PERFORMANCE REPORT

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FEDERAL AID PROJECT F-30-R-33

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2007 Survey Report

Choke Canyon Reservoir

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July 31, 2008

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SURVEY AND MANAGEMENT SUMMARY

Fish populations at Choke Canyon Reservoir were surveyed in fall 2007 using trap nets and electrofishing, and in 2008 using gill nets to assess population trends for important sport fish communities. A creel survey was conducted. This report summarizes the results and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Choke Canyon is a 25,989-acre reservoir (averaged 25,623 acres in 2007-2008) located on the Frio River in the Nueces River Basin, approximately 80 miles south of San Antonio. Its main utilities are water supply and recreational opportunities including angling and pleasure boating. The reservoir has a history of substantial water level fluctuations. Habitat consisted of standing timber and colonies of native and exotic vegetation.

- **Management history:** Important sport fish species included blue and channel catfish, largemouth bass, white bass, and white crappie. Since the previous report, northern largemouth bass were stocked as part of a research project. Water hyacinth became an issue on this reservoir in 2006. Herbicide treatments on water hyacinth were conducted in both 2006 (25.5 acres) and 2007 (174.5 acres). The 2004 management plan focused on monitoring hydrilla, publicizing improving fisheries, and removing the annual creel survey. District staff annually monitored access areas where hydrilla could restrict use. District staff publicized the fisheries through written press releases and telephone interviews. The creel survey was moved to Coleto Creek Reservoir from June 2005 through May 2006 but returned to Choke Canyon beginning in September 2006.

- **Fish Community**
  - **Prey species:** Gizzard shad relative abundance steadily decreased and the majority of individuals generally were too large for most predators. Threadfin shad, bluegill, and redear sunfish populations were mostly comprised of sizes available to most predators. Body condition of most predator species indicated no problem with forage availability.

  - **Catfishes:** Blue catfish were the predominant catfish species in the reservoir, and targeted by most catfish anglers. Channel catfish provided a fishery as suggested by the creel survey data despite relatively low catch rates in gill net surveys. Flathead catfish were present in the reservoir but were rarely encountered in gill net and creel surveys.

  - **White bass:** White bass were numerous in the reservoir and sought by many anglers, especially during the spring spawning run. Catches of white bass exceeding 18-inches in length have been documented from this reservoir.

  - **Largemouth bass:** Largemouth bass were the most sought species in this reservoir. Numerous largemouth bass over 8 pounds were caught by anglers and reports of bass over 10 pounds were frequent. The electrofishing catch rate of largemouth bass decreased in 2007; however, this was expected as the reservoir water level increased 6.5 ft from the previous year, likely spreading out the population.

  - **Crappies:** White crappie were the predominant crappie species. Despite decreasing trap net catch rates of crappie, angler catch rates for white crappie increased.

- **Management strategies:** Continue to manage the sport fisheries under existing harvest regulations. Continue to work with the city of Corpus Christi on controlling water hyacinth. Continue to monitor access areas where hydrilla could restrict use. Implement a trophy largemouth bass reporting program.

INTRODUCTION

This document is a summary of fisheries data collected from Choke Canyon Reservoir in 2007-2008. Its purpose is to provide fisheries information and management recommendations to improve and maintain the sport fisheries. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Management recommendations address existing problems or opportunities. Historical data is presented with the 2007-2008 data for comparison.

Reservoir Description

Choke Canyon is a 25,989-acre reservoir (averaged 25,623 acres in 2007-2008) located in the Nueces River Basin on the Frio River, approximately 80 miles south of San Antonio. Its main utilities are water supply and recreational opportunities including angling and pleasure boating. The reservoir has a history of substantial water level fluctuations (Figure 1). Shoreline, boat and handicap access were adequate with multiple launch sites and shoreline angling availability within the state park boundaries. Secchi disc measurements of water clarity ranged from 33 cm to 97 cm and the substrate is composed primarily of clay, sand, and small rock. Littoral habitat consists of timber stands, periodically flooded terrestrial vegetation, native aquatic vegetation, and exotic vegetation. The water level of the reservoir average 20-23 feet below conservation pool until July 2002, when it refilled. Native aquatic vegetation and hydrilla reestablished and became more widespread in the reservoir after refilling. Water hyacinth became established in 2006 and was treated with herbicides in 2006 (25.5 acres) and 2007 (174.5 acres). Other descriptive characteristics of this reservoir are in Table 1.

Management History

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

1. Monitor hydrilla for access problems.
   Action: District staff annually monitored hydrilla around all access points. Hydrilla spread throughout the reservoir but never created access problems around boat ramps. Bank fishing and swimming areas located within the state parks and some small coves in the lower section of the reservoir can be covered with hydrilla. Hydrilla was not an issue at this time.
2. Publicize improvements in fisheries since the reservoir refilled in 2002.
   Action: District staff prepared and submitted numerous press releases concerning improvements in the reservoir's fisheries. Additionally, many angling magazines have contacted the district office concerning the improved fisheries and increase in habitat.
3. Remove annual creel survey.
   Action: Creel surveys were moved from Choke Canyon to Coleto Creek Resevoir beginning June 2005 and ran through May 2006. Creel surveys returned to Choke Canyon in Fall 2006 as part of a special project to examine differences in catfish harvest, catch rate, and size structure among active and passive angling gears. Creel surveys will be conducted annually at Choke Canyon until data collection for the project is completed in August 2011.

Harvest regulation history: Sport fishes in Choke Canyon Reservoir have been managed with statewide harvest regulations to the present (Table 2).

Stocking history: Threadfin shad, fathead minnow, blue catfish, channel catfish, striped bass, and Florida largemouth bass were stocked as the reservoir was initially filling. Florida largemouth bass (FLMB) were stocked again in 1990, 1998, 2002, and 2003 to increase Florida largemouth bass genetics and also in response to increased habitat due to water level rises. Northern largemouth bass (NLMB) were stocked from 2003 to 2005 as part of a research project examining the potential for increasing

northern largemouth bass alleles in reservoirs with high Florida largemouth bass genetics. White crappie were stocked in 1992. A complete stocking history can be found in Table 3.

Vegetation/habitat history: Choke Canyon Reservoir supported communities of both native and exotic aquatic vegetation (Table 4). Surface coverage of aquatic vegetation changed with water level. Hydrilla and water stargrass have been the dominant vegetation species on the reservoir, but have not negatively impacted angler access. Isolated colonies of water hyacinth were found on the reservoir from 1998 through 2005. These colonies were initially removed by hand however, in 2006, water hyacinth colonies were too large to remove by hand and herbicide treatments began. Historically, hydrilla infestations at boat ramps were controlled with herbicide treatments.

METHODS

Fishes were collected using electrofishing (2.0 hours at 24, 5-min stations), gill netting (15 net nights at 15 stations) and trap netting (15 net nights at 15 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour of actual electrofishing (fish/h) and for gill and trap nets as the number of fish caught in one net set overnight (fish/nn). All survey sites were randomly selected. A littoral habitat and vegetation survey and largemouth bass genetic survey were conducted. The creel survey was designed with unequal probabilities for boat ramp and time period selection on a quarterly basis to maximize the number of catfish angler interviews. Creel quarters were defined as: summer = June through August; fall = September through November; winter = December through February; and spring = March through May; and 13 surveys were conducted per quarter (9 weekend days and 4 weekdays). All surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2005). Forty age-0 largemouth bass were collected from each of 24 stations (14 stocked stations and 10 control/non-stocked stations) in late summer/early fall from 2002 through 2005 as part of the NLMB research project. Micro-satellite DNA was used to determine genetics of collected bass for the research project.

Sampling statistics (CPUE for various length categories) and structural indices [Proportional Stock Density (PSD) and Relative Stock Density Preferred (RSD-P)], and condition indices [relative weight indices ($\underline{W_r}$)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for gizzard shad according to 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. Mean age at length was calculated for largemouth bass between 330 and 381 mm in 2005 (N=13), 2006 (N=41), and 2007 (N=13) using otoliths. Genetic composition of largemouth bass was determined by electrophoresis from 2002 through 2004 and by using Micro-satellite DNA analysis from 2005 through 2007. Source for the water level data was the United States Geological Survey (USGS) website and the Nueces River Authority (NRA) website.

RESULTS AND DISCUSSION

Habitat: Shoreline habitat consisted of non-descript and eroded banks, native submersed aquatic vegetation, exotic vegetation, and standing timber (Table 4). Water stargrass and coontail were the most abundant native submersed vegetation species and were present in 1,578 and 1,059 acres of water, respectively. Hydrilla and water hyacinth were the only two exotic plants species observed during vegetation survey and were present in 3,788 and 1,540 acres of water, respectively. Previous estimates of standing timber (2,563 acres) were used for this report.

Creel: In 2007-2008, directed effort was highest for largemouth bass (58.3%), followed by anglers targeting all catfish species (28.8%), blue catfish (4.1%), anything (3.2%), white bass (2.6%), and white crappie (1.1%) (Table 5). Alligator gar were commercially fished on Choke Canyon Reservoir and comprised 1% of the total directed effort in 2007-2008. The total fishing effort at Choke Canyon Reservoir was 293,027 h and direct expenditures were estimated at $2,501,246 in 2006-2007 (based on 9 months of

sampling, September 2006 through May 2007) (Table 6). In 2007-2008, (based on 12 months of sampling, June 2007 through May 2008) total fishing effort was 390,481 h and direct expenditures were estimated at $4,010,759 (Table 6).

Prey Species: The 2007 electrofishing catch rates for gizzard and threadfin shad were 28.5/h and 143.5/h, respectively (Figure 2). The Index of Vulnerability (IOV), for gizzard shad was 33, indicating that 33% of the gizzard shad population is less than 8 inches in length and available to most predators. Electrofishing catch rate of gizzard shad decreased since 2005 along with IOV. During the electrofishing survey most gizzard shad were collected on the outside hydrilla edge, in deeper water. However, when possible the electrofishing boat was operated on the inside hydrilla edge, in shallower water, where fewer gizzard shad were collected. This may explain the lower catch rate in 2007. Threadfin shad were fairly abundant and provided adequate forage for most predators.
The 2008 electrofishing catch rates for bluegill and redear sunfish were 80.0/h (Figure 3) and 38.5/h Figure 4), respectively. Catch rate of both species decreased substantially from previous surveys despite efforts to sample in shallower water. This decrease may be explained by the 6.5 ft water level rise in July 2007 increasing shallow water habitat possibly dispersing the sunfish populations. Sampling indicated few large sunfish were present. Most sunfish were small enough to be utilized as prey by predator species.

Blue catfish: The 2008 gill net catch rate for blue catfish was 29.7/nn, higher than 23.9/nn in 2006 and 23.3 in 2007 (Figure 5). The PSD remained similar whereas CPUE-12 was lower than previous years. Recruitment of sub-legal blue catfish was excellent. Condition of fish greater than 12 inches in total length was good as mean relative weights were near 95. Anglers spent 15,942 h (0.62 h/acre) seeking blue catfish in 2007-2008 (Table 7). Also in 2007-2008, average angler catch rate (#/h) of blue catfish was 0.95/h and harvest rate (#/acre) was 3.96/acre (Table 7). The length frequency of harvested blue catfish is shown in Figure 6.

Channel catfish: The 2008 gill net catch rate for channel catfish was 2.4/nn, which is similar to 2.7/nn in 2006 but lower than 4.5/nn in 2007 (Figure 7). Very few anglers targeted channel catfish where anglers spent 1,676 h (0.07 h/acre) seeking channel catfish in 2007-2008 (Table 8). Also in 2007-2008, average angler catch rate for channel catfish was 1.61/h and harvest rate for channel catfish was 0.66/acre (Table 8). The length frequency of harvested channel catfish is presented Figure 8.

White bass: The 2008 gill net catch rate for white bass was 1.6/nn, higher than 0.5/nn in 2006 and 0.3/nn in 2007 (Figure 9). Gill net catch rates of white bass have been low since the reservoir refilled in 2002. Prior to refilling, white bass were more easily collected as they were concentrated in the river channel. Catch rates of white bass ranged from 3.6/nn to 9.9/nn between 1995 and 2002. After refilling, white bass were no longer confined to the river channel and spread out during the spring spawning runs. Condition of stock size fish was excellent as mean relative weights were near 100. Anglers spent 10,639 h (0.42 h/acre) targeting white bass in 2007-2008 (Table 9). Also in 2007-2008, average angler catch rate was 0.20/h and harvest rate was 0.26/acre (Table 9). The length frequency of harvested white bass is presented in Figure 10.

Largemouth bass: The 2007 electrofishing catch rate for largemouth bass was 132.5/h, lower than 198.0/h in 2005 and 191.5/h in 2006 (Figure 11). The PSD and RSD-P increased from 2005, suggesting recruitment to larger size classes is good. Condition of stock size fish was excellent as mean relative weights were above 100. Growth rates were similar among years as mean age of bass from 330 to 381mm was 1.9 years in 2007 (N=13), compared to 1.8 years in 2006 (N=41) and 1.6 years in 2005 (N=13). Largemouth bass fishing was popular as anglers spent 227,845 h (8.89 h/acre) targeting largemouth bass in 2007-2008 (Table 10). Also in 2007-2008, average angler catch rate of largemouth bass was 0.57/h and harvest rate was 0.17/acre (Table 10). The length frequency of harvested largemouth bass is shown in Figure 12. Nearly two-thirds of legal bass caught were released back into the fishery(Table 10). Genetic analysis indicated an 83% frequency of Florida largemouth bass alleles, with 10% of the population having the Florida largemouth bass genotype (Table 11). Beginning in 2003, northern largemouth bass were stocked as part of a research project examining the potential for

increasing northern largemouth bass alleles in reservoirs with high Florida largemouth bass genetics. Northern largemouth bass alleles increased following NLMB stockings but subsequently decreased once NLMB stocking stopped (Table 11). Mean percentage of age-0 NLMB collected from both stocked and control sites increased substantially in 2005 (Figure 13).

White crappie: The 2007 trap net catch rate for white crappie was 1.3/nn, lower than 4.7 in 2003 but similar to 1.2 in 2005 (Figure 14). Condition of stock size and greater fish was good; mean relative weights were above 100. Anglers spent 4,149 h (0.16 h/acre) targeting white crappie in 2007-2008 (Table 13). Also in 2007-2008, average angler catch rate was 0.96/h and harvest rate was 0.12/acre (Table 13). The length frequency of harvested white crappie is presented in Figure 15.

Fisheries management plan for Choke Canyon Reservoir, Texas.

Prepared – July 2008

Issue 1: Based on 2007 vegetation surveys, water hyacinth has recently expanded on Choke Canyon Reservoir, primarily on the upper, western end of the reservoir, in the Frio River and San Miguel Creek areas.

MANAGEMENT STRATEGIES

1. Explain the importance of water hyacinth control to city of Corpus Christi staff and other stakeholder groups.
2. Continue to monitor water hyacinth coverage and distribution throughout the reservoir by conducting annual quantitative surveys.
3. Develop and implement a nuisance aquatic vegetation management plan.

Issue 2: Hydrilla continues to be widespread in the reservoir, however boat and bank angler access have not been negatively impacted.

MANAGEMENT STRATEGIES

1. Monitor coverage and distribution of hydrilla lakewide and also at angler access points.
2. If hydrilla control becomes necessary, seek assistance from the city of Corpus Christi.

Issue 3: Catches of trophy largemouth bass have increased since the reservoir refilled in 2002. Anecdotal data from anglers in conjunction with tournament results, and bass fishing websites suggest good numbers of trophy largemouth bass are caught and released by anglers. Based on creel surveys, most (62.5%) legal-sized largemouth bass caught by anglers were released but there is no quantitative or qualitative data collected on the release of trophy largemouth bass. Tournament and creel data will be used to document catch and harvest of trophy largemouth bass.

MANAGEMENT STRATEGIES

1. Record estimated numbers of largemouth bass released by weight classes (<4 pounds, 4 to 7 pounds, 7 to 10 pounds, and >10 pounds) during creel surveys.
2. Publicize trophy largemouth bass data through press releases.

SAMPLING SCHEDULE JUSTIFICATION

The proposed sampling schedule includes electrofishing (fall 2008-2011) and gill netting (spring 2009-2012) every year and trap netting (fall 2009 and 2011) every other year. Electrofishing and gill netting every year is necessary to monitor important largemouth bass and blue catfish fisheries. Trap netting every other year will document presence or absence of crappie species and inclines or declines in crappie populations. A creel survey will be conducted annually (N = 52 days/yr) in order to monitor fisheries and as part of a research project. A report will be prepared at the conclusion of the 2011-2012 sampling period.

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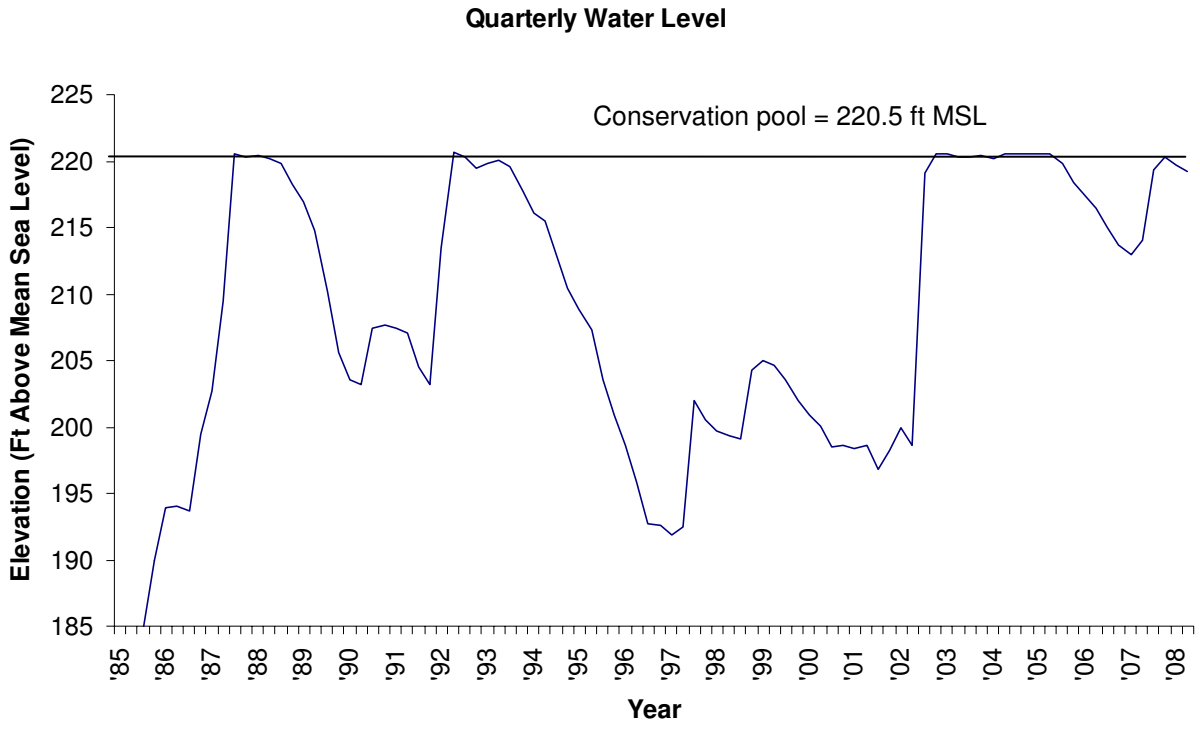


Figure 1. Mean quarterly water elevations in feet above mean sea level (MSL) recorded for Choke Canyon Reservior, Texas, 1985 through May 2008.

Table 1. Characteristics of Choke Canyon Reservoir, Texas.

Characteristic	Description
Year constructed	1982
Controlling authority	City of Corpus Christi, Nueces River Authority, U.S. Bureau of Reclamation, TPWD (surrounding lands)
Counties	Live Oak, McMullen
Reservoir type	Mainstem
Shoreline Development Index	7.1
Conductivity (umhos/cm)	600
Access: Boat	Good – 6 public ramps
Bank	Adequate – 6 public ramp areas, 1 fishing jetty, Wildlife Management Area access, State Park shoreline access
Handicapped	Adequate – Calliham State Park – concrete jetty Inadequate – South Shores State Park

Table 2. Harvest regulations for Choke Canyon Reservoir, Texas.

Species	Bag Limit (per person)	Minimum-Maximum Length (inches)
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 – No Limit
Catfish, flathead	5	18 – No Limit
Bass, white	25	10 – No Limit
Bass, largemouth	5	14 – No Limit
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 – No Limit

Table 3. Fish stocking history at Choke Canyon Reservoir, Texas. Size categories are: FRY = ≤ 1.0 inch, FGL = 1-3 inches and ADL = adult (sexually mature fish).

Year	Number	Size
	Threadfin shad	
1981	10,000	ADL
1982	4,000	ADL
1983	8,000	ADL
Species Total	22,000	
	Fathead minnow	
1981	unknown	ADL
Species total	unknown	
	Blue catfish	
1982	98,800	FGL
1983	102,088	FGL
Species Total	200,088	
	Channel Catfish	
1981	92,800	FGL
1982	307,000	FGL
1983	91,256	FGL
Species total	490,456	
	Striped bass	
1983	102,600	FGL
Species Total	102,600	
	Northern largemouth bass	
2003	107,137	FGL
2004	99,632	FGL
2005	102,314	FGL
Species total	309,083	
	Florida largemouth bass	
1981	19,906	FGL
1982	146,030	FGL
1983	143,368	FGL
1990	375,790	FRY
1998	383,565	FGL
2002	384,236	FGL
2003	180,014	FGL
Species total	1,632,909	
	White crappie	
1992	148,294	FRY
1992	33,380	FGL
Species total	181,674	

Table 4. Survey of littoral zone and physical habitat types, Choke Canyon Reservoir, Texas, 2007. A linear shoreline distance (miles) was recorded for each habitat type for the entire reservoir. Surface area and percent of reservoir surface area were determined for each type of aquatic vegetation for the entire reservoir. Surface area estimates are based on the acreage of water containing a specific vegetation type not the total acreage of vegetation. The reservoir was at conservation pool at the time of sampling (25,989 acres).

Habitat type	Shoreline Distance		Surface Area of Water with Vegetation	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Shoreline habitat				
Rip-rap	1.3	0.7		
Eroded bank	30.5	16.9		
Rocky/gravel	1.5	0.8		
Non-descript	142.2	80.2		
Concrete	2.6	1.4		
Total	181.1	100		
Vegetation				
Native submersed vegetation			2,422.7	9.3
American pondweed			318.0	1.2
Sago pondweed			14.6	0.06
Coontail			1,577.7	6.1
Water stargrass			1,059.3	4.1
Exotic vegetation			4,127.2	15.9
Water hyacinth			1,540.7	5.9
Hydrilla			3,788.0	14.6
Adjacent to shoreline				
Standing timber			2,563	9.9

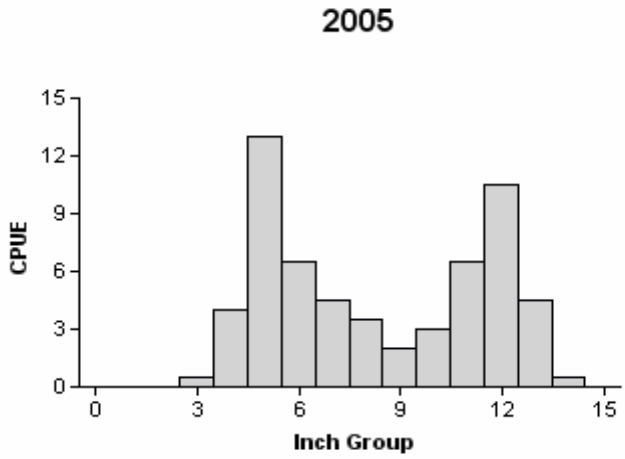
Table 5. Percent of total angling effort directed to individual sport fish species at Choke Canyon Reservoir, Texas, September 2006 through May 2008.

	Year	
Species	2006/2007	2007/2008
All catfish species	28.7	28.8
Blue catfish	3.9	4.1
Channel catfish	<1.0	<1.0
Flathead catfish	<1.0	<1.0
White bass	<1.0	2.7
Largemouth bass	61.0	58.3
White crappie	1.5	1.1
Anything	2.3	3.2

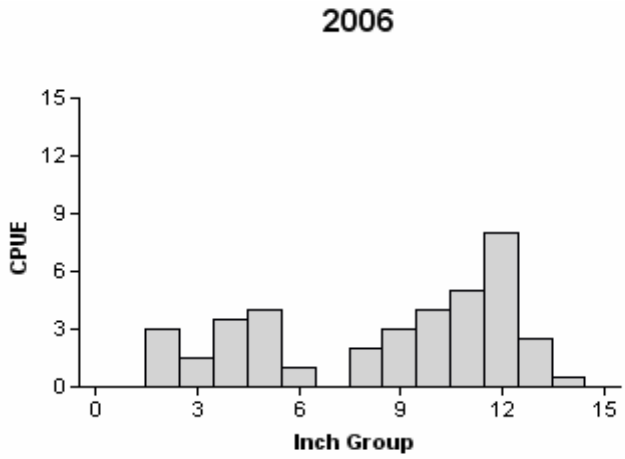
Table 6. Total angling effort for all species and total direct angling expenditures for Choke Canyon Reservoir, Texas, September 2006 through May 2008.

	Year	
Creel Statistic	2006/2007	2007/2008
Total fishing effort (h)	293,027	390,481
Total directed expenditures	$2,501,246	$4,010,759

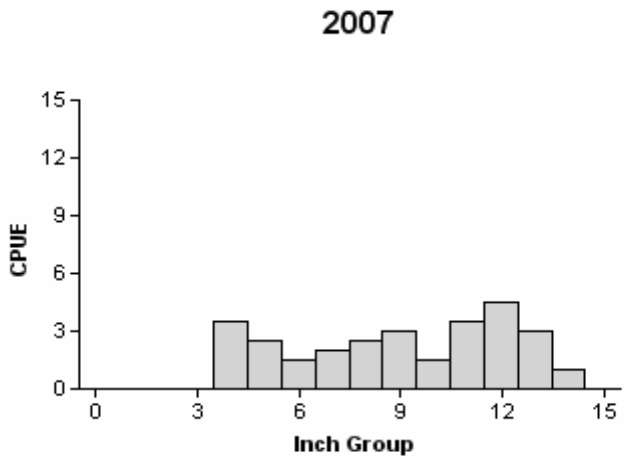
Gizzard shad



Effort = 2.0
Total CPUE = 59.0 (22; 118)
IOV = 48 (12)



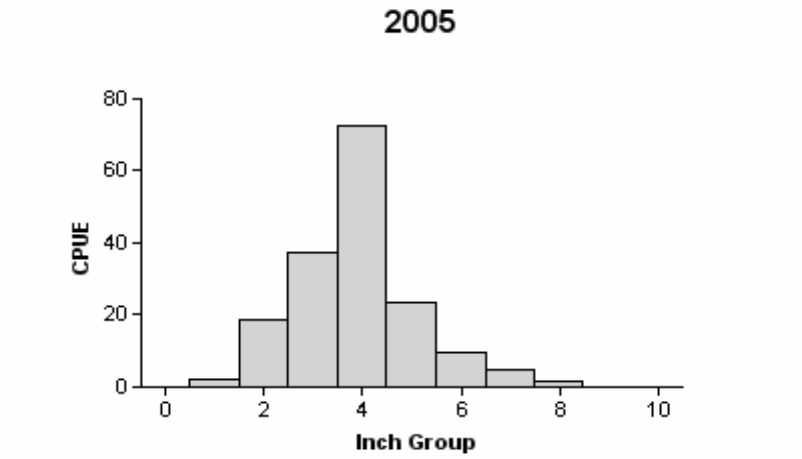
Effort = 2.0
Total CPUE = 38.0 (29; 76)
IOV = 34 (7)



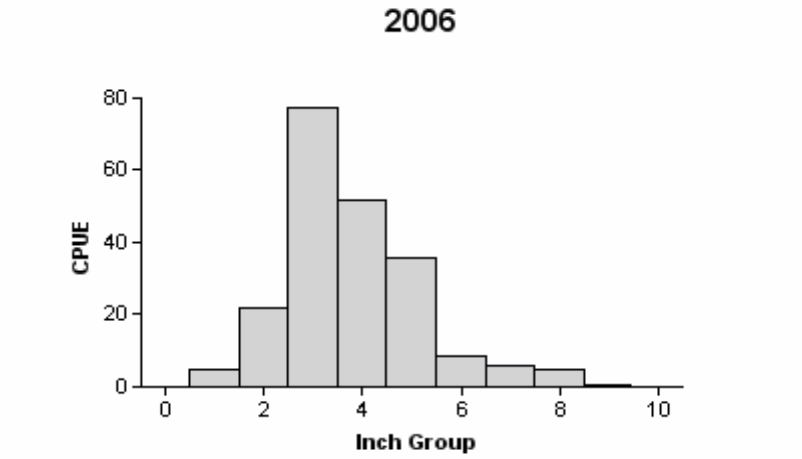
Effort = 2.0
Total CPUE = 28.5 (26; 57)
IOV = 33 (9)

Figure 2. Comparison of the number of gizzard shad caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Choke Canyon Reservoir, Texas, 2005, 2006, and 2007.

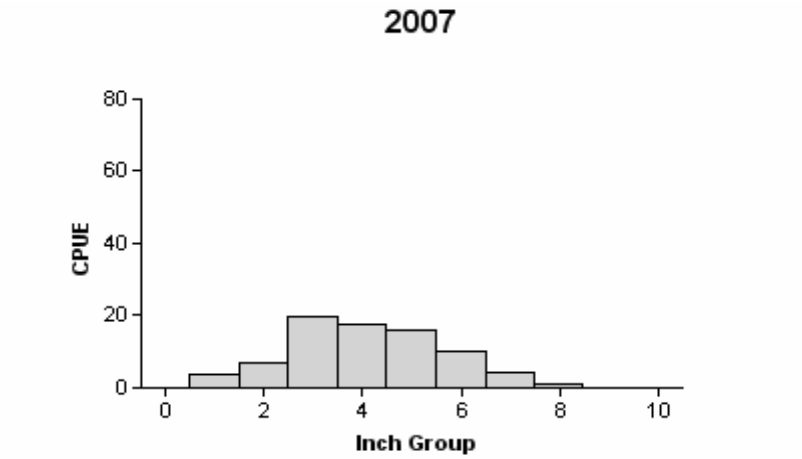
Bluegill



Effort = 2.0
Total CPUE = 170.0 (22; 340)
PSD = 11 (2)



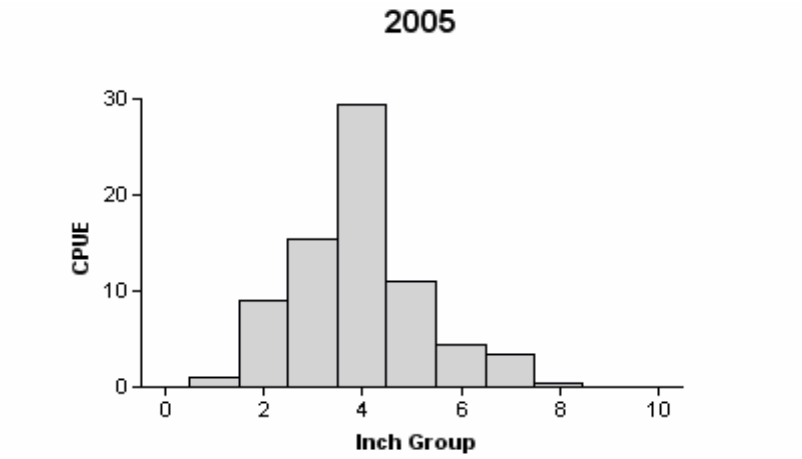
Effort = 2.0
Total CPUE = 212.0 (21; 424)
PSD = 11 (4)



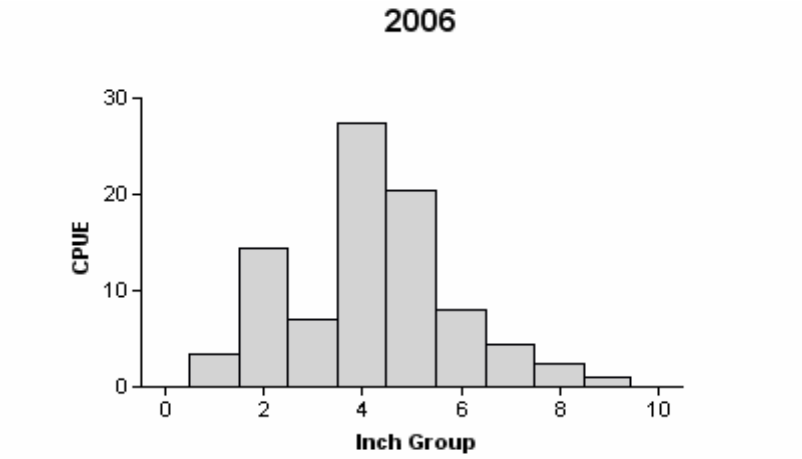
Effort = 2.0
Total CPUE = 80.0 (24; 160)
PSD = 22 (4)

Figure 3. Comparison of the number of bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Choke Canyon Reservoir, Texas, 2005, 2006, and 2007.

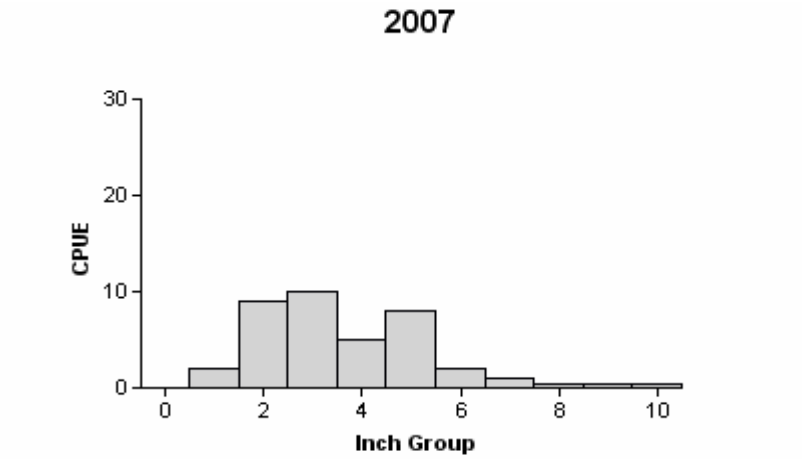
Redear sunfish



Effort = 2.0
Total CPUE = 74.5 (23; 149)
PSD = 8 (7)



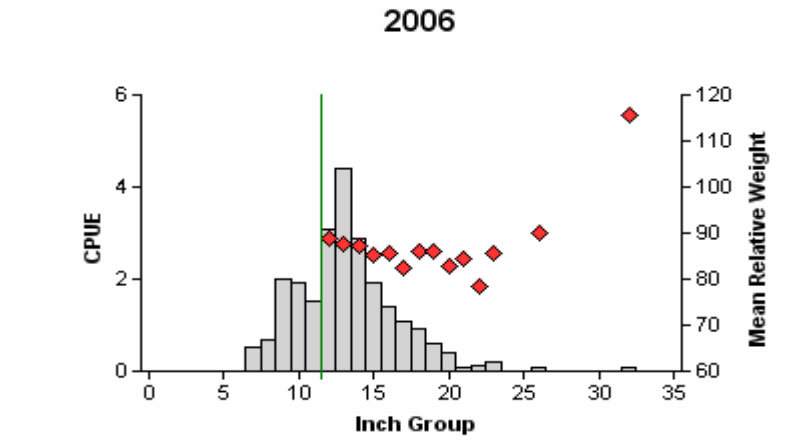
Effort = 2.0
Total CPUE = 89.0 (24; 178)
PSD = 12 (4)



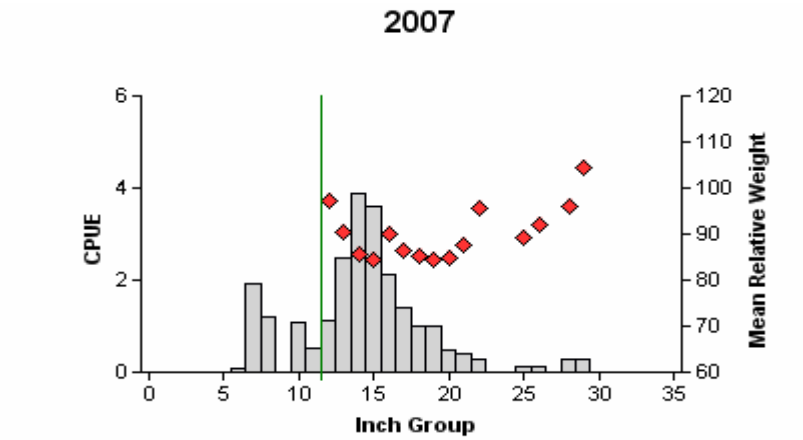
Effort = 2.0
Total CPUE = 38.5 (21; 77)
PSD = 14 (5)

Figure 4. Comparison of the number of redear sunfish caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Choke Canyon Reservoir, Texas, 2005, 2006, and 2007.

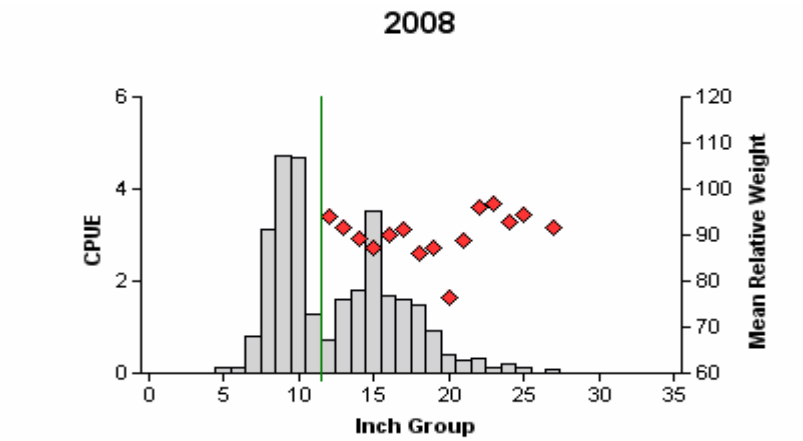
Blue catfish



Effort = 15.0
Total CPUE = 23.9 (15; 358)
CPUE-12 = 17.2 (14; 258)
PSD = 5 (3)



Effort = 15.0
Total CPUE = 23.3 (13; 350)
CPUE-12 = 18.5 (11; 278)
PSD = 10 (3)



Effort = 15.0
Total CPUE = 29.7 (18; 446)
CPUE-12 = 14.9 (14; 223)
PSD = 10 (3)

Figure 5. Comparison of the number of blue catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Choke Canyon Reservoir, Texas, 2006, 2007, and 2008. Vertical lines denote 12-inch minimum length limit.

Blue catfish

Table 7. Creel survey statistics for blue catfish at Choke Canyon Reservoir from September 2006 through May 2008, 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.

	Year	
Creel Survey Statistic	2006/2007	2007/2008
Directed effort (h)	11,549 (22)	15,942 (21)
Directed effort/acre	0.52 (22)	0.62 (21)
Average angler catch rate (#/h)	1.11 (33)	0.95 (45)
Total harvest	76,278 (17)	101,394 (20)
Harvest/acre	3.43 (17)	3.96 (20)

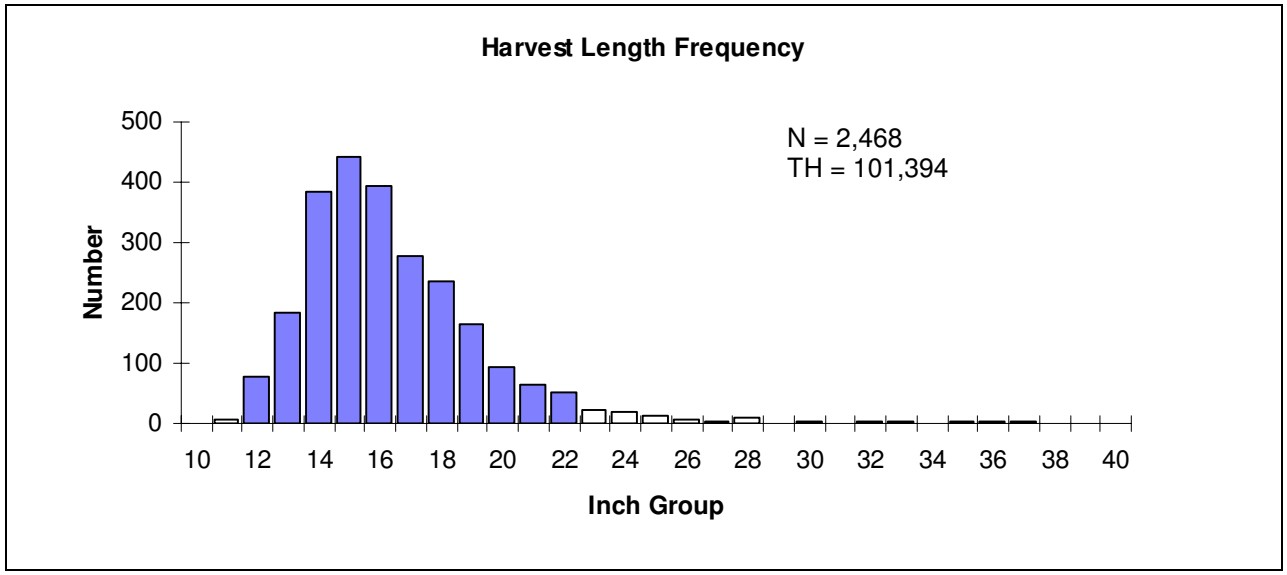
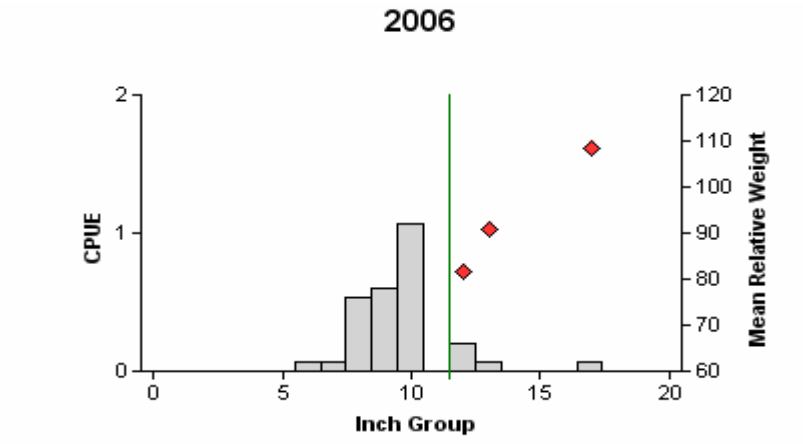
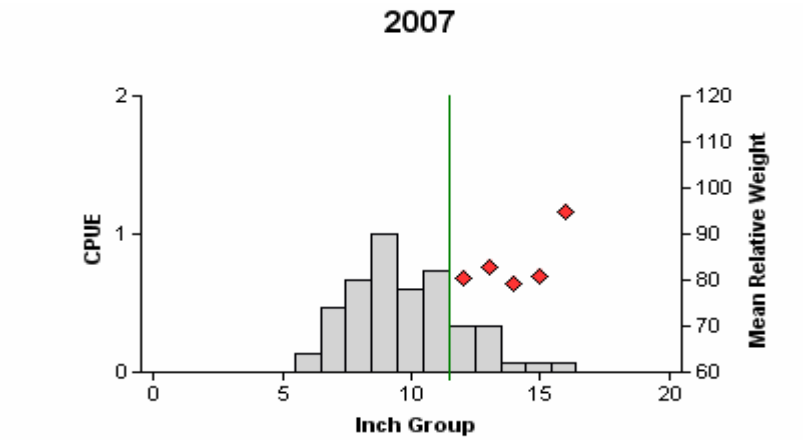


Figure 6. Length frequency of harvested blue catfish observed during creel surveys a Choke Canyon Reservoir, Texas, June 2007 through May 2008, all anglers combined. N is the number of harvested blue catfish observed during creel surveys and TH is the total estimated harvest for the creel period.

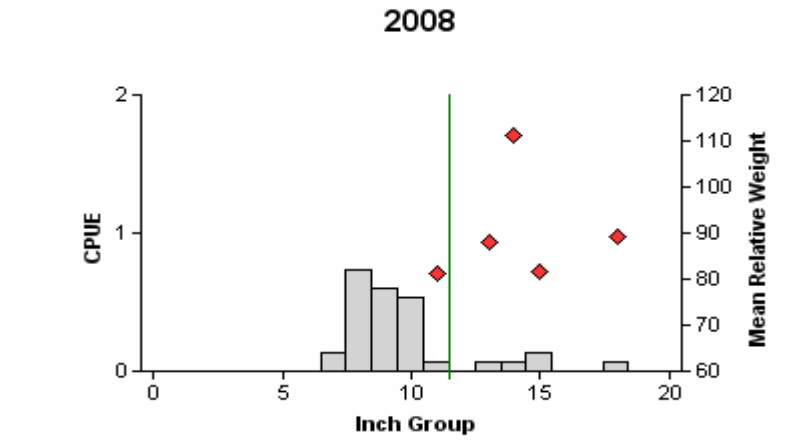
Channel catfish



Effort = 15.0
Total CPUE = 2.7 (30; 40)
CPUE-12 = 0.3 (56; 5)
PSD = 20 (16)



Effort = 15.0
Total CPUE = 4.5 (30; 67)
CPUE-12 = 0.9 (32; 13)
PSD = 4 (5)



Effort = 15.0
Total CPUE = 2.4 (44; 36)
CPUE-12 = 0.3 (56; 5)
PSD = 17 (14)

Figure 7. Comparison of the number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Choke Canyon Reservoir, Texas, 2006, 2007, and 2008. Vertical lines denote 12-inch minimum length limit.

Channel catfish

Table 8. Creel survey statistics for channel catfish at Choke Canyon Reservoir from September 2006 through May 2008, 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.

	Year	
Creel Survey Statistic	2006/2007	2007/2008
Directed effort (h)	926 (72)	1,676 (52)
Directed effort/acre	0.04 (72)	0.07 (52)
Average angler catch rate (#/h)	0.50 (76)	1.61 (13)
Total harvest	23,066 (19)	16,840 (26)
Harvest/acre	1.04 (19)	0.66 (26)

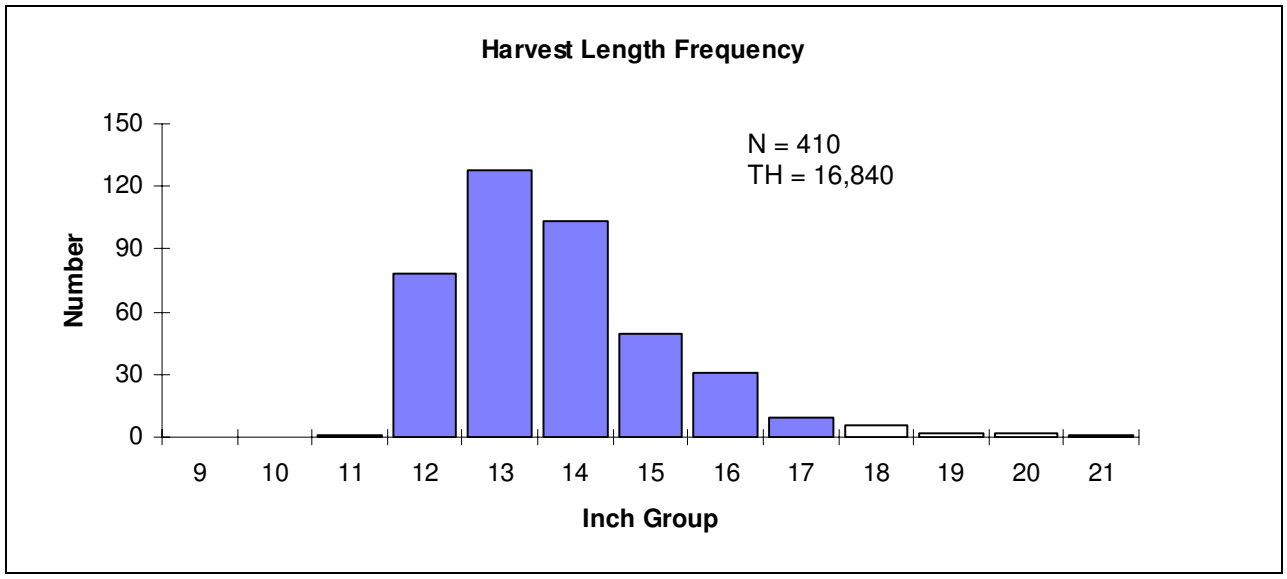
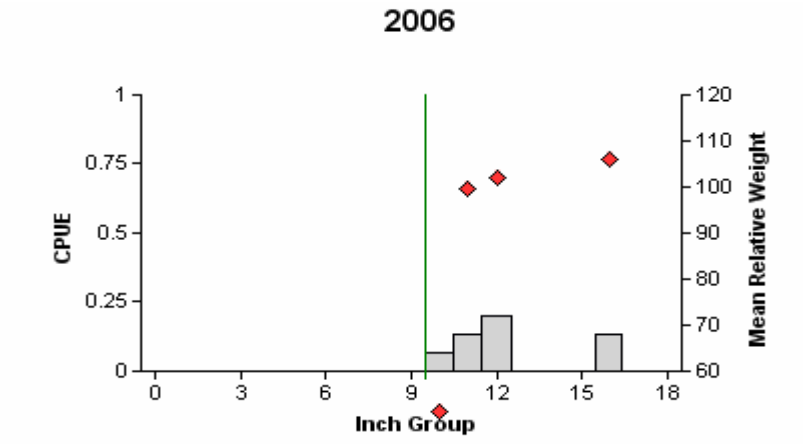
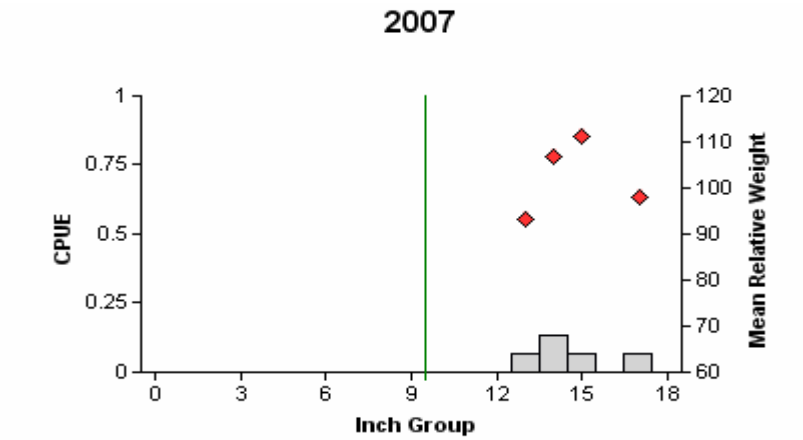


Figure 8. Length frequency of harvested channel catfish observed during creel surveys a Choke Canyon Reservoir, Texas, June 2007 through May 2008, all anglers combined. N is the number of harvested channel catfish observed during creel surveys and TH is the total estimated harvest for the creel period.

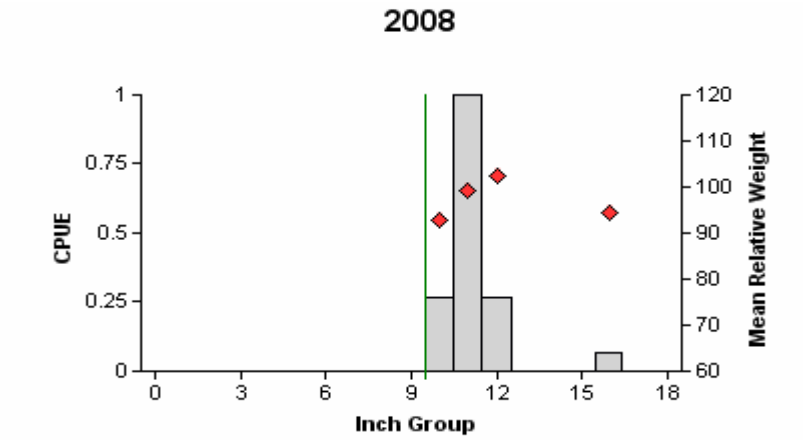
White bass



Effort = 15.0
Total CPUE = 0.5 (66; 8)
PSD = 100 (0)



Effort = 15.0
Total CPUE = 0.3 (48; 5)
PSD = 100 (0)



Effort = 15.0
Total CPUE = 1.6 (52; 24)
PSD = 100 (0)

Figure 9. Comparison of the number of white 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 spring gill net surveys, Choke Canyon Reservoir, Texas, 2006, 2007, and 2008. Vertical lines denote 10-inch minimum length limit.

White bass

Table 9. Creel survey statistics for white bass at Choke Canyon Reservoir from September 2006 through May 2008, 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.

	Year	
Creel Survey Statistic	2006/2007	2007/2008
Directed effort (h)	2,488 (40)	10,639 (53)
Directed effort/acre	0.11 (40)	0.42 (53)
Average angler catch rate (#/h)	0.20 (58)	0.78 (19)
Total harvest	690 (277)	6,749 (73)
Harvest/acre	0.03 (277)	0.26 (73)

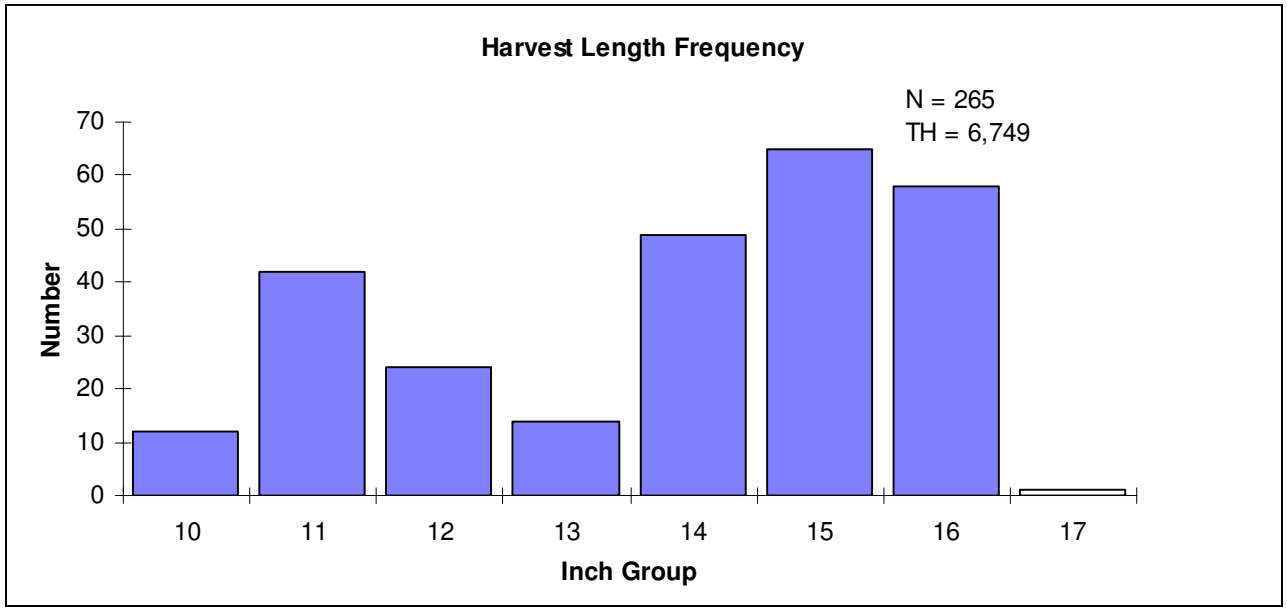
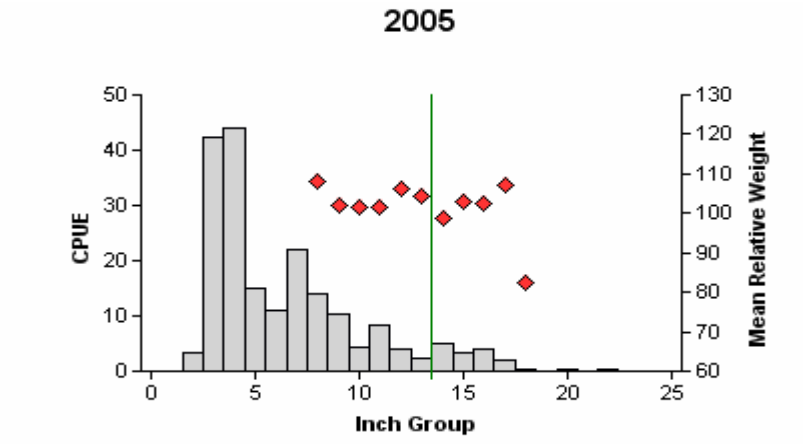
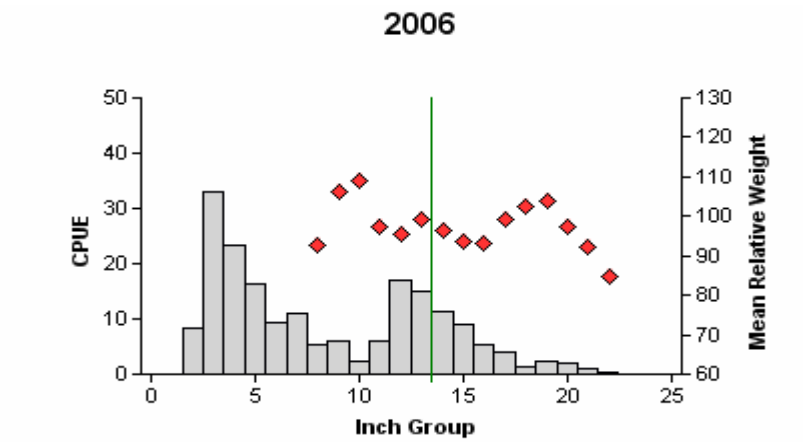


Figure 10. Length frequency of harvested white bass observed during creel surveys a Choke Canyon Reservoir, Texas, June 2007 through May 2008, all anglers combined. N is the number of harvested white bass observed during creel surveys and TH is the total estimated harvest for the creel period.

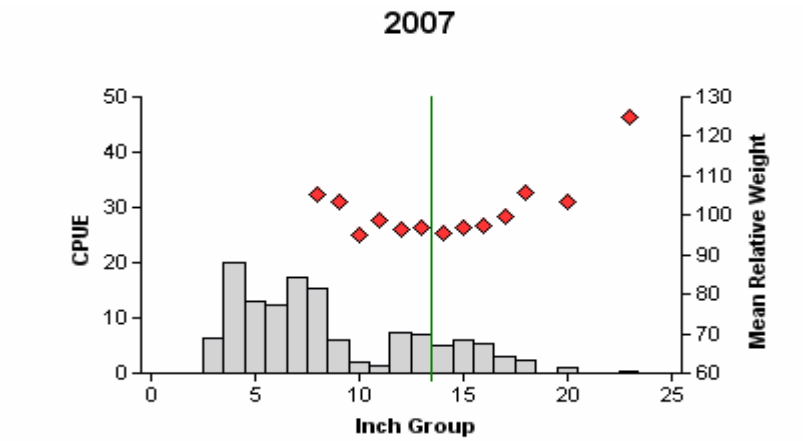
Largemouth bass



Effort = 2.0
Total CPUE = 198.0 (9; 396)
Stock CPUE = 60.0 (17; 120)
PSD = 38 (4)
RSD-P = 18 (4)



Effort = 2.0
Total CPUE = 191.5 (21; 383)
Stock CPUE = 89.5 (30; 179)
PSD = 78 (5)
RSD-P = 29 (4)



Effort = 2.0
Total CPUE = 132.5 (18; 265)
Stock CPUE = 63.0 (18; 126)
PSD = 60 (5)
RSD-P = 29 (5)

Figure 11. Comparison of the 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, Choke Canyon Reservoir, Texas, 2005, 2006, and 2007. Vertical lines denote 14-inch minimum length limit.

Largemouth bass

Table 10. Creel survey statistics for largemouth bass at Choke Canyon Reservoir from September 2006 through May 2008, 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.

	Year	
Creel Survey Statistic	2006/2007	2007/2008
Directed effort (h)	178,718 (10)	227,845 (16)
Directed effort/acre	8.03 (10)	8.89 (16)
Average angler catch rate (#/h)	0.75 (6)	0.57 (9)
Total harvest	4,240 (27)	4,459 (27)
Harvest/acre	0.19 (27)	0.17 (27)
Percent legal released	60.9	65.2

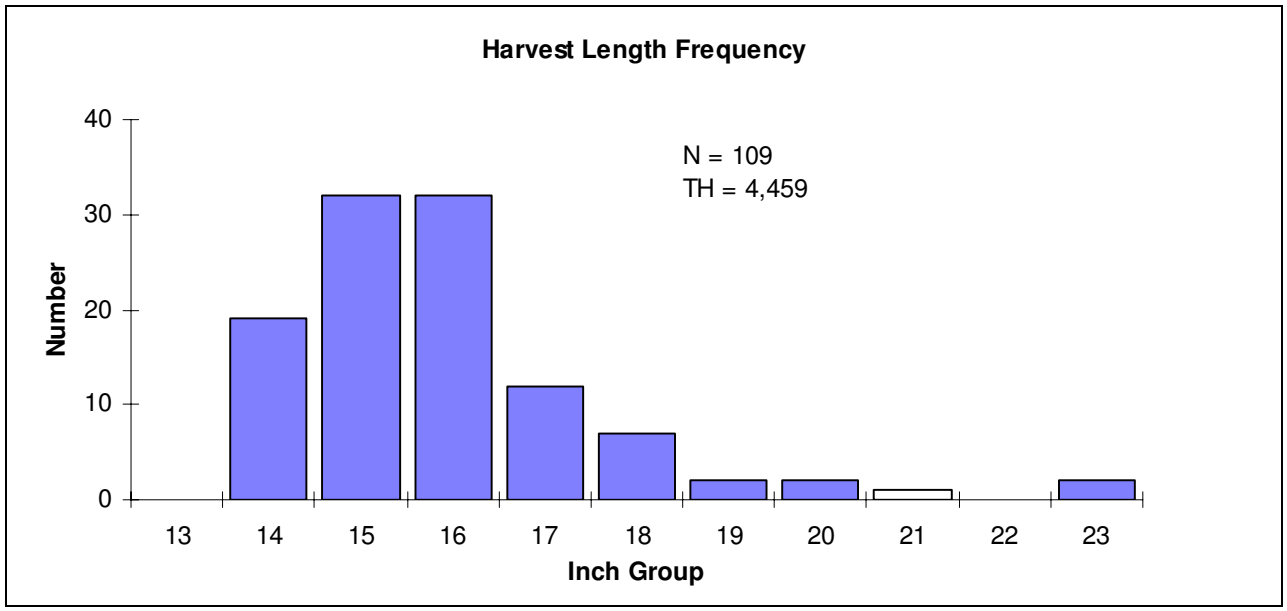


Figure 12. Length frequency of harvested largemouth bass observed during creel surveys a Choke Canyon Reservoir, Texas, June 2007 through May 2008, all anglers combined. N is the number of harvested largemouth bass observed during creel surveys and TH is the total estimated harvest for the creel period.

Largemouth bass

Table 11. Results of genetic analysis of largemouth bass collected by fall electrofishing, Choke Canyon Reservoir, Texas, 2002, 2003, 2004, 2005, 2006, and 2007. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass, F1 = first generation intergrade between a FLMB and NLMB, and Fx = second or higher generation intergrade between a FLMB and NLMB. Largemouth bass genetic composition was determined using electrophoresis from 2002 through 2004 and using micro-satellite DNA from 2005 through 2007.

		Genotype					
Year	Sample size	FLMB	F1	Fx	NLMB	% FLMB alleles	% NLMB alleles
2002	24	16	0	8	0	89	11
2003	30	17	0	13	0	87	13
2004	30	15	3	12	0	85	15
2005	30	15	1	60	0	78	22
2006	30	3	0	27	0	80	20
2007	30	8	0	22	0	83	17

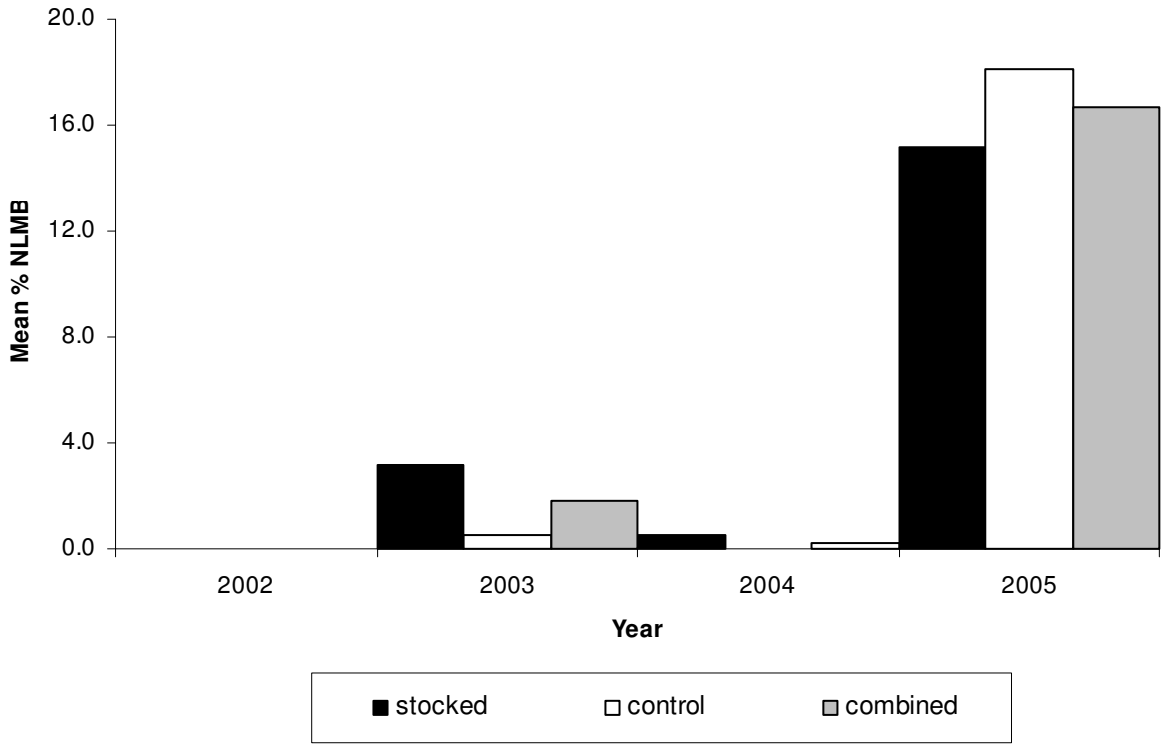
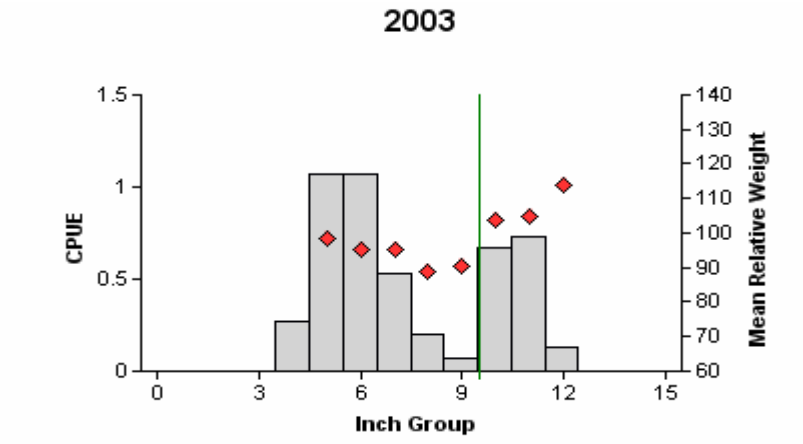
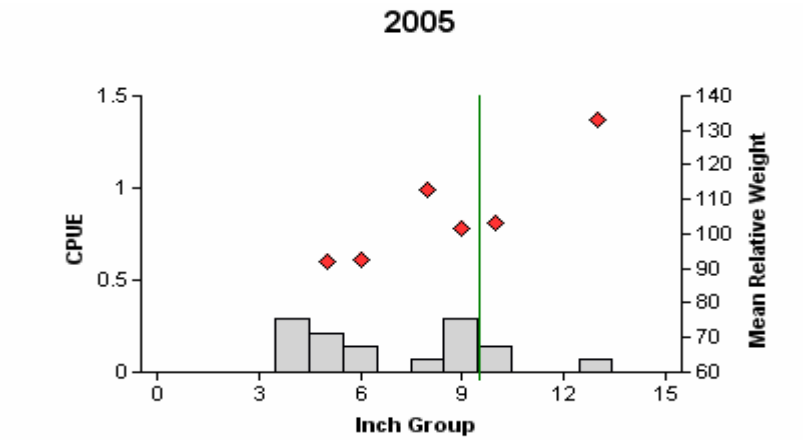


Figure 13. Mean percentage of age-0 northern largemouth bass collected in fall Y-O-Y largemouth bass electrofishing surveys conducted at stocked and control sites in Choke Canyon Reservoir, Texas, 2002, 2003, 2004, and 2005. Presented data was taken from unpublished data collected as part of the NLMB research project conducted on Choke Canyon Reservoir.

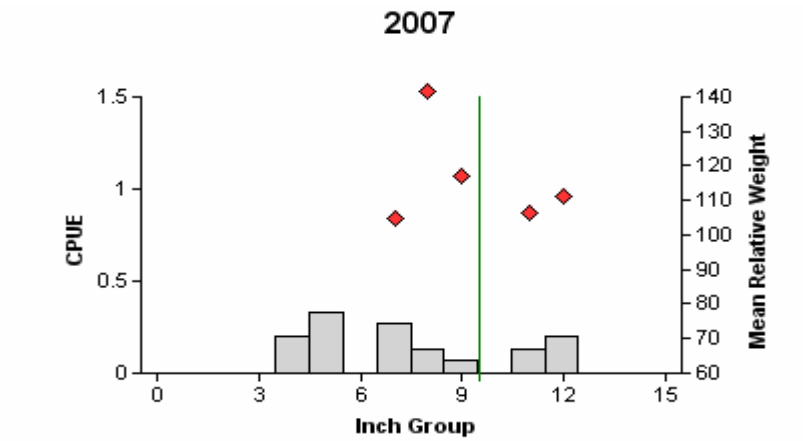
White crappie



Effort = 15.0
Total CPUE = 4.7 (38; 71)
Stock CPUE = 4.5 (37; 67)
PSD = 40 (10)
RSD-P = 34 (11)



Effort = 14.0
Total CPUE = 1.2 (63; 17)
Stock CPUE = 0.9 (57; 13)
PSD = 62 (27)
RSD-P = 23 (17)



Effort = 15.0
Total CPUE = 1.3 (38; 20)
Stock CPUE = 1.1 (35; 17)
PSD = 47 (14)
RSD-P = 29 (11)

Figure 14. Comparison of the number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Choke Canyon Reservoir, Texas, 2003, 2005, and 2007. Vertical lines denote 10-inch minimum length limit.

White crappie

Table 12. Creel survey statistics for white crappie at Choke Canyon Reservoir from September 2006 through May 2008, 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.

	Year	
Creel Survey Statistic	2006/2007	2007/2008
Directed effort (h)	4,380 (33)	4,149 (44)
Directed effort/acre	0.20 (33)	0.16 (44)
Average angler catch rate (#/h)	0.56 (39)	0.96 (55)
Total harvest	2,016 (122)	3,030 (105)
Harvest/acre	0.09 (122)	0.12 (105)

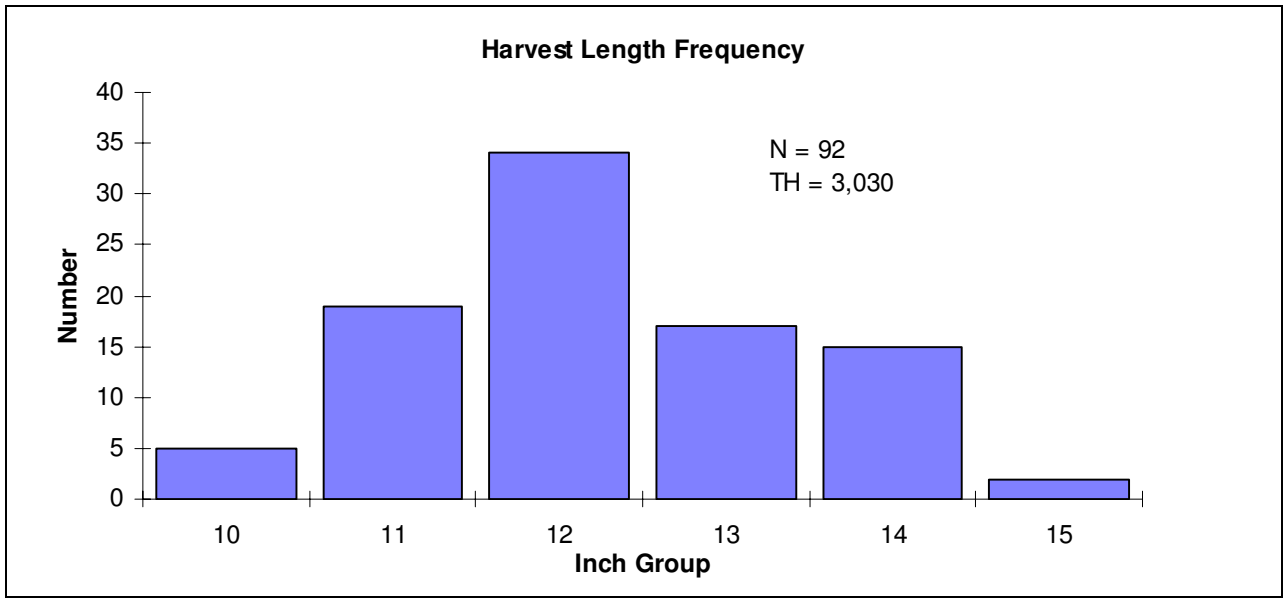


Figure 15. Length frequency of harvested white crappie observed during creel surveys a Choke Canyon Reservoir, Texas, June 2007 through May 2008, all anglers combined. N is the number of harvested white crappie observed during creel surveys and TH is the total estimated harvest for the creel period.

Table 12. Proposed survey schedule for Choke Canyon Reservoir, Texas. Creel surveys are conducted over a 12 month period with a total of 52 creel days. Trap net and electrofishing surveys are conducted in the fall and the gill net survey is conducted in the spring. Standard surveys are denoted by S.

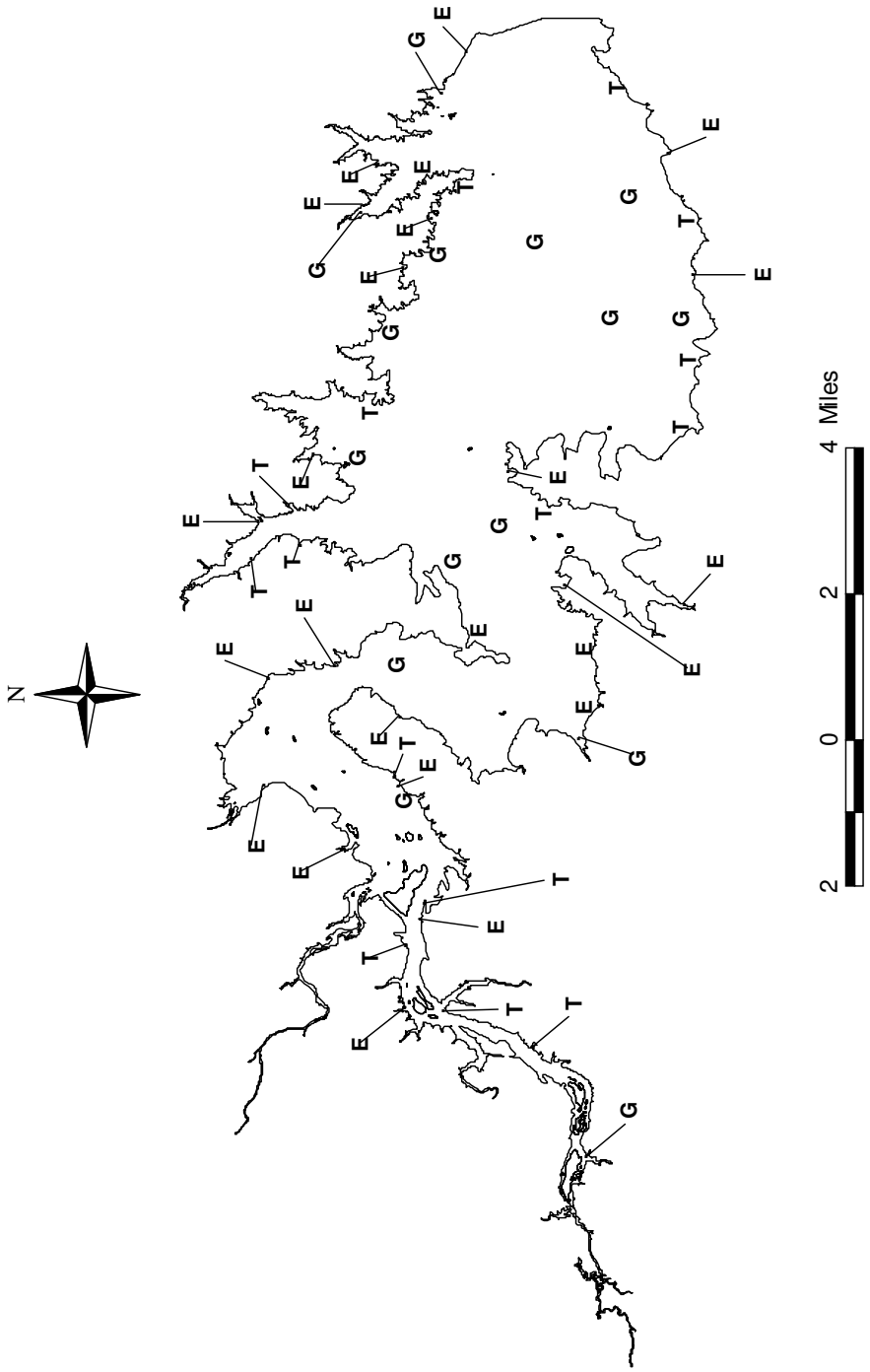
Sampling year	Creel	Electrofishing	Trap net	Gill net	Report
Fall 2008-Spring 2009	S	S		S	
Fall 2009-Spring 2010	S	S	S	S	
Fall 2010-Spring 2011	S	S		S	
Fall 2011-Spring 2012	S	S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected from all gear types from Choke Canyon Reservoir, Texas, 2007-2008.

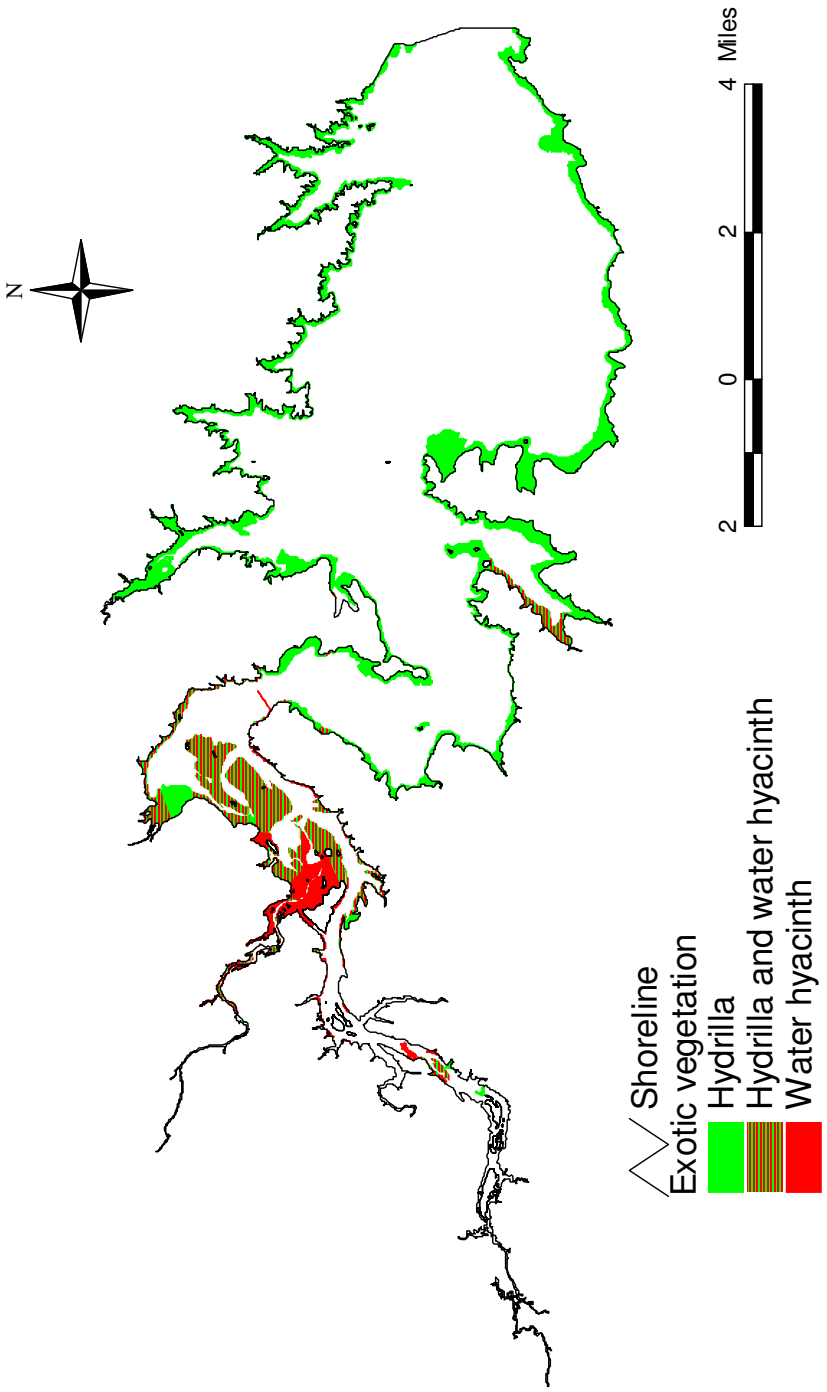
	Electrofishing		Trap netting		Gill netting	
Species	N	CPUE	N	CPUE	N	CPUE
Spotted gar			1	0.07	14	0.93
Longnose gar					3	0.20
Gizzard shad	57	28.50	4	0.27	326	21.73
Threadfin shad	287	143.50	8	0.53		
Common carp					2	0.13
Golden shiner	1	0.50				
Bullhead minnow	3	1.50				
Inland silverside	87	43.50				
Smallmouth buffalo					53	3.53
Blue catfish					446	29.73
Channel catfish					36	2.40
Flathead catfish					2	0.13
Mexican tetra	14	7.00	1	0.07		
White bass					24	1.60
Green sunfish	6	3.00				
Warmouth			4	0.27		
Bluegill	160	80.00	212	14.13	10	0.67
Longear sunfish	3	1.50				
Redear sunfish	77	38.50	74	4.93	3	0.20
Largemouth bass	265	132.50			8	0.53
White crappie	1	0.50	20	1.33	11	0.73
Freshwater drum					117	7.80
Blue tilapia	18	9.00				

APPENDIX B



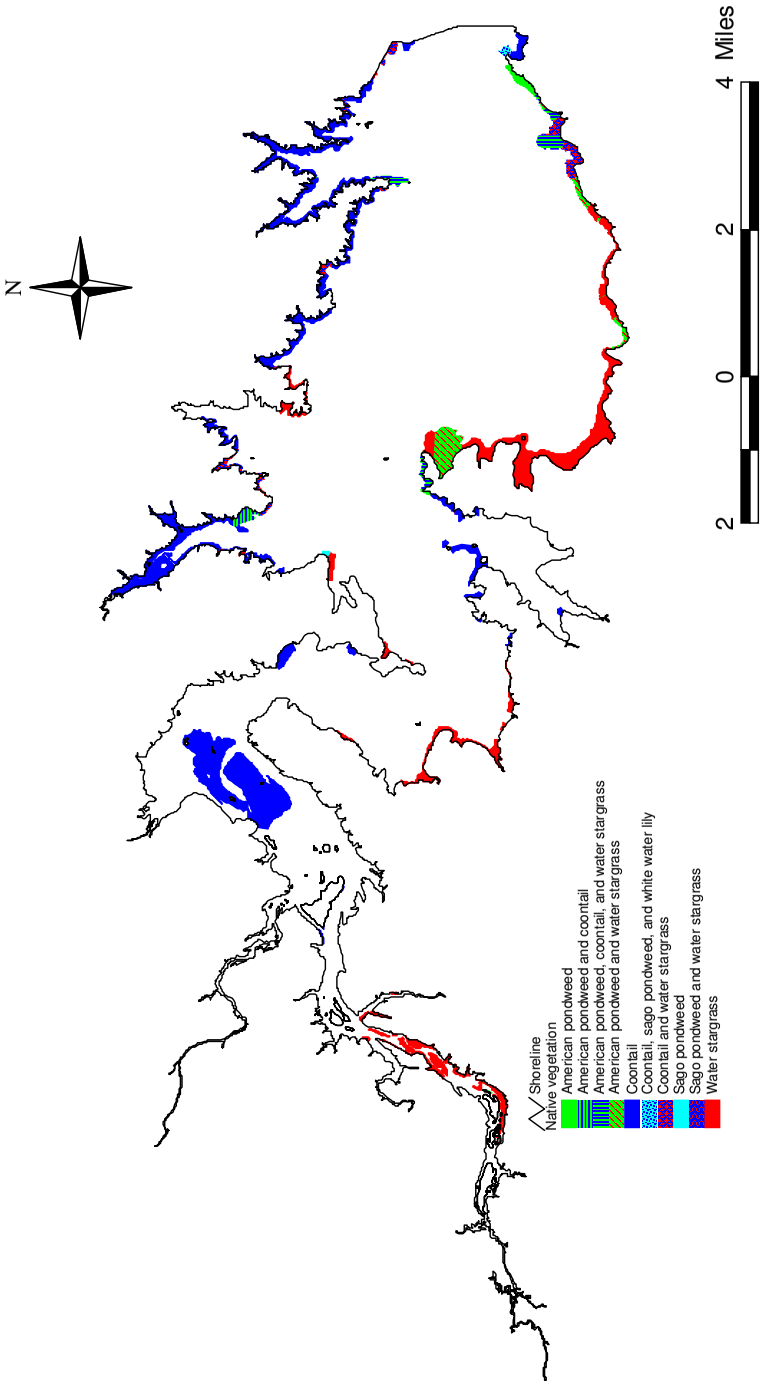
Location of sampling sites, Choke Canyon Reservoir, Texas, 2007-2008. Electrofishing, trap netting, and gill netting stations are denoted by E, T, and G, respectively.

APPENDIX C



Map of exotic aquatic vegetation, Choke Canyon Reservoir, Texas, September 2007.

APPENDIX D



Map of native aquatic vegetation, Choke Canyon Reservoir, Texas, September 2007.