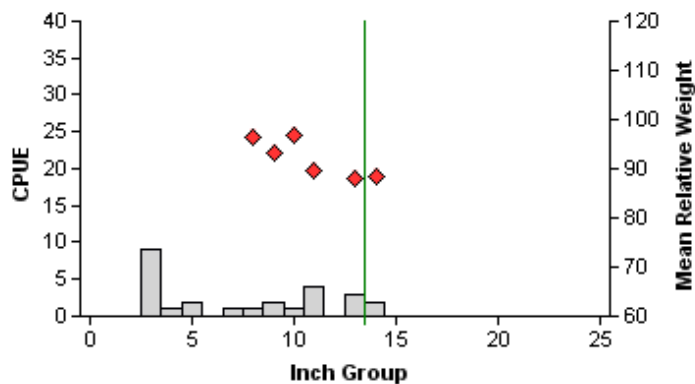
Effort = 1.5
 Total CPUE = 108.7 (15; 163)
 Stock CPUE = 51.3 (16; 77)
 PSD = 27 (6.8)
 RSD-P = 4 (2.1)

2003



Effort = 1.0
 Total CPUE = 62.0 (22; 62)
 Stock CPUE = 37.0 (19; 37)
 PSD = 43 (6.1)
 RSD-P = 19 (5.2)

2007

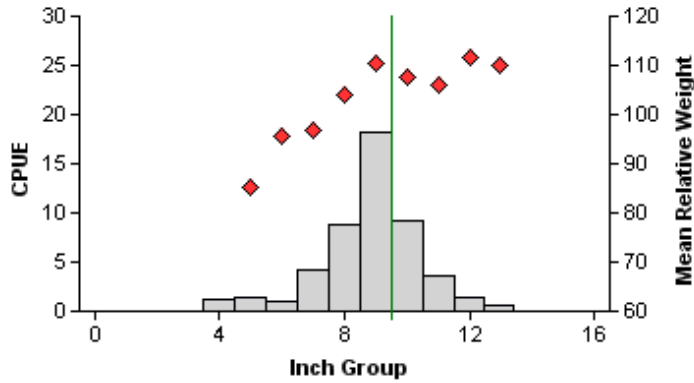


Effort = 1.0
 Total CPUE = 26.0 (50; 26)
 Stock CPUE = 13.0 (61; 13)
 PSD = 38 (14.6)
 RSD-P = 0 (0)

Figure 7. Number of largemouth bass caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Mexia Reservoir, Texas, 1999, 2003, and 2007.

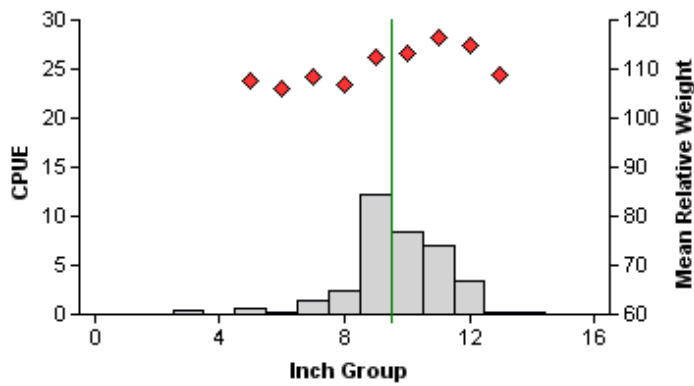
White Crappie

1999



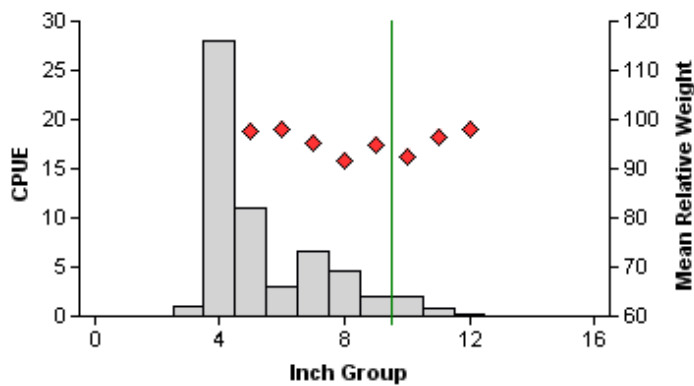
Effort = 5.0
 Total CPUE = 49.6 (18; 248)
 Stock CPUE = 48.4 (19; 242)
 PSD = 86 (5.1)
 RSD-P = 31 (5.6)

2003



Effort = 5.0
 Total CPUE = 36.4 (41; 182)
 Stock CPUE = 36.0 (41; 180)
 PSD = 94 (3.3)
 RSD-P = 53 (7.7)

2007



Effort = 5.0
 Total CPUE = 59.2 (38; 296)
 Stock CPUE = 30.2 (28; 151)
 PSD = 32 (6.8)
 RSD-P = 10 (1.6)

Figure 8. Number of white crappie caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Mexia Reservoir, Texas, 1999, 2003, and 2007.

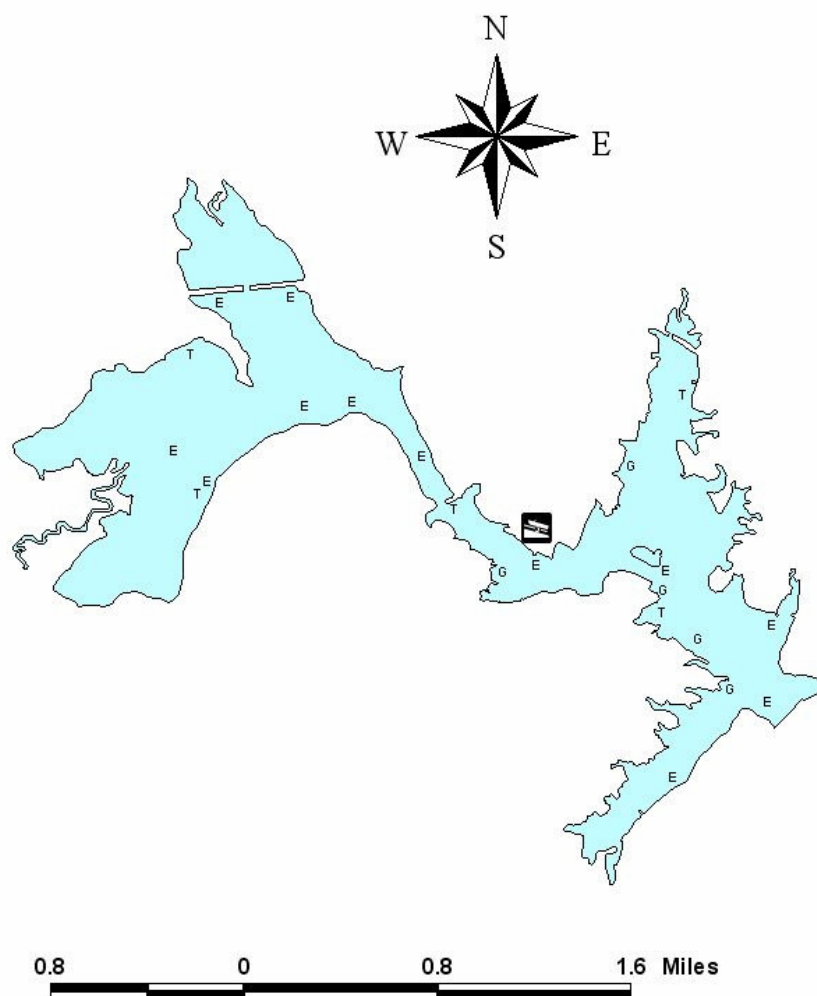
Table 5. Proposed sampling schedule for Mexia Reservoir, Texas. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

Survey Year	Electrofisher	Trap Net	Gill Net	Creeel Survey	Report
Fall 2008-Spring 2009					
Fall 2009-Spring 2010					
Fall 2010-Spring 2011					
Fall 2011-Spring 2012	S	S	S		S

APPENDIX A

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

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					519	519.0
Threadfin shad					18	18.0
Blue catfish	1	0.20				
Channel catfish	23	4.60				
Redbreast sunfish						
Green sunfish					1	1.0
Bluegill					143	143.0
Longear sunfish					20	20.0
Largemouth bass					26	26.0
White crappie			296	59.2		

APPENDIX B

Location of sampling sites, Mexia Reservoir, Texas, 2007-2008. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water levels were within one foot of conservation pool (448.3) during the time of sampling.