

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

Limestone Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Limestone Reservoir were surveyed in 2008 using electrofishing and trap nets and in 2009 using gill nets. This report summarizes survey results and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Limestone Reservoir is a 13,680-acre reservoir within the Navasota River system in Limestone, Robertson, and Leon Counties, Texas. Shoreline fish habitat consisted mainly of natural shoreline and bulkheading. Bank fishing is limited to a few day-use areas on the reservoir. Boat access remains adequate yet overall handicap facilities remain poor. Further information about Limestone Reservoir and its facilities can be obtained by visiting the Texas Parks and Wildlife web site at www.tpwd.state.tx.us and navigating within the fishing link.
- **Management history:** Important sport fish include blue catfish, channel catfish, white bass, largemouth bass, and white crappie. The 2004 survey report included a thorough age and growth analysis of all five of these species (Tibbs and Baird 2005). Management strategies from that report included: conducting an angler creel survey in 2012 and 2013 to monitor exploitation, discontinuing Florida bass stockings, and continuing annual monitoring of noxious vegetation.
- **Fish Community**
 - **Prey species:** Forage species collected in fall 2008 included threadfin shad, gizzard shad, bluegill, longear sunfish, redear sunfish, and warmouth in order of decreasing abundance. The 2008 catch rates were generally higher than those observed in 2004, with the exception of gizzard shad which were lower. Bluegill were collected at nearly double the 2004 rate.
 - **Catfishes:** Blue catfish were present in excellent numbers and fair body condition; channel catfish were also present in good numbers with fair body condition. No flathead catfish were observed.
 - **White bass:** White bass were present in good numbers and continue to offer excellent fishing opportunities.
 - **Black basses:** Largemouth bass were present in low numbers; however population structure was basically unchanged. Current catch rates for Largemouth bass are among the lowest in the district.
 - **White crappie:** White crappie were present in slightly depressed numbers and displayed good body condition.
- **Management Strategies:** Continue managing Limestone Reservoir with statewide regulations. Conduct standard monitoring with electrofisher and trap nets in 2012 and gill nets in 2013. Specific management strategies should include annual vegetation surveys to monitor exotic vegetation, a creel survey in 2012, and an additional physical habitat survey prior to the 2017 report.

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INTRODUCTION

This document is a summary of fisheries data collected from Limestone Reservoir in 2008-2009. The purpose of the document is to provide fisheries information and make management recommendations to establish, 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 2008-2009 data for comparison.

Reservoir Description

Limestone Reservoir is a 13,680-acre reservoir within the Navasota River system in Limestone, Robertson and Leon counties, Texas (Figure 1). The reservoir was created in 1978 and is operated by the Brazos River Authority (BRA). Primary land use surrounding Limestone's 117 miles of shoreline is agriculture. The reservoir is eutrophic with water transparencies ranging from 1 to 2 feet, and average and maximum depths of 16.5 and 43 feet respectively. Water uses include power plant cooling and recreation. Shoreline fish habitat consisted mainly of natural shoreline and bulkheading (Table 4). Bank fishing is limited to a few day-use areas on the reservoir. Boat access remains adequate and handicap facilities remain poor. Further information about Limestone Reservoir and its facilities can be obtained by visiting the Texas Parks and Wildlife web site at www.tpwd.state.tx.us and navigating within the fishing link. Other descriptive characteristics for Limestone Reservoir are in Table 1.

Management History

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

1. Conduct a creel in 2012 and 2013 to monitor exploitation levels of sport fish.
Action: Creel is scheduled to begin in June 2012.
2. Discontinue Florida bass stockings.
Action: Florida bass stockings on Limestone were discontinued as recruitment was consistent and genetics were acceptable.
3. Continue annual vegetation surveys.
Action: Vegetation surveys were conducted annually. Surveys conducted since the 2005 report identified two new exotic species in the reservoir – Eurasian watermilfoil (*Myriophyllum spicatum*) and giant cane (*Arundinaria gigantea*).

Harvest regulation history: Sportfishes in Limestone Reservoir are currently managed with statewide regulations (Table 2).

Stocking history: No recent fish stockings have occurred for Limestone reservoir. The complete stocking history is in Table 3.

Vegetation/habitat history: Annual vegetation surveys have been conducted since 2005. Hydrilla, (*Hydrilla verticillata*) was the only species of concern in the reservoir in 1997, covering an estimated 19 surface acres; however only trace amounts have been found since then. Water hyacinth (*Eichhornia crassipes*) coverage was estimated at 3.5 acres in 2001, 37.5 acres in 2002, and 35 acres from 2003 through 2004. Coverage had dropped to trace amounts by 2006, but increased again to nearly 12 acres by summer 2008. Eurasian watermilfoil (*Myriophyllum spicatum*), was first observed in 2006 (estimated 21 acres), and maintained a similar coverage through 2008. Giant cane (*Arundinaria gigantea*) was first observed during the summer 2008 vegetation survey in sparse amounts. Limestone currently has four exotic vegetation species: hydrilla, giant cane, water hyacinth, and watermilfoil – in order of increasing abundance. Currently, none of these species are causing access problems. A comprehensive physical habitat survey was conducted in summer 2009 and represents the most accurate habitat data available for this reservoir (Table 4).

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METHODS

Fishes were collected by electrofishing (5 minutes at 18 stations), trap netting (10 net nights at 10 stations), and gill netting (10 net nights at 10 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 2008). Largemouth bass genetic samples were collected according to the Texas Parks and Wildlife Department Inland Fisheries Assessment Procedures (unpublished, revised manual 2008).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)], and condition indices [relative weight (Wr)] 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 X SE of the estimate/estimate) was calculated for all CPUE statistics and for creel statistics and SE was calculated for structural indices and IOV. Ages, when provided, were determined using otoliths for largemouth bass, white crappie, and white bass according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Assessment Procedures (unpublished, revised manual 2008). Source for water level data was the United States Geological Survey (USGS) website.

RESULTS AND DISCUSSION

Habitat: Shoreline fish habitat consisted mainly of natural shoreline and bulkheading. Complete habitat survey results can be found in Table 4.

Creel: No angler creel surveys have been conducted on Limestone Reservoir since the 2005 report was published.

Prey species: The electrofishing catch rates of threadfin and gizzard shad were 1302/h (Appendix A) and 190/h, slightly lower than the previous catch rate (Figure 2). Index of vulnerability (IOV) for gizzard shad was good, indicating 85% of the gizzard shad population was available to existing predators as forage. Catch rates of other important forage species collected were bluegill (104/h), longear sunfish (45.3/h), and redear sunfish (12.7/h) (Figures 3, 4, and 5).

Catfishes: The blue catfish population in Limestone has grown to be an excellent fishery. Gill net catch rate of blue catfish increased to 12.6/nn, from 2.1/nn and 2.3/nn in 2005 and 2001, respectively. The improved catch rates are most likely due to an increase in sublegal fish in the sample. Body condition or mean relative weight (Wr) ranged from 75 to 95 (Figure 6). The gill net catch rate for channel catfish was 6.2/nn – higher than the 3.3/nn and 3.5/nn in 2005 and 2001, respectively. Body condition (Wr) improved with larger length classes and ranged from 82 to 110 (Figure 7). Historical age and growth data can be found in Tibbs and Baird (2005).

White bass: The gill net catch rate for white bass was good at 5.2/nn in 2009 (Figure 8). Seventy-nine percent of the population was 12-inches in length or greater (i.e., RSD-12) indicating plenty of good-sized fish available for angler harvest. Body condition ranged from 78 to 94 (Figure 8). Historical age and growth data can be found in Tibbs and Baird (2005).

Black basses: The electrofishing catch rate of largemouth bass decreased to 32/h in 2008, from 51.5/h and 60/h in 2004 and 2000, respectively. It's unlikely that water level is responsible for the lower catch rate since levels were similar at the time of the 2004 and 2008 electrofishing surveys. Size structure of the bass population was similar to 2004 as illustrated by the similar proportional stock density (PSD), and relative stock density of 14-inch and larger individuals (RSD-14) (Figure 9). The catch rate of legal fish

decreased to 5.3/h, from 7.5/h and 7.0/h in 2004 and 2000, respectively (Figure 9). Body condition for most length classes was excellent (range 85 to 108) (Figure 9). Recruitment appeared to be consistent. The percentage of pure Florida largemouth bass and Florida alleles was 3.3 % and 31.7% respectively in 2004 (Tibbs and Baird 2005). Historical creel and age and growth data can be found in Tibbs and Baird (2005).

White crappie: The trap net catch rate of white crappie was 2.9/nn in 2008, well below the 5.0/nn in 2004 and 10.6/nn in 2000 (Figure 10). Relative weights were good to excellent for all size classes (range 95 to 106); however few legal-sized fish were collected. Historical age and growth data can be found in Tibbs and Baird (2005).

Fisheries management plan for Limestone Reservoir, Texas

Prepared – July 2009.

ISSUE 1:

Hydrilla (<1 acre), water hyacinth (11.7 acres), giant cane (< 1 acre), and Eurasian watermilfoil (26.4 acres) are currently present in the reservoir. All of these exotic species can expand rapidly causing access and boating problems among others.

Management Strategies

1. Continue annual vegetation surveys and share the current data with the BRA. Opportunities to control these exotic plants should be investigated.

ISSUE 2:

The blue catfish, channel catfish, and white bass populations in Limestone Reservoir are excellent. Current gill net catch data support this. According to the 2004-2005 creel survey results, these fisheries seemed under-utilized.

Management Strategies

1. Promote these fisheries to encourage more utilization by anglers. Present these data at local angling club meetings, etc. when opportunities arise.
2. Conduct a creel survey in 2012-2013 to monitor exploitation of these species.

ISSUE 3:

As Limestone reservoir ages, woody habitat will disappear and sedimentation will begin to fill-in deeper water habitats; this has already begun in the upper end of the reservoir above highway 3371. Texas Water Development Board data indicate a 4.3% loss in volume in the reservoir from time of impoundment (1975) through 2003; additional TWDB surveys are scheduled in the next 5 to 10 years. Sedimentation has also caused noticeable and severe effects in two other Navasota River reservoirs: Mexia and Fort Parker State Park Lake, both upstream of Limestone Reservoir. These ageing reservoir effects, combined with increases in manmade bulkheading around newly constructed homes, pose real habitat threats for the future of the reservoir.

Management Strategies

1. Educate interested angler groups and reservoir stakeholders on habitat loss when opportunities arise.
2. Work with the BRA to determine legality of habitat additions (i.e., brush piles) and their placement within the reservoir; pass all updated information along to interested constituents.
3. Track the loss of shoreline habitat with a physical habitat survey every four years.

ISSUE 4.

Anecdotal evidence suggests large increases in jug-lining and trot-lining on the reservoir in recent years – possibly in response to the improvement in the blue catfish fishery.

Management Strategies

1. Use the 2012-2013 angler creel survey to obtain information on these passive gears and their effects on the catfish fisheries.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes electrofisher and trap net sampling in 2012, gill net sampling in 2013, and a creel survey from 2012 through 2013 (Table 5).

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- 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.
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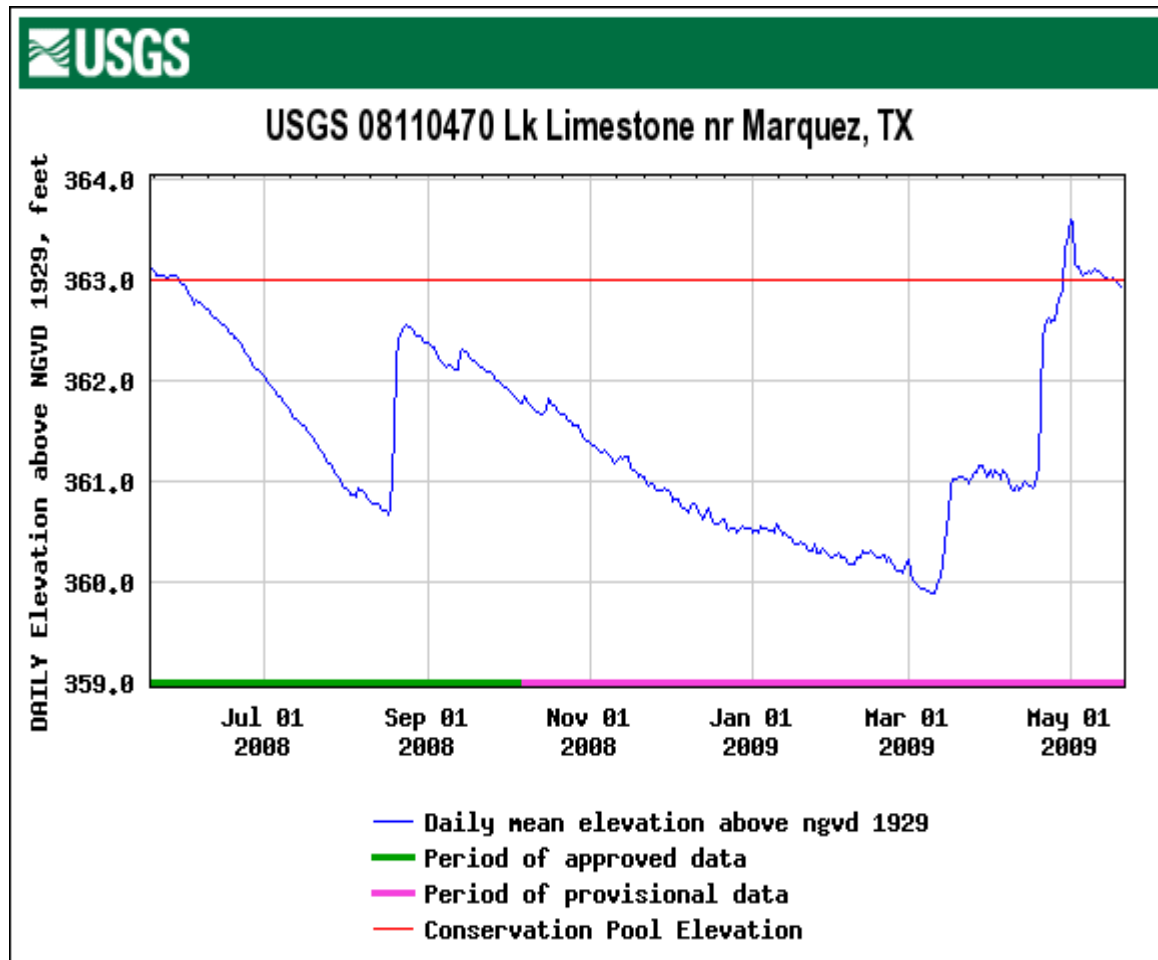


Figure 1. Mean daily water level elevations in feet above mean sea level (MSL) recorded for Limestone Reservoir, Texas. Solid line represents conservation pool (363 ft.).

Table 1. Characteristics of Limestone Reservoir, Texas.

Characteristic	Description
Year Constructed	1978
Controlling authority	Brazos River Authority
Counties	Limestone, Robertson, and Leon
Reservoir type	Tributary
Shoreline Development Index (SDI)	7.9
Conductivity	234

Table 2. Harvest regulations for Limestone 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 Limestone 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.

Species	Year	Number	Life Stage	Mean TL (in)
Blue catfish	1986	135,42	FGL	2.0
	1996	306,47	FGL	1.8
	1998	1,50	AFGL	9.8
	1998	78,57	FGL	2.3
	Total	521,97		
Channel catfish	1979	338,23	AFGL	7.9
	Total	338,23		
Florida Largemouth bass	1979	78,75	FGL	2.0
	1979	122,04	FRY	1.0
	1995	12	ADL	12.0
	1995	69,87	FGL	1.0
	1996	43,42	FGL	1.6
	1996	185,28	FRY	1.0
	Total	499,51		
Largemouth bass	1994	15	ADL	11.8
	1996	4	ADL	12.0
	Total	19		
Palmetto Bass (striped X white bass hybrid)	1984	274,17	FGL	2.0
	Total	274,17		

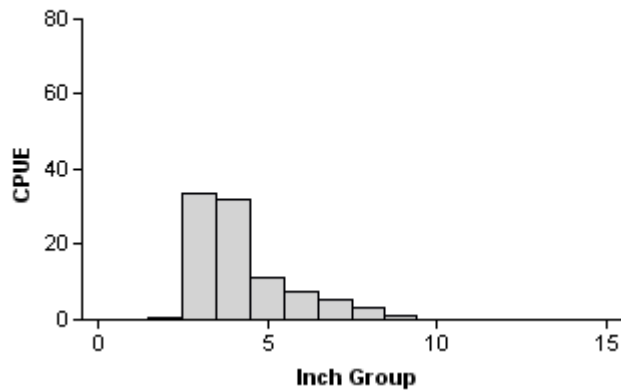
Table 4. Survey of littoral zone and physical habitat types, Limestone Reservoir, Texas, 2009. Linear shoreline distance (miles) and percent of linear shoreline distance was recorded for each habitat type found. Surface area (acres) and percent of reservoir area was determined for each type of aquatic vegetation found.

Shoreline habitat type	<u>Shoreline Distance</u>		Acres	<u>Surface Area</u>	
	Miles	Percent of total		Percent of surface area	
Bulkhead	28.52	24.4			
Gravel shoreline (rocks < 4")	1.3	<1.0			
Rocky shoreline (rocks > 4")	8.0	<1.0			
Natural shoreline	79.4	67.8			
Boat docks/Ramps	3.7	3.0			
Giant cane	.04	<1.0	0.1	<1.0	
Native emergents	1.0	<1.0	3.84	<1.0	

Gizzard Shad

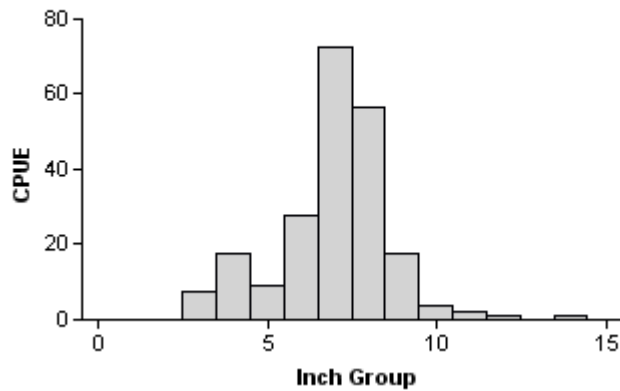
2000

Effort : 2.0
 Total CPUE : 94.0 (38; 188)
 Stock CPUE : 9.5 (31; 19)
 IOV : 95.74 (2.5)



2004

Effort : 2.0
 Total CPUE : 215.5 (13; 431)
 Stock CPUE : 154.0 (15; 308)
 IOV : 62.18 (4.7)



2008

Effort : 1.5
 Total CPUE : 190.0 (12; 285)
 Stock CPUE : 77.3 (21; 116)
 IOV : 85.26 (3.2)

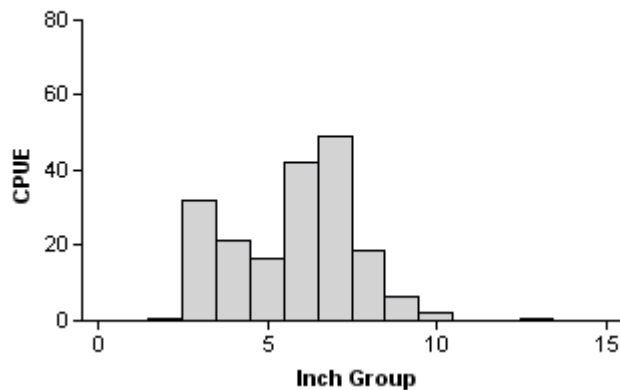
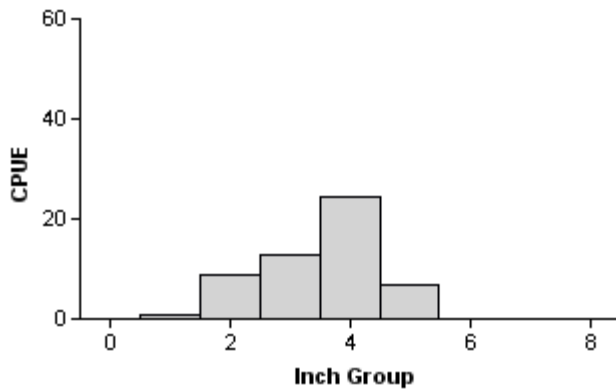


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Limestone Reservoir, Texas, 2000, 2004, and 2008.

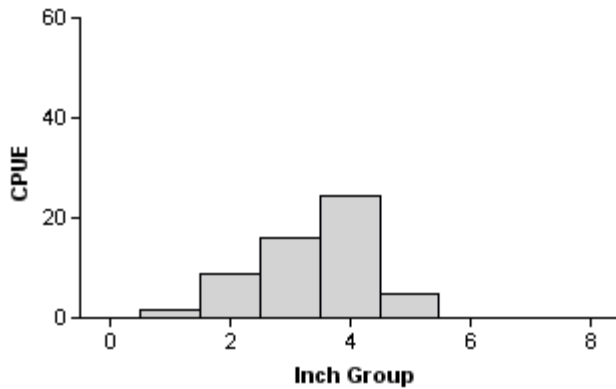
Bluegill

2000



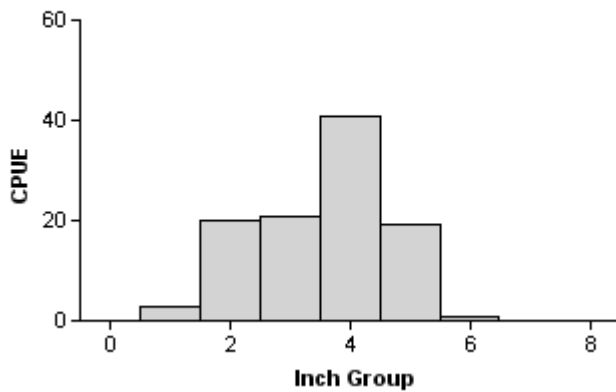
Effort : 2.0
 Total CPUE : 54.5 (26; 109)
 Stock CPUE : 44.5 (26; 89)
 PSD : 0 (41.1)

2004



Effort : 2.0
 Total CPUE : 56.0 (17; 112)
 Stock CPUE : 45.5 (16; 91)
 PSD : 0 (33.3)

2008



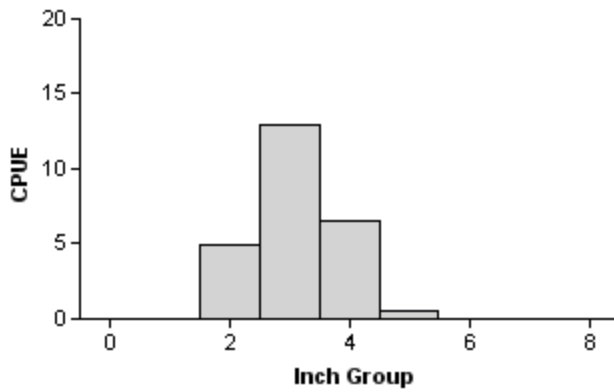
Effort : 1.5
 Total CPUE : 104.0 (24; 156)
 Stock CPUE : 81.3 (26; 122)
 PSD : 1 (0.8)

Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parenthesis) for fall electrofishing surveys, Limestone Reservoir, Texas, 2000, 2004, and 2008.

Longear Sunfish

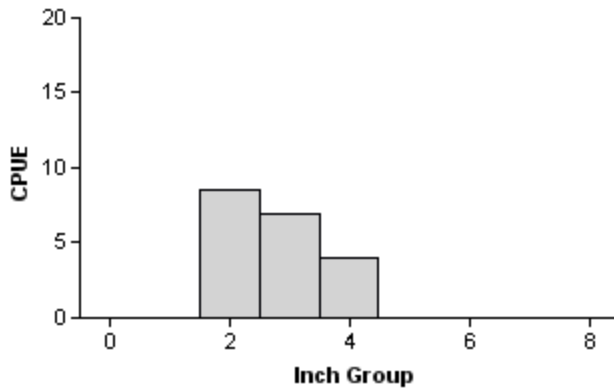
2000

Effort : 2.0
 Total CPUE : 25.0 (27; 50)
 Stock CPUE : 25.0 (27; 50)
 PSD : 100 (0)



2004

Effort : 2.0
 Total CPUE : 19.5 (19; 39)
 Stock CPUE : 19.5 (19; 39)
 PSD : 100 (0.0)



2008

Effort : 1.5
 Total CPUE : 45.3 (35; 68)
 Stock CPUE : 45.3 (35; 68)
 PSD : 100 (0)

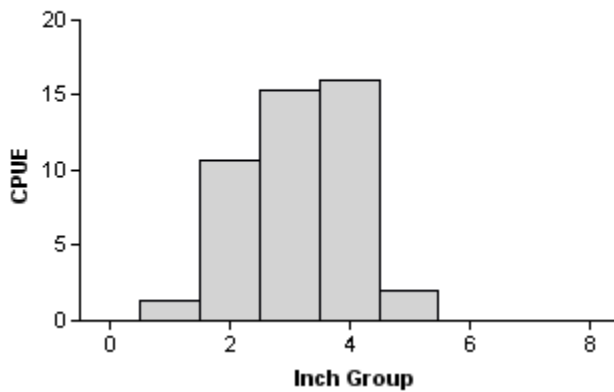
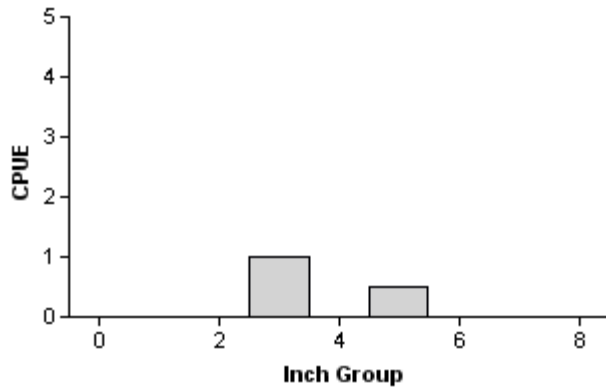


Figure 4. Number of Longear caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parenthesis) for fall electrofishing surveys, Limestone Reservoir, Texas, 2000, 2004, and 2008.

Redear Sunfish

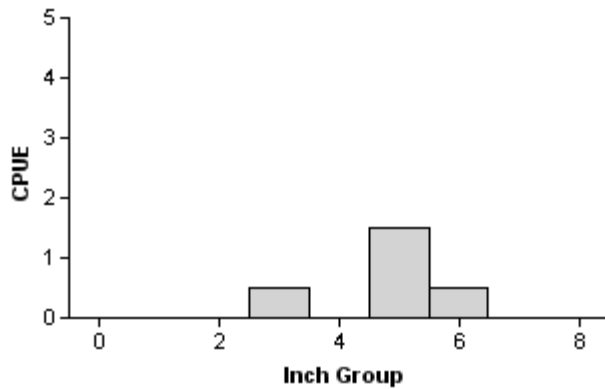
2000

Effort : 2.0
 Total CPUE : 1.5 (55; 3
 Stock CPUE : 0.5 (100; 1
 PSD : 0 (176.9



2004

Effort : 2.0
 Total CPUE : 2.5 (50; 5
 Stock CPUE : 2.0 (59; 4
 PSD : 0 (67.6



2008

Effort : 1.5
 Total CPUE : 12.7 (44; 19
 Stock CPUE : 5.3 (33; 8
 PSD : 12 (12.2

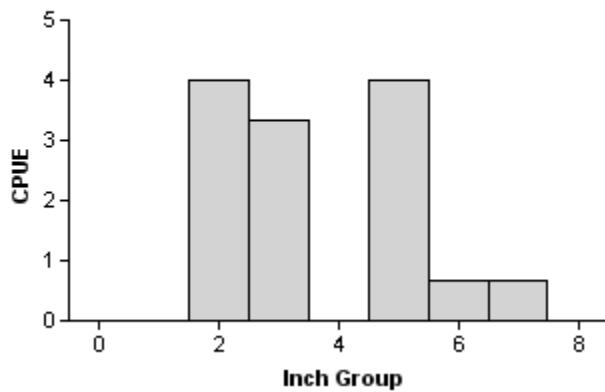
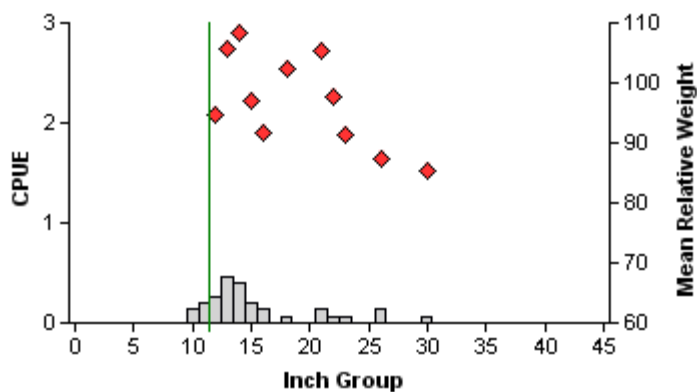


Figure 5. Number of Redear caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parenthesis) for fall electrofishing surveys, Limestone Reservoir, Texas, 2000, 2004, and 2008.

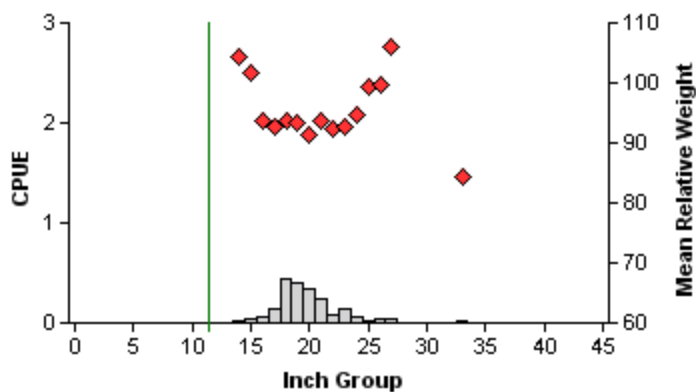
Blue Catfish

2001



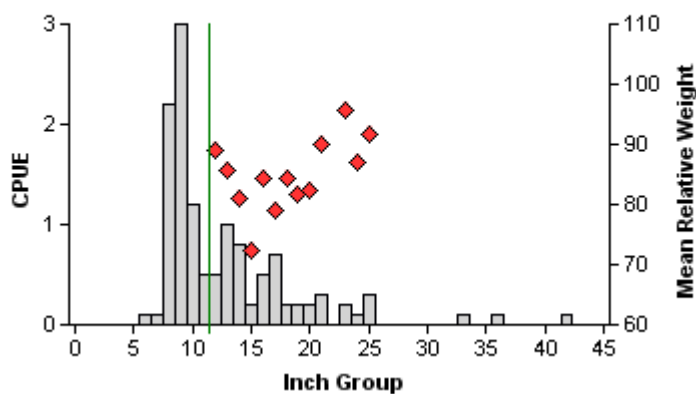
Effort : 15.0
 Total CPUE : 2.3 (32; 35)
 Stock CPUE : 2.0 (33; 30)
 PSD : 23 (5.1)
 RSD-12 : 100 (0)
 RSD-24 : 10 (5.3)

2005



Effort : 60.0
 Total CPUE : 2.1 (13; 125)
 Stock CPUE : 2.1 (13; 125)
 PSD : 47 (4.5)
 RSD-12 : 100 (0)
 RSD-24 : 8 (2.5)

2009

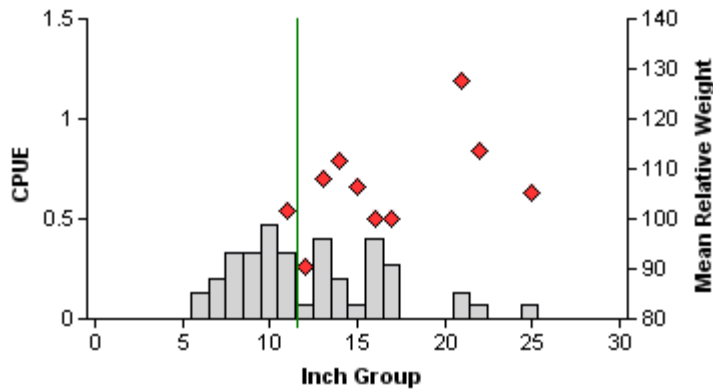


Effort : 10.0
 Total CPUE : 12.6 (26; 126)
 Stock CPUE : 5.5 (25; 55)
 PSD : 25 (6.5)
 RSD-12 : 100 (0)
 RSD-24 : 13 (6.6)

Figure 6. 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, Limestone Reservoir, Texas, 2001, 2005, and 2009. Minimum length limit represented by vertical line.

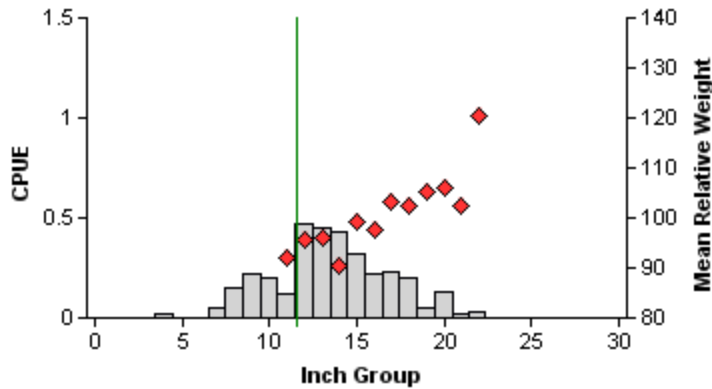
Channel Catfish

2001



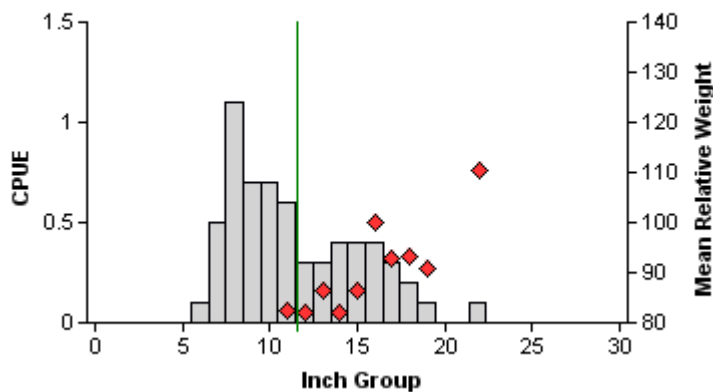
Effort : 15.0
 Total CPUE : 3.5 (20; 52)
 Stock CPUE : 2.0 (22; 30)
 PSD : 47 (10.3)
 RSD-12 : 83 (7.9)
 RSD-24 : 3 (3.2)

2005



Effort : 60.0
 Total CPUE : 3.3 (13; 198)
 Stock CPUE : 2.7 (14; 160)
 PSD : 33 (3.7)
 RSD-12 : 96 (1.9)
 RSD-24 : 0 (0)

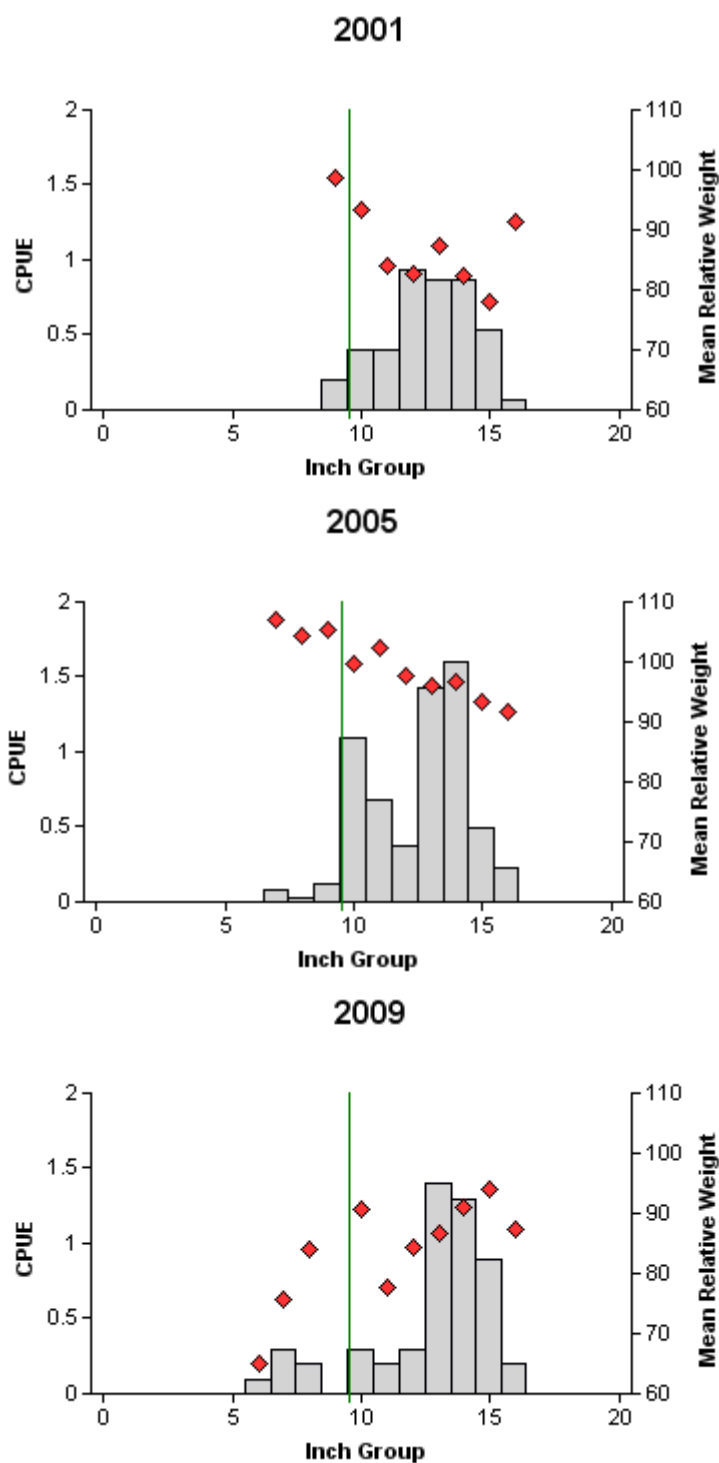
2009



Effort : 10.0
 Total CPUE : 6.2 (27; 62)
 Stock CPUE : 3.1 (26; 31)
 PSD : 35 (9.6)
 RSD-12 : 81 (8.1)
 RSD-24 : 0 (0)

Figure 7. 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, Limestone Reservoir, Texas, 2001, 2005, and 2009. Minimum length limit represented by vertical line.

White Bass



Effort : 15.0
 Total CPUE : 4.3 (36; 64
 Stock CPUE : 4.3 (36; 64
 PSD : 100 (0
 RSD-12 : 77 (5.2

Effort : 60.0
 Total CPUE : 6.2 (15; 369
 Stock CPUE : 6.2 (15; 369
 PSD : 98 (1.0
 RSD-12 : 67 (5.4

Effort : 10.0
 Total CPUE : 5.2 (39; 52
 Stock CPUE : 5.2 (39; 52
 PSD : 88 (8.4
 RSD-12 : 79 (7.2

Figure 8. 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, Limestone Reservoir, Texas, 2001, 2005, and 2009. Minimum length limit represented by vertical line.

Largemouth Bass

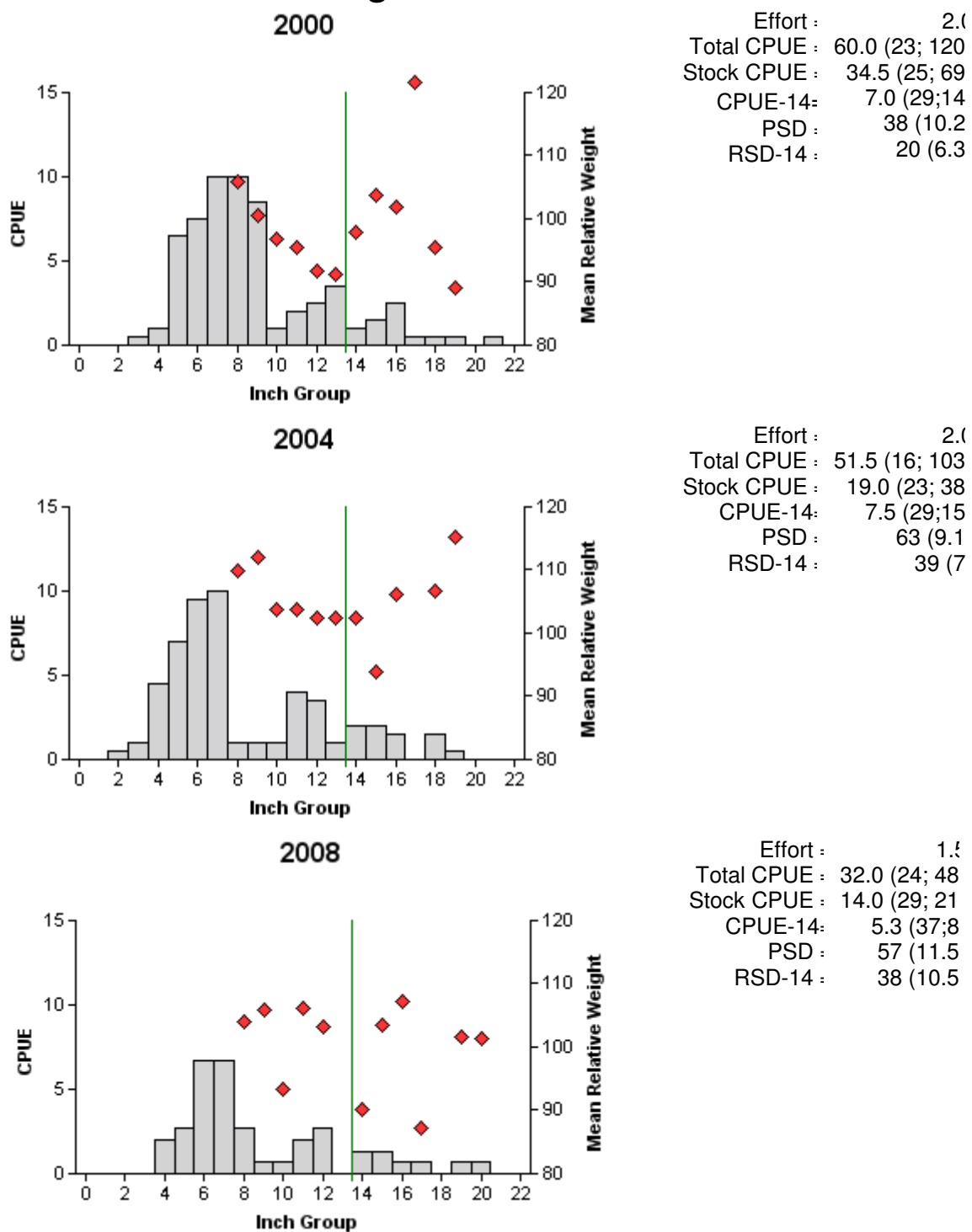
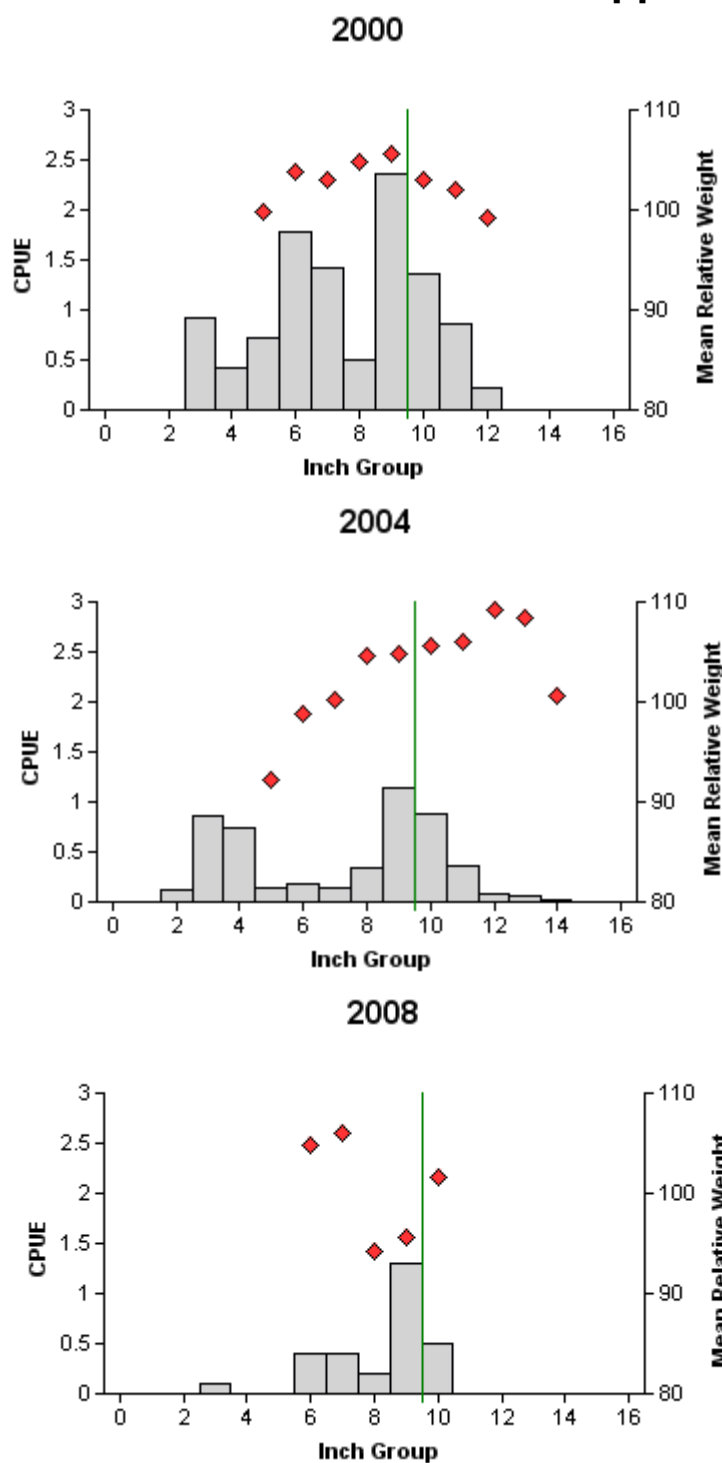


Figure 9. Number of largemouth bass caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Limestone Reservoir, Texas, 2000, 2004, and 2008. Minimum length limit represented by vertical line.

White Crappie



Effort : 14.0
 Total CPUE : 10.6 (58; 148)
 Stock CPUE : 9.2 (55; 129)
 PSD : 57 (8.6)
 RSD-10 : 26 (4.7)

Effort : 75.0
 Total CPUE : 5.0 (15; 378)
 Stock CPUE : 3.3 (13; 249)
 PSD : 87 (2.3)
 RSD-10 : 42 (3.7)

Effort : 10.0
 Total CPUE : 2.9 (54; 29)
 Stock CPUE : 2.8 (55; 28)
 PSD : 71 (6)
 RSD-10 : 18 (3.9)

Figure 10. 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, Limestone Reservoir, Texas, 2000, 2004, and 2008. Minimum length limit represented by vertical line.

Table 5. Proposed sampling schedule for Limestone 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.

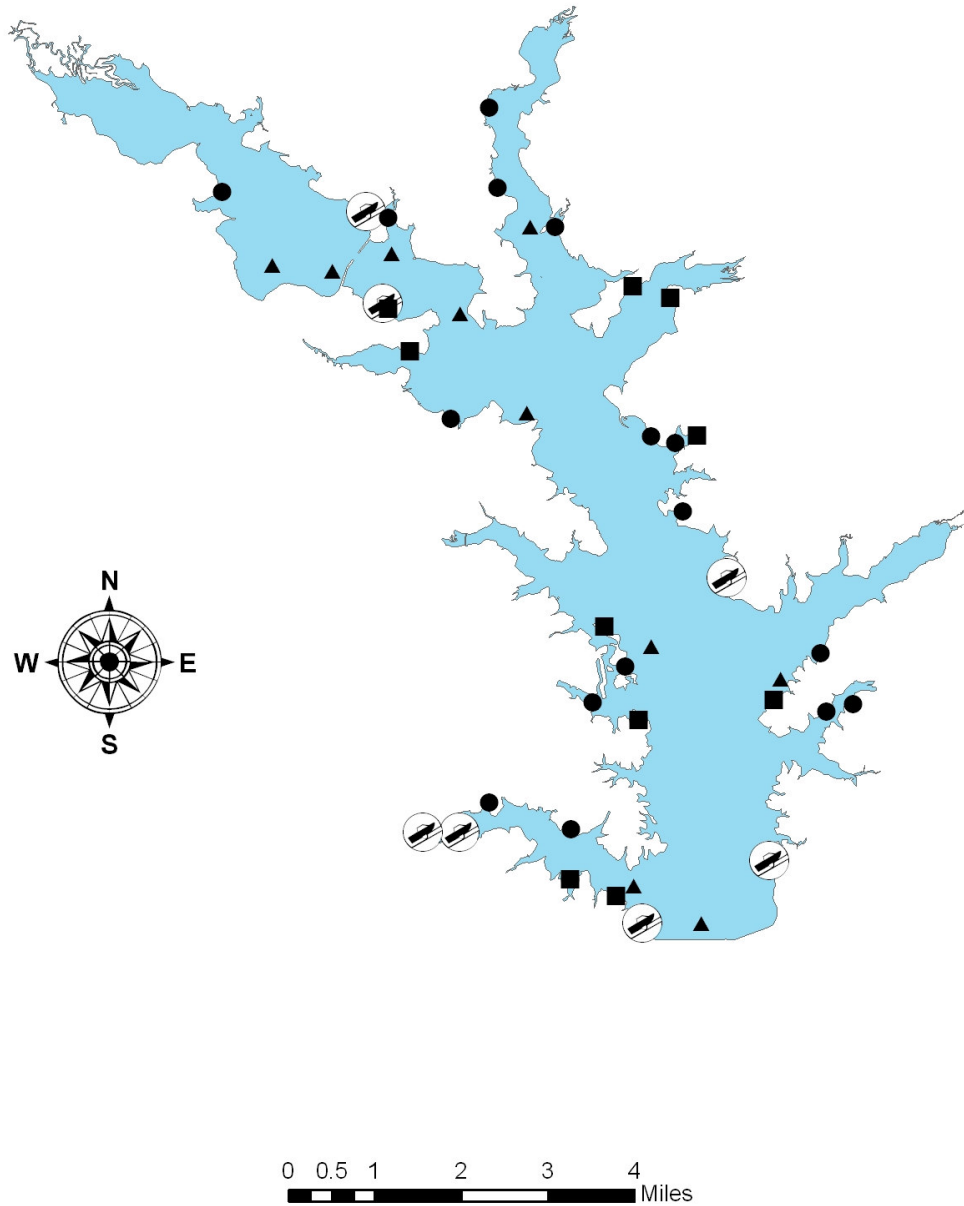
Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Report
Fall 2009-Spring 2010					
Fall 2010-Spring 2011					
Fall 2011-Spring 2012					
Fall 2012-Spring 2013	S	S	S	S	S

APPENDIX A

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

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					285	190.0
Threadfin shad					1953	1302.0
Blue catfish	126	12.6				
Channel catfish	62	6.2				
White bass	52	5.2				
Warmouth					1	0.7
Bluegill					156	104.0
Longear sunfish					68	45.3
Redear sunfish					19	12.7
Largemouth bass					48	32.0
White crappie			29	2.9		

APPENDIX B

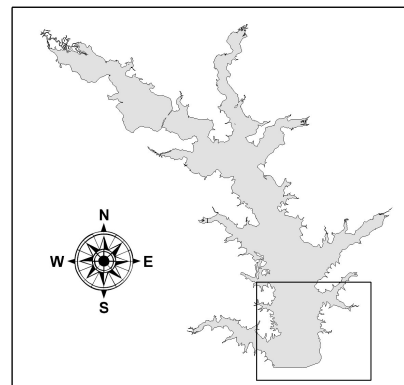


Location of electrofishing (circles), trap netting (squares), gill netting (triangles), and boat ramp sites, Limestone Reservoir, Texas, 2008 and 2009. Water level was 1-2' low at time of sampling.

APPENDIX C

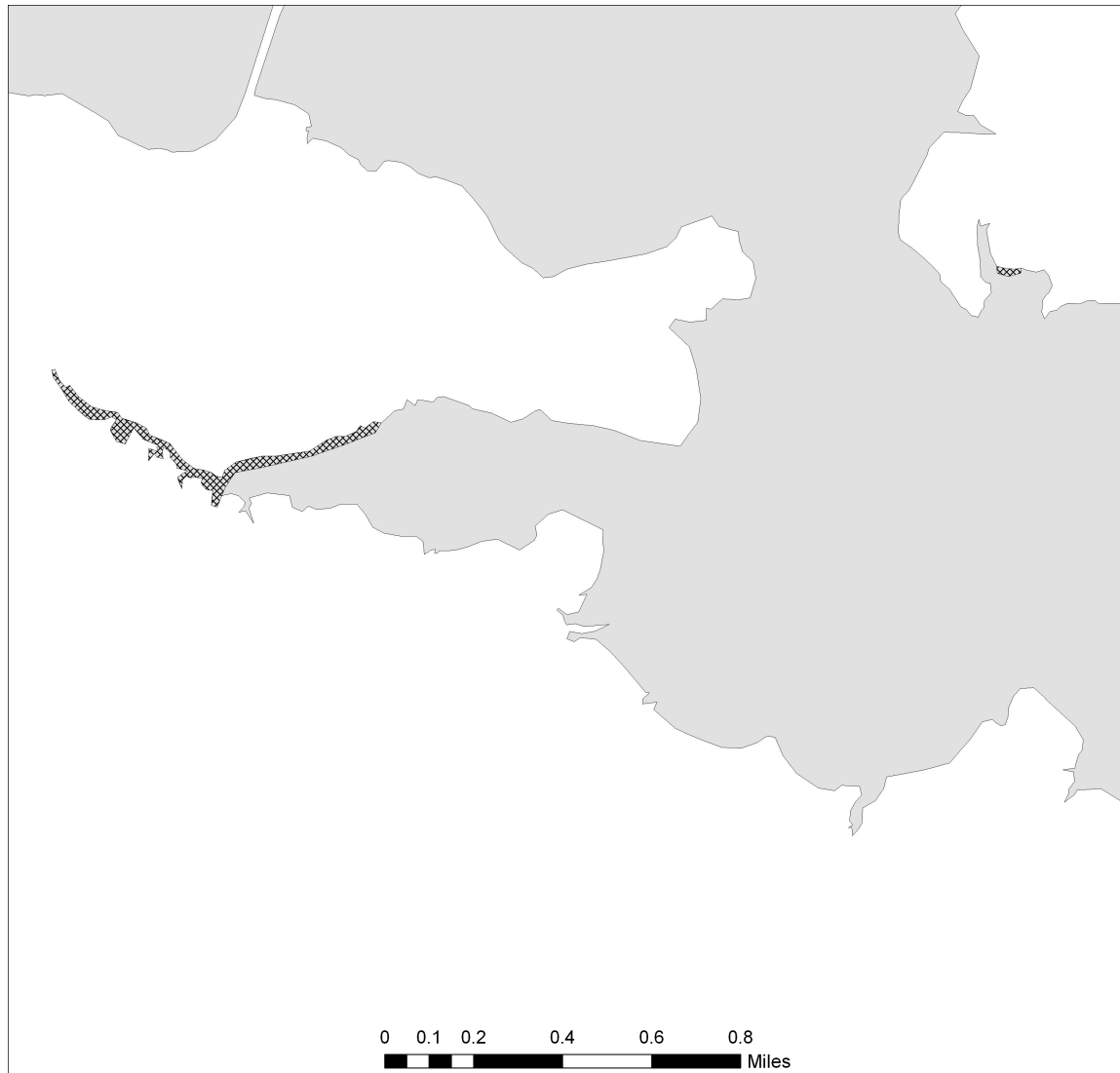


Legend

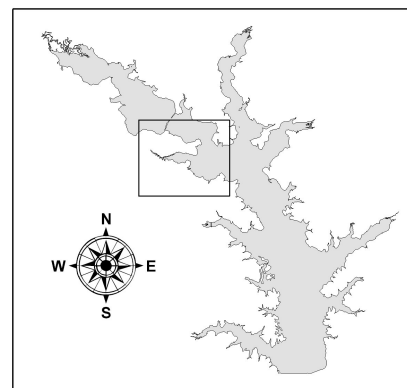


Close-up view of Eurasian watermilfoil (*Myriophyllum spicatum*) observed during summer vegetation surveys on Limestone Reservoir, Texas, 2008.

APPENDIX D

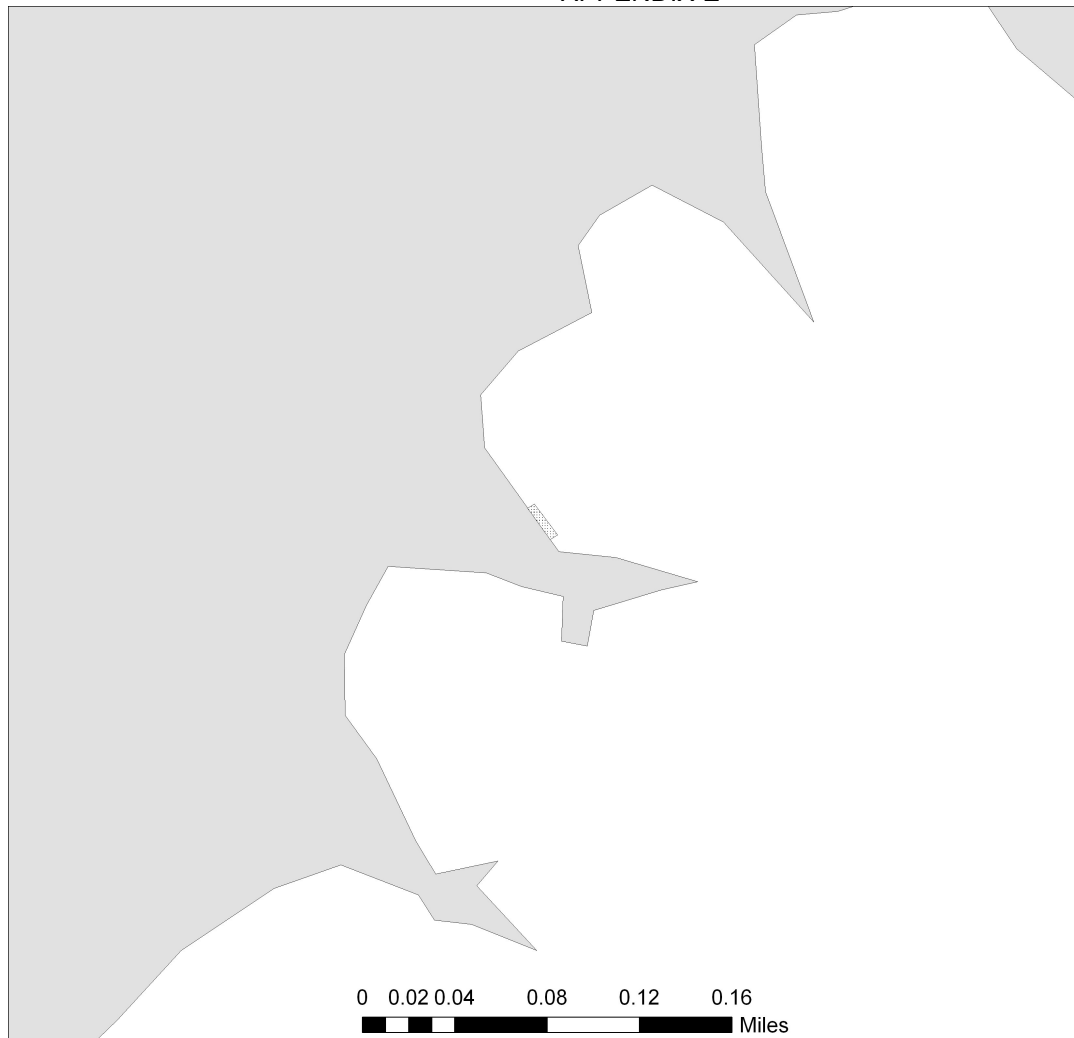


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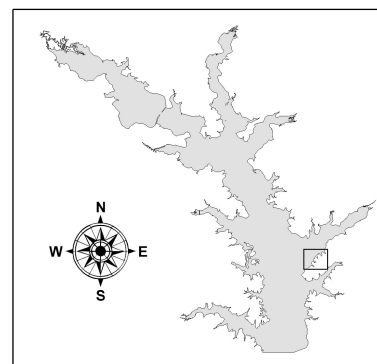


Close-up view of water hyacinth (*Eichhornia crassipes*) observed during summer vegetation surveys on Limestone Reservoir, Texas, 2008.

APPENDIX E



Legend



Close-up view of giant cane (*Arundinaria gigantea*) observed during summer vegetation surveys on Limestone Reservoir, Texas, 2008.