PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-30-R-31

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2005 Survey Report

Graham Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Graham Reservoir were surveyed in 2005 using electrofishing and trap nets and in 2006 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:** Graham Reservoir is a 2,396-acre impoundment located on Salt Creek in the Brazos River Basin approximately two miles northwest of Graham. Water level was at or near full pool since mid October 2005. From 2002-2004, the reservoir had low and dropping water levels. Graham Reservoir had moderate to high productivity. Habitat features consisted of standing timber, rocks, and abundant flooded brush and trees. There are three public boat ramps and limited bank-fishing access.

- **Management History:** Since 1999, the requested annual stocking rate of palmetto bass has been 5 fish/acre because of limited food availability and relatively poor growth of palmetto bass. Palmetto bass were not stocked in 2000, 2001, and 2003 because of golden alga problems in the hatchery. Anecdotal evidence suggested that blue catfish were introduced into Graham Reservoir by anglers sometime in the late 1990s.

- **Fish Community**
  - **Prey species:** Threadfin shad continued to be present in the reservoir. Electrofishing catch of gizzard shad and bluegill was low.

  - **Catfishes:** Few channel catfish were available to anglers, but 65% of the channel catfish in the 2006 survey were legal length (12 inches) or longer. The blue catfish population has expanded since 2002 and should be an excellent resource for anglers; 78% of the blue catfish collected were legal length (12 inches) or longer, and fish up to 24-inches long were collected. Flathead catfish were present in the reservoir.

  - **Temperate basses:** White bass and palmetto bass were present in the reservoir. The white bass population was in terrific shape with many fish in the 10- to 15-inch size range available to anglers. Palmetto bass have steadily declined since 1997.

  - **Largemouth bass:** Reproduction of largemouth bass was good in 2005. This should translate into good numbers of adult largemouth bass in coming years. Although numbers of adults appeared to be lower than in previous years, the size distribution of these fish was good; 33% of the adults were legal length (14 inches) or longer.

  - **White crappie:** White crappie abundance and size distribution continued to be good; about 20% of the adult crappie collected were legal length (10 inches) or longer.

- **Management Strategies:** Increase stocking rate of palmetto bass to 10-15/acre. Transfer Graham Reservoir from Abilene inland fisheries district office to Wichita Falls inland fisheries district office. Conduct electrofishing survey in 2006 to determine status of largemouth bass population and gill net survey in 2008 to track blue catfish and palmetto bass populations.

INTRODUCTION

This document is a summary of fisheries data collected from Graham Reservoir in 2005-2006. 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 2005-2006 data for comparison.

Reservoir Description

Graham Reservoir is a 2,396-acre impoundment constructed in 1929 on Salt Creek. It is located in Young County approximately two miles north of Graham and is operated and controlled by the city of Graham. Graham reservoir is split into two sections by a narrow channel; the west section is referred to as Graham, and the east section is referred to as Eddleman. The reservoir provides municipal and industrial water supply for the city of Graham and water for a steam-electric generating plant (located on the Eddleman section), which is on standby status and used only during grid overloads. The reservoir is also used for flood control and recreation. Land use around the reservoir includes residential and agriculture.

At time of sampling, habitat was diverse, consisting mainly of rocky structure, standing timber, emergent native aquatic plants, and abundant flooded terrestrial vegetation. Water level increased about four feet just prior to the electrofishing survey in October 2005, submerging many acres of terrestrial vegetation, which may have impacted electrofishing effectiveness. Water level reached a low of 11.5 feet below spillway during the summer 2004 before nearly filling with increases in August and November 2004; prior to August 2004, there was a three-year span (2002-2004) of low and dropping water levels (Figure 1).

Graham Reservoir was mesotrophic based on Carlson's Trophic State Index for Chlorophyll-a (TSI Chl-a) with a mean TSI chl-*a* of 46.24 and a trend that indicated an increase in algal content (Texas Commission on Environmental Quality 2005). Boat access consisted of three public boat ramps and several private boat ramps. Bank fishing access was restricted to the area around the boat ramps. A pay-for-fishing crappie house was available on the Eddleman side of the reservoir. Other descriptive characteristics for Graham Reservoir are in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Jons and Dumont 2002) included:

1. Continue stocking hybrid striped bass at reduced stocking rate of 5 fish/acre annually.
   Action: Palmetto bass are a popular sport fish at Graham Reservoir, based on anecdotal evidence, and must be stocked to maintain a fishery. The forage base seemed inadequate to support maximum palmetto stocking rates, so annual stockings at lower rates (5/acre) were requested from 2002 through 2005; palmetto bass were stocked in 2002, 2004, and 2005 at stocking rates that ranged from five to seven fish per acre.
2. Introduce blue catfish
   Action: Anglers requested blue catfish as an additional sport fish at Graham Reservoir, so we requested them in winter 2001. Blue catfish were collected in a gill netting survey the following spring, so the stocking request was terminated. Based on various phone calls to area anglers, blue catfish presence in the reservoir resulted from angler stockings in the late 1990s.

Harvest regulation history: Sportfishes in Graham Reservoir are currently managed, and have always been managed, with statewide regulations (Table 2).

Stocking history: Graham Reservoir has been stocked with palmetto bass nearly every year since 1979. The reservoir was not stocked in 2000, 2001, and 2003 because of golden alga problems in state

hatcheries. Prior to 1999, stocking rates were at least 15 fish/acre; after 1998, stocking rates were around 5 fish/acre. Florida largemouth bass were introduced in 1979 and stocked again in 1992, 1994, and 1997. The complete stocking history is in Table 3.

Vegetation/habitat history: Graham Reservoir has no significant vegetation/habitat management history.

METHODS

Fishes were collected by electrofishing (1 hour at 12 5-min stations), gill netting (10 net nights at 10 stations), and trap netting (five net nights at five 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). Microsatellite DNA analysis was used in 2005 and electrophoresis was used prior to 2005 to determine largemouth bass genetics. 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 some 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 SE was calculated for structural indices and IOV. Ages were determined using otoliths from 5 to 10 fish per inch group. Source for water level data was the United States Geological Survey website.

RESULTS AND DISCUSSION

Habitat: A habitat survey was last conducted in 1997 (Dumont and Jons 1998). No manmade changes have occurred since the 1997 habitat survey.

Prey species: Electrofishing catch rate of bluegill, gizzard shad, and threadfin shad was 97.0/h, 77.0/h, and 57.0/h, respectively. The IOV for gizzard shad was 79%. This was lower than the IOV estimate in 2001, and no gizzard shad under five inches total length were collected in 2005 (Figure 2). Total CPUE of gizzard shad was considerably lower in 2005 compared to previous surveys (Figure 2). Total CPUE of bluegill in 2005 was considerably lower than total CPUE from surveys in 2001 and 1997, and size structure continued to be dominated by small individuals (Figure 3). Threadfin shad, although still present in adequate abundance, could decline if the power plant continues to function on a standby basis, especially with a cold winter. It was possible that water increases, and consequential increases in flooded terrestrial vegetation, just prior to survey negatively impacted electrofishing efficiency for prey species in 2005. It is also possible that low and dropping water levels from 2002-2004 could have had an impact on relative abundance of prey species.

Blue catfish: Blue catfish were first collected in Graham Reservoir in 2002; 11 fish were collected in 15 gill nets, and they ranged in length from 8 to 20 inches (Figure 4). Blue catfish continued to expand and, in 2006, CPUE increased to 3.2 fish/nn, and fish length ranged from 7 to 24 inches (Figure 4). The percent of blue catfish collected that were harvestable size (at least 12 inches long) increased from 43% in 2002 to 78% in 2006. Body condition of blue catfish was excellent in 2006; average W_r of 12.0- to 19.9-inch blue catfish was 97 (N = 20). It appears that blue catfish are thriving in Graham Reservoir.

Channel catfish: The gill net catch rate of channel catfish was 2.0/nn in 2006, and there was a declining trend in relative abundance as evidenced by CPUE from 1997 to 2006 (Figure 5). Despite an apparent decline in abundance, size structure was adequate as 65% of the catch was legal size (at least 12 inches long). Average W_r for channel catfish, 11.0 to 16.9 inches long, was 94 (N = 23) in 2002 and 99 (N = 13) in 2006, indicating good body condition and adequate forage for these fish.

White bass: The gill net catch rate of white bass was 5.6/nn in 2006, compared to 4.3/nn in 1997 and 2.9/nn in 2002. Size structure of white bass was excellent in 2006 (RSD-10 = 95), and RSE-10 steadily increased since 1997 (Figure 6). From 1997 to 2006, average W_r for white bass, 10.0 to 14.9 inches long, steadily improved; 92 (N = 10) in 1997, 94 (N = 23) in 2002, and 102 (N = 53) in 2006.

Palmetto bass: The gill net catch rate of palmetto bass continued to plummet, declining from 12.5/nn in 1997 to 0.8/nn in 2006 (Figure 7). Missing years classes in 2000, 2001, and 2003 have decimated the palmetto bass population. In addition, fish from the 2004 and 2005 stockings were scarcely represented in the 2006 survey (Figure 7). Although too few fish were collected in 2006 to determine body condition or growth, historical data indicated that palmetto bass typically had poor body condition and grew slowly, particularly after age 3 (Table 4; Figure 8).

Largemouth bass: The electrofishing catch rate of stock-length largemouth bass was 27.0/h in 2005, considerably lower than the catch rate in 1997 and 2001 (Figure 9). Reproduction in 2005 was satisfactory as evidenced from the CPUE of sub-stock fish (Figure 9). Size structure was excellent; PSD varied from 44 to 51 since 1997 and RSD-14 increased from 17 in 1997 to 33 in 2006 (Figure 9). Growth of largemouth bass in Graham Reservoir has been good historically; average age at 14 inches (13.0 to 14.9 inches) was 2.4 years (N = 7; range = 2 - 3) in 1994, 2.7 years (N = 10; range = 2 – 4 years) in 1997 and 2.2 years (N = 9; range = 1 – 4 years) in 2001. Florida largemouth bass influence was exclusively limited to second generation, or higher, intergrades between northern and Florida strains as 100% of the bass tested that had Florida influence were Fx. Similar results occurred in 1997 and 1994 (Table 5). Florida alleles were 31% in 2006 and ranged from 18% to 37% since 1994 (Table 5). Mean W_r among size classes was adequate, ranged from 89 to 93, and was similar to previous years (Table 6).

White crappie: The trap net catch rate of white crappie was 10.0/nn in 2005, much higher than in 2001 (3.7/nn) and similar to 1997 (10.8/nn). The PSD was 63, which was lower and more desirable than PSD in previous surveys (Figure 10). The percentage of legal-size fish (RSD-10) remained adequate and has ranged from 21 to 38 since 1997 (Figure 10). Growth of white crappie has typically been good; average age at 10 inches (9.0 to 10.9 inches) steadily improved from 2.3 years (N = 20; range = 2 – 4) in 1994 to 1.6 years (N = 11; range = 1 – 2) in 1997 and 1.3 years (N = 27; range 1 – 2) in 2001.

Fisheries management plan for Graham Reservoir, Texas

Prepared – July 2006.

ISSUE 1: Palmetto bass are a popular sport fish at Graham Reservoir. Angler demand for palmetto bass, based on anecdotal evidence, is an incentive to continue stockings. The palmetto bass population has significantly declined since 1997; fish were not stocked in 2000, 2001, and 2003 because of golden alga problems at the hatchery. The stocking rate of 5/acre in 2002, 2004, and 2005 has not reestablished palmetto bass abundance to a desirable level.

MANAGEMENT STRATEGY

1. Stock palmetto bass at a rate of 10-15 fish/acre annually until abundance is increased to a desirable level.

ISSUE 2: Graham Reservoir is located near Graham, Texas, and is considerably closer to the Wichita Falls inland fisheries district office than to the Abilene inland fisheries district office. Anglers typically contact the Wichita Falls office for information regarding Graham Reservoir and its fish populations.

MANAGEMENT STRATEGY

1. Transfer Graham Reservoir from Abilene inland fisheries district office to the Wichita Falls inland fisheries district office, effective 1 June 2006. District work units, defined by number of sampling stations for all district reservoirs, after transfer of Graham Reservoir, will be similar (Abilene 356; Wichita Falls 354).

SAMPLING SCHEDULE JUSTIFICATION:

An electrofishing survey will be conducted in 2006 so the Wichita Fall district office can become more familiar with the reservoir and to determine if the 2005 survey, which had a much lower catch rate than previous years, truly reflected largemouth bass relative abundance and size structure. An additional gill net survey will be conducted in 2008 to track palmetto bass and blue catfish populations. Standard surveys and a report are scheduled for 2009/2010.

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Jons, G., and S. Dumont. 2002. Statewide freshwater fisheries monitoring and management program survey report for Graham Reservoir, 2001. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.

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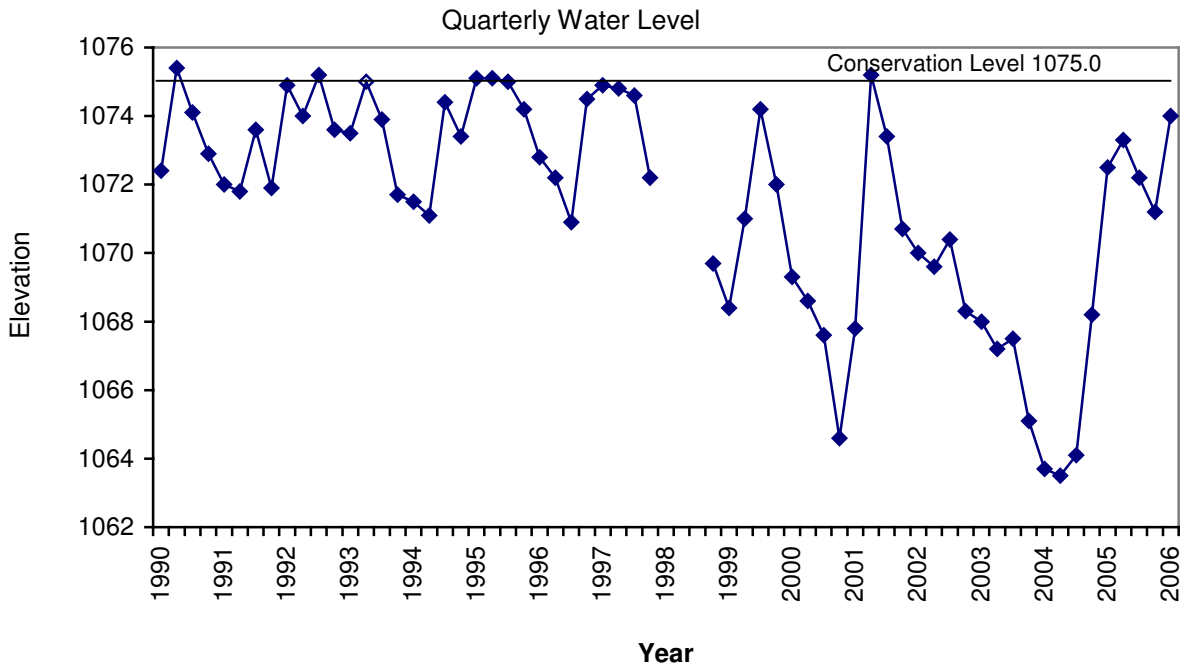


Figure 1. Quarterly water level elevations in feet above mean sea level recorded for Graham Reservoir, Texas.

Table 1. Characteristics of Graham Reservoir, Texas.

Characteristic	Description
Year constructed	1929
Controlling authority	City of Graham
County	Young
Reservoir type	Main stream
Shoreline Development Index	3.25
Conductivity	526 umhos/cm

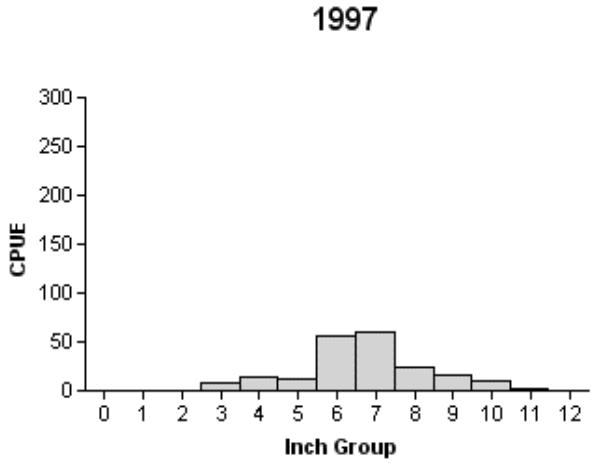
Table 2. Harvest regulations for Graham Reservoir, Texas

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, palmetto	5	18 - No Limit
Bass, largemouth	5	14 – No Limit
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 - No Limit

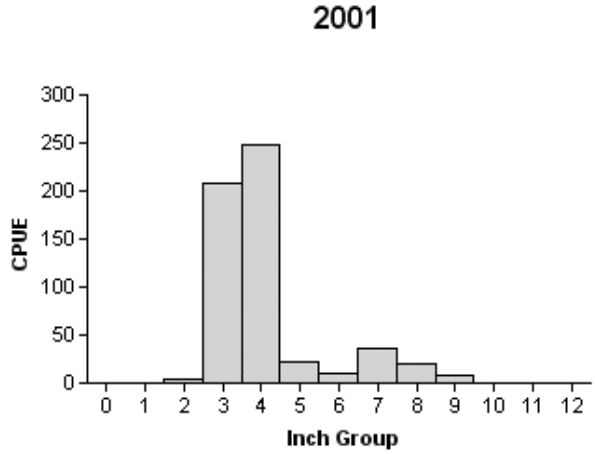
Table 3. Stocking history of Graham Reservoir, Texas. Size categories are: FGL = 1-3 inches.

Species	Year	Number	Size
Channel catfish	1970	50,000	FGL
Palmetto bass	1979	100,000	FGL
	1981	100,000	FGL
	1983	148,500	FGL
	1985	60,600	FGL
	1986	59,900	FGL
	1987	59,900	FGL
	1988	60,868	FGL
	1989	69,426	FGL
	1991	56,235	FGL
	1992	25,415	FGL
	1994	46,350	FGL
	1995	52,277	FGL
	1996	45,334	FGL
	1997	36,680	FGL
	1998	30,536	FGL
	1999	22,655	FGL
	2002	15,050	FGL
	2004	16,816	FGL
	2005	12,867	FGL
	Total	1,013,703	
Largemouth bass	1966	303,000	FGL
	1967	60,000	FGL
	1969	10,000	FGL
	1970	50,000	FGL
	1971	4,000	FGL
	Total	427,000	
Florida largemouth bass	1979	50,022	FGL
	1992	151,869	FGL
	1994	150,217	FGL
	1997	151,247	FGL
	Total	503,355	

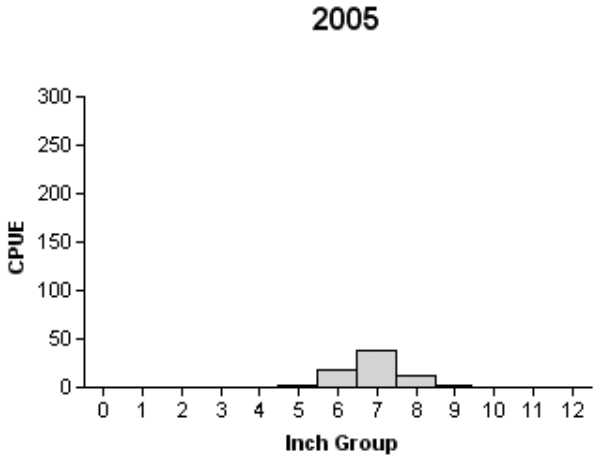
Gizzard Shad



Effort = 1.5
Total CPUE = 202.7 (28; 304)
IOV = 75.0 (5.0)



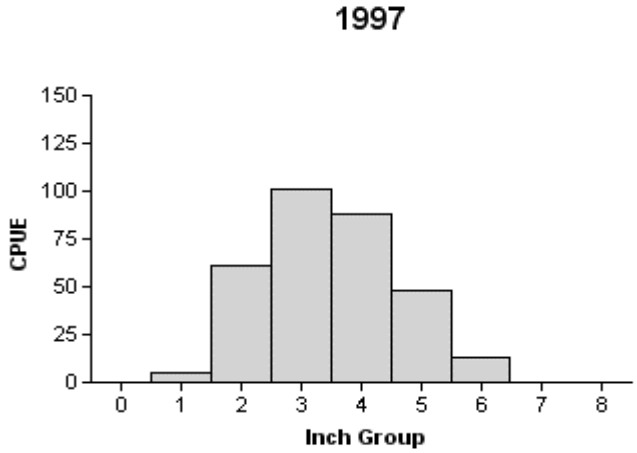
Effort = 1.3
Total CPUE = 555.2 (21; 694)
IOV = 95.0 (2.0)



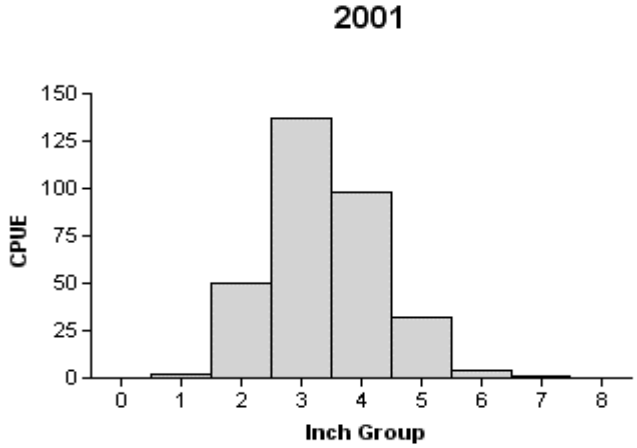
Effort = 1.0
Total CPUE = 77.0 (19; 77)
IOV = 79.0 (4.0)

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, Graham Reservoir, Texas, 1997, 2001, and 2005.

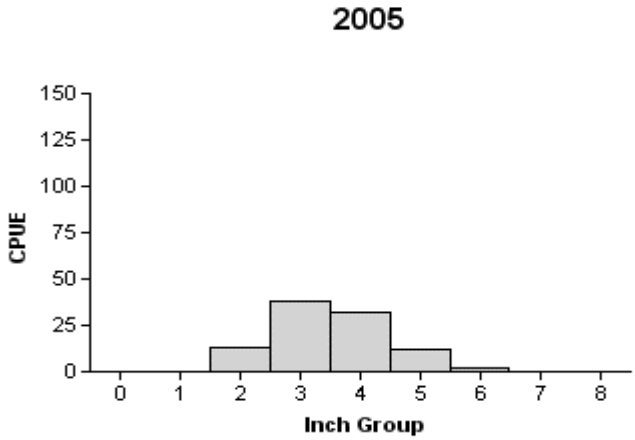
Bluegill



Effort = 1.5
Total CPUE = 316.7 (29; 475)
PSD = 5.0 (1.0)



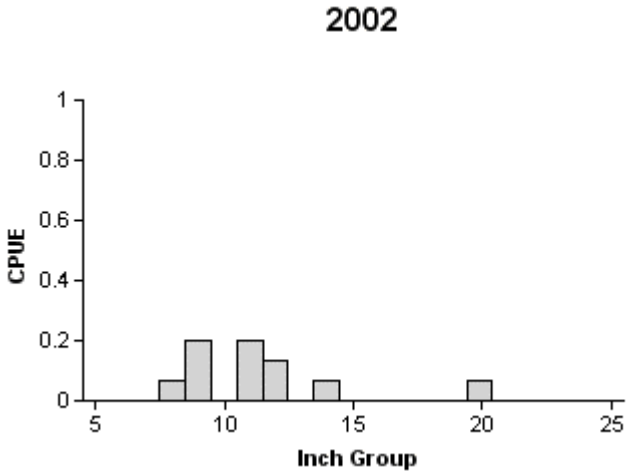
Effort = 1.3
Total CPUE = 324.0 (18; 405)
PSD = 2.0 (1.0)



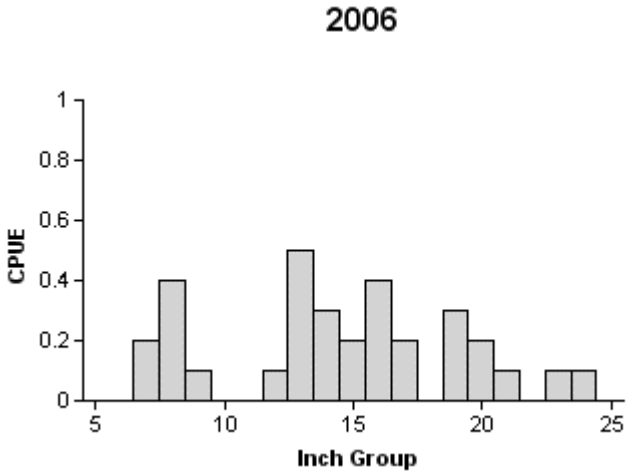
Effort = 1.0
Total CPUE = 97.0 (17; 97)
PSD = 2.0 (1.0)

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, Graham Reservoir, Texas, 1997, 2001, and 2005.

Blue Catfish



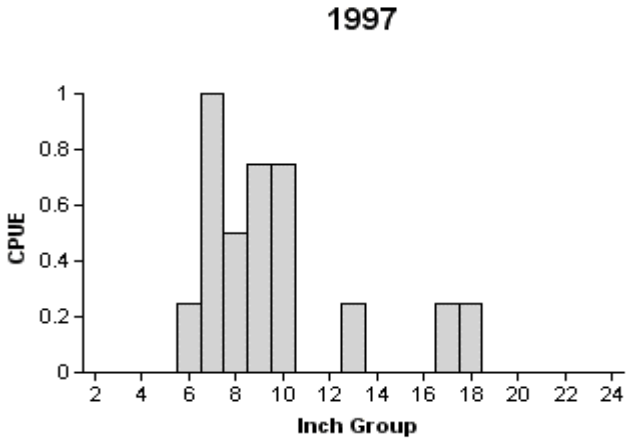
Effort =	15.0
Total CPUE =	0.7 (17; 11)
CPUE-12 =	0.3 (47; 4)
PSD =	25.0 (26.0)



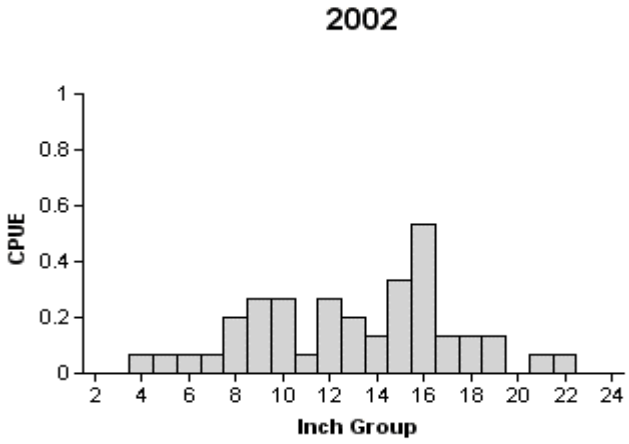
Effort =	10.0
Total CPUE =	3.2 (40; 32)
CPUE-12 =	2.5 (37; 25)
PSD =	20.0 (13.0)

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, Graham Reservoir, Texas, 2002 and 2006.

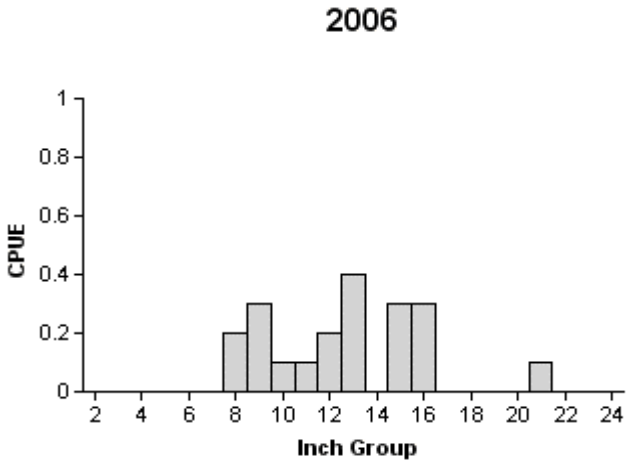
Channel Catfish



Effort = 4.0
Total CPUE = 4.0 (41; 16)
CPUE-12 = 0.8 (58; 3)
PSD = 67.0 (19.0)



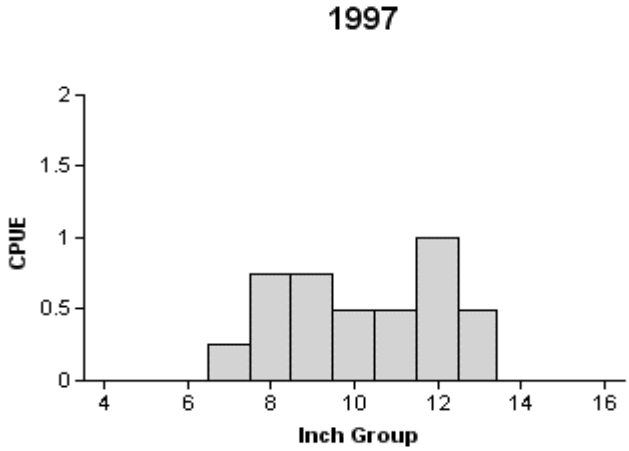
Effort = 15.0
Total CPUE = 3.1 (24; 46)
CPUE-12 = 2.0 (27; 30)
PSD = 52.0 (10.0)



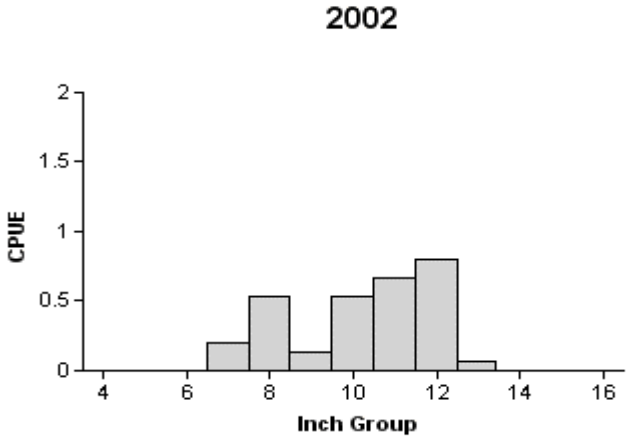
Effort = 10.0
Total CPUE = 2.0 (34; 20)
CPUE-12 = 1.3 (26; 13)
PSD = 29.0 (11.0)

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, Graham Reservoir, Texas, 1997, 2002, and 2006.

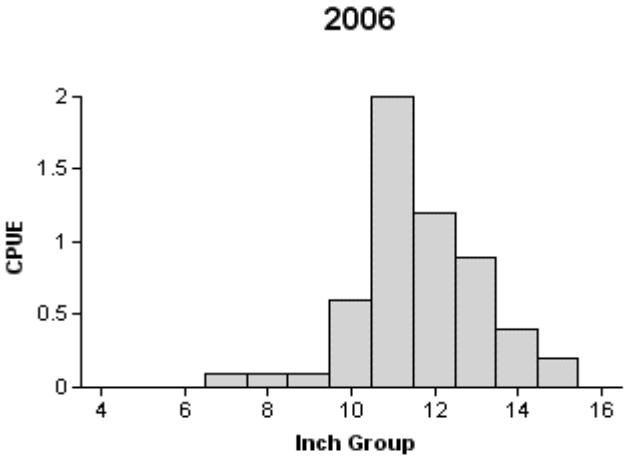
White Bass



Effort = 4.0
Total CPUE = 4.3 (22; 17)
CPUE-10 = 2.5 (53; 10)
RSD-10 = 59.0 (19.0)



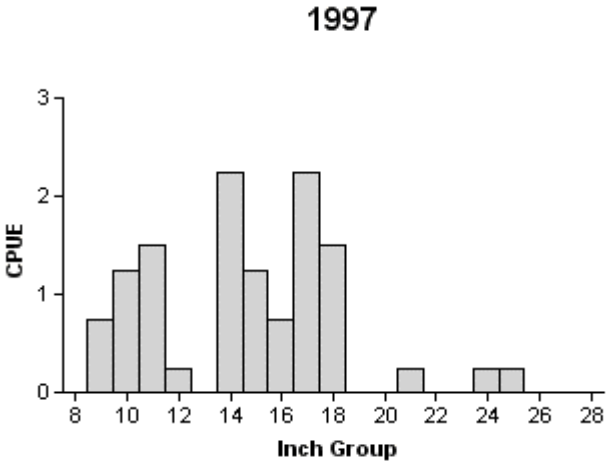
Effort = 15.0
Total CPUE = 2.9 (29; 44)
CPUE-10 = 2.1 (30; 31)
RSD-10 = 70.0 (11.0)



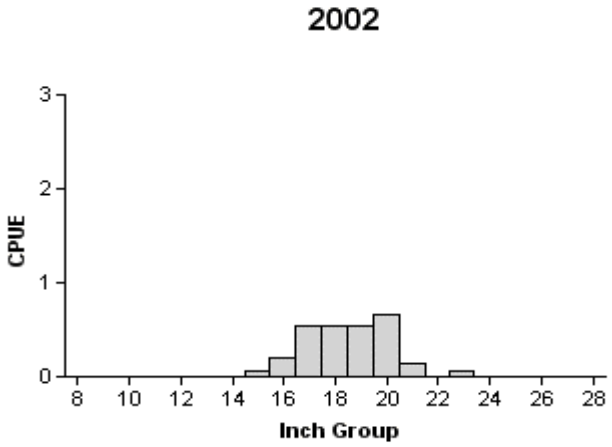
Effort = 10.0
Total CPUE = 5.6 (23; 56)
CPUE-10 = 5.3 (25; 53)
RSD-10 = 95.0 (4.0)

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, Graham Reservoir, Texas, 1997, 2002, and 2006.

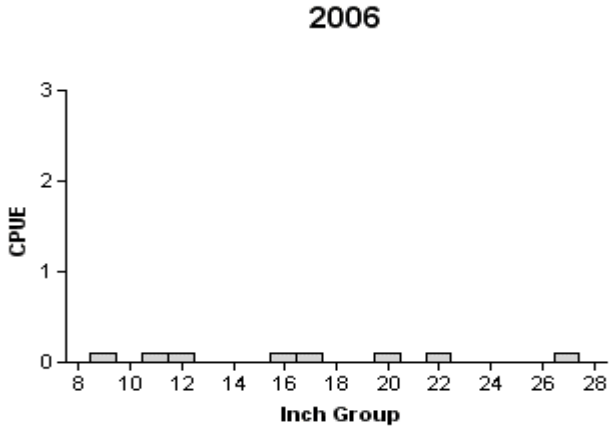
Palmetto Bass



Effort = 4.0
Total CPUE = 12.5 (74; 50)
CPUE-18 = 2.5 (42; 10)
RSD-18 = 20.0 (9.0)



Effort = 15.0
Total CPUE = 2.7 (37; 41)
CPUE-18 = 1.9 (37; 29)
RSD-18 = 71.0 (11.0)



Effort = 10.0
Total CPUE = 0.8 (20; 8)
CPUE-18 = 0.3 (33; 3)
RSD-18 = 38.0 (8.0)

Figure 7. Number of palmetto 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, Graham Reservoir, Texas, 1997, 2002, and 2006.

Palmetto Bass

Table 4. Mean relative weight and sample size (N) of palmetto bass in size-classes (in) collected from spring gill net surveys, Graham Reservoir, Texas, 1997 and 2002.

	Mean relative weight and N in size-classes (in)	
Year	15.0 – 17.9	18.0 – 25.9
1997	85 (N = 12)	81 (N = 29)
2002	82 (N = 17)	78 (N = 9)

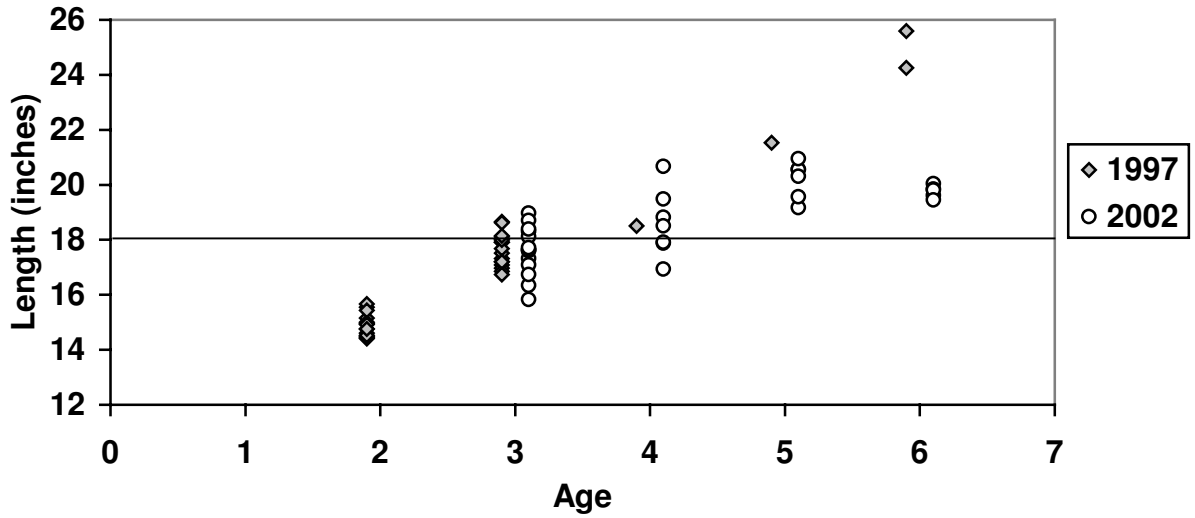
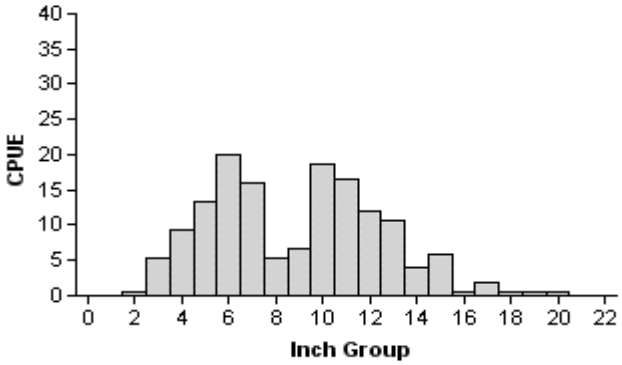


Figure 8. Length at age for palmetto bass collected from gill nets at Graham Reservoir, Texas, spring 1997 and 2002. Horizontal line represents the minimum length limit.

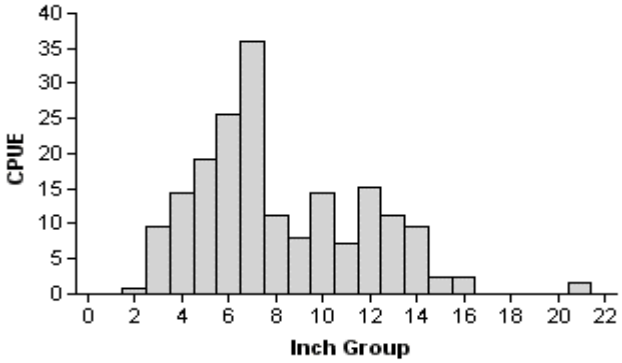
Largemouth Bass

1997



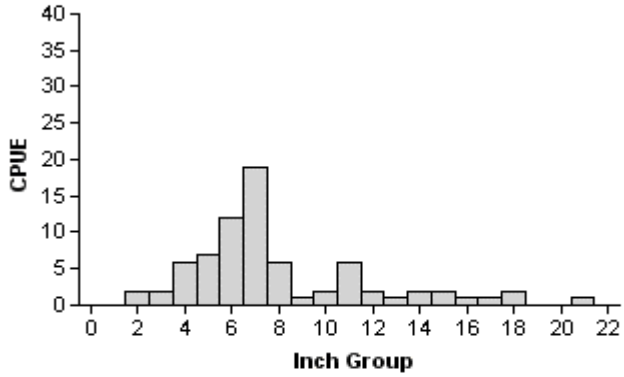
Effort =	1.5
Total CPUE =	149.3 (14; 224)
Stock CPUE =	84.7 (19; 127)
CPUE-14 =	14.7 (24; 22)
PSD =	44.0 (5.0)
RSD-P =	13.0 (3.0)
RSD-14 =	17.0 (3.0)

2001



Effort =	1.3
Total CPUE =	188.8 (18; 236)
Stock CPUE =	83.2 (26; 104)
CPUE-14 =	16.0 (32; 20)
PSD =	51.0 (6.0)
RSD-P =	8.0 (2.0)
RSD-14 =	19.0 (3.0)

2005



Effort =	1.0
Total CPUE =	75.0 (18; 75)
Stock CPUE =	27.0 (14; 27)
CPUE-14 =	9.0 (24; 9)
PSD =	44.0 (9.0)
RSD-P =	26.0 (8.0)
RSD-14 =	33.0 (7.0)

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, Graham Reservoir, Texas, 1997, 2001, and 2005.

Largemouth Bass

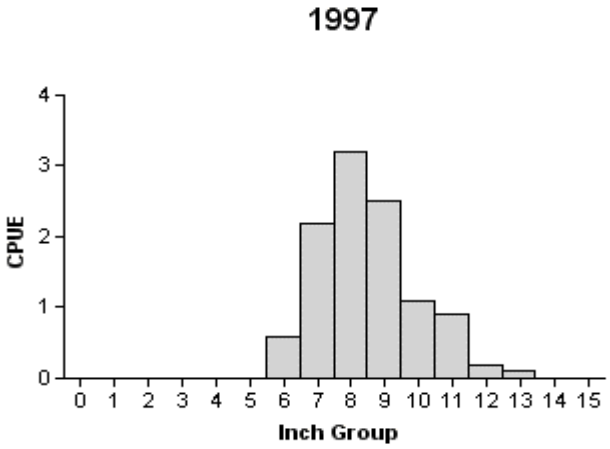
Table 5. Results of genetic analysis of largemouth bass collected by fall electrofishing, Graham Reservoir, Texas, 1994, 1997, 2001, and 2005. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass, F1 = first generation intergrade between a FLMB and a NLMB, Fx = second or higher generation intergrade between a FLMB and a NLMB. Microsatellite DNA analysis was used in 2005, and electrophoresis was used in 1994, 1997, and 2001 to determine largemouth bass genetics.

		Genotype					
Year	Sample size	FLMB	F1	Fx	NLMB	% FLMB alleles	% pure FLMB
1994	33	0	0	19	14	22.7	0.0
1997	30	1	0	12	17	18.3	3.3
2001	28	1	10	10	7	37.1	3.6
2005	34	0	0	26	8	30.7	0.0

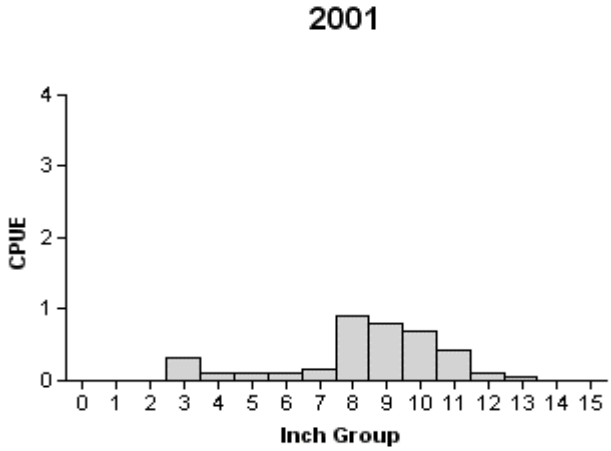
Table 6. Mean relative weight and sample size (N) of largemouth bass in size-classes (in) collected from fall electrofishing surveys, Graham Reservoir, Texas, 1997, 2001, and 2005.

	Mean relative weight and N in size-classes (in)		
Year	8.0 – 11.9	12.0 – 14.9	≥ 15.0
1997	94 (N = 71)	83 (N = 40)	93 (N = 16)
2001	95 (N = 49)	92 (N = 45)	94 (N = 8)
2005	93 (N = 15)	89 (N = 5)	93 (N = 6)

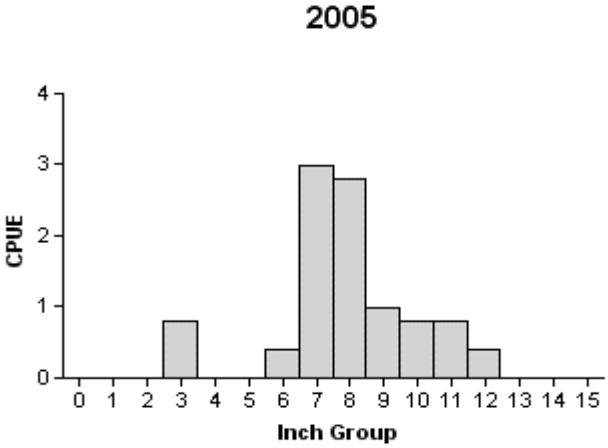
White Crappie



Effort =	10.0
Total CPUE =	10.8 (45; 108)
Stock CPUE =	10.8 (45; 108)
CPUE-10 =	2.3 (44; 23)
PSD =	74.0 (5.0)
RSD-10 =	21.0 (4.0)



Effort =	19.0
Total CPUE =	3.7 (19; 71)
Stock CPUE =	3.3 (19; 63)
CPUE-10 =	1.3 (20; 24)
PSD =	89.0 (6.0)
RSD-10 =	38.0 (8.0)



Effort =	5.0
Total CPUE =	10.0 (16; 50)
Stock CPUE =	9.2 (17; 46)
CPUE-10 =	2.0 (42; 10)
PSD =	63.0 (6.0)
RSD-10 =	22.0 (7.0)

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, Graham Reservoir, Texas, 1997, 2001, and 2005.

White Crappie

Table 7. Mean relative weight and sample size (N) of white crappie in size-classes (in) collected from fall trap netting surveys, Graham Reservoir, Texas, 1994, 1997, and 2001.

	Mean relative weight and N in size-classes (in)		
Year	5.0 – 7.9	8.0 – 9.9	≥ 10.0
1994	89 (N = 28)	91 (N = 39)	92 (N = 32)
1997	93 (N = 28)	96 (N = 57)	92 (N = 23)
2001	97 (N = 7)	96 (N = 32)	99 (N = 24)

Table 8. Proposed sampling schedule for Graham 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.

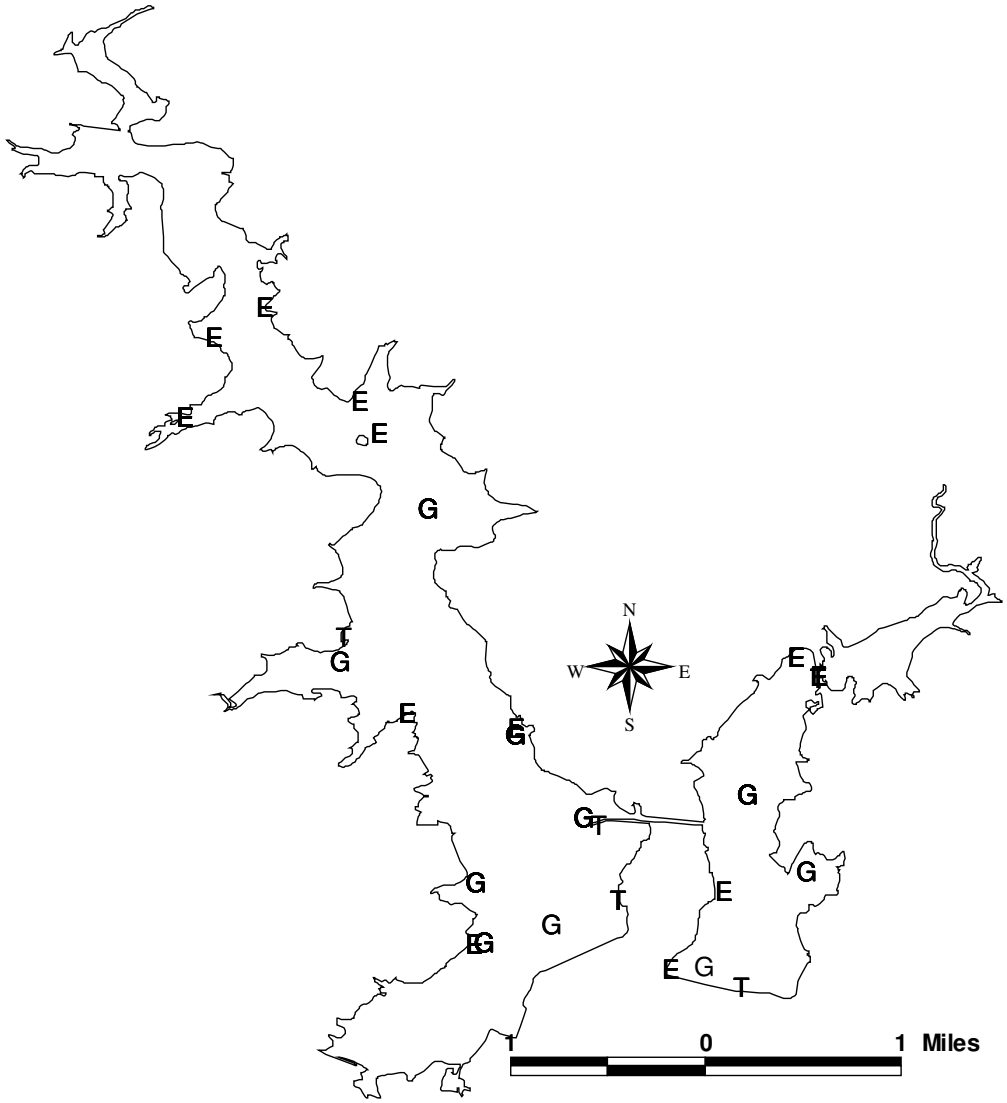
Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Report
Fall 2006-Spring 2007	A				
Fall 2007-Spring 2008			A		
Fall 2008-Spring 2009					
Fall 2009-Spring 2010	S	S	S		S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected from all gear types from Graham Reservoir, Texas, 2005-2006.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					77	77.0
Threadfin shad					57	57.0
Blue catfish	32	3.2				
Channel catfish	20	2.0				
Flathead catfish	3	0.3				
White bass	56	5.6				
Palmetto bass	8	0.8				
Green sunfish					6	6.0
Warmouth					3	3.0
Orange spotted sunfish					4	4.0
Bluegill					97	97.0
Longear sunfish					30	30.0
Redear sunfish					29	29.0
Largemouth bass					75	75.0
White crappie			50	10.0		
Black crappie			1	0.2		

APPENDIX B



Location of sampling sites, Graham Reservoir, Texas, 2005-2006. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was near full pool at time of sampling.