

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-30

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2004 Survey Report

Bonham City Reservoir

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Executive Summary

Bonham City Reservoir was surveyed by creel survey in 2002, with trap nets and electrofisher in 2004, and with gill nets in 2005. This report summarizes the results of these surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Bonham City Reservoir, a 1,020-acre impoundment on Timber Creek a tributary to Bois d'Arc Creek which is a tributary to the Red River, was constructed in 1969 by the City of Bonham for municipal and agriculture water supply and recreation. It is located 3 miles northeast of Bonham in Fannin County. The reservoir drains approximately 29 square miles. The shoreline was 18.25 miles long and has a shoreline development index of 4.1. Boating access was good and there were facilities available to the physically challenged. Fish habitat was primarily native emergent vegetation, boat docks, and boat ramps.
- **Prey species:** The electrofishing catch rate of gizzard shad was 163.0/hour, lower than 409.0/hour collected in 2000 and lower than the reservoir's historic average of 226.7/hour. Historic catch rates used in this report were calculated from data collected on five occasions since 1990. The major change in the population from 2000 to 2004 was a reduction in numbers of 3-inch and 4-inch gizzard shad. The electrofishing catch rate of bluegill was 1,178.0/hour, very near the 1,207.0/hour collected in 2000 and above the historic average of 722.1/hour. Structurally, the bluegill populations of 2000 and 2004 were similar. The index of vulnerability (IOV) for gizzard shad (50) was lower than during previous years. The catch rate of threadfin shad was 3,486.0/hour, which was higher than the historic average of 942.6/hour. The catch rate of threadfin shad continued to expand throughout the years. Small gizzard shad, threadfin shad, bluegill, and longear sunfish continued to provide adequate prey. Not only did the small sunfishes (bluegill, warmouth, green sunfish, longear sunfish, and redear sunfish) provide prey, larger specimens are sought-after by anglers. Angler catch rate for the sunfish category was 5.0/angler-hour and harvest rate was 4.0/angler-hour.
- **Catfishes:** Blue catfish were stocked in 1985. Despite a declining gill net catch rate (3.4/net night), blue catfish continued to provide angler-recreation. Although we did not identify angler directed effort for blue catfish, creel survey results in the spring of 2002 indicated they were harvested. The historic gill net catch rate of blue catfish was 5.7/net night. The highest gill net catch rate (11.0/net night) was collected in 1994. Sublegal fish have not been collected since 1997 survey and we have not been able to determine at what age blue catfish reach legal size. The average relative weight was 90. Fish in the population ranged in length from 17 to 24 inches.

Channel catfish was the second-most sought-after sport fish in this reservoir, and produced a gill net catch rate of 8.4/net night which was in keeping with the historic

average catch rate of 8.9/net night. The substock portion of the population appeared to be declining as evidenced by channel catfish ≥ 12 inches making up 93% of the sample population. We could not determine at what age channel catfish reach legal size, since very few sublegal channel catfish were collected. Unsuccessful natural reproduction or predation may have limited recruitment of this species. Catfishes have a hard time recruiting past substock in small impoundments because of predation (Miller 1966). The average relative weight (109) was high.

The spring 2002 creel survey estimated 21,676 angler-hours of fishing effort on this reservoir with 20.1% directed angling effort for catfishes (blue and channel). These species were combined because anglers responded they were fishing for channel catfish despite having blue catfish in their creel. Angler catch rate was 1.2 fish/angler-hour and anglers harvested 0.93 fish/angler-hour.

- **Black basses:** The electrofishing catch rate of largemouth bass was 172.0/hour, up from 79.0/hour collected in 2000 and higher than the historic average of 118.5/hour. They were the third-most sought-after species in the reservoir with 8.3% directed angler effort. Anglers caught almost 1 largemouth bass/angler-hour, but directed harvest was 0.0/angler-hour. However, creel survey results indicated non-directed largemouth bass harvest. The average relative weight was 96, evidence of abundant and available prey. Only 6% of the largemouth bass sampled were > 14 inches, but there was a slight increase in the proportion of the sample population that was ≥ 15 inches. The age at which largemouth bass reached 14 inches was not determined.

Florida largemouth bass (FLMB) were stocked in this reservoir in 1996, 1997, and 1998. In 1999 and 2000 the % FLMB alleles did not meet the minimum of 20% to be considered established. In 2004, the sample population had 35.8% FLMB alleles, well above the minimum criterion and 10% of the sample was pure FLMB. The reservoir record is 9.5 pounds and 22.5 inches long.

Only seven spotted bass were collected, therefore, no catch statistics are shown.

- **Crappies:** The most sought-after species by anglers in this reservoir (36.1% directed effort), crappies were represented by both white and black crappie. The trap net catch rate of white crappie was 51.6/net night, higher than the historic average catch rate of 36.4/net night. The highest trap net catch was 69.6/net night in 1990. The average relative weight was 93 and 31% of the white crappie sample population was ≥ 10 inches.

The trap net catch rate of black crappie was 10.6/net night, higher than the historic average of 2.9/ net night. The average relative weight was 91 and 30% of the sample population was ≥ 10 inches.

The spring 2002 creel survey indicated an angler catch rate of 1.4 crappie/angler-hour and an angler harvest rate of 0.5 crappie/angler-hour, black and white crappie combined. Because of their disproportionate composition in the population, anglers harvested many more white crappie than black crappie.

- **Management Strategies**

Based on current information, Bonham City Reservoir should continue to be managed with existing regulations. Although blue catfish are recruiting to legal size, no sublegal fish have been collected since the 1997 survey. The same situation exists with channel catfish, except there were a few sublegals collected, but not enough to conduct a category-two age-analysis. The blue and channel catfish populations should be sampled again in 2007 to check population structure and age and growth. The largemouth bass population should be sampled again in 2006 to augment age and growth data last collected in 2000. Fish stock assessments should continue according to established procedures. Update the Bonham City Reservoir (Bonham City Lake) web page on the TPWD web site with appropriate information as needed.

Introduction

This document is a summary of fisheries data collected from Bonham City Reservoir in 2004 and 2005 and creel survey data collected in 2002. The purpose of the document is to provide fisheries information and make management recommendations to protect and enhance 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. Historical data are presented with the 2004-2005 data for comparison.

Harvest regulations for Bonham City Reservoir, Texas, 2004-2005.

Species	Bag Limit	Minimum Length (inches)
Bass, largemouth	5	14
Bass, spotted	in aggregate	No Limit
Catfish, blue and channel	25	12
Catfish, flathead	5	18
Crappie, white and black	25	10

Methods

- Fish stocks were assessed by electrofishing (1.0 hours at 12 randomly selected stations), gill netting (5 net nights at 5 randomly selected stations), and trap netting (5 net nights at 5 randomly selected sites). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour of actual electrofishing, and for gill and trap nets as the number of fish caught in one net set overnight. Largemouth bass electrophoresis samples were collected according to Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2003).
- Sampling statistics (CPUE for various length categories) and structural indices (Proportional Stock Density [PSD], Relative Stock Density [RSD], and relative weight [Wr]) were calculated for target fishes according to Anderson and Neumann (1996) and Muoneke and Pope (1999). Index of vulnerability (IOV) for gizzard shad was calculated according to DiCenzo et al. (1996).
- An assessment of the littoral zone and physical habitat and water quality assessment was conducted in 2004 in accordance with Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2004).
- A creel survey was conducted 5 weekend days and 4 week days over a 3-month period in the spring of 2002 to assess angler use and in accordance with the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2004)

Acknowledgments

Fish and Wildlife Technicians Todd R. Robinson and Bill Thornhill contributed to collecting field data, compiling, analyzing data, and report preparation.

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. American Fisheries Society, Bethesda, Maryland.

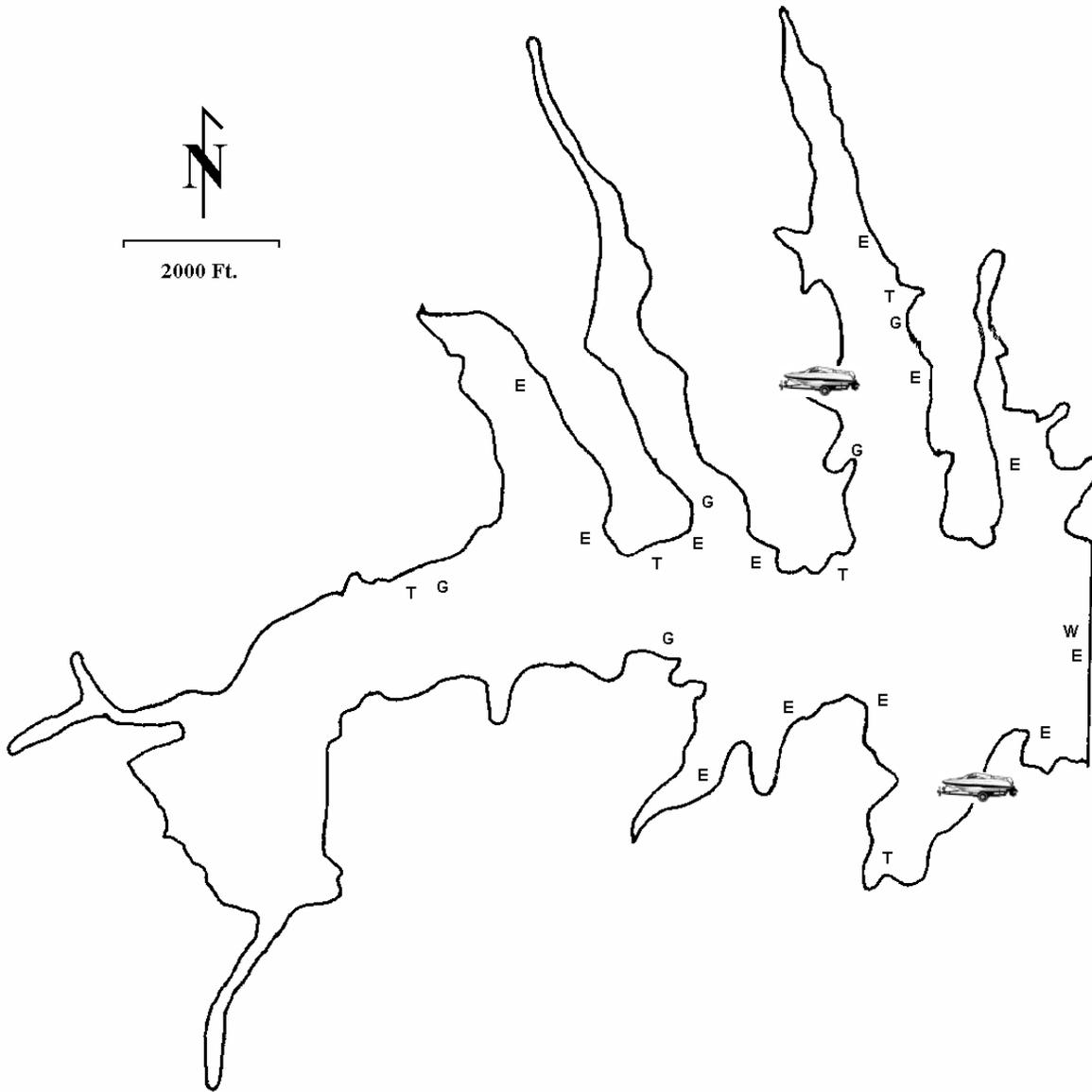
- DiCenzo, V. J., M. J. Maceina, and M. R. Stimpert. 1996. Relations between reservoir trophic state and gizzard shad population characteristics in Alabama reservoirs. *North American Journal of Fisheries Management*. 16:888-895.
- Miller, E. E. 1966. Channel catfish. Pages 440 – 463 in Alex Calhoun, Editor. *Inland Fisheries Management*. State of California, Department of Fish and Game, Sacramento.
- Muoneke, M.I. and K.L. Pope. 1999. Development and evaluation of a standard weight (Ws) equation for blue catfish. *North American Journal of Fisheries Management* 19:878-879.

Survey of littoral zone and physical habitat types, Bonham City Reservoir, Texas, August 2004. A linear shoreline distance (miles) was recorded for each habitat type found. Acreage is listed for aquatic vegetation and habitat types adjacent to shoreline.

Shoreline habitat type	Shoreline distance		Acreage
	Miles	Percent of total	
Bulkhead	3.1	16.9	
Eroded bank	1.5	8.3	
Indescript or featureless	11.3	61.7	
Rip rap	1.5	8.2	
Rocky or gravel shoreline	<u>0.9</u>	4.9	
Total shoreline length:	18.3		
<u>Vegetation</u>			
Native emergent	5.4		19.6
Native floating	4.1		81.1
Native submergent	13.7		99.6
<u>Habitat adjacent to shoreline</u>			
Boat docks, piers, marinas	0.2		0.8

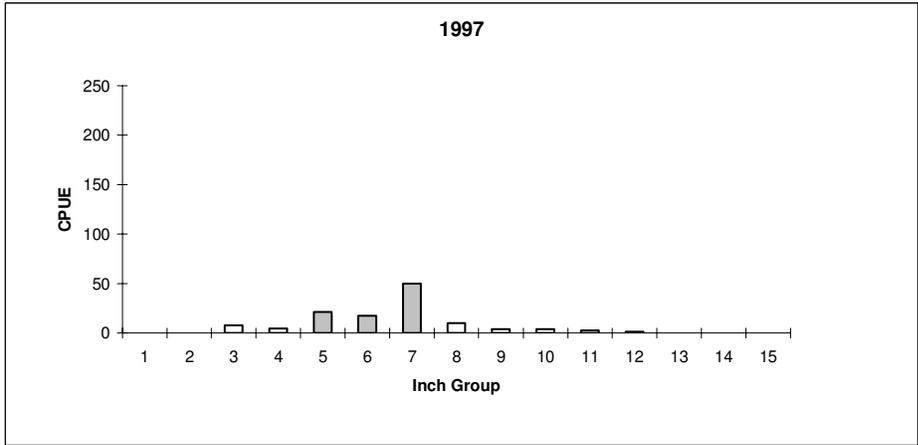
Stocking history of Bonham City Reservoir, Texas. Size categories are FGL for fingerling and FGL+ for 6- to 8-inch fingerlings.

Species	Year	Number	Size
Blue catfish	1985	<u>25,486</u>	FGL+
Species total:		25,486	
Channel catfish	1969	50,000	FGL+
	1994	<u>1,634</u>	FGL+
Species total:		51,634	
Palmetto Bass	1978	<u>26,313</u>	FGL
Species total:		26,313	
Largemouth bass	1969	<u>200,000</u>	FGL
Species total:		200,000	
Florida largemouth bass	1996	101,900	FGL
	1997	104,206	FGL
	1998	<u>103,324</u>	FGL
Species total:		309,430	

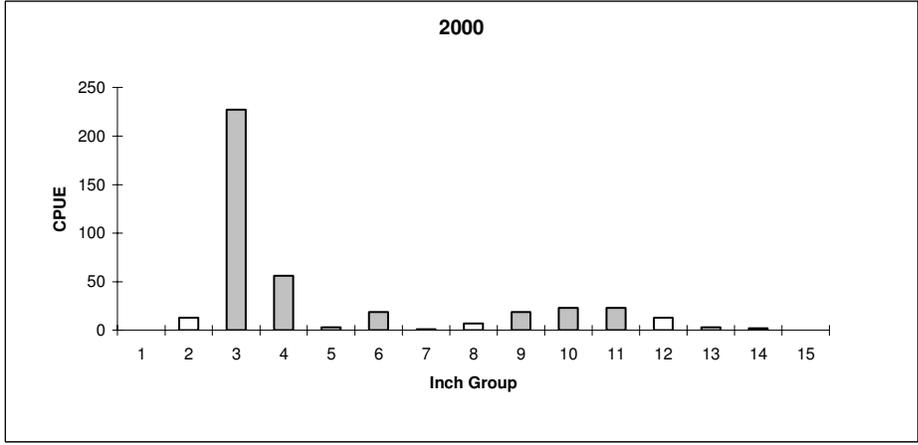


Location of sampling sites, Bonham City Reservoir, Texas, 2004-2005. Trap net, gill net, electrofishing, and water sample stations are indicated by T, G, E, and W, respectively. Boat ramps are indicated by  .

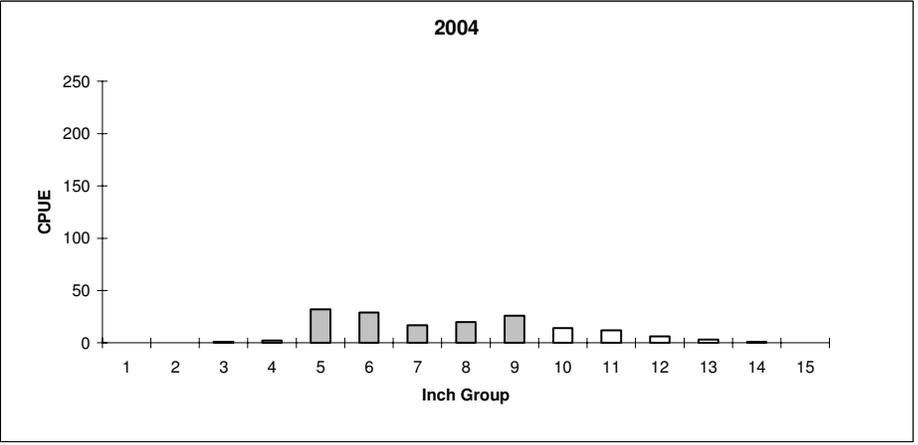
Gizzard Shad



Effort = 1.5
 Total CPUE = 123.3
 Stock CPUE = 72.0
 PSD = 6
 IOV = 82



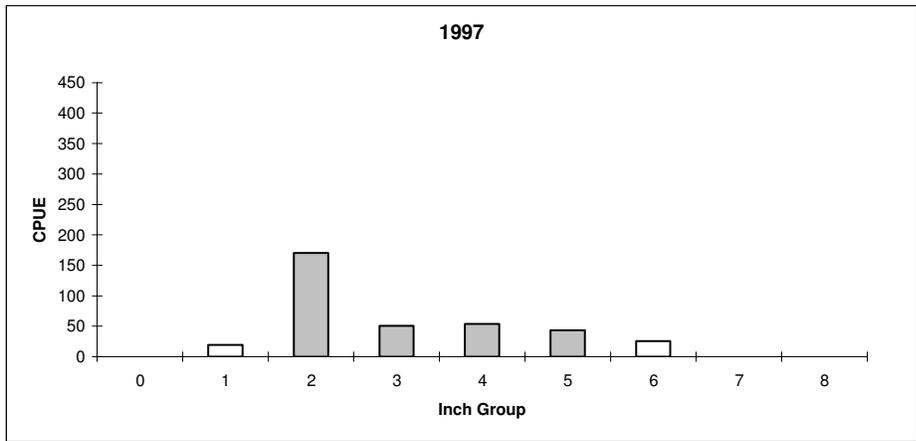
Effort = 1.0
 Total CPUE = 409.0
 Stock CPUE = 91.0
 PSD = 45
 IOV = 78



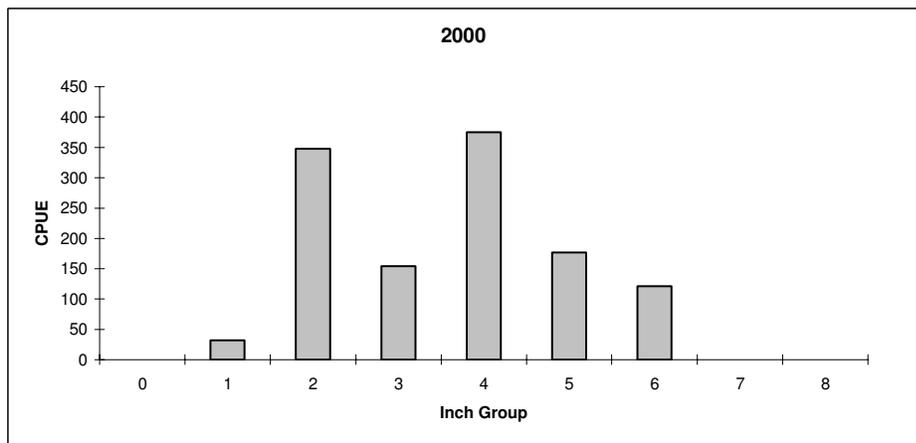
Effort = 1.0
 Total CPUE = 163.0
 Stock CPUE = 99.0
 PSD = 22
 IOV = 50

Comparison of the number of gizzard shad caught per hour (CPUE, bars), and population indices for electrofishing surveys, Bonham City Reservoir, Texas, October 1997, 2000, and 2004.

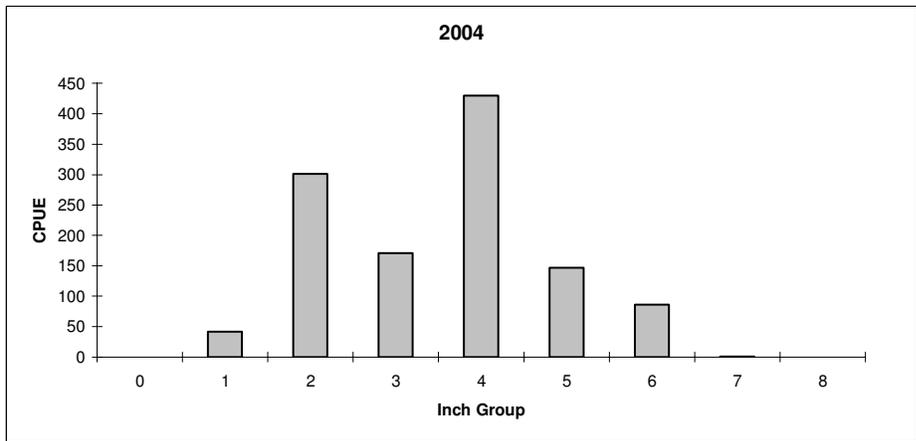
Bluegill



Effort = 1.5
 Total CPUE = 364.0
 Stock CPUE = 174.0
 PSD = 15
 RSD-P = 0



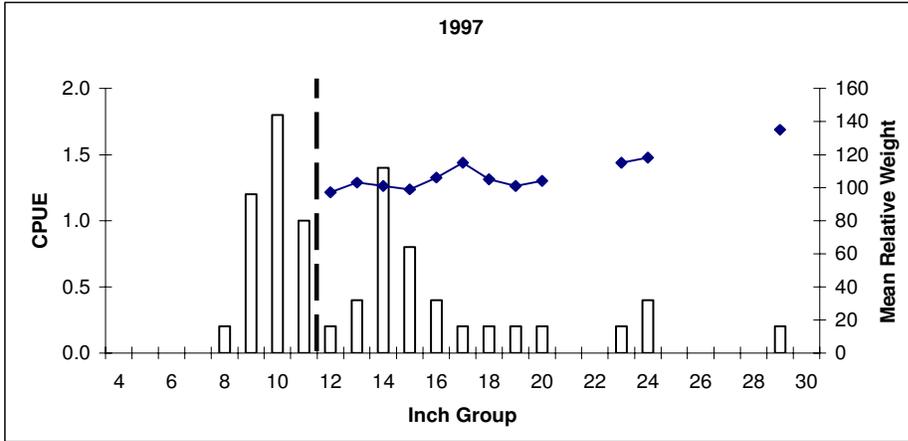
Effort = 1.0
 Total CPUE = 1207.0
 Stock CPUE = 827.0
 PSD = 15
 RSD-P = 0



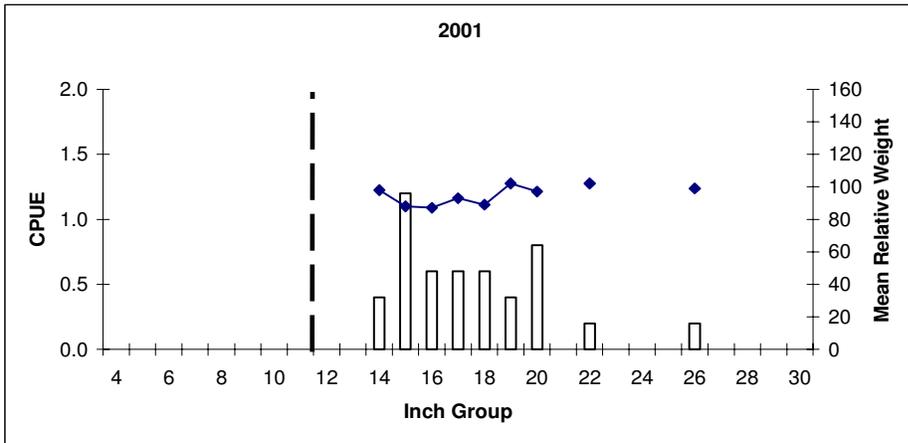
Effort = 1.0
 Total CPUE = 1178.0
 Stock CPUE = 835.0
 PSD = 10
 RSD-P = 0

Comparison of the number of bluegill caught per hour (CPUE, bars), and population indices for electrofishing surveys, Bonham City Reservoir, Texas, October 1997, 2000, and 2004.

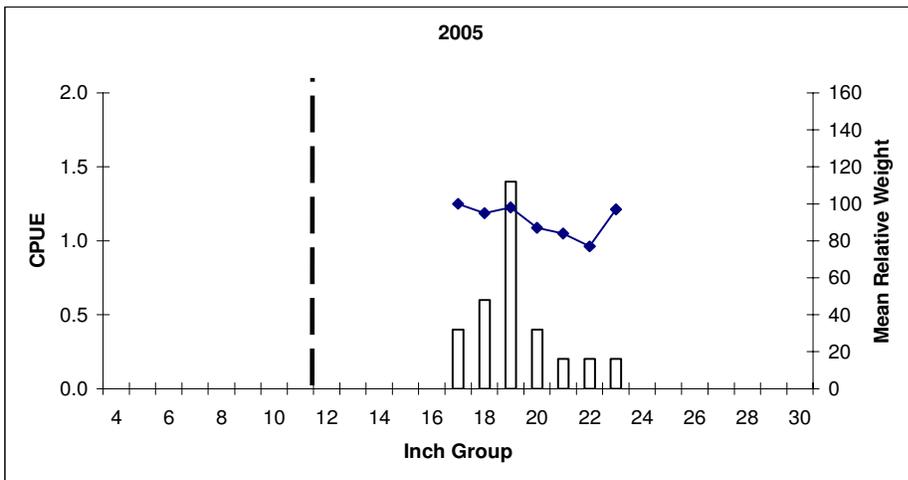
Blue Catfish



Effort = 5
 Total CPUE = 9.0
 Stock CPUE = 4.8
 PSD = 21
 RSD-P = 0



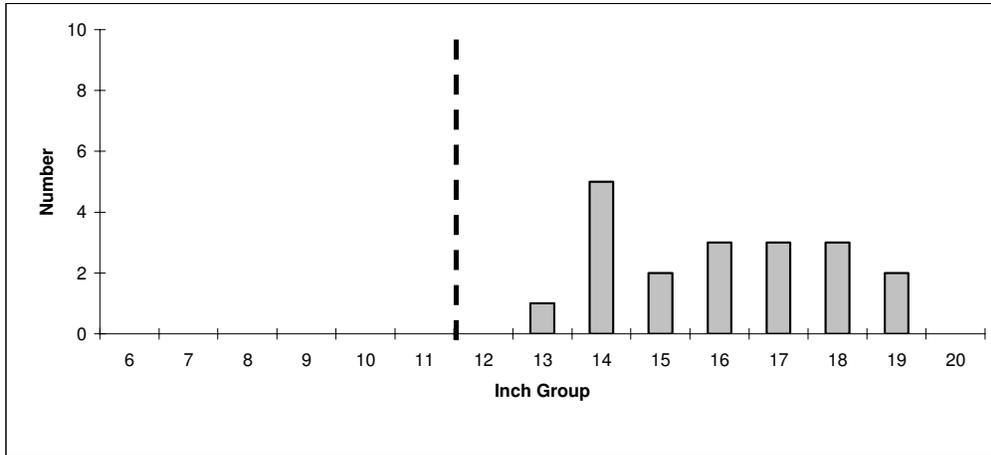
Effort = 5
 Total CPUE = 5.0
 Stock CPUE = 5.0
 PSD = 24
 RSD-P = 0



Effort = 5
 Total CPUE = 3.4
 Stock CPUE = 3.4
 PSD = 29
 RSD-P = 0

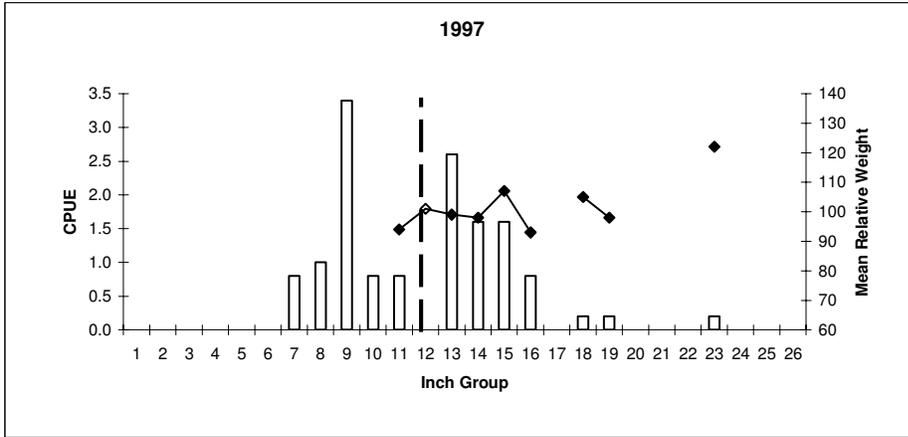
Comparison of the number of blue catfish caught per net night (CPUE, bars), mean relative weight (lines), and population indices for gill net collections, Bonham City Reservoir, Texas, May 1997, 2001, and 2005. Dashed lines indicate length limit at time of sample collection.

Blue Catfish

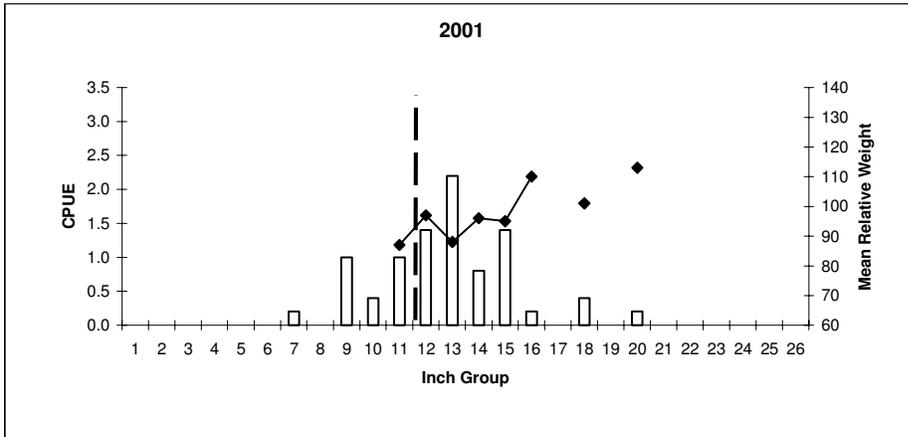


Length frequency of blue catfish harvested during creel survey at Bonham City Reservoir, Texas, March through May 2002, all anglers combined. Dashed line indicates length limit at time of creel survey.

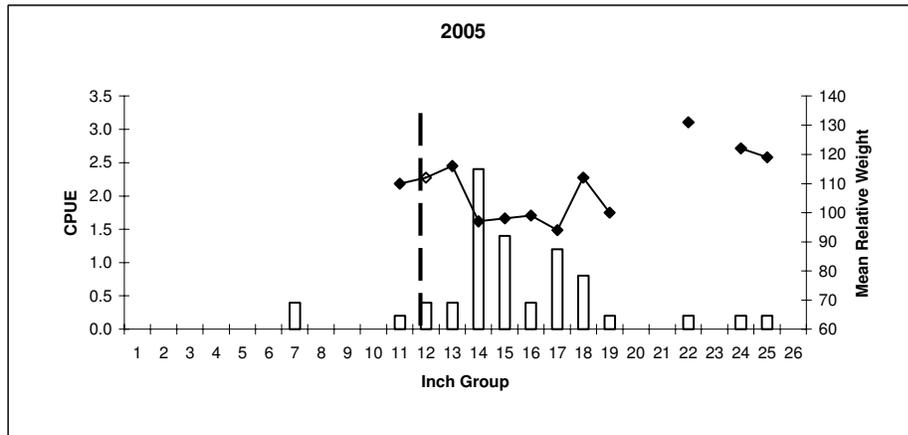
Channel Catfish



Effort = 5
 Total CPUE = 16.0
 Stock CPUE = 10.0
 PSD = 14
 RSD-P = 0



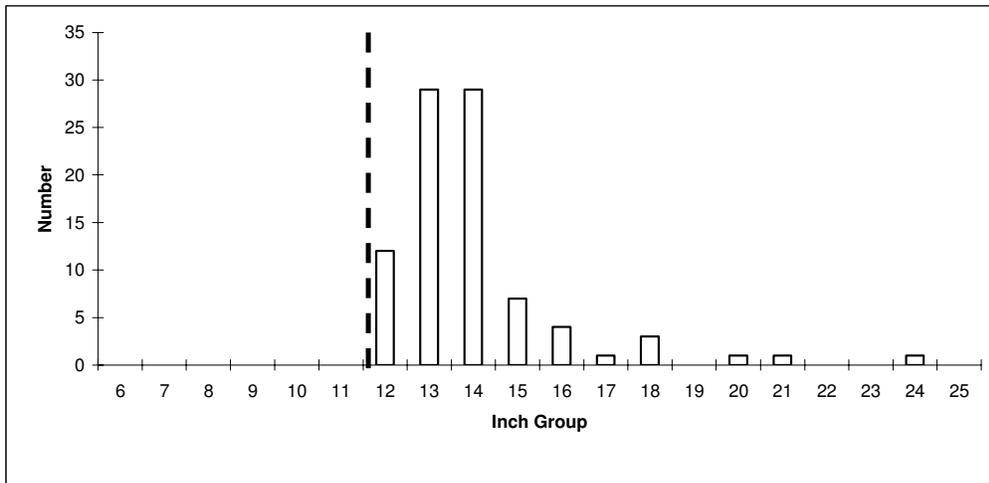
Effort = 5
 Total CPUE = 7.6
 Stock CPUE = 6.0
 PSD = 11
 RSD-P = 0



Effort = 5
 Total CPUE = 8.4
 Stock CPUE = 8.0
 PSD = 40
 RSD-P = 0

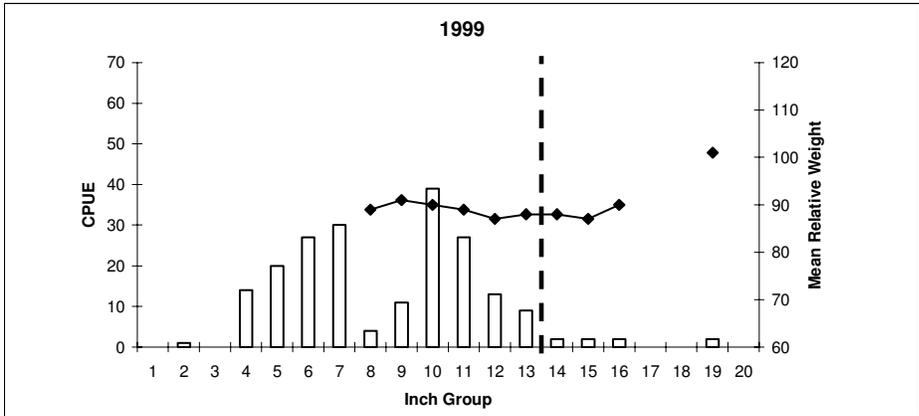
Comparison of the number of channel catfish caught per net night (CPUE, bars), mean relative weight (lines), and population indices for gill net collections, Bonham City Reservoir, Texas, May 1997, 2001, and 2005. Dashed lines indicate length limit at time of sample collection.

Channel Catfish

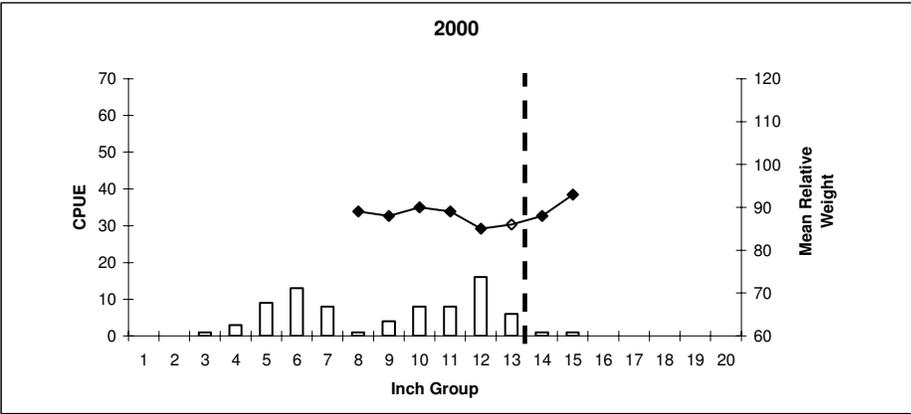


Length frequency of channel catfish harvested during creel survey at Bonham City Reservoir, Texas, March through May 2002, all anglers combined. Dashed line indicates length limit at time of creel survey.

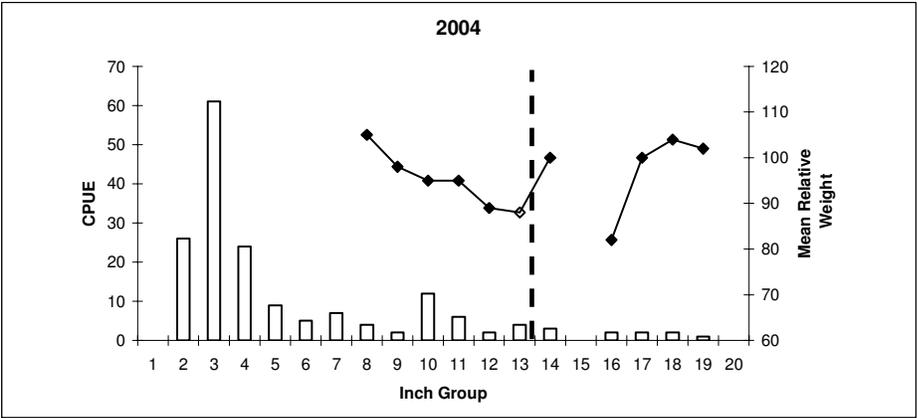
Largemouth Bass



Effort = 1.0
 Total CPUE = 203.0
 Stock CPUE = 111.0
 PSD = 27
 RSD-P = 5
 %FLMB ALLELES = 16.0
 %FLMB = 4.0



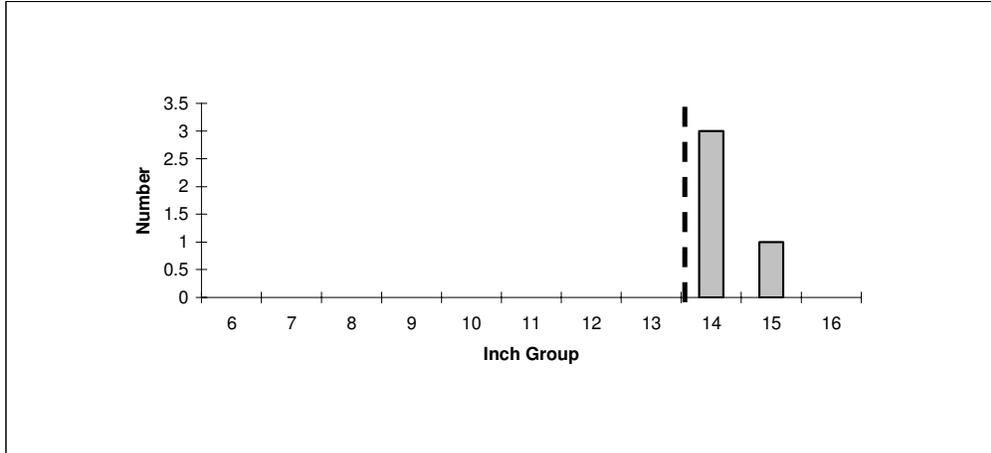
Effort = 1.0
 Total CPUE = 79.0
 Stock CPUE = 45.0
 PSD = 53
 RSD-P = 2
 %FLMB ALLELES = 6.8
 %FLMB = 0.0



Effort = 1.0
 Total CPUE = 172.0
 Stock CPUE = 40.0
 PSD = 40
 RSD-P = 18
 %FLMB ALLELES = 35.8
 %FLMB = 10.0

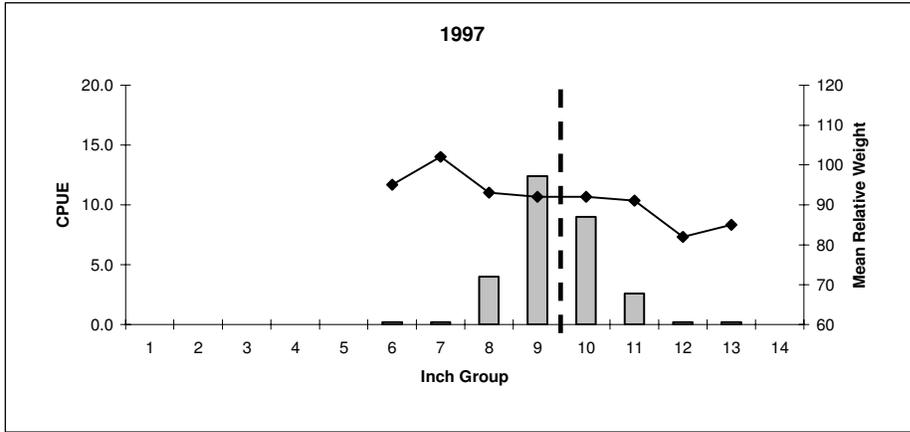
Comparison of the number of largemouth bass caught per hour (CPUE, bars), mean relative weight (lines), and population indices for electrofishing surveys, Bonham City Reservoir, Texas, October 1999, 2000, and 2004. "%FLMB ALLELES" equals percent of Florida bass alleles in a sample of the largemouth bass population. "%FLMB" equals percent of pure Florida bass in a sample of the largemouth bass population. Dashed lines indicate length limit at time of sample collection.

Largemouth Bass

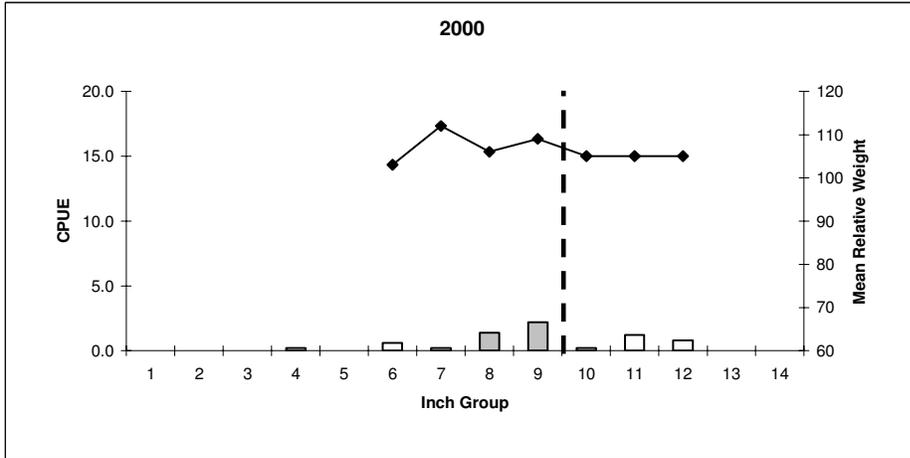


Length frequency of largemouth bass harvested during creel survey at Bonham City Reservoir, Texas, March through May 2002, all anglers combined. Dashed line indicates length limit at time of creel survey.

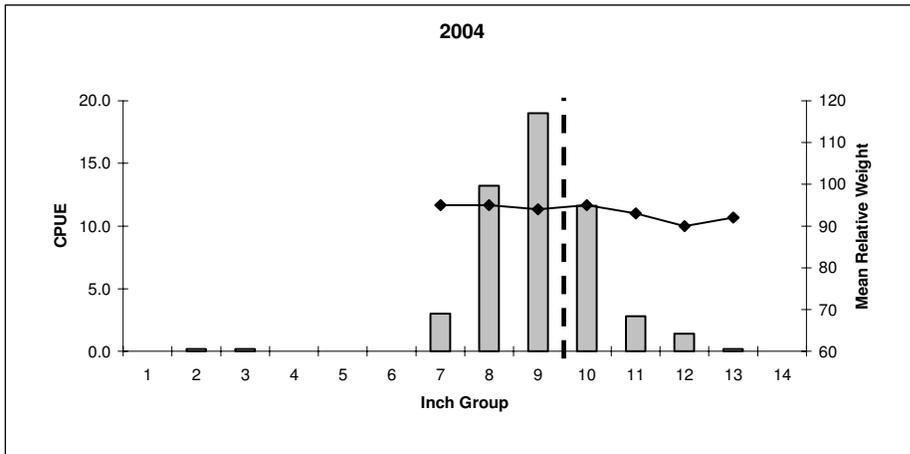
White Crappie



Effort = 5
 Total CPUE = 28.8
 Stock CPUE = 28.8
 PSD = 99
 RSD-P = 42



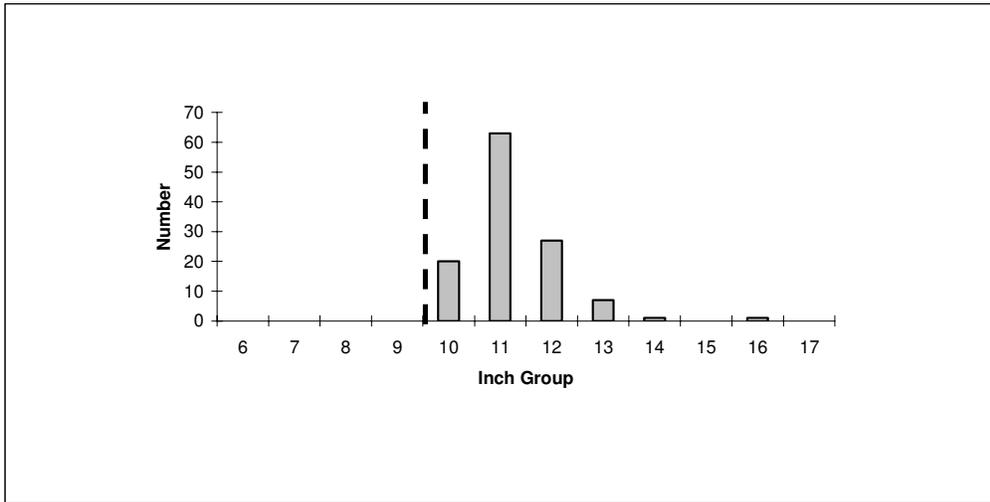
Effort = 5
 Total CPUE = 6.8
 Stock CPUE = 6.4
 PSD = 88
 RSD-P = 33



Effort = 5
 Total CPUE = 51.6
 Stock CPUE = 51.2
 PSD = 94
 RSD-P = 31

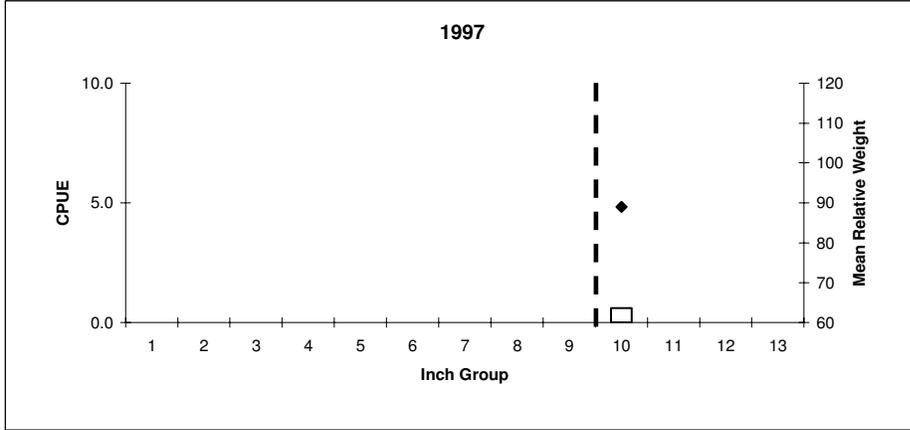
Comparison of the number of white crappie caught per net night (CPUE, bars), mean relative weight (lines), and population indices for trap net surveys, Bonham City Reservoir, Texas, October 1997, 2000, and 2004. Dashed lines indicate length limit at time of sample collection.

White Crappie

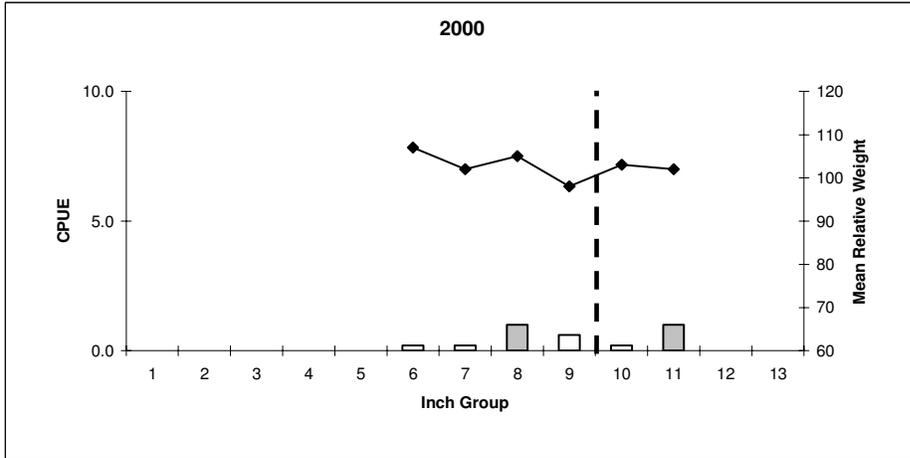


Length frequency of white crappie harvested during creel survey at Bonham City Reservoir, Texas, March through May 2002, all anglers combined. Dashed line indicates length limit at time of creel survey.

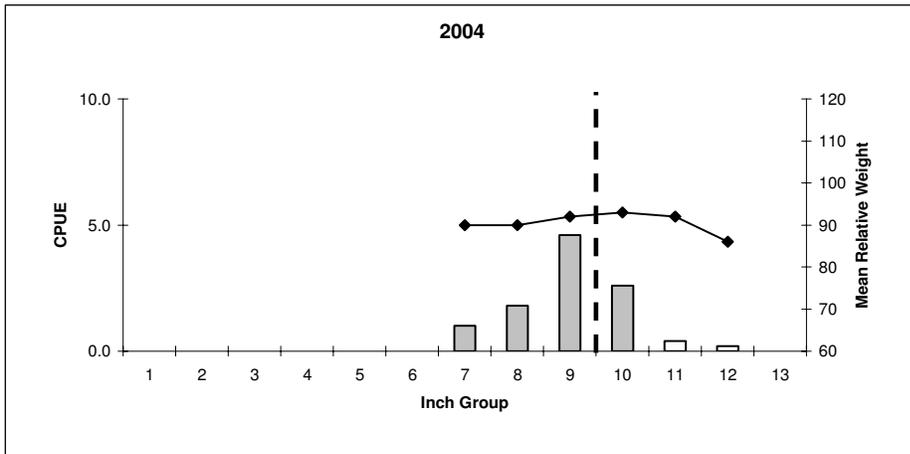
Black Crappie



Effort = 5
 Total CPUE = 0.6
 Stock CPUE = 0.6
 PSD = 100
 RSD-P = 100



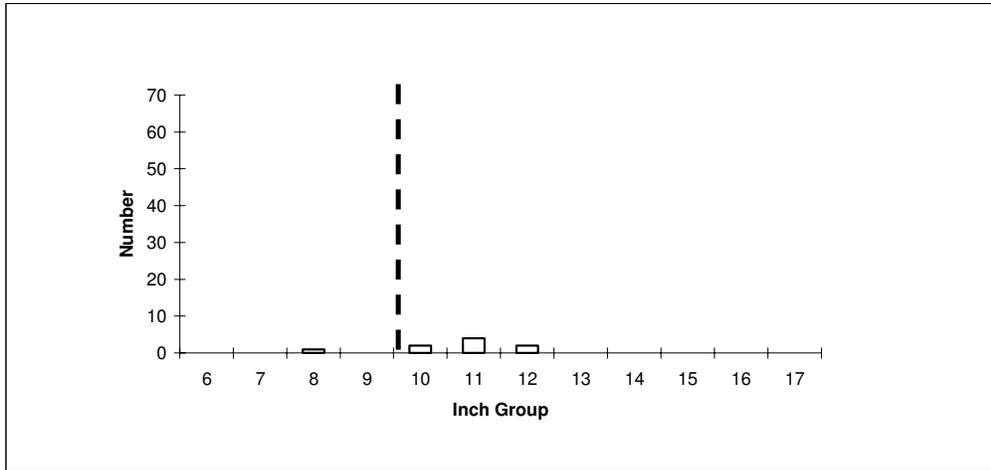
Effort = 5
 Total CPUE = 3.2
 Stock CPUE = 3.2
 PSD = 88
 RSD-P = 38



Effort = 5
 Total CPUE = 10.6
 Stock CPUE = 10.6
 PSD = 91
 RSD-P = 30

Comparison of the number of black crappie caught per net night (CPUE, bars), mean relative weight (lines), and population indices for trap net surveys, Bonham City Reservoir, Texas, October 1997, 2000, and 2004. Dashed line indicates length limit at time of sample collection.

Black Crappie



Length frequency of black crappie harvested during creel survey at Bonham City Reservoir, Texas, March through May 2002, all anglers combined. Dashed line indicates length limit at time of creel survey.

**FISHERIES MANAGEMENT PLAN
BONHAM CITY RESERVOIR, TEXAS**

Prepared – July 2005

Issue 1 Blue catfish are recruiting to legal size, but no sublegal fish have been collected since the 1997 survey. Channel catfish appear to have limited reproduction. Age and growth information is lacking to determine when blue and channel catfish are reaching legal size.

Management
Strategies

1. Gill net at 10 stations in spring 2007 to determine population structure of blue and channel catfish.
2. Collect aging structures for category-two age analysis to determine the age at which blue and channel catfish reach legal size.

Issue 2 Largemouth bass age and growth information is not current and 2000 data should be augmented.

Management
Strategy

Conduct bass-only electrofishing in fall 2006 to collect aging structures of largemouth bass for category-two age analysis to augment historical age and growth data.

Issue 3 Changes in existing fishing opportunities need to be communicated to the public.

Management
Strategy

Updating the Bonham City Reservoir (Bonham City Lake) web page with current information will be ongoing.

Appendix A:

Number (N) and catch rate (CPUE) of all species collected from all gear types from Bonham City Reservoir, Texas, 2004-2005. Gill net and trap net CPUE is the number of fish per net night, while electrofishing CPUE is the number of fish per hour. Only targeted species were recorded from electrofishing.

Species	Gill Net 2005		Trap Net 2004		Electrofishing 2004	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad	148	29.6			163	163.0
Threadfin shad					3486	3486.0
Common carp	2	0.4				
Blue catfish	17	3.4				
Yellow bullhead			2	0.4		
Channel catfish	42	8.4				
Flathead catfish	1	0.2				
Green sunfish					2	2.0
Warmouth sunfish			4	0.8	35	35.0
Bluegill sunfish	7	1.4	389	77.8	1178	1178.0
Longear sunfish			8	1.6	589	589.0
Redear sunfish			20	4.0	154	154.0
Spotted bass					7	7.0
Largemouth bass			1	0.2	172	172.0
White crappie	14	2.8	258	51.6		
Black crappie			53	10.6		
Freshwater drum	29	5.8				

Appendix B:

The percentage of directed effort (21,676 angler-hours), directed catch rate (number/angling-hour) and directed harvest rate (number/angling-hour), Bonham City Reservoir, Texas, March-May, 2002.

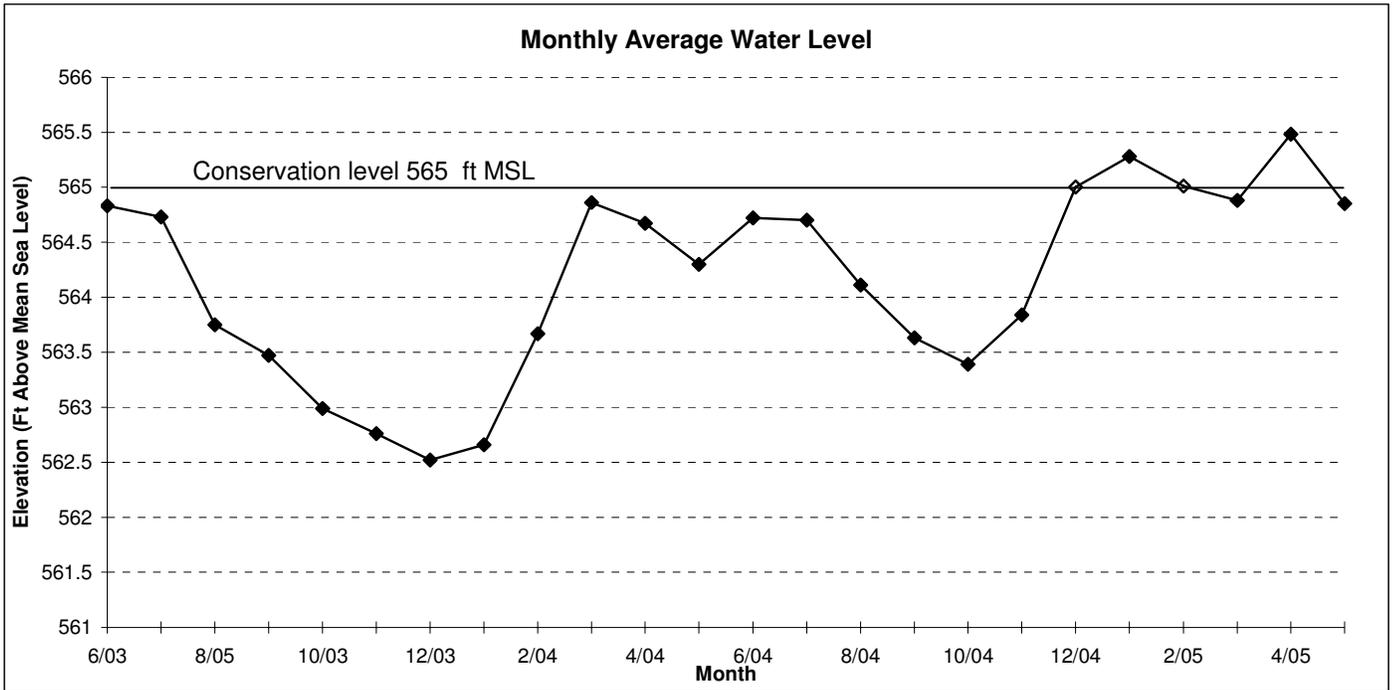
Species	Directed variable		
	% effort	Catch Rate	Harvest Rate
Catfishes	20.1	1.2	0.9
Sunfish	0.9	5.0	4.0
Black basses	8.3	0.9	0.0
Crappies	36.1	1.4	0.5

Appendix C:

Water chemistry profile for Bonham City Reservoir, Texas, August 4, 2004. Sample station located at dam site.

Depth (m)	Temp (C°)	D.O. (ppm)	Chlorides (ppm)	Conductivity (mhos/cm)	Alkalinity (ppm)	Total Dissolved Solids (ppm)	pH
Surface	31.3	9.8	5	130	47	84.5	9.2
1.0	31.2	10.0					
2.0	31.1	10.0	6	126	53	81.9	9.2
3.0	29.0	6.9					
4.0	27.7	1.5	8	126	49	81.9	8.0
5.0	27.3	0.1					
6.0	27.1	0.0					
7.0	26.7	0.0					
8.0	26.2	0.0	6	152	70	98.8	7.0

Appendix D:



Monthly average water level elevations in feet above mean sea level (MSL) recorded for Bonham City Reservoir, Texas, June 2003-May 2005.

Appendix E:

Historical catch rates (CPUE) of targeted species by gear type for Bonham City Reservoir, Texas, 1990, 1994, 1997, 2000, 2001, 2004, and 2005.

		Year						
		1990 _a	1994 _a	1997 _b	2000 _b	2001 _b	2004 _b	2005 _b
Gill Netting	Blue catfish	0.2	11.0	9.0		5.0		3.4
	Channel catfish	5.8	5.0	16.0		9.2		8.4
	Palmetto bass	0.4	0.0	0.0		0.0		0.0
Electrofishing	Gizzard shad	222.7	215.3	123.3	409.0		163.0	
	Threadfin shad	0.0	57.3	392.7	777.0		3486.0	
	Green sunfish	0.0	9.3	0.7	0.0		2.0	
	Warmouth	14.7	38.7	12.0	28.0		35.0	
	Orangespotted sunfish	0.0	40.0	0.0	0.0		0.0	
	Bluegill sunfish	509.3	352.0	364.0	1207.0		1178.0	
	Longear sunfish	98.7	56.7	137.3	197.0		589.0	
	Redear sunfish	19.3	1.3	13.3	131.0		154.0	
	Spotted bass	0.0	0.7	6.7	12.0		7.0	
	Largemouth bass	74.0	143.3	124.0	79.0		172.0	
Trap Netting	White crappie	69.6	25.4	28.8	6.8		51.6	
	Black crappie	0.2	0.0	0.6	3.2		10.6	

^a Electrofishing, gill netting, and trap netting sites were subjectively selected.

^b Electrofishing, gill netting, and trap netting sites were randomly selected.

Appendix F:

Largemouth bass electrophoresis results for Bonham City Reservoir, Texas, 1999, 2000, and 2004.

Year Florida Bass Stocked	Year Collected	% Northern Alleles	% Florida Alleles	% FxN F ₁	% FxN F _x	% Pure Northern	% Pure Florida	Sample Size
1998	2004	64.2	35.8	33.3	30.0	26.7	10.0	30
1997	2000	93.2	6.8	10.3	3.4	86.2	0.0	29
1996	1999	84.0	16.0	10.0	18.0	68.0	4.0	50