

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-33

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2007 Survey Report

**Fort Phantom Hill Reservoir**

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## TABLE OF CONTENTS

Survey and management summary .....	1
Introduction.....	2
Reservoir description.....	2
Management history.....	2
Methods.....	3
Results and discussion.....	3
Fisheries management plan.....	6
Literature cited.....	7
Figures and tables.....	8-30
Water level (Figure 1).....	8
Reservoir characteristics (Table 1) .....	8
Harvest regulations (Table 2).....	9
Stocking history (Table 3).....	10
Creel statistics (Tables 4-5) .....	11
Gizzard shad and threadfin shad (Figures 2-3).....	12
Bluegill (Figures 4-5) .....	14
Blue catfish (Figures 6-8; Table 6) .....	16
Channel catfish (Figures 9-11; Table 7).....	18
White bass (Figures 12-13; Table 8).....	20
Palmetto bass (Figures 14-16; Table 9).....	22
Largemouth bass (Figures 17-21; Tables 10-13).....	24
White crappie (Figures 22-24; Table 14) .....	28
Proposed sampling schedule (Table 15).....	30
Appendix A	
Catch rates of all target species from all gear types .....	31
Appendix B	
Map of 2007-2008 sampling locations .....	32

## SURVEY AND MANAGEMENT SUMMARY

Fish populations in Fort Phantom Hill Reservoir were surveyed in 2007 using electrofishing and trap nets and in 2008 using gill nets. Anglers were surveyed from March through August in 2007. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Fort Phantom Hill Reservoir is a 4,246-acre impoundment constructed on Elm Creek approximately 15 miles north of Abilene, Texas. It is located in the Brazos River Basin, and its primary use was municipal water supply. Secondary use was recreation. Beginning in December 2003, power plant generation was reduced to peak use only. The reservoir filled to conservation level in August 2007, 10 years after it was last full. Water level was 1 to 2 feet below conservation level at time of sampling. At time of sampling littoral habitat was primarily rock, dead flooded-terrestrial vegetation, smartweed, black willow, and grass (unidentified).
- **Management History:** Walleye were stocked 10 times from 1973 to 1995 before requests were discontinued because of poor stocking success and a failure to establish a fishery. Blue catfish were introduced in 1974 and have become an established fishery. An 18-inch minimum length limit on blue catfish existed from 1993 to 1999 before reinstatement to the statewide regulation. Threadfin shad were introduced in 1984 and have maintained a population. Florida largemouth bass were introduced in 1976 and have been stocked eight times from 1976 to 2001. A 16-inch minimum length limit on largemouth bass has been in place since 1994. Palmetto bass were introduced in 1977 and have been stocked nearly every year thereafter.
- **Fish Community**
  - **Prey species:** Electrofishing catch of gizzard shad and bluegill was high. With high prey abundance and good growth and body condition of sport fish, prey fish species were providing excellent forage for existing sport fish.
  - **Catfishes:** The blue catfish population continued to improve and larger fish were available to anglers. Channel catfish were present in the reservoir.
  - **Temperate basses:** White bass and palmetto bass populations were moderately abundant and provided excellent fishing opportunities.
  - **Largemouth bass:** A strong year class of fish was produced in 2007. There appeared to be little, if any, difference in angler success and largemouth bass abundance and size structure under the 16-in MLL compared to the 14-inch MLL.
  - **White crappie:** White crappie continued to be abundant, and over 30% of adult fish were legal size or longer. White crappie continued to be the most popular sport fish at Fort Phantom Hill Reservoir.
- **Management Strategies:** Investigate reinstating the 14-in MLL on largemouth bass. Obtain angler opinions on largemouth bass harvest regulations. Continue trap net and electrofishing surveys at two-year intervals and gill net surveys once every four years.

## INTRODUCTION

This document is a summary of fisheries data collected from Fort Phantom Hill Reservoir in 2007-2008. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2007-2008 data for comparison.

### *Reservoir Description*

Fort Phantom Hill Reservoir is a 4,246-acre impoundment constructed on Elm Creek approximately 15 miles north of Abilene, Texas. It is located in the Brazos River Basin, and its primary use was municipal water supply. Secondary use was recreation. Beginning in December 2003, power plant generation was reduced to peak use only.

The reservoir filled to conservation level in August 2007, 10 years after it was last full (Figure 1). It nearly filled in 2004, catching 13 ft. of water, then fell about 10 feet in 2005 and 2006 (Figure 1). Water level was at conservation level at time of sampling, and littoral habitat consisted primarily of rock, dead flooded-terrestrial vegetation, smartweed, black willow, and some form of semi-terrestrial grass.

Fort Phantom Hill Reservoir was eutrophic based on Carlson's Trophic State Index for Chlorophyll-a (TSI Chl-a) with a mean TSI chl-a of 56.86, representing an increasing trend in algal content compared to previous years (Texas Commission on Environmental Quality 2008). Boat access consisted of five public boat ramps. Bank fishing access was very good for a reservoir of this size with access points scattered all around the reservoir. In addition, there was one privately operated pay-for-fishing dock and one public fishing dock installed by the city of Abilene. Other descriptive characteristics for Fort Phantom Hill Reservoir are in Table 1. A contour map of the reservoir was completed in 2007 by district staff.

### *Management History*

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

1. Annual stockings of palmetto bass at 15 fish/acre and creel and gill net surveys to determine status of fishery and population.

**Action:** Palmetto bass have been stocked at the full stocking rate since 2003. A creel survey was conducted in 2004 and 2007. Gill net surveys were conducted in 2005 and 2008.

2. Continue evaluation of 16-inch minimum length limit on largemouth bass using electrofishing and creel survey data.

**Action:** A creel survey was conducted in 2004 and 2007. Electrofishing surveys were conducted in 2005 and 2007.

3. Monitor blue catfish population and stock Imperial channel catfish fingerlings.

**Action:** Blue catfish population was monitored with gill nets in 2005 and 2008 and with a creel survey in 2004 and 2007. No action was taken on stocking Imperial channel catfish in 2005-2007. This management action was deemed unnecessary.

**Harvest regulation history:** Blue catfish were managed with an 18-inch MLL from 1 September 1993 to 1 September 1999 when it reverted to the statewide 12-inch MLL because of low angler support and extremely slow growth of blue catfish. Largemouth bass have been managed with a 16-inch MLL since 1 September 1994. The 16-inch MLL was implemented to increase abundance of quality-size largemouth bass ( $\geq 15$  inches long) under heavy fishing pressure, high harvest, and variable recruitment conditions

(Dumont and Munger 1995). The original management objective was to maintain electrofishing CPUE-15 of 12/h (Dumont and Munger 1995). Other sport fishes have been managed with statewide regulations (Table 2).

**Stocking history:** Walleye were stocked 10 times from 1973 to 1995. Blue catfish were introduced in 1974. Threadfin shad were introduced in 1984. Florida largemouth bass were introduced in 1976 and have been stocked eight times from 1976 to 2001. Palmetto bass were introduced in 1977 and have been stocked nearly every year thereafter. The complete stocking history is in Table 3.

**Vegetation/habitat history:** Fort Phantom Hill Reservoir has no significant vegetation/habitat management history.

## METHODS

Fishes were collected by electrofishing (2 hours at 24 5-min stations), gill netting (six net nights at six stations), and trap netting (10 net nights at 10 sites). 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. A roving creel survey was conducted from March through August 2007. 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 Size Distribution (PSD)] (Guy *et al.* 2007), and condition indices [relative weight ( $W_t$ )] 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 of largemouth bass, palmetto bass, and blue catfish were determined using otoliths. Source for water level data was the United States Geological Survey website.

## RESULTS AND DISCUSSION

**Habitat:** A habitat survey was last conducted in 1998 (Cole *et al.* 1999).

**Creel:** Anglers preferred to fish for “anything that bites”, white crappie, and catfish. These three groups accounted for 82-85% of the angling effort since 2003 (Table 4). Palmetto bass and largemouth bass made up about 5-10% of the total angling effort (Table 4). There was an increasing trend in total angling effort from 2003 to 2007 and about 75% of all fishing effort was from bank-fishing anglers (Table 5). The total number of fish caught per creel period ranged from 72,818 to 106,626 since 2003 (Table 5). Total direct expenditures by anglers steadily increased since 2003 and was over \$143,000 in 2007 (Table 5).

**Prey species:** Electrofishing CPUE of threadfin shad, gizzard shad, and bluegill was 174.5/h, 898.5/h, and 231.0/h, respectively, in 2007. Total CPUE of gizzard shad steadily increased since 2003 and over 90% of all gizzard shad collected were 7 inches or less in length (Figure 2). Threadfin shad and small gizzard shad, together, have historically provided a substantial forage base for existing predators, particularly in 2005 and 2007 (Figure 3). Bluegill CPUE has declined slightly since 2003 (Figure 4). However, CPUE in 2007 was above CPUE estimates in most years (Figure 5).

**Blue catfish:** Gill net CPUE of blue catfish was 9.3/nn in 2008, which was similar to catch rates in 2004 and 2005 (Figure 6). Size structure has gradually improved from 2004 to 2008 as more fish were at least 15 inches in length (Figure 6), and size structure was better in 2008 than in any previous surveys dating

back to 1996 (Figure 7). Growth of blue catfish, although poor, has also improved; mean age of 12-inch blue catfish was 7.9 years (N=10) in 2003, 9.7 years (N=9) in 2004, and 5.3 years in 2008 (N=6). Age composition of 12-inch blue catfish in 2003 and 2004 consisted of six year classes ranging in age from 3 to 14 years old. In 2008 age composition of 12-inch blue catfish was comprised of only four year classes, ranging from 4 to 7 years old. There was a popular fishery for blue catfish; angling effort for blue catfish was over 2,000 h in 2004 and 2007. Average angler catch per hour and percent of legal-sized fish released have steadily increased since 2003 (Table 6). An estimated 5,983 blue catfish were harvested from March through August 2007 and another 8,800 were caught that could have been harvested (Table 6). In addition, observed harvest of blue catfish was 2.5 times higher in 2007 compared to 2003 and 2004 (Figure 8). Harvested fish in 2007 ranged in size from 12 to 20 inches (Figure 8).

**Channel catfish:** Gill net CPUE of channel catfish was 1.0/n in 2008 and was similar to catch rates in previous years (Figures 9 and 10). Channel catfish were scarce in the reservoir and offered limited fishing opportunities; directed effort has been < 350 h per survey period and total harvest has ranged from 900 to 1,500 fish (Table 7). Harvested fish ranged from 12 to 21 inches in length (Figure 11).

**White bass:** Gill net CPUE of white bass was 3.0/n in 2008 which was similar to the catch rate in 2005 but much lower than the catch rate in 2004 (Figure 12). White bass size structure was good from 2004 to 2008, indicating that a high proportion of white bass were of legal size or larger (Figure 12). Too few white bass were collected to estimate growth in 2008. However, based on the last age and growth sample in 2004, mean age at 10 inches was 1.4 years (N=14). Angling effort for white bass in 2004 and 2007 was around 1,000 h, and average angler catch per hour was 2.0 fish/h or higher (Table 8). The number of white bass harvested increased since 2003 with over 3,800 white bass were harvested in 2007 during the creel period (Table 8). Harvested fish ranged from 10-16 in with 11-13 in fish being most common (Figure 13).

**Palmetto bass:** Gill net CPUE of palmetto bass was 8.8/n in 2008 which was similar to catch rates in 2004 and 2005 (Figure 14), but somewhat lower than catch rates in 1996 thru 2000 (Figure 15). Body condition of palmetto bass in 2008 was excellent as most fish had relative weights above 95 (Figure 14). Growth of palmetto bass improved in recent years and was good in 2008; mean age at 20 inches was 6.7 years (N=12) in 2004, 3.5 years (N=10) in 2005, and 4.2 years (N=19) in 2008, and mean age at 18 inches was 3.1 years (N=20) in 2008. Palmetto bass were a popular sport fish at Fort Phantom Hill Reservoir; directed effort was over 5,800 h in 2007, which was much higher than in 2003 and 2004 (Table 9). Harvest also showed a large increase from 300 or so fish in 2003 and 2004 to over 2,400 fish in 2007 (Table 9). Another 2,000 to 3,000 fish that could have been harvested were released as 58% of legal palmetto bass caught were released. Size distribution of harvested palmetto bass consisted primarily of 18- to 22-inch fish (Figure 16).

**Largemouth bass:** Electrofishing CPUE of largemouth bass was 114.0/h in 2007, of which 47.0/h were stock-size and larger. Although these catch rates were lower compared to 2003 and 2005, relative abundance was most likely higher because conditions were very different in 2007; the reservoir was full for the first time since 1997, and the amount of shoreline cover was immense. This may have limited electrofishing effectiveness because fish were likely scattered over large areas. Size structure was similar to previous surveys in 2003 and 2005, other than the proportion of 16-in and larger fish, which was considerably lower in 2007 (Figure 17). The stated management objective of the 16-inch MLL was to maintain a CPUE-15 of  $\geq 12/h$ . CPUE-15 has fluctuated substantially since 1986 and was not maintained at 12/h largely because of drought conditions (Figure 18). Although there was no stated objective related to proportional size distribution, an acceptable PSD-15 would be 15% in West Texas reservoirs. This has been achieved under the 16-inch MLL but with relative inconsistency (Figure 18). Body condition has improved for largemouth bass from 8 to 15 inches since 2003 (Table 10). Body condition of larger fish has not changed, and fish of all sizes had relative weights above 95 in 2007 (Table 10). Growth of largemouth bass was excellent in 2007 as fish reached 14 inches in just over two years, compared to 3.2 years in 2001 (Table 11). In 2007 most fish from 11 to 15 inches were two years old (Table 11). Florida influence (% Florida largemouth bass alleles) was fairly high and ranged from 41% to 62% since 1998

(Table 12). Fishing effort for largemouth bass ranged from 0.75h/acre to 1.16h/acre since 2003 (Table 13). Angling effort decreased from 1998 through 2000 during the drought and generally increased from 2001 to 2007 as water level increased (Figure 19). Harvest of largemouth bass was minimal and fishing success in terms of catch per hour was good (Table 13). Average angler catch per hour increased since 2001 (Figure 19). Harvest has been variable since 1994; harvest was high in 1998, low in 1997 and 2000-2002, and has generally increased since 2001 (Figure 20). Some illegal harvest of largemouth bass occurred in 2007, however, most harvested fish were 16-17 inches long (Figure 21).

**White crappie:** Trap net CPUE of white crappie has increased in each survey since 2003 and was 20.6/nn in 2007. With the exception of a higher young-of-the-year catch in 2007, size structure of crappie has been similar since 2003 (Figure 22). Size structure and relative abundance of white crappie has been consistent and good at Fort Phantom Hill Reservoir since 1996 (Figure 23). White crappie were an extremely popular sport fish at Fort Phantom Hill Reservoir as directed effort ranged from 11,644 h in 2003 to over 17,500 h in 2007 (Table 14). Angler catch rate has been high (over one fish per hour) and harvest ranged from 8,000 to 20,000 fish since 2003 (Table 14). White crappie from 10-14 inches were harvested in 2007 (Figure 24).

**Fisheries management plan for Fort Phantom Hill Reservoir, Texas**

Prepared – July 2008.

**ISSUE 1:** The largemouth bass population has had the 16-in MLL since 1994. There appeared to be no evidence that this regulation improved the population or fishing success over and beyond what the 14-inch MLL did. It is likely that environmental factors (namely water level) were the primary driving forces behind largemouth bass population dynamics and not the 16-inch MLL.

**MANAGEMENT STRATEGY**

1. Investigate a regulation change from 16-inch MLL to statewide 14-inch MLL.
  - a. Conduct mail-out survey of Abilene anglers regarding harvest regulations for largemouth bass at Fort Phantom Hill Reservoir.
  - b. Obtain input from local bass clubs on largemouth bass regulations.
  - c. Conduct electrofishing survey once every two years.
  - d. Compare largemouth bass population indices to water level data.

**ISSUE 2:** Palmetto bass do not naturally reproduce and must be stocked to maintain a population.

**MANAGEMENT STRATEGY**

1. Continue with annual stocking of fingerling palmetto bass at 15/acre.

**SAMPLING SCHEDULE JUSTIFICATION:**

Conduct electrofishing, trap net, and gill net surveys in 2009/2010 to continue with long-term database and as a means of educating area anglers on potential fishing opportunities at Fort Phantom Hill Reservoir. A sampling schedule is in Table 15.



7  
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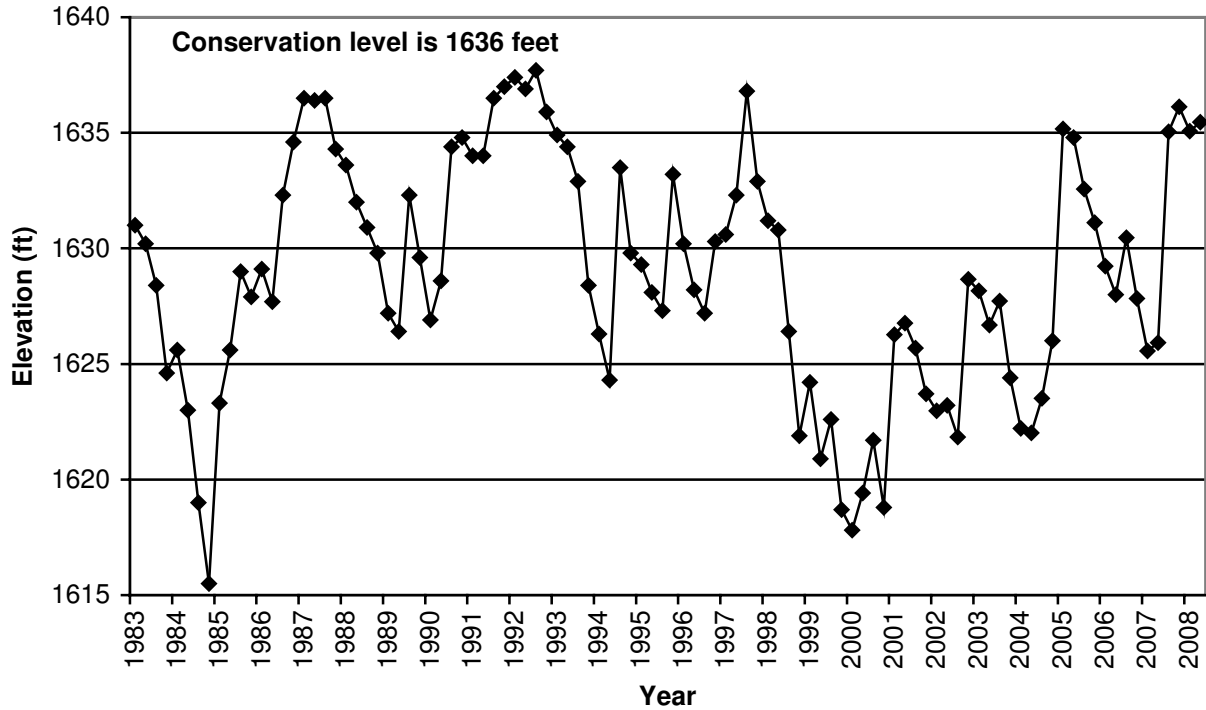


Figure 1. Quarterly water level elevations in feet above mean sea level for Fort Phantom Hill Reservoir, Texas, 1983-2008.

Table 1. Characteristics of Fort Phantom Hill Reservoir, Texas.

Characteristic	Description
Year constructed	1938
Controlling authority	City of Abilene
County	Jones
Reservoir type	Tributary, Brazos River Basin
Shoreline Development Index	2.0
Conductivity	420 umhos/cm

Table 2. Harvest regulations for Fort Phantom Hill Reservoir, Texas

Species	Bag Limit	Minimum Length Limit (inches)
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12
Catfish, flathead	5	18
Bass, white	25	10
Bass, palmetto	5	18
Bass, largemouth	5	16
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10

Table 3. Stocking history of Fort Phantom Hill Reservoir, Texas. Size categories are: FRY = < 1 inch, FGL = 1-3 inches and ADL = adults.

Species	Year	Number	Size
Threadfin shad	1984	1,000	ADL
Blue catfish	1974	10,000	FGL
Palmetto bass	1977	55,440	FGL
	1979	43,000	FGL
	1983	43,000	FGL
	1984	100,575	FGL
	1986	63,690	FGL
	1987	105,950	FGL
	1988	87,094	FGL
	1989	102,955	FGL
	1991	64,180	FGL
	1992	44,480	FGL
	1993	35,960	FGL
	1994	65,800	FGL
	1995	63,960	FGL
	1996	65,760	FGL
	1997	51,756	FGL
	1998	42,733	FGL
	1999	20,018	FGL
	2002	32,200	FGL
	2003	63,209	FGL
	2004	64,777	FGL
	2005	63,400	FGL
	2006	65,346	FGL
	2007	64,145	FGL
	Total	1,409,428	
Redear sunfish	1981	42,800	FGL
Largemouth bass	1973	2,500	FGL
Florida largemouth bass	1976	210,087	FGL
	1977	65,280	FGL
	1979	10,000	FGL
	1986	152,000	FGL
	1994	213,334	FGL
	1995	10,000	FGL
	1997	213,179	FGL
	2001	212,650	FGL
	Total	1,021,250	

Table 3. Continued.

Species	Year	Number	Size
Walleye	1973	770,000	FRY
	1974	700,000	FRY
	1975	800,000	FRY
	1979	6,797,500	FRY
	1982	335,738	FRY
	1983	6,996,441	FRY
	1985	8,637,242	FRY
	1991	2,440,295	FRY
	1993	8,520,000	FRY
	1995	8,500,000	FRY
Total		44,497,216	

Table 4. Percent directed angler effort by species for Fort Phantom Hill Reservoir, Texas, 2003, 2004, and 2007.

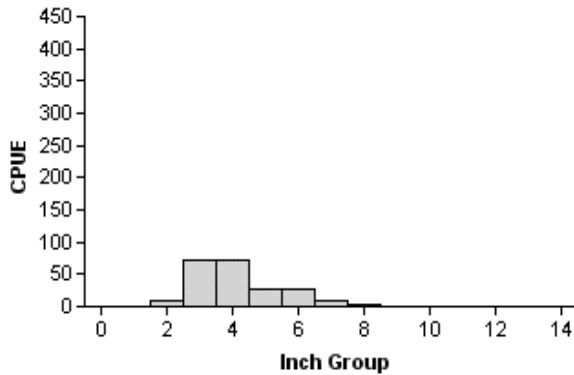
Species	Year		
	2003	2004	2007
Blue catfish	2	4	4
Channel catfish	< 1	< 1	< 1
Catfishes	23	23	18
White bass	< 1	3	2
Palmetto bass	4	2	10
Sunfishes	< 1	1	< 1
Largemouth bass	8	6	5
White crappie	26	27	31
Anything	32	31	29

Table 5. Fishing effort (h), catch, and total directed expenditures (\$) at Fort Phantom Hill Reservoir, Texas, March-August, 2003, 2004, and 2007.

Creel Statistic	Year		
	2003	2004	2007
Bank fishing effort	33,165	37,540	41,283
Boat fishing effort	11,186	10,388	15,609
Total fishing effort	44,351	47,928	56,892
Total number of fish caught	87,606	72,818	106,626
Total directed expenditures	88,842	120,837	143,146

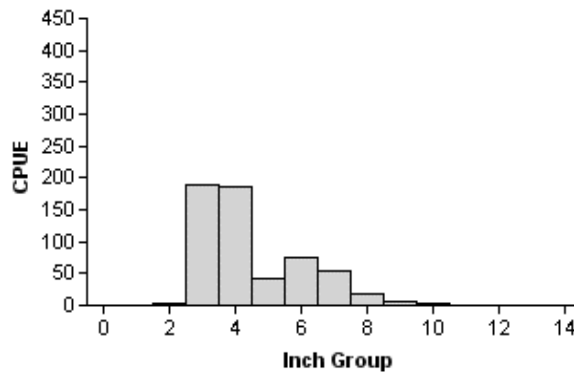
## Gizzard Shad

2003



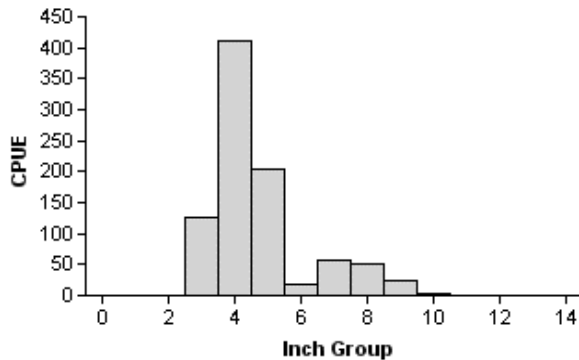
Effort = 1.0  
 Total CPUE = 218.0 (38; 218)  
 Stock CPUE = 14.0 (42; 14)  
 PSD = 0  
 IOV = 98 (1)

2005



Effort = 1.9  
 Total CPUE = 583.8 (16; 1119)  
 Stock CPUE = 85.6 (18; 164)  
 PSD = 5 (1)  
 IOV = 95 (1)

2007



Effort = 2.0  
 Total CPUE = 898.5 (13; 1797)  
 Stock CPUE = 137.5 (20; 275)  
 PSD = 1 (0)  
 IOV = 91 (2)

Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for PSD and IOV are in parentheses) for fall electrofishing surveys, Fort Phantom Hill Reservoir, Texas, 2003, 2005, and 2007.

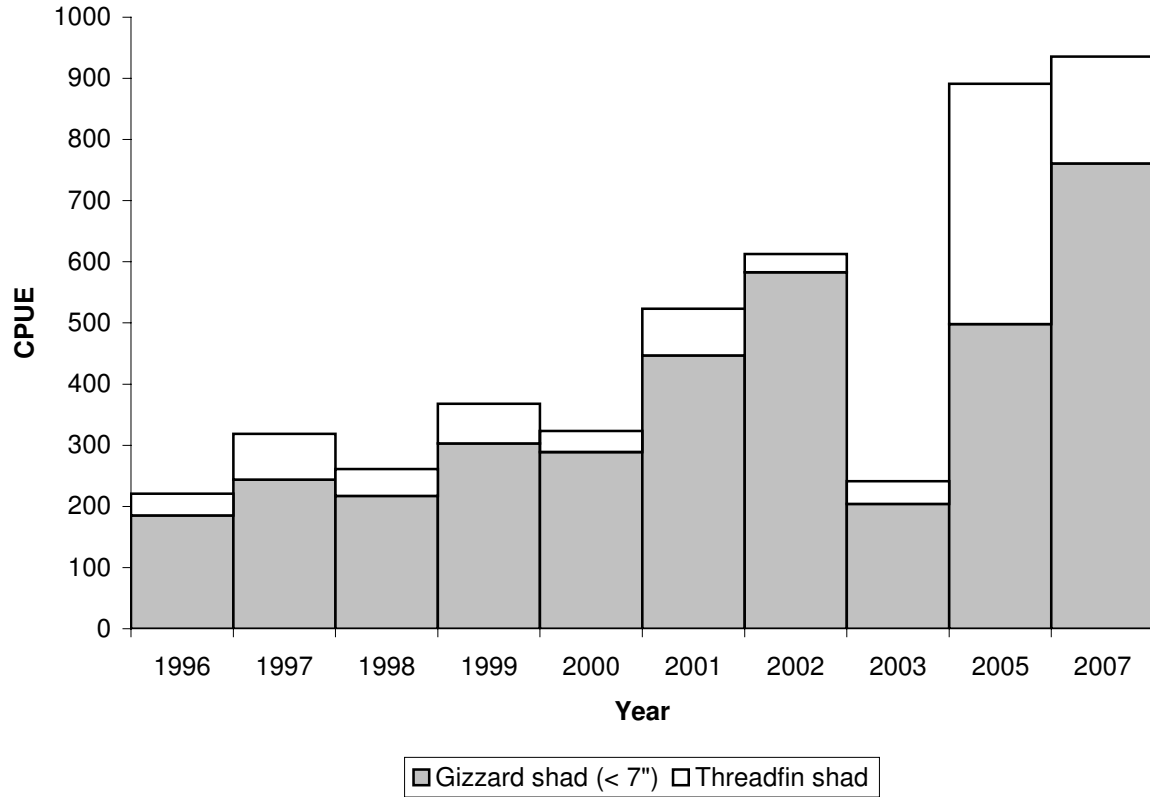
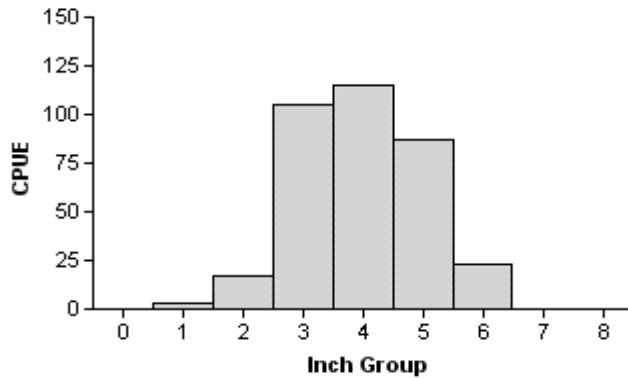


Figure 3. Number of threadfin shad and sub-stock (< 7") gizzard shad caught per hour (CPUE) from fall electrofishing surveys, Fort Phantom Hill Reservoir, Texas, 1996-2007.

## Bluegill

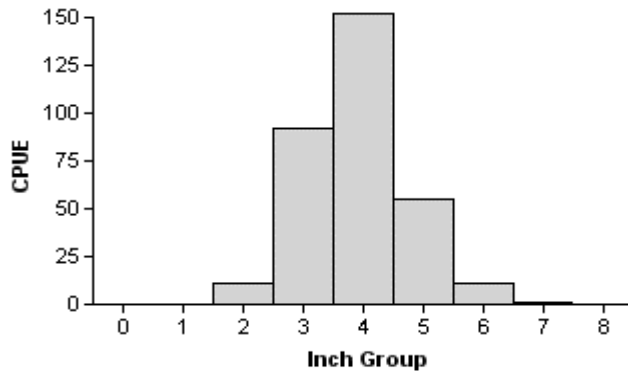
**2003**

Effort = 1.0  
Total CPUE = 350.0 (16; 350)  
PSD = 7 (1)



**2005**

Effort = 1.9  
Total CPUE = 322.4 (14; 618)  
PSD = 4 (1)



**2007**

Effort = 2.0  
Total CPUE = 231.0 (26; 462)  
PSD = 11 (2)

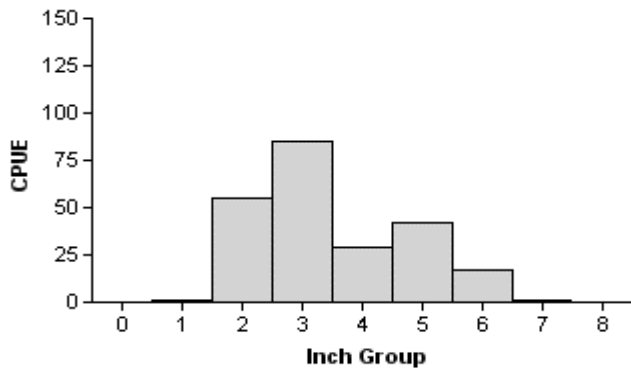


Figure 4. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Fort Phantom Hill Reservoir, Texas, 2003, 2005, and 2007.



15  
**Bluegill**

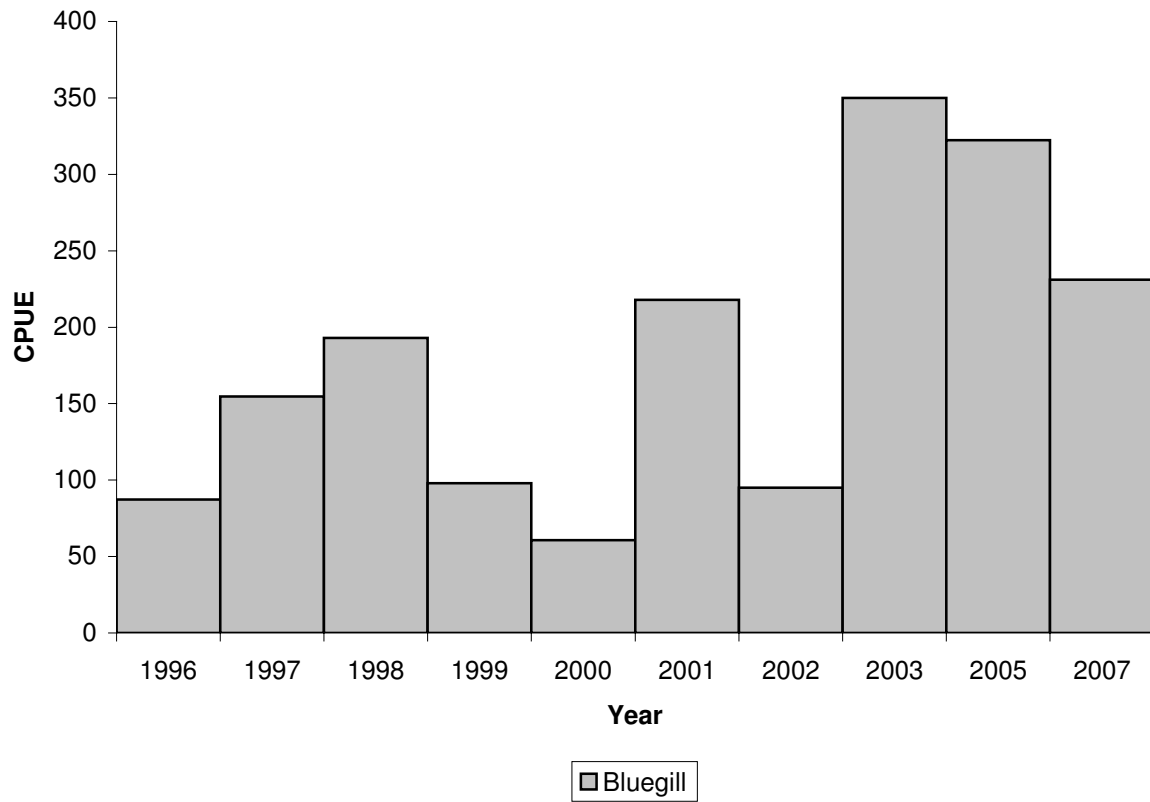
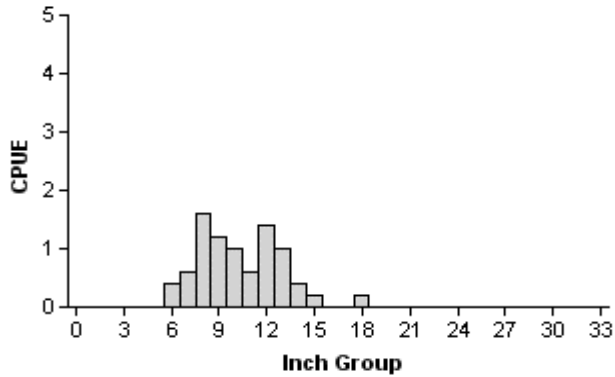


Figure 5. Number of bluegill caught per hour (CPUE) for fall electrofishing surveys, Fort Phantom Hill Reservoir, Texas, 1996-2007.

# Blue Catfish

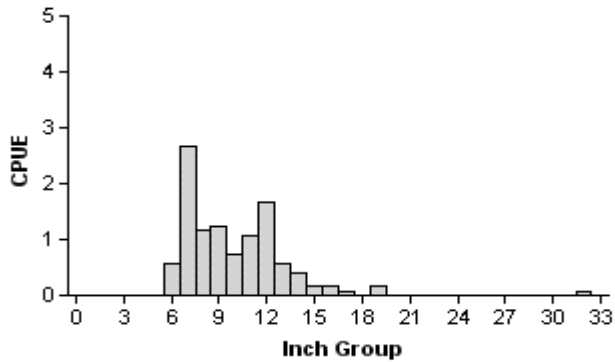
**2004**

Effort = 5.0  
 Total CPUE = 8.6 (36; 43)  
 CPUE-12 = 3.2 (52; 16)  
 PSD = 0



**2005**

Effort = 12.0  
 Total CPUE = 10.8 (43; 130)  
 CPUE-12 = 3.3 (18; 40)  
 PSD = 2 (3)



**2008**

Effort = 6.0  
 Total CPUE = 9.3 (13; 56)  
 CPUE-12 = 5.3 (30; 32)  
 PSD = 3 (3)

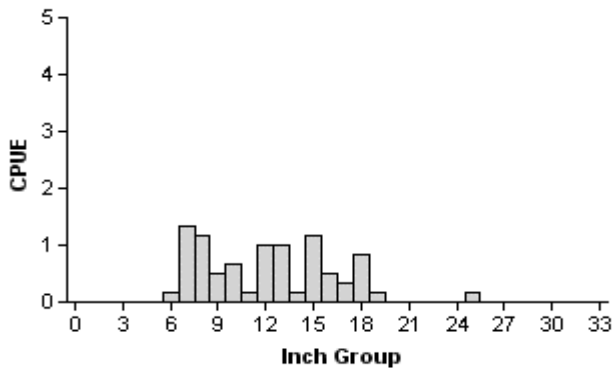


Figure 6. Number of blue catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Fort Phantom Hill Reservoir, Texas, 2004, 2005, and 2008.

## Blue Catfish

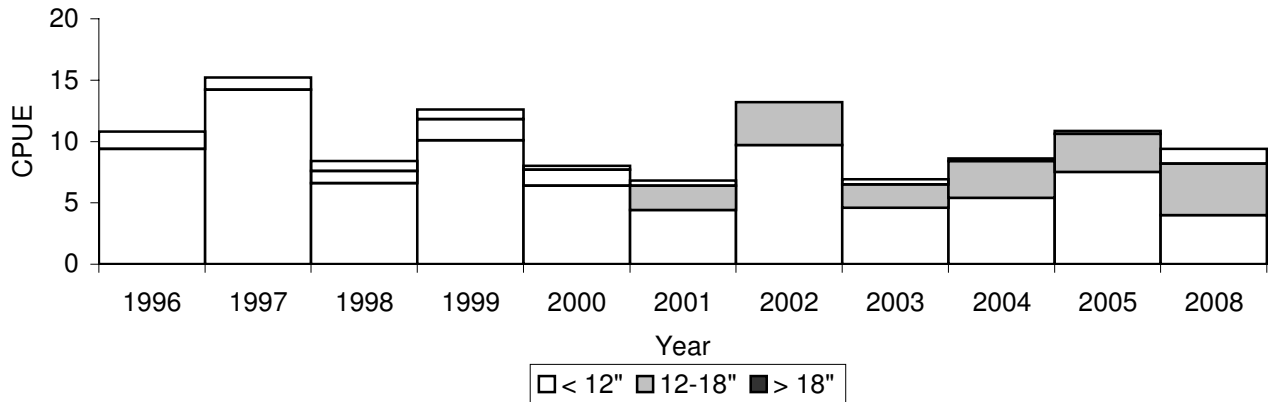


Figure 7. Number of blue catfish caught per net night (CPUE) for spring gill net surveys, Fort Phantom Hill Reservoir, Texas, 1996-2008.

Table 6. Creel survey statistics for blue catfish at Fort Phantom Hill Reservoir from March through August 2003, 2004, and 2007 where total catch per hour is for anglers targeting blue catfish and total harvest is the estimated number of blue catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	2003	2004	2007
Directed effort (h)	954 (43)	2,034 (39)	2,208 (27)
Directed effort/acre	0.33 (43)	0.83 (39)	0.65 (27)
Average angler catch per hour	0.23 (148)	0.78 (73)	1.15 (61)
Total harvest	6,562 (66)	4,187 (50)	5,983 (28)
Harvest/acre	2.26 (66)	1.72 (5)	1.76 (28)
Harvestable size fish caught	7,150	5,494	8,813
Percent legal released	8	24	36

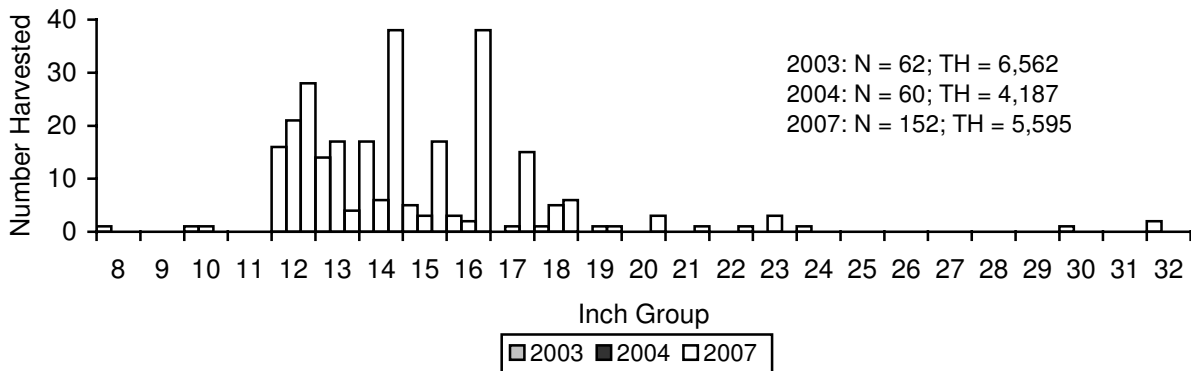


Figure 8. Length frequency of harvested blue catfish observed during creel surveys at Fort Phantom Hill Reservoir, Texas, March through August, 2003, 2004, and 2007. N is the number of harvested blue catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

## Channel Catfish

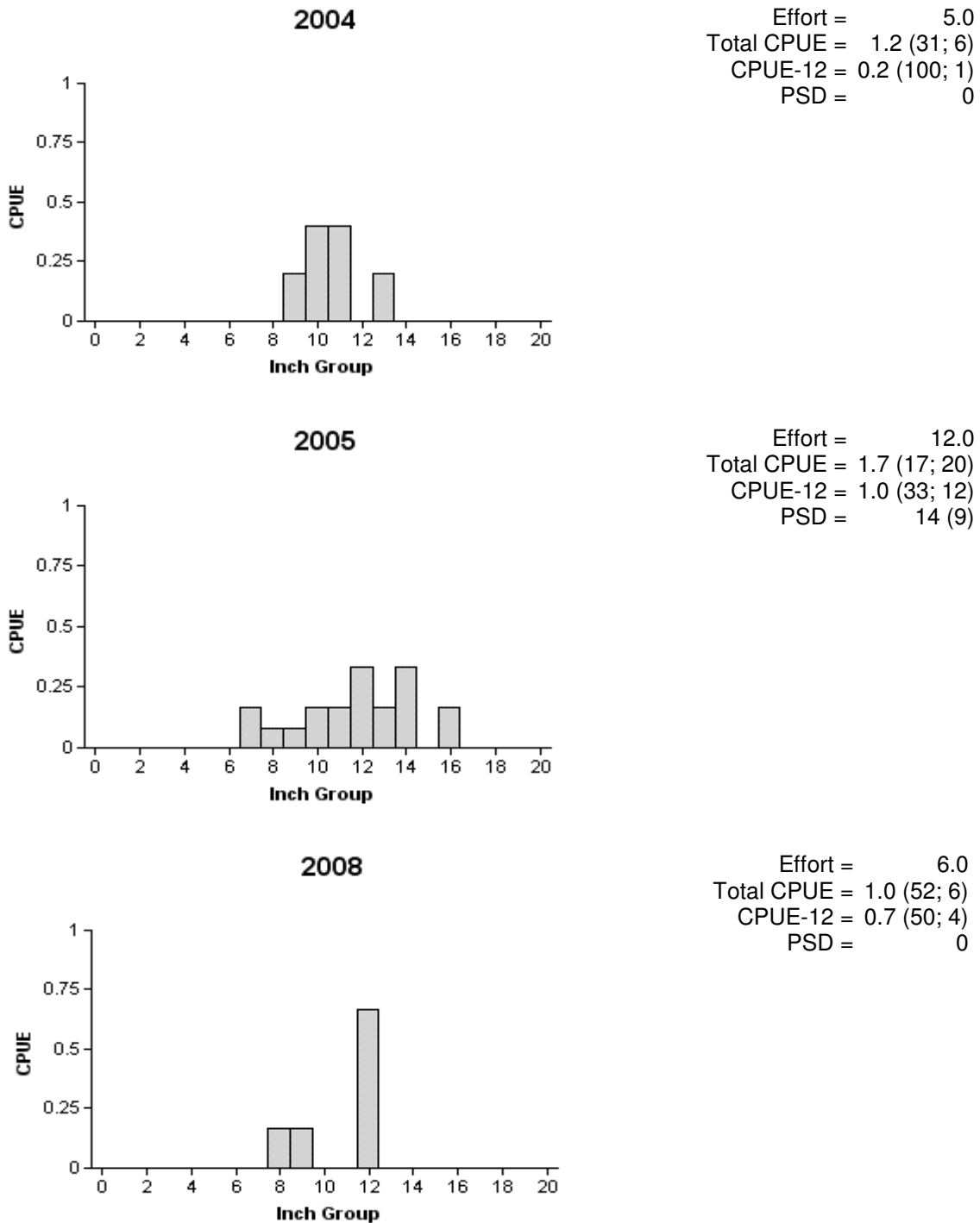


Figure 9. Number of channel catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Fort Phantom Hill Reservoir, Texas, 2004, 2005, and 2008.

## Channel Catfish

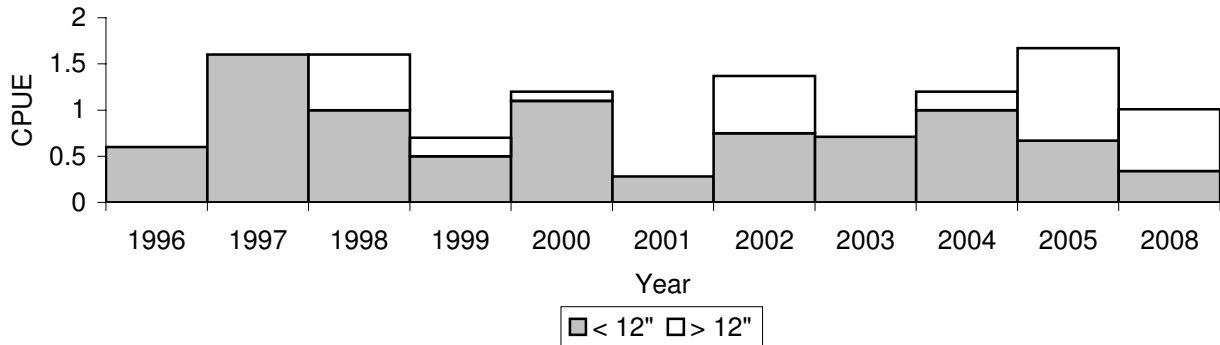


Figure 10. Number of channel catfish caught per net night (CPUE) for spring gill net surveys, Fort Phantom Hill Reservoir, Texas, 1996-2008.

Table 7. Creel survey statistics for channel catfish at Fort Phantom Hill Reservoir from March through August 2003, 2004, and 2007 where total catch per hour is for anglers targeting channel catfish and total harvest is the estimated number of channel catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	2003	2004	2007
Directed effort (h)	131 (113)	280 (105)	327 (65)
Directed effort/acre	0.04 (113)	0.11 (105)	0.09 (65)
Average angler catch per hour	0.00 (0)	0.00 (0)	0.13 (0)
Total harvest	1,482 (83)	1,197 (174)	954 (74)
Harvest/acre	0.51 (83)	0.49 (174)	0.28 (74)
Percent legal released	7	2	31

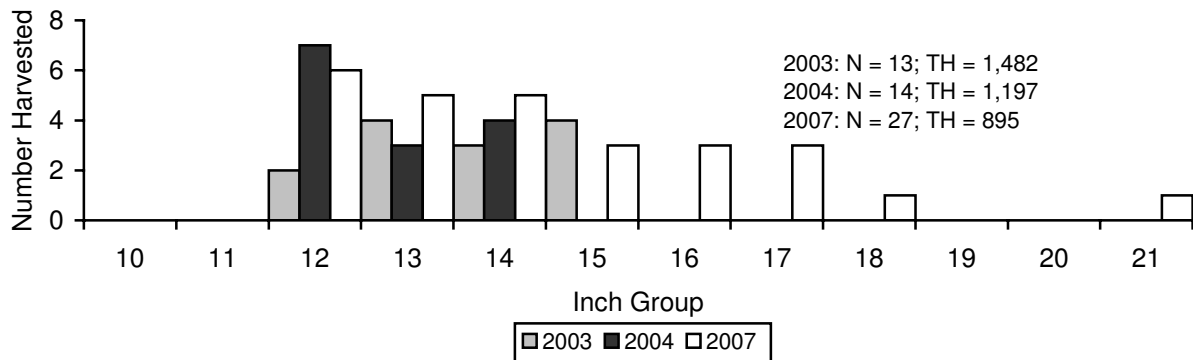
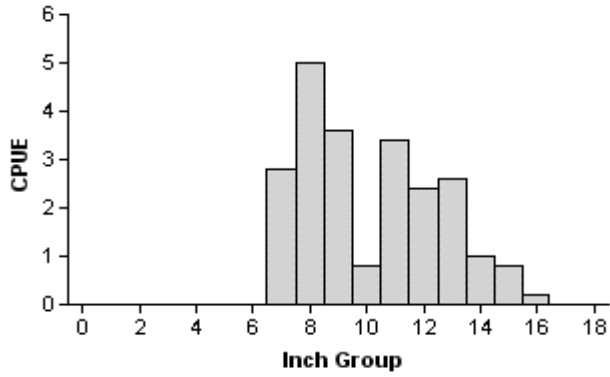


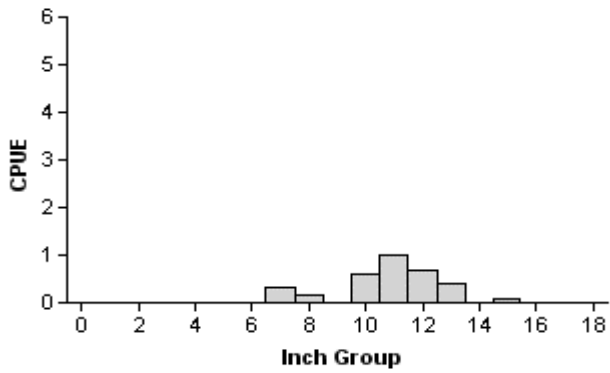
Figure 11. Length frequency of harvested channel catfish observed during creel surveys at Fort Phantom Hill Reservoir, Texas, March through August, 2003, 2004, and 2007. N is the number of harvested channel catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

**White Bass****2004**

Effort = 5.0  
 Total CPUE = 22.6 (32; 113)  
 CPUE-10 = 11.2 (25; 56)

**2005**

Effort = 12.0  
 Total CPUE = 3.3 (40; 39)  
 CPUE-10 = 2.8 (39; 33)

**2008**

Effort = 6.0  
 Total CPUE = 3.0 (74; 18)  
 CPUE-10 = 2.3 (67; 14)

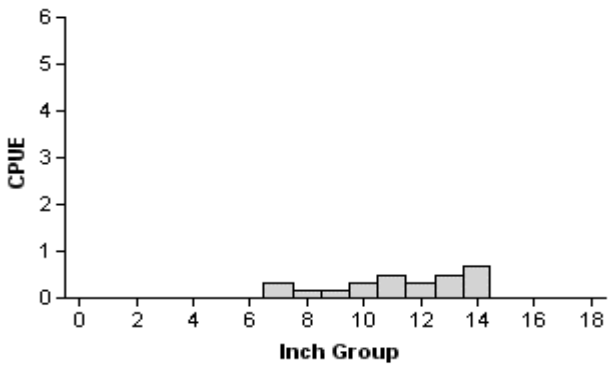


Figure 12. Number of white bass caught per net night (CPUE) and population indices (RSE and N for CPUE are in parentheses) for spring gill net surveys, Fort Phantom Hill Reservoir, Texas, 2004, 2005, and 2008.

## White bass

Table 8. Creel survey statistics for white bass at Fort Phantom Hill Reservoir from March through August 2003, 2004, and 2007 where total catch per hour is for anglers targeting white bass and total harvest is the estimated number of white bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	2003	2004	2007
Directed effort (h)	232 (90)	1,389 (50)	953 (36)
Directed effort/acre	0.08 (90)	0.57 (50)	0.28 (36)
Total catch per hour	5.40 (0)	2.91 (42)	2.06 (59)
Total harvest	2,195 (75)	3,190 (52)	3,836 (40)
Harvest/acre	0.76 (75)	1.31 (52)	1.13 (74)
Percent legal released	37	58	51

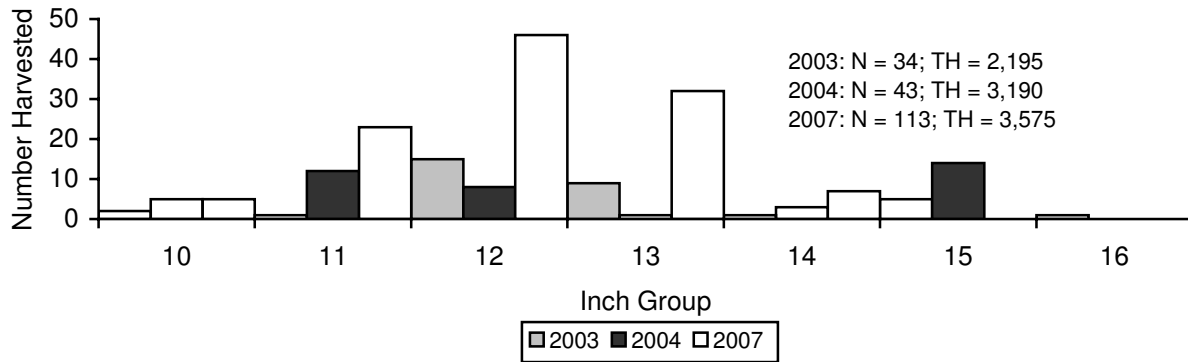
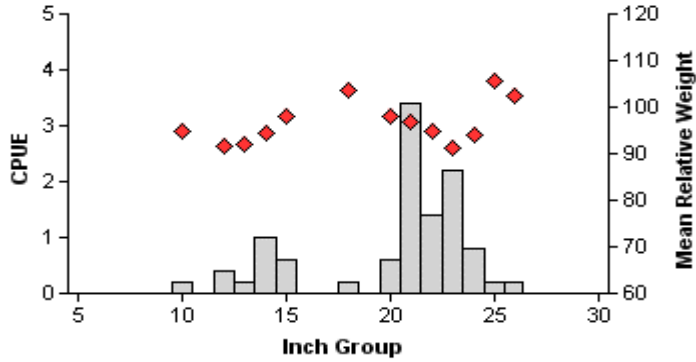


Figure 13. Length frequency of harvested white bass observed during creel surveys at Fort Phantom Hill Reservoir, Texas, March through August, 2003, 2004, and 2007. N is the number of harvested white bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

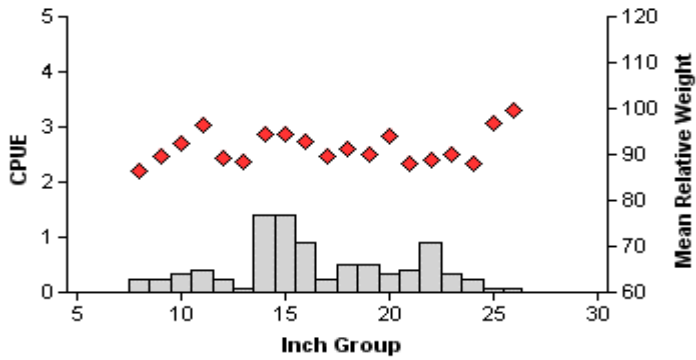
## Palmetto Bass

2004



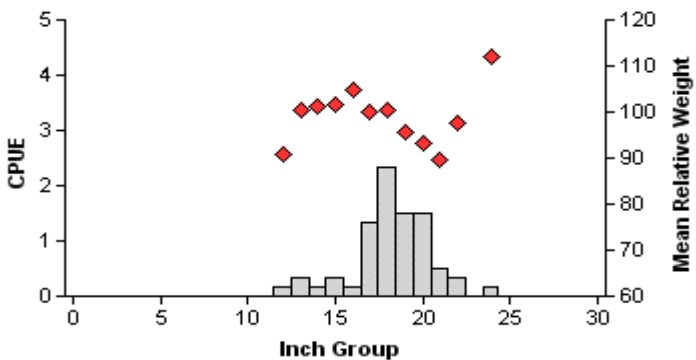
Effort = 5.0  
 Total CPUE = 11.4 (51; 57)  
 CPUE-18 = 11.2 (25; 56)  
 PSD-18 = 79 (6)

2005



Effort = 12.0  
 Total CPUE = 9.0 (30; 108)  
 CPUE-18 = 2.8 (39; 33)  
 PSD-18 = 38 (10)

2008



Effort = 6.0  
 Total CPUE = 8.8 (54; 53)  
 CPUE-18 = 6.3 (46; 38)  
 PSD-18 = 72 (8)

Figure 14. Number of palmetto bass caught per net night (CPUE), mean relative weight ( $W_r$ , diamonds) and population indices (RSE and N for CPUE are in parentheses) for spring gill net surveys, Fort Phantom Hill Reservoir, Texas, 2004, 2005, and 2008.



## Palmetto Bass

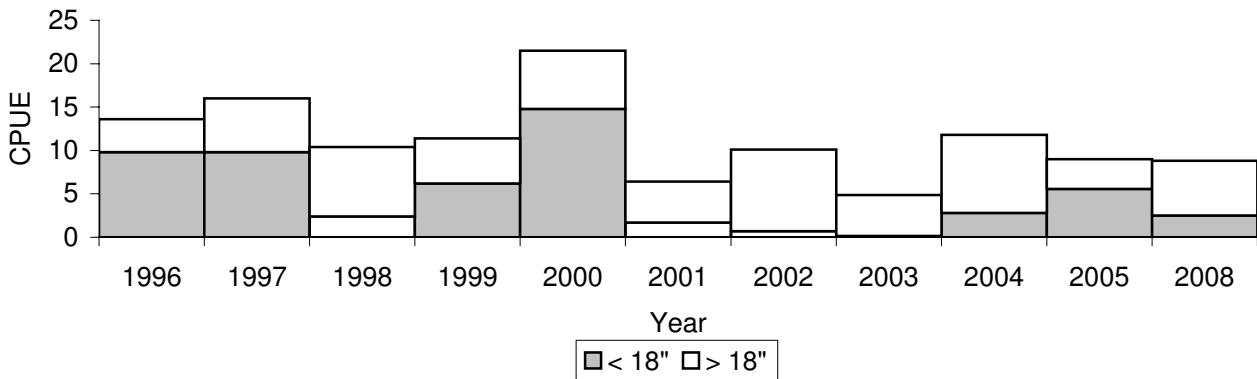


Figure 15. Number of palmetto bass per net night (CPUE) for spring gill net surveys, Fort Phantom Hill Reservoir, Texas, 1996-2008.

Table 9. Creel survey statistics for palmetto bass at Fort Phantom Hill Reservoir from March through August 2003, 2004, and 2007 where total catch per hour is for anglers targeting palmetto bass and total harvest is the estimated number of palmetto bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	2003	2004	2007
Directed effort (h)	1,707 (33)	1,180 (51)	5,822 (16)
Directed effort/acre	0.59 (33)	0.48 (51)	1.71 (16)
Average angler catch per hour	0.10 (111)	0.06 (141)	0.50 (51)
Total harvest	316 (356)	386 (171)	2,474 (43)
Harvest/acre	0.11 (356)	0.16 (171)	0.73 (43)
Percent legal released	0	24	58

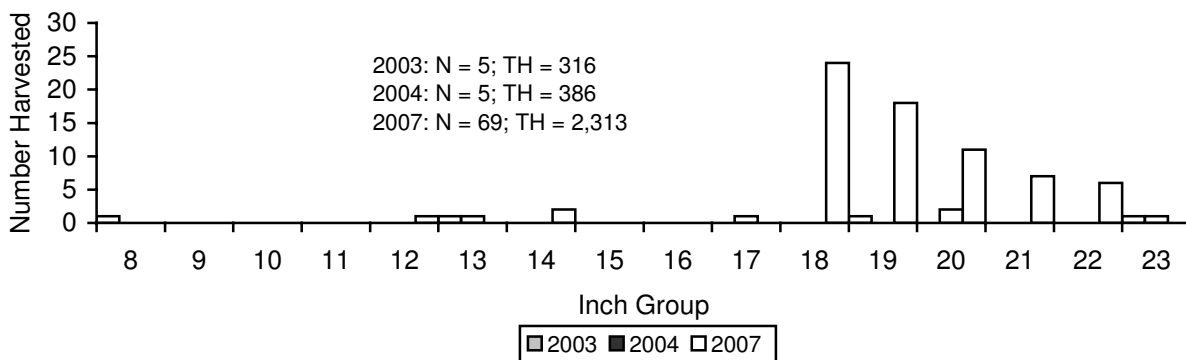
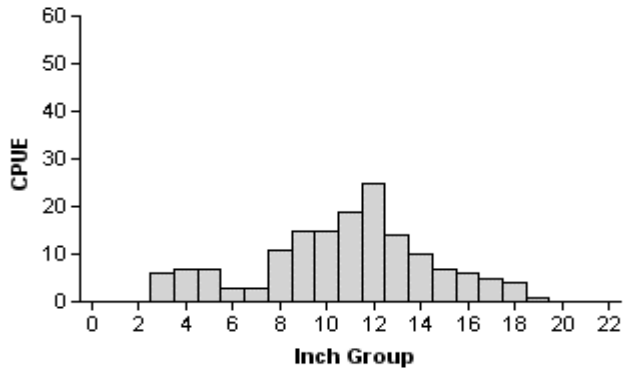


Figure 16. Length frequency of harvested palmetto bass observed during creel surveys at Fort Phantom Hill Reservoir, Texas, March through August, 2003, 2004, and 2007. N is the number of harvested palmetto bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

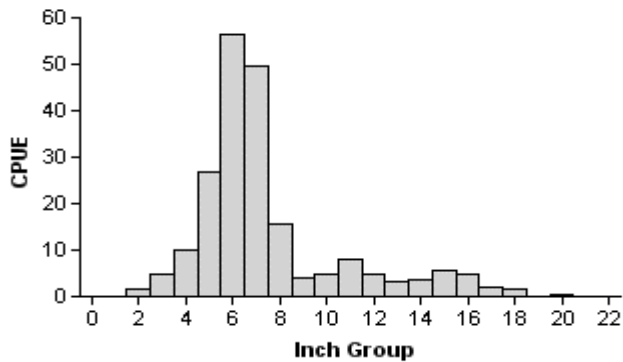
## Largemouth Bass

2003



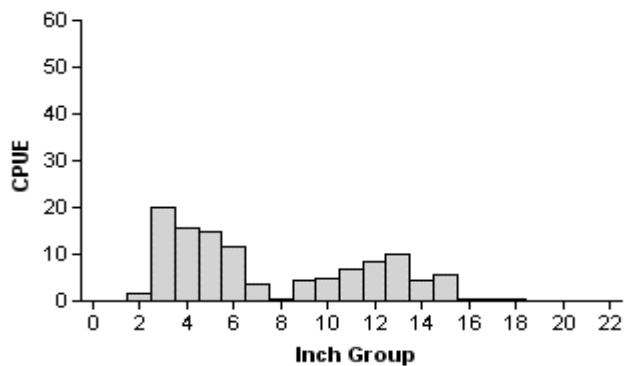
Effort = 1.0  
 Total CPUE = 158.0 (17; 158)  
 Stock CPUE = 132.0 (18; 132)  
 CPUE-14 = 33.0 (27; 33)  
 CPUE-16 = 16.0 (25; 16)  
 PSD = 55 (6)  
 PSD-14 = 25 (4)  
 PSD-16 = 12 (2)

2005



Effort = 1.9  
 Total CPUE = 207.1 (12; 397)  
 Stock CPUE = 58.4 (21; 112)  
 CPUE-14 = 18.3 (26; 35)  
 CPUE-16 = 9.4 (30; 18)  
 PSD = 45 (4)  
 PSD-14 = 31 (4)  
 PSD-16 = 16 (3)

2007



Effort = 2.0  
 Total CPUE = 114.0 (17; 228)  
 Stock CPUE = 47.0 (18; 94)  
 CPUE-14 = 11.5 (21; 23)  
 CPUE-16 = 1.5 (55; 3)  
 PSD = 64 (6)  
 PSD-14 = 24 (5)  
 PSD-16 = 3 (2)

Figure 17. 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, Fort Phantom Hill Reservoir, Texas, 2003, 2005, and 2007.

## Largemouth Bass

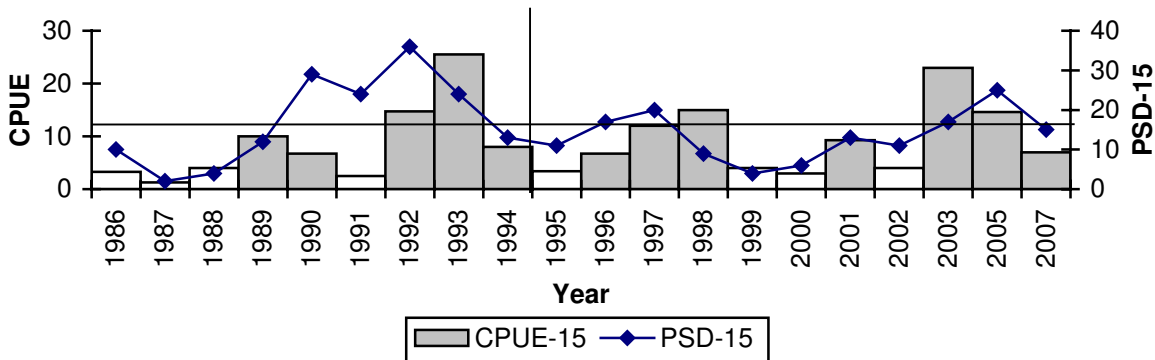


Figure 18. CPUE-15 and PSD-15 of largemouth bass from fall electrofishing surveys, Fort Phantom Hill Reservoir, Texas, 1986-2007. Vertical line represents change from 14-inch MLL to 16-inch MLL. Horizontal line represents management objective of CPUE-15  $\geq$  12 fish/h.

Table 10. Average relative weight of 8.0-11.9-inch and 12.0-14.9-inch largemouth bass from 2003, 2005, and 2007 at Fort Phantom Hill Reservoir, Texas. Sample size for each estimate is in parentheses.

Year	Mean Wr		
	8.0-11.9	12.0-14.9	> 14.9
2003	87(60)	86(49)	98(23)
2005	98(60)	93(22)	98(28)
2007	101(34)	102(46)	95(14)

Table 11. Mean age at length of largemouth bass at 12 inches and 14 inches collected from fall electrofishing surveys in Fort Phantom Hill Reservoir, Texas, in 2001, 2003, and 2007. Sample size for each estimate is in parentheses.

Year	Mean age at length	
	12" (11.0"-12.9")	14" (13.0"-14.9")
2001	1.5 (9)	3.2 (10)
2003	1.9 (23)	2.5 (18)
2007	1.8 (21)	2.1 (12)

Table 12. Results of genetic analysis of largemouth bass collected by fall electrofishing, Fort Phantom Hill Reservoir, Texas, 1998, 2003, and 2005. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass. Microsatellite DNA analysis was used in 2005, and electrophoresis was used in 1998 and 2003 to determine largemouth bass genetics.

Year	Sample size	Genotype			% FLMB alleles	% FLMB genotype
		FLMB	Intergrades	NLMB		
1998	29	2	24	3	41.4	6.9
2003	31	3	28	0	61.9	9.7
2005	72	2	70	0	56.8	3.0

## Largemouth Bass

Table 13. Creel survey statistics for largemouth bass at Fort Phantom Hill Reservoir, Texas, from March through August 2003, 2004, and 2007 where total catch per hour is for anglers targeting largemouth bass and total harvest is the estimated number of largemouth bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	2003	2004	2007
Directed effort (h)	3,353 (25)	2,654 (42)	2,570 (23)
Directed effort/acre	1.16 (25)	1.09 (42)	0.75 (23)
Average angler catch per hour	0.73 (44)	0.59 (43)	1.22 (32)
Total harvest	632 (118)	302 (188)	752 (95)
Harvest/acre	0.22 (118)	0.12 (188)	0.22 (95)
Percent legal released	42	79	68

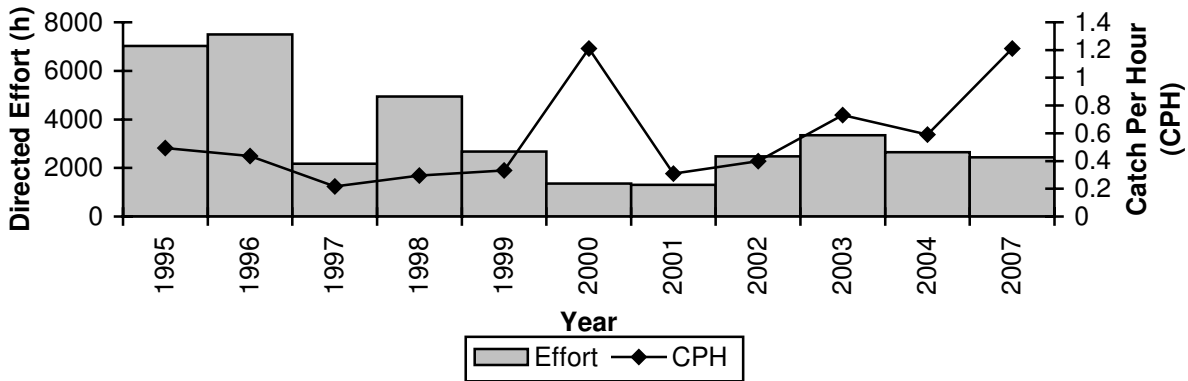


Figure 19. Directed effort (h) and catch per hour (CPH) of largemouth bass at Fort Phantom Hill Reservoir, Texas, based on March-August creel surveys, 1995-2007.

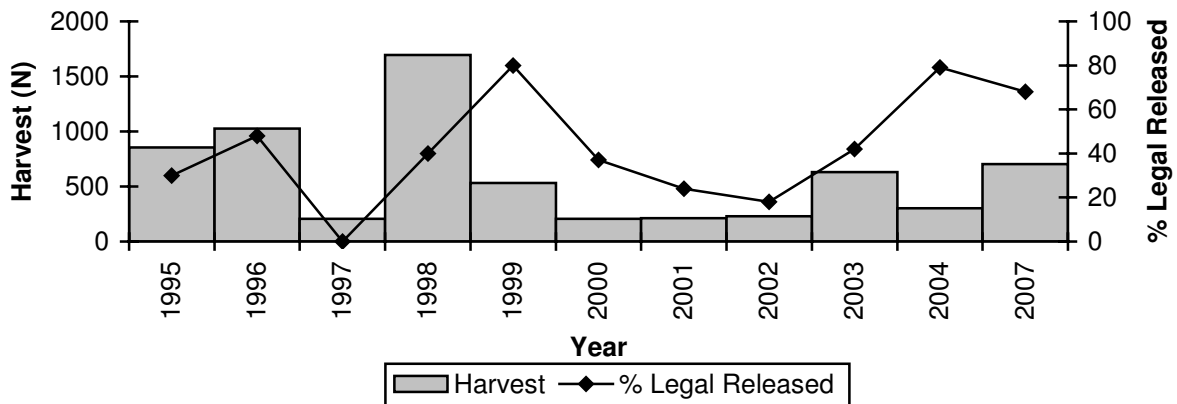


Figure 20. Harvest (N) of largemouth bass and percent of legal-size largemouth bass released at Fort Phantom Hill Reservoir, Texas, based on March-August creel surveys, 1995-2007.

## Largemouth Bass

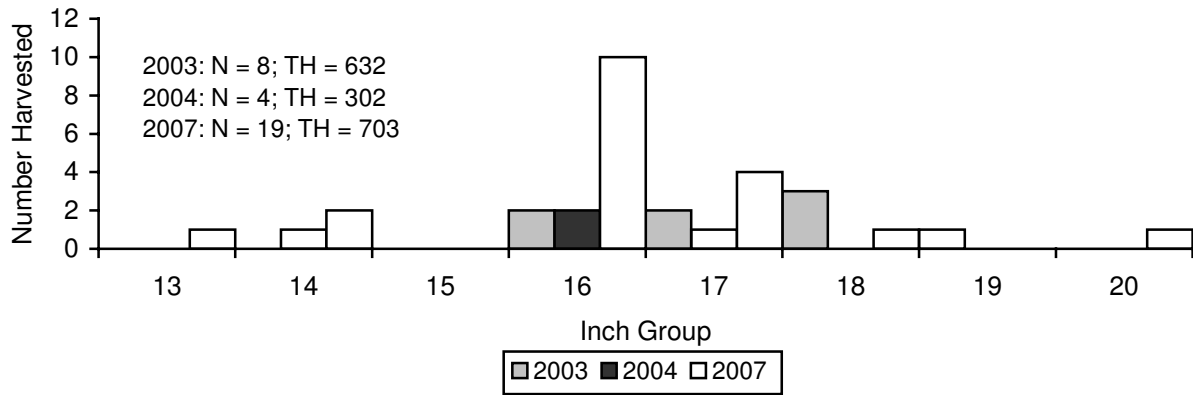
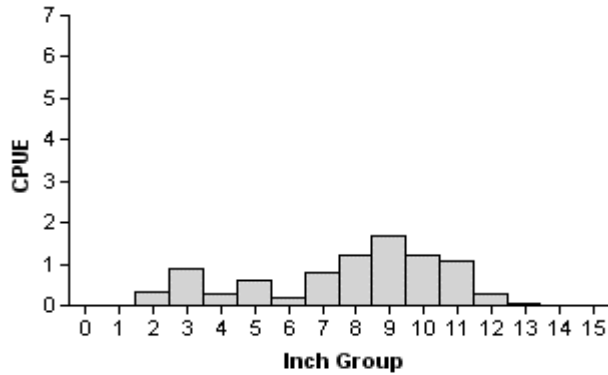


Figure 21. Length frequency of harvested largemouth bass observed during creel surveys at Fort Phantom Hill Reservoir, Texas, March through August, 2003, 2004, and 2007. N is the number of harvested largemouth bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

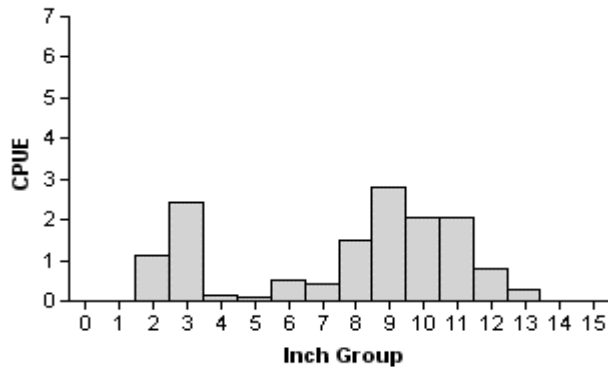
## White Crappie

2003



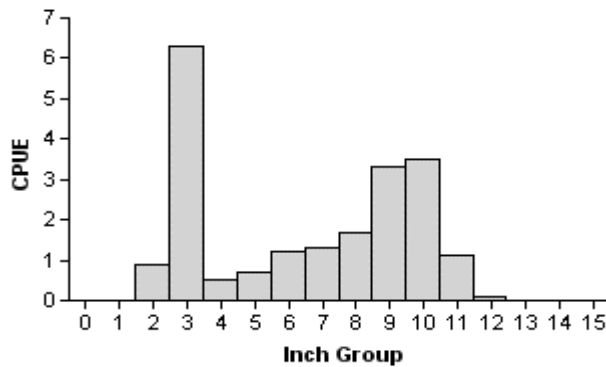
Effort = 18.0  
 Total CPUE = 8.6 (21; 154)  
 Stock CPUE = 7.1 (22; 127)  
 CPUE-10 = 2.6 (24; 47)  
 PSD = 78 (6)  
 PSD-10 = 37 (4)

2005



Effort = 14.0  
 Total CPUE = 14.2 (22; 199)  
 Stock CPUE = 10.5 (30; 147)  
 CPUE-10 = 5.2 (30; 73)  
 PSD = 90 (4)  
 PSD-10 = 50 (5)

2007



Effort = 10.0  
 Total CPUE = 20.6 (29; 206)  
 Stock CPUE = 12.9 (38; 129)  
 CPUE-10 = 4.7 (50; 47)  
 PSD = 75 (9)  
 PSD-10 = 36 (8)

Figure 22. 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, Fort Phantom Hill Reservoir, Texas, 2003, 2005, and 2007.

## White Crappie

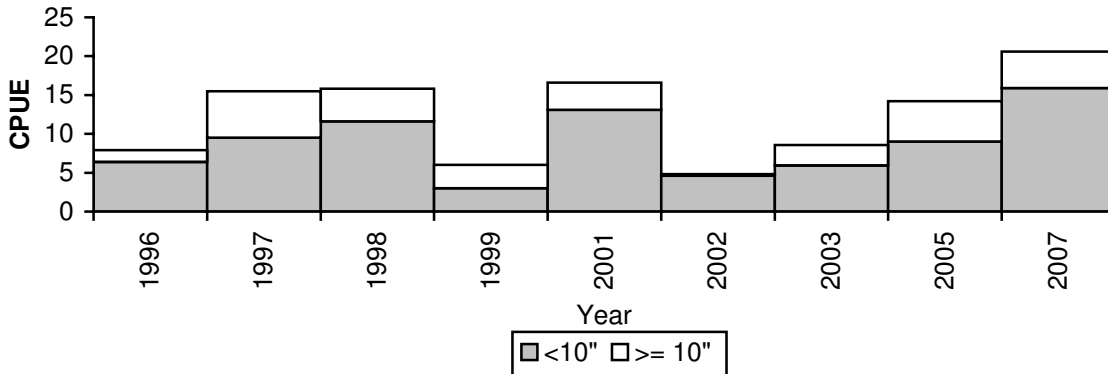


Figure 23. Number of white crappie per net night (CPUE) for fall trap net surveys, Fort Phantom Hill Reservoir, Texas, 1996-2007.

Table 14. Creel survey statistics for white crappie at Fort Phantom Hill Reservoir from March through August 2003, 2004, and 2007 where total catch per hour is for anglers targeting white crappie and total harvest is the estimated number of white crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	2003	2004	2007
Directed effort (h)	11,644 (23)	12,954 (23)	17,527 (14)
Directed effort/acre	4.01 (23)	5.31 (23)	5.15 (16)
Average angler catch per hour	1.88 (36)	1.22 (52)	1.85 (27)
Total harvest	20,969 (53)	8,270 (30)	12,966 (25)
Harvest/acre	7.23 (53)	3.39 (171)	3.81 (43)
Percent legal released	< 1	11	6

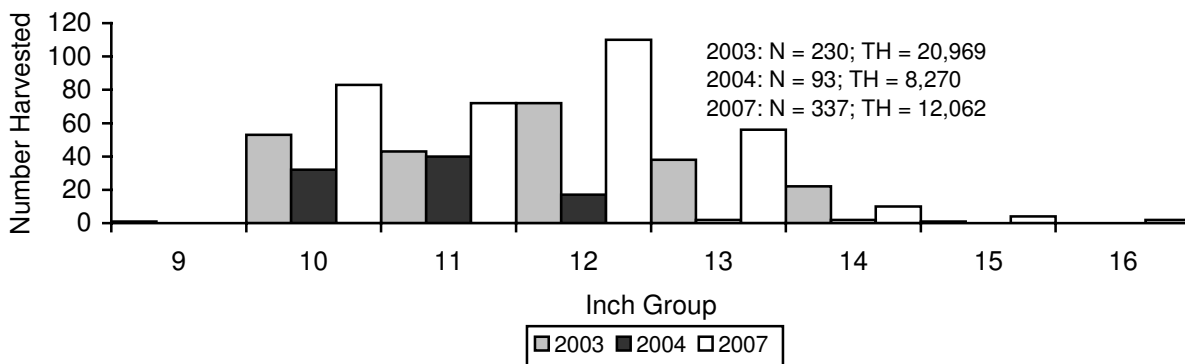


Figure 24. Length frequency of harvested white crappie observed during creel surveys at Fort Phantom Hill Reservoir, Texas, March through August, 2003, 2004, and 2007. N is the number of harvested white crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 15. Proposed sampling schedule for Fort Phantom Hill 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	Report
Fall 2008-Spring 2009				
Fall 2009-Spring 2010	A	A	A	
Fall 2010-Spring 2011				
Fall 2011-Spring 2012	S	S	S	S

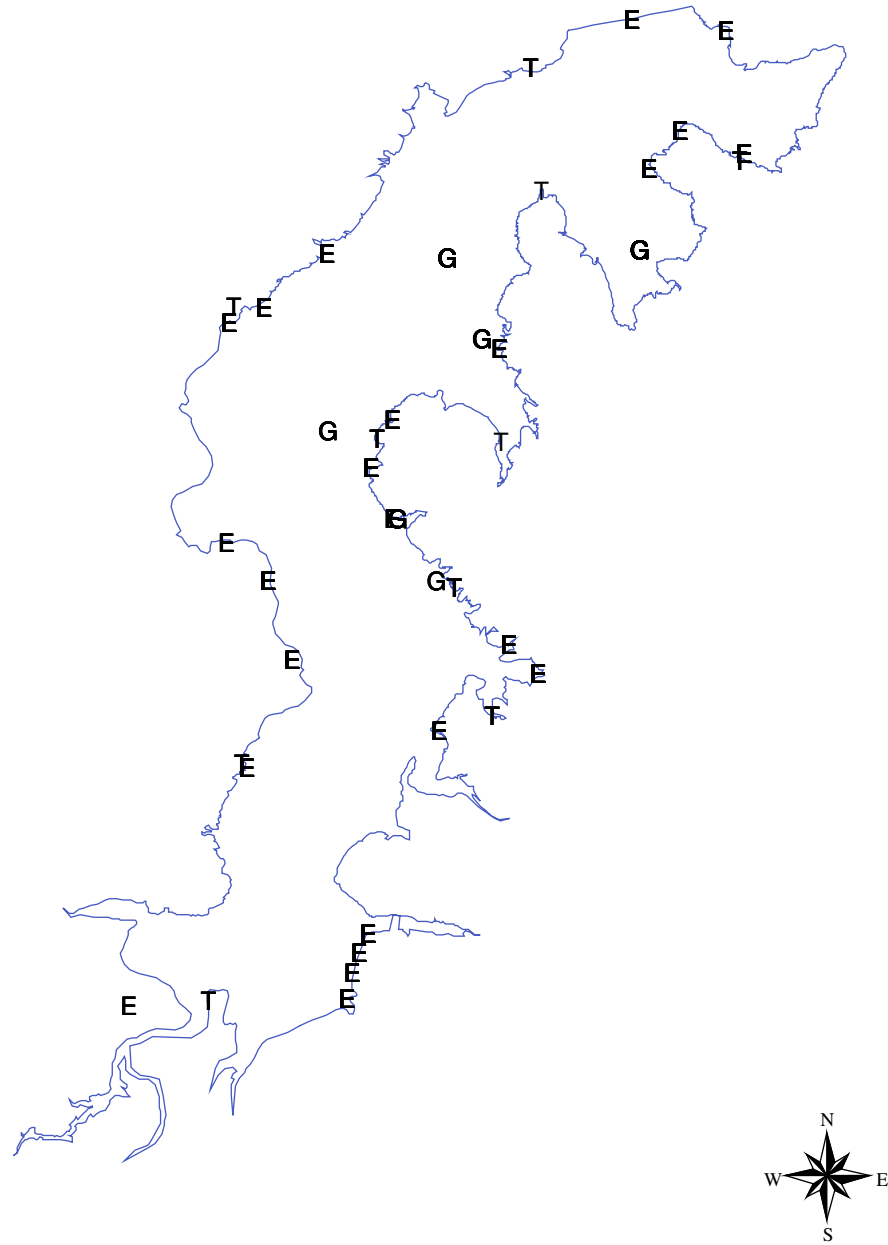


**APPENDIX A**

Number (N) and catch rate (CPUE) of all target species collected from Fort Phantom Hill Reservoir, Texas, 2007-2008.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					1797	898.5
Threadfin shad					349	174.5
Blue catfish	56	9.3				
Channel catfish	6	1.0				
White bass	18	3.0				
Palmetto bass	53	8.8				
Green sunfish					20	10.0
Warmouth					3	1.5
Bluegill					462	231.0
Longear sunfish					87	43.5
Redear sunfish					20	10.0
Largemouth bass					228	114.0
White crappie			206	20.6		

## APPENDIX B



Location of sampling sites, Fort Phantom Hill Reservoir, Texas, 2007-2008. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was at conservation level at time of sampling.