PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-30-R-35

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2009 Survey Report

Marble Falls Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Marble Falls Reservoir were surveyed in 2009 using electrofishing and in 2010 using gill nets. This report summarizes the results of the surveys and contains a fisheries management plan for the reservoir based on those findings.

- **Reservoir Description:** Marble Falls Reservoir is a 573-acre main-stem stable level impoundment of the Colorado River, located in the City of Marble Falls, Burnet County, TX. It was constructed in 1951 by the Lower Colorado River Authority (LCRA) for purposes of hydroelectric power, recreation and water supply. The reservoir is riverine in nature with a limited number of coves and creeks. The reservoir area represents a geological transition between granite outcroppings and limestone formations of the Edwards Plateau, and its shoreline length is approximately 19 miles. The majority of the shoreline is private; however, one public boat ramp is available.

Management History: Important sport fish include largemouth bass and catfish species. The Florida subspecies of largemouth bass was stocked in Marble Falls Reservoir in 1999 to increase Florida bass genetic influence.

- **Fish Community**
  - **Prey species:** Gizzard shad, threadfin shad, bluegill, and redbreast sunfish were the dominant prey species available.
  - **Catfishes:** Channel catfish were the dominant species present. Flathead catfish were present in low density. Blue catfish were present in low density.
  - **Black basses:** Largemouth bass were abundant. Electrofishing CPUE has decreased since last survey. Guadalupe bass were also present at low densities.
  - **Temperate basses:** Striped bass were present in low density. This is the first year they have been sampled. They most likely emigrated from an upstream reservoir.

- **Management Strategies**
  The reservoir should continue to be managed with existing fishing regulations. General monitoring with gill nets and electrofishing should be conducted in 2013 – 2014. An aquatic vegetation survey should be conducted in summer 2010.

INTRODUCTION

This document is a summary of fisheries data collected from Marble Falls Reservoir in 2009 and 2010. The purpose of the document is to provide fisheries information and make fisheries 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 species and important prey species. Fisheries management strategies are included to address existing problems or opportunities. Historical data is presented with the 2009 and 2010 data for comparison.

Reservoir Description

Marble Falls Reservoir is a 573-acre stable level impoundment of the Colorado River, located in the City of Marble Falls, Burnet County, TX. It was constructed in 1951 by the Lower Colorado River Authority (LCRA) for purposes of hydroelectric power, recreation and water supply. The reservoir is riverine in nature with a limited number of small coves and creeks. The upper third of the reservoir is extremely shallow (< 5 feet) and has many underwater hazards (granite boulders and outcroppings), making access to this part of the reservoir by motorized boats difficult. The reservoir area represents a geological transition between granite outcroppings and limestone formations of the Edwards Plateau. Habitat consisted of rock bank, rock bluff, bulkhead, sand, terrestrial grasses, and native emergent vegetation. Native aquatic emergent plants present in 2005 were water willow and cattail, occupying 5.50 acres (about 1% coverage). Marble Falls is a stable level reservoir with little fluctuation in water level (Figure 1). Boat access consisted of one public boat ramp. Public bank access was poor, limited to park area at the one boat ramp. Other descriptive characteristics for Marble Falls Reservoir are listed in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (De Jesus and Magnelia 2006) included:

1. Promote the Marble Falls Reservoir's catfish fishery.
   Action: News releases were prepared promoting fisheries for these species.

2. Promote the Marble Falls Reservoir's largemouth bass fishery.
   Action: News releases were prepared promoting fisheries for these species.

Harvest Regulation History: Sport fish in Marble Falls Reservoir have been managed with statewide regulations (Table 2). The Guadalupe bass 12-inch minimum length limit was changed to a statewide no minimum length limit in 2001. The white bass minimum length limit was reduced to 10 inches in September 2004 as analyses indicated that population densities were probably determined by environmental factors rather than angler harvest.

Stocking History: Marble Falls Reservoir has not been stocked since 1999 (Florida largemouth bass). Largemouth bass were introduced in 1966, and Florida largemouth bass in 1999 to increase Florida largemouth bass genetic influence. The complete stocking history is in Table 3.

Aquatic Vegetation/habitat history: Marble Falls Reservoir had very low aquatic vegetation coverage (Table 4). Most of the shoreline habitat is comprised of rock, bulkhead, and terrestrial grasses. Two native species of aquatic emerging vegetation (cattail and water willow) accounted for only 5.50 acres (< 1% coverage) in 2005. This coverage was similar to a 2001 survey (Magnelia and Bonds 2001). No aquatic vegetation or habitat survey has been conducted since 2005, because no significant changes have occurred.

METHODS

Fishes were collected by electrofishing (1.0 hour at 12 stations) and gill 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 netting as the number of fish caught in one net set overnight (fish/nn). All survey sites were randomly selected and all surveys were conducted according to the Texas Parks and Wildlife Department Inland Fisheries Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2008). Trap netting for white crappie was not performed due to historically low catch rates and high cost/benefit ratio associated with collecting these data.

Sampling statistics (CPUE for various length categories) and structural indices [Proportional Size Distribution (PSD); as defined by Guy et al. (2007)], and condition indices [relative weights (Wr)] were calculated for target fishes according to Anderson and Neumann (1996). The Index of Vulnerability (IOV) was used to determine the percentage of gizzard shad vulnerable to predation (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. Ages were determined for LMB using otoliths from 13 fish between 330 and 381mm (category 2 age analysis for 14-inch LMB; TPWD Procedures Manual 2008). Largemouth bass electrophoresis samples were collected according to the Texas Parks and Wildlife Department Inland Fisheries Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2008).

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of rocks, bulkhead, and terrestrial grasses (Table 4).

Prey species: Gizzard shad, threadfin shad, bluegill, and redbreast sunfish electrofishing catch rates were 30/h, 36/h, 118/h and 170/h, respectively. Index of Vulnerability (IOV) for gizzard shad was poor, indicating that only 17% of gizzard shad were vulnerable to existing predators. This was higher than the IOV estimates from 2005 (Figure 2). Total CPUE of gizzard shad was lower in 2009 compared to the 2005 survey (Figure 2). Total CPUE of bluegill in 2009 was lower than total CPUE from surveys in 2005 and 2001 (Figure 3). Total CPUE of redbreast sunfish in 2009 was higher than total CPUE from 2005, and more individuals ($\geq$ 7 inches) were sampled (Figure 4). Larger ($\geq$ 7 inches) redbreast sunfish could be targeted by sport fish anglers.

Catfishes: The gill net catch rate of channel catfish increased to 3.6/nn in 2010, compared to 1.8/nn in 2006 (Figure 5). Most individuals were within the 11 to 16 inch range (Figure 5). The gill net catch rate of flathead catfish was 0.2/nn in 2010, which was lower than the 2006 survey (Figure 6). The gill net catch rate of blue catfish was 1.0/nn in 2010 (Appendix A). No blue catfish were sampled in 2006 (De Jesus and Magnelia 2006).

Largemouth bass: The electrofishing catch rate of stock-length largemouth bass was 50/h in 2009, similar to the 49/h documented in 2005. Proportional Size Distribution (PSD) and PSD_{14} were similar between 2009 and 2005 electrofishing samples (Figure 7). While the population is dominated by sub-legal length fish individuals exceeding the legal length limit are available for anglers (Figure 7). A new reservoir record for largemouth bass was established in 2010 (11.18 pounds, 25.75 inches). Average age at 14 inches of length was between 2 and 3 years (N = 12; range = 1 – 4 years) (Figure 8). Body condition in 2009 was good (relative weights over 85) for all size classes (Figure 7). Florida largemouth bass influence was 50.7% in 2005. No genetic analysis was conducted in 2009.

Fisheries management plan for Marble Falls Reservoir, Texas

Prepared – July 2010.

ISSUE 1 Marble Falls Reservoir has poor reservoir morphology (low SDI) and low water residence time resulting in limited fisheries productivity (Baker et al. 1993). Quality aquatic habitat is also extremely limited. Due to these circumstances sport fish species are generally present in low densities and provide a limited fishery. The sport fishery that does exist persists through natural reproduction or emigration from upstream reservoirs (i.e. striped bass). Additional fisheries management through supplemental stocking or stocking of new species; or, more restrictive length limit regulations would likely be ineffective or minimally effective.

MANAGEMENT STRATEGIES

1. Continue standard sampling surveys to monitor the fishery.
2. Promote the limited sport fishery that is present when the opportunity arises.

ISSUE 2: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant Salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Educate the public about invasive species through the use of media and the internet.
2. Make a speaking point about invasive species when presenting to constituent and user groups.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule will constitute mandatory sampling in 2013/2014 (Table 6). Mandatory sampling every 4 years has been sufficient to monitor fish populations at Marble Falls Reservoir.

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Guy, C. S., R. M. Neumann, D. W. Willis, and R. O. Anderson. 2007. Proportional Size Distribution (PSD): A Further Refinement of Population Size Structure Index Terminology. Fisheries 32(7):348.

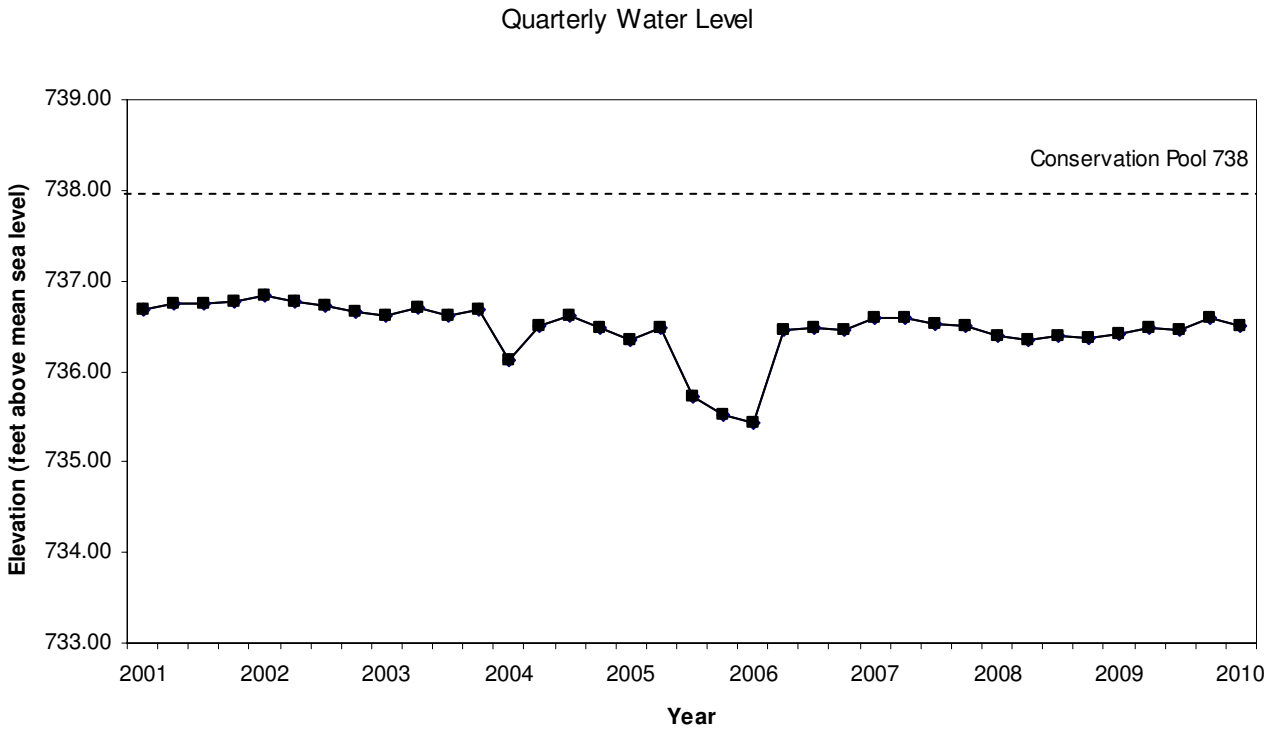


Figure 1. Mean quarterly water level elevations in feet above mean sea level (MSL) recorded for Marble Falls Reservoir, Texas.

Table 1. Characteristics of Marble Falls Reservoir, Texas

Characteristic	Description
Year constructed	1951
Controlling authority	LCRA
Counties	Burnet and Llano
Reservoir type	Mainstream river system: Colorado
Shoreline development index (SDI)	3.1
Conductivity	319 umhos/cm

Table 2. Harvest regulations for Marble Falls Reservoir.

Species	Bag limit	Length limit (inches)
Bass: largemouth	5*	14 minimum
Bass: Guadalupe	5*	No minimum limit
White bass	25	10 minimum**
Catfish: channel and blue catfish	25	12 minimum
Flathead catfish	5	18 minimum
White crappie	25	10 minimum

*Five largemouth and Guadalupe basses in any combination.
**Changed from 12-inch minimum length limit to 10-inch minimum length limit on September 1, 2004.

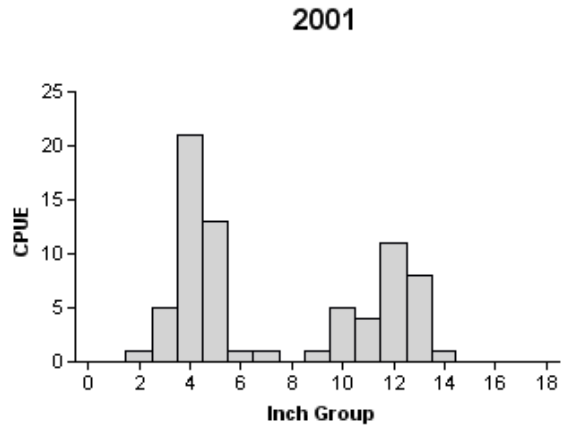
Table 3. Stocking history of Marble Falls Reservoir, Texas. Size categories are: FRY = smaller than 1 inch, FGL = 1-3 inches, and ADL = Adult.

Species	Year	Number	Size
Blue catfish	1971	38,200	FRY
	1979	21,868	FRY
	Species total	60,068	
Channel catfish	1966	20,700	ADL
	1969	18,500	ADL
	1971	10,500	ADL
	1972	15,000	ADL
	1984	7,523	ADL
	Species total	72,223	
Florida largemouth bass	1999	78,525	FGL
	Species total	78,525	
Green X redear sunfish	1966	200	FRY
	Species total	200	
Palmetto bass	1976	1,922	FRY
	1980	9,100	FRY
	1983	7,873	FRY
	Species total	18,895	
Native largemouth bass	1966	1,200	FRY
	Species total	1,200	
Smallmouth bass	1978	48,000	FRY
	1979	36,350	FRY
	1980	10,000	FRY
	1988	38,954	FRY
	Species total	133,304	
White crappie	1971	1,000	
	Species total	1,000	

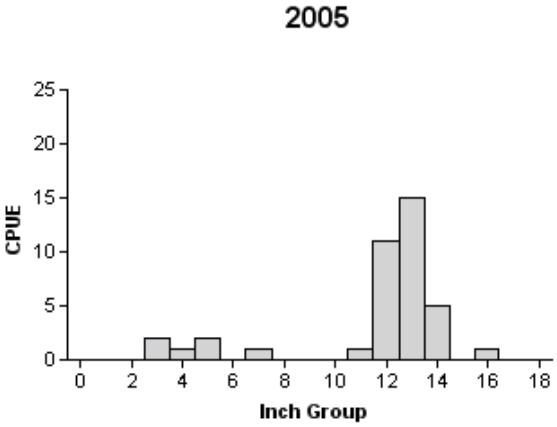
Table 4. Survey of littoral zone and physical habitat types, Marble Falls Reservoir, Texas, 2005. A linear shoreline distance (miles) was recorded for each habitat type found. Surface area (acres) and percent of reservoir coverage were determined for each plant species found.

	Shoreline distance		Surface Area	
Shoreline habitat type	Miles	Percent of total	Acres	Percent of reservoir surface area
Concrete	0.3	1.6		
Bulkhead	2.3	12.1		
Eroded Bank	2.9	15.1		
Rock bank	9.3	48.3		
Rock bluff	3.2	16.8		
Sand	0.5	2.5		
Terrestrial grasses	0.7	3.5		
Cattail			0.61	<1
Water willow			4.90	<1

Gizzard Shad



Effort =	1.0
Total CPUE =	72.0 (53; 72)
IOV =	58.33 (4.2)



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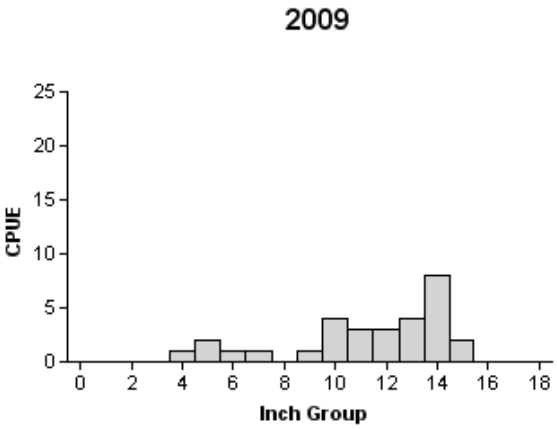
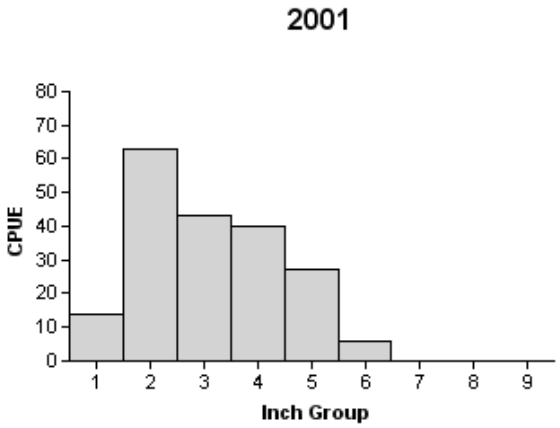
IOV =	15.38 (8.5)



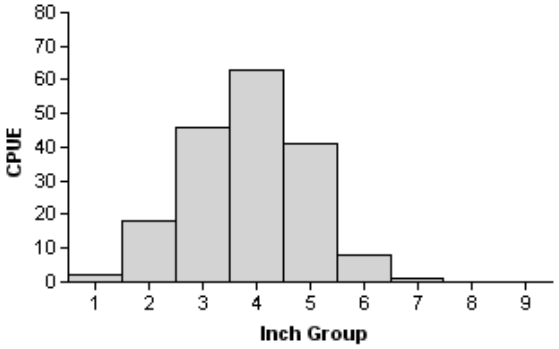
Effort =	1.0
Total CPUE =	30.0 (31; 30)
IOV =	16.67 (11.5)

Figure 2. Number of gizzard shad caught per hour (CPUE) population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Marble Falls Reservoir, Texas, 2001, 2005 and 2009.

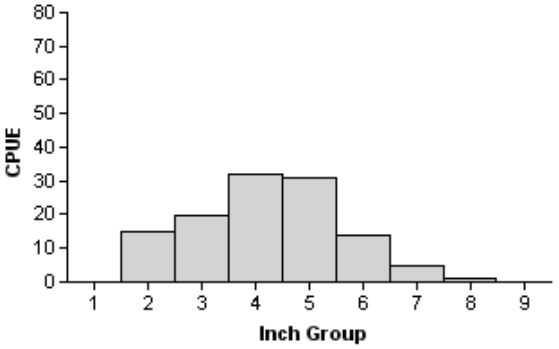
Bluegill



Effort =	1.0
Total CPUE =	193.0 (18; 193)
CPUE-7 =	0.0 (0; 0)
PSD =	5 (2.4)



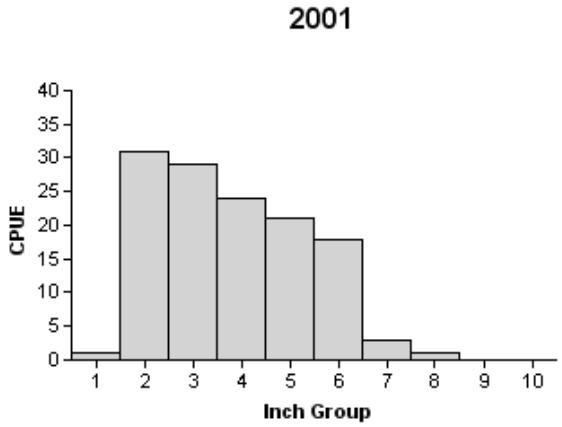
Effort =	1.0
Total CPUE =	179.0 (24; 179)
CPUE-7 =	1.0 (100; 1)
PSD =	6 (3.4)



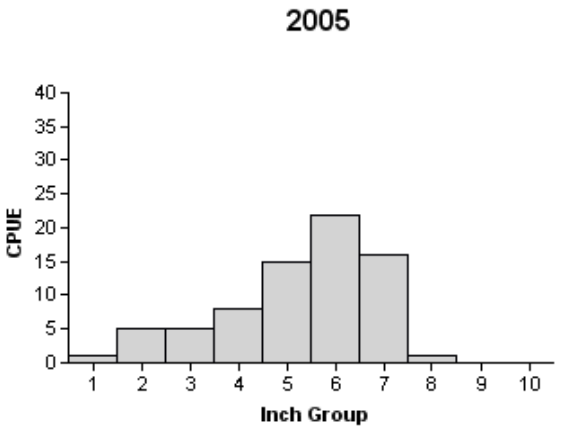
Effort =	1.0
Total CPUE =	118.0 (20; 118)
CPUE-7 =	6.0 (39; 6)
PSD =	19 (5.4)

Figure 3. Number of bluegill caught per hour (CPUE) population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Marble Falls Reservoir, Texas, 2001, 2005 and 2009.

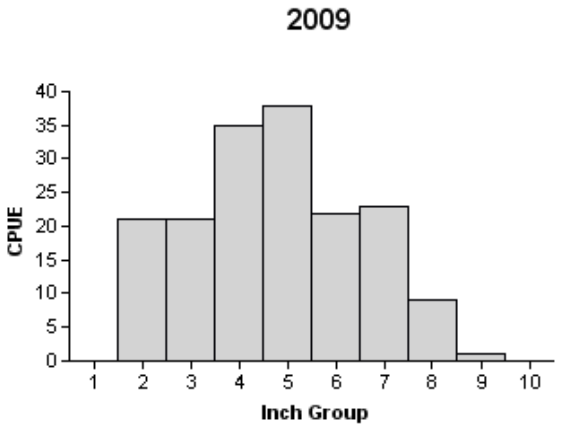
Redbreast Sunfish



Effort =	1.0
Total CPUE =	128.0 (13; 128)
PSD =	23.0 (0.05)
CPUE-7 =	4.0 (56; 4)



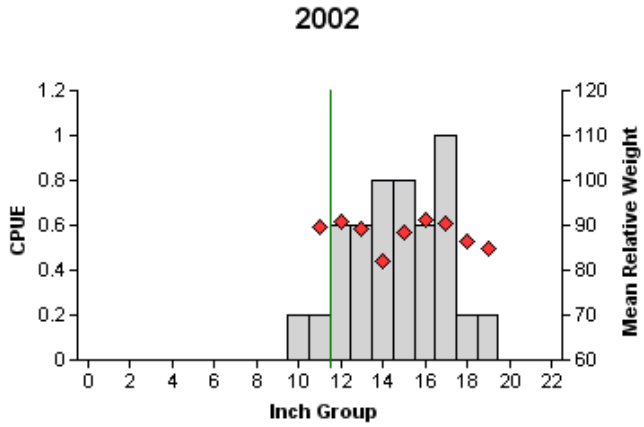
Effort =	1.0
Total CPUE =	73.0 (19; 73)
PSD =	58.0 (0.14)
CPUE-7 =	17.0 (48; 17)



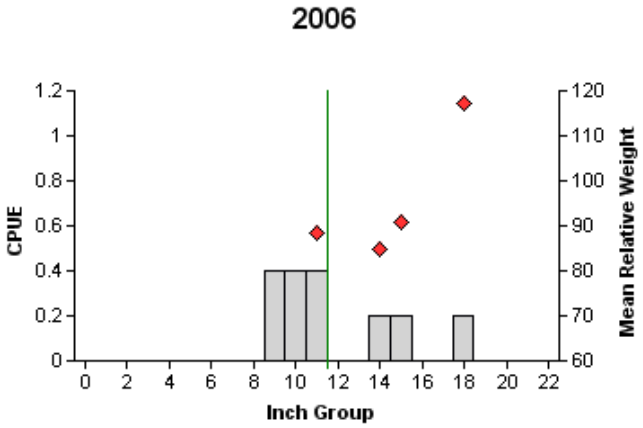
Effort =	1.0
Total CPUE =	170.0 (27; 170)
PSD =	33.0 (39; 33)
CPUE-7 =	37 (6.7)

Figure 4. Number of redbreast sunfish caught per hour (CPUE) population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Marble Falls Reservoir, Texas, 2001, 2005 and 2009.

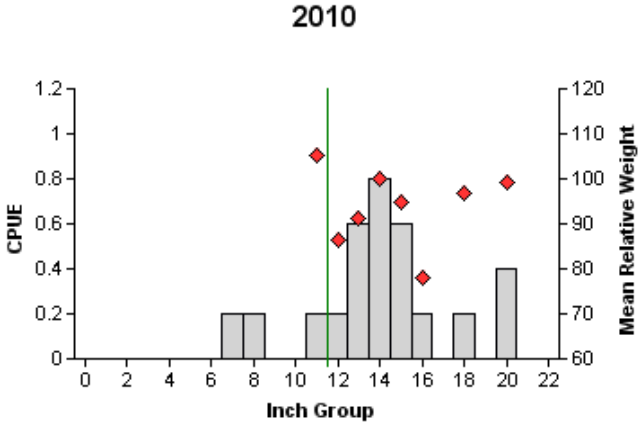
Channel Catfish



Effort =	5.0
Total CPUE =	5.2 (35; 26)
PSD =	40.0 (8.1)



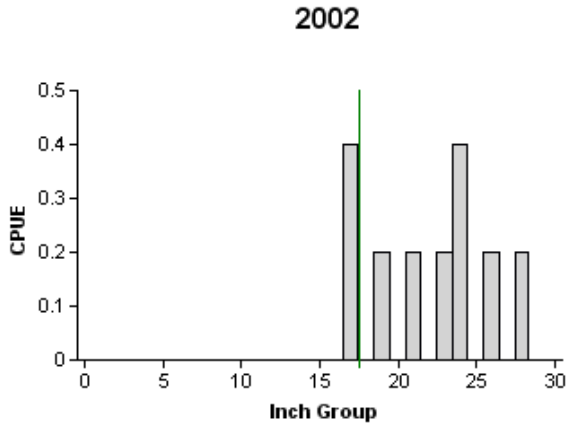
Effort =	5.0
Total CPUE =	1.8 (21; 9)
PSD =	20.0 (16.7)



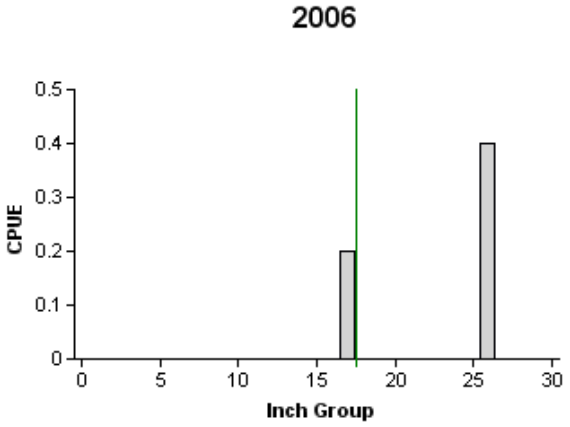
Effort =	5.0
Total CPUE =	3.6 (24; 18)
PSD =	25 (11.6)

Figure 5. Number of channel catfish caught per hour (CPUE) population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Marble Falls Reservoir, Texas, 2002, 2006 and 2010. Minimum length limit represented by vertical line.

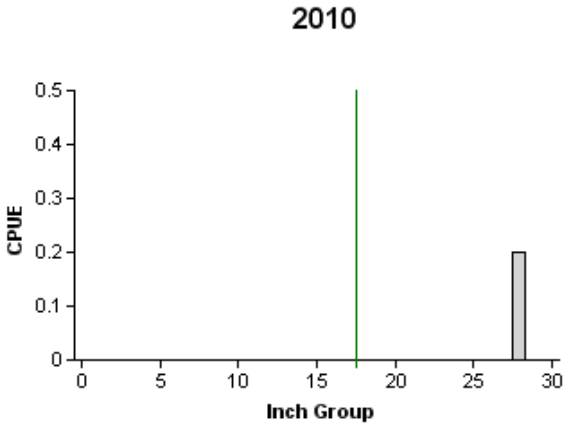
Flathead Catfish



Effort = 5.0
Total CPUE = 1.8 (51; 9)
PSD = 67 (10)



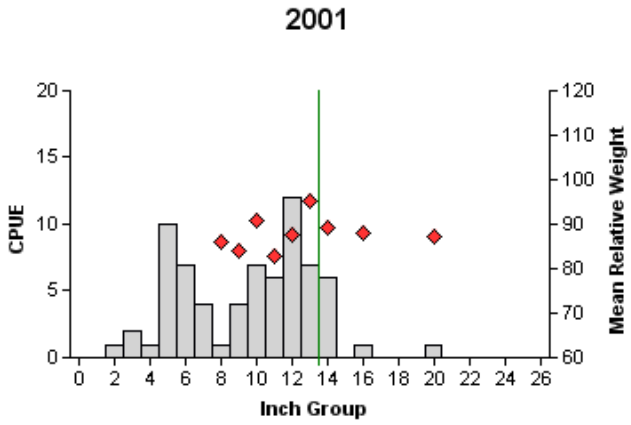
Effort = 5.0
Total CPUE = 0.6 (67; 3)
PSD = 67 (17.7)



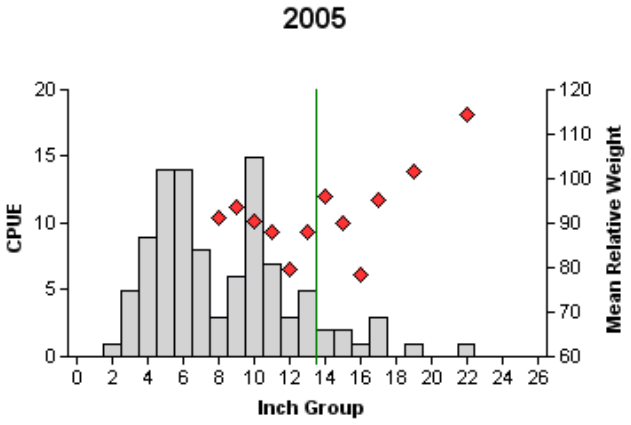
Effort = 5.0
Total CPUE = 0.2 (100; 1)
PSD = 100 (0)

Figure 6. Number of flathead catfish caught per hour (CPUE) population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Marble Falls Reservoir, Texas, 2002, 2006 and 2010. Minimum length limit represented by vertical line.

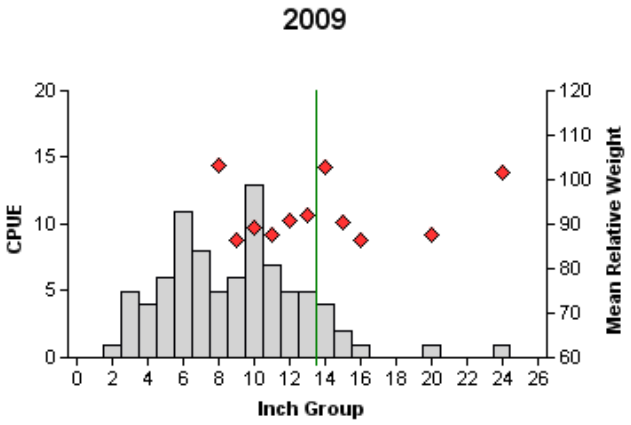
Largemouth Bass



Effort =	1.0
Total CPUE =	70.0 (17; 70)
Stock CPUE =	45.0 (21; 45)
CPUE-14 =	8.0 (34; 8)
PSD =	60 (4.4)
PSD-14 =	18 (4.9)



Effort =	1.0
Total CPUE =	100.0 (22; 100)
Stock CPUE =	49.0 (25; 49)
CPUE-14 =	10.0 (29; 10)
PSD =	37 (4.6)
PSD-14 =	20 (7.4)



Effort =	1.0
Total CPUE =	85.0 (15; 85)
Stock CPUE =	50.0 (16; 50)
CPUE-14 =	9.0 (33; 9)
PSD =	38 (6.7)
PSD-14 =	18 (6.1)

Figure 7. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Marble Falls Reservoir, Texas, 2001, 2005 and 2009. Minimum length limit represented by vertical line.

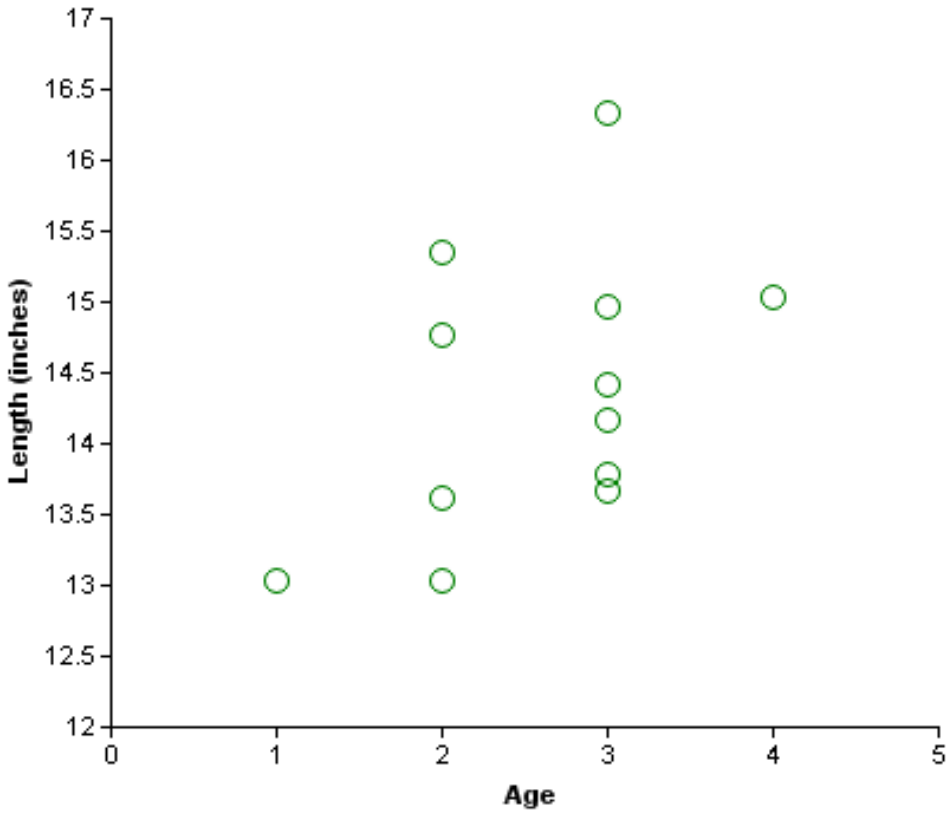


Figure 8. Length at age for largemouth bass collected by electrofishing at Marble Falls Reservoir, Texas, November 2009 (N = 12).

Table 5. Results of genetic analysis of largemouth bass collected by electrofishing, Marble Falls Reservoir, Texas, 1997, 2001 and 2005. FLMB = Florida largemouth bass, NLMB = northern largemouth bass, F1 = first generation hybrid between a FLMB and NLMB, Fx = second or higher generation hybrid between FLMB and NLMB.

Year	Sample size	Genotype				% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	NLMB		
1997	13	0	2	3	8	15.4	0.0
2001	30	4	10	12	4	44.2	13.3
2005	30	0	0	30	0	50.7	0.0

Table 6. Proposed sampling schedule for Marble Falls 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.

Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Report
Fall 2010-Spring 2011					
Fall 2011-Spring 2012					
Fall 2012-Spring 2013					
Fall 2013-Spring 2014	S		S		S

Appendix A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Marble Falls Reservoir, Texas, 2009 and 2010.

	Gill Net		Electrofishing	
Species	N	CPUE	N	CPUE
Gizzard shad			30	30.0
Bluegill			118	118.0
Redbreast sunfish			170	170.0
Redear sunfish			8	8.0
Warmouth			8	8.0
Longear sunfish			65	65.0
Rio Grande cichlid			3	3.0
Largemouth bass			85	85.0
Guadalupe bass			19	19.0
Blue catfish	5	1.0		
Channel catfish	18	3.6		
Flathead catfish	1	0.2		
Striped bass	2	0.4		
Threadfin Shad			36	36.0
Bullhead Minnow			24	24.0
Inland Silverside			10	10.0
Green Sunfish			7	7.0

Appendix B

Location of sampling sites, Marble Falls Reservoir, Texas, 2009-2010. Gill net and electrofishing stations indicated by **G** and **E**, respectively. Boat ramp indicated by boat ramp symbol ( ).