PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-30

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2005 Survey Report

Kirby Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish Populations in Kirby Reservoir were surveyed in 2005 using electrofishing and trap nets, in 2006 using gill nets, and in 2005 and 2006 using hoop nets. Anglers were surveyed from March through August 2003 and 2004 with a recreational fishing survey (creel survey). This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Kirby Reservoir is a 740-acre impoundment located within the city limits of Abilene on Cedar Creek in the Brazos River Basin. Water level has been within three feet of spillway elevation since July 2002. The reservoir was completely dry in early fall 2000. Treated reuse water has been pumped into the reservoir since September 2001 to maintain water level. Habitat features consisted of bulrush, rocks, brush, and mud flats. Two boat ramps and one fishing pier were available to anglers, and bank-fishing access was excellent.

- **Management History:** Saugeye have been stocked annually since 2001 (excluding 2003) to provide an additional sport fish. District staff have maintained contact with city officials and encouraged them to maintain a high and stable water level at Kirby Reservoir. The reservoir went completely dry in fall 2000. Forage and sport fish were re-introduced as the reservoir refilled.

- **Fish Community**
  - **Prey species:** Prey species consisted of threadfin shad, gizzard shad, inland silversides, and bluegill. Enough prey fish were available to support quality sport fish populations.

  - **Catfishes:** A quality blue catfish population has been established and reproduction has occurred. Channel catfish have also reproduced, and smaller channel catfish are becoming more abundant. Harvest of channel catfish was high prior to 2005.

  - **Largemouth bass:** Numbers of largemouth bass were low, but size range of fish available to anglers was good. These fish were plump and had significant Florida largemouth bass genetic influence. Angling effort for largemouth bass, after the reservoir refilled, was first documented in 2003 and nearly tripled in 2004.

  - **White crappie:** Growth of white crappie has been extremely fast. Anecdotal evidence suggested that angler catch of crappie in 2005 was exceptional. Numbers of small crappie were well below desired levels in 2004 and 2005, which could negatively impact crappie fishing in coming years.

  - **Saugeye:** An outstanding saugeye population has developed, enough so to support a quality fishery.

- **Management Strategies:** Monitor white crappie population annually. Stock saugeye annually and inform anglers about availability of quality saugeye population. Increase habitat with placement of artificial habitat structures. Survey largemouth bass, forage, catfish, and saugeye populations every other year.

INTRODUCTION

This document is a summary of fisheries data collected from Kirby 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 is presented with the 2005-2006 data for comparison.

Reservoir Description

Kirby Reservoir is a 740-acre impoundment constructed in 1928 on Cedar Creek. It is located in Taylor County within the city limits of Abilene. It is operated and controlled by the city of Abilene. Primary water uses included non-potable municipal water supply and storage and recreation. Watershed use was primarily ranching and residential. Habitat at time of sampling consisted of rocks, bulrush, dead flooded terrestrial vegetation, and mud flats. In fall 2000, Kirby Reservoir went completely dry. Rain events in late 2000 and spring 2001 added some water to the reservoir. A treated effluent discharge permit was approved in 2001 and, beginning in September 2001, the city of Abilene began pumping reuse water into Kirby Reservoir. From September 2001 to April 2006, over 7,000 acre-feet of water was pumped into the reservoir. Enough reuse water has been pumped into the reservoir to maintain and even increase water levels, particularly during winter months. The reservoir filled with a rain event in July 2002 and water level has been relatively stable ever since, staying within three feet of spillway level (Figure 1).

Boat access consisted of two public boat ramps. Bank fishing access was very good and covered nearly the entire shoreline. Other descriptive characteristics for Kirby 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 with drought recovery program.
   Action: Saugeye were stocked in 2004 and 2005, flathead catfish adults were stocked in 2003, and northern largemouth bass were stocked in 2003 and 2004. Saugeye were requested annually. The developing multi-species fishery was documented with creel surveys in 2003 and 2004.
2. Encourage city of Abilene to maintain a high water level at Kirby Reservoir.
   Action: Met with new water utilities director for the city of Abilene and presented case history of fisheries management at Kirby Reservoir and importance of high and stable water levels. Water level has been relatively stable since 2002, not falling more than three feet below spillway level since it filled in July 2002.
3. Improve aquatic habitat for sport fishes through investigation of planting trees, bulrushes, and other emergent vegetation along west side of reservoir.
   Action: One failed attempt was made to establish water willow. With the apparent spread of bulrush and the difficulty of establishing other native plants, the decision was made to increase habitat with abiotic structures. Sixty habitat structures (cinder blocks filled with 20 one to four foot sections of plastic irrigation tubing) were placed in 2006. An additional 140 structures will be placed in the next year. District staff prepared an application packet requesting $7,500 from the FishAmerica grant program to purchase 110 Berkley Fish Habs (four-foot square cubes made from recycled fishing line). Status of application packet, as of July 2006, is pending.

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

Stocking history: Kirby Reservoir was extensively stocked with various forage and sport fishes from 2000 to 2004 to re-establish fish populations that were extirpated when the reservoir went dry in October 2000. Stockings of saugeye were requested annually to maintain this sport fish. The stocking history since 2000 is in Table 3.

Vegetation/habitat history: Kirby Reservoir has no significant vegetation/habitat management history beyond what was discussed above in previous management strategies and actions.

METHODS

Fishes were collected by electrofishing (1.25 hours at 15 5-min stations), gill netting (five net nights at five stations), trap netting (seven net nights at seven stations), and hoop netting (12 hoop-net series fished for three nights at 12 random stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing, for gill and trap nets as the number of fish per net night (fish/nn), and for hoop nets as the number of fish per net series (fish/ns). Each hoop net series consisted of three baited (cheese logs) hoop nets in tandem fished for three consecutive nights without being lifted (one hoop net unit of effort equals three tandem hoop net series fished for three nights). A roving creel survey was conducted during a six-month period from March through August in 2003 and 2004 to estimate angling effort and sport fish catch and harvest. Sampling was stratified by season (two, three-month quarters) and day type (week day and weekend day). Number of creel days varied from 28 to 36 days per creel period per year. Microsatellite DNA analysis was used in 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 2004).

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 selected 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 for creel statistics and SE was calculated for structural indices and IOV. Ages were determined using otoliths from 5 to 10 fish per inch group. Water level was determined by visual inspection of the gauge located at the dam.

RESULTS AND DISCUSSION

Habitat: A habitat survey was last conducted in 1998 (Jons and Dumont 1999). No manmade changes have occurred since the 1998 habitat survey.

Creel: Directed fishing effort was highest for catfishes and for anglers fishing for anything, and minimal fishing effort was directed towards other species in 2003 and 2004 (Table 4). Total fishing effort for all species at Kirby Reservoir in 2003 and 2004 was 19,770 h and 22,481h, respectively, and anglers spent an estimated $25,000 and $50,000 on direct expenditures (Table 5). From 90 to 94% of fishing effort was by shore-fishing anglers.

Prey species: Electrofishing catch rates of bluegill, gizzard shad, and threadfin shad were 276.8/h, 251.2/h, and 25.6/h, respectively. The IOV for gizzard shad was high, indicating that 85% of gizzard shad were available to existing predators; this was higher than the IOV estimate in 2004 and similar to the IOV estimate in 2002 (Figure 2). Total CPUE of gizzard shad has steadily increased since 2002 (Figure 2). Total CPUE of bluegill in 2004 and 2005 was considerably higher than the total CPUE in 2002, and size structure in 2005 shifted towards bigger fish as the PSD increased from 1 to 15 (Figure 3). Prey availability and abundance appeared to be sufficient for sport fish in Kirby Reservoir.

Blue catfish: Blue catfish were stocked in Kirby Reservoir in 2001 and thrived under new reservoir conditions; the gill net catch rate was 16.3 fish/nn in 2003. Although gill net catch rates were lower in

2005 and 2006, relative abundance was certainly enough to sustain a good fishery (Figure 4). Size structure in 2006 was noticeably different when compared to previous years. Differences were the presence of 8- to 10-inch fish (evidence of reproduction), the wide range of sizes that were collected, and the increase in PSD from 1 in 2004 to 17 in 2006 (Figure 4).

There was no fishing effort directed specifically for blue catfish in 2003 or 2004, but directed effort for catfishes in general was 7,973 h in 2003 and 10,537 h in 2004. Harvest of blue catfish was much higher in 2003 than in 2004, but RSE of these estimates was extremely high, making harvest estimates virtually unusable (Table 6). Harvested blue catfish in 2003 and 2004 ranged in length from 12 to 19 inches (Figure 5).

Channel catfish: The initial stocking of Imperial channel catfish in 2001, along with native channel catfish that immigrated into Kirby Reservoir from private ponds during rain events, flourished based on the 2003 gill net catch rate of 21.5 fish/nn. These fish ranged in length from 7 to 17 inches, and 89% of the fish collected were legal size or longer (Figure 6). Gill net catch rate was extremely low in 2004 and 2005 and increased in 2006 (Figure 6). Hoop net catch rates were similar in 2003 and 2004, dropped considerably in 2005, and increased significantly in 2006 (Figure 7).

Catch of channel catfish in hoop nets far exceeded catch from gill nets in all years, particularly in 2004-2006; 26 fish were collected with gill nets (15 units of effort), while 644 fish were collected with hoop nets (18 units of effort). Without hoop nets, relative abundance and size structure of channel catfish in Kirby Reservoir could not have been assessed in 2004 and 2005. In 2003, when both gears caught sufficient numbers of fish, size structure was similar (Figures 6-7). However, size structure was markedly different in 2006; gill nets caught a much higher proportion of larger fish than hoop nets (Figures 6-7).

Hoop net surveys in 2003 and 2004 showed an increase in PSD from 8 to 40 and a drop in percent of legal-size fish from 81% to 66% as more small fish entered the population (Figure 7). In 2005 and 2006, there was a considerable change in size structure; very few fish were now over 12 inches long (12% in 2005 and 2% in 2006), compared to 66% in 2004 and 81% in 2003 (Figure 7).

Reproduction occurred as early as 2002 because 46% of the age and growth sample in 2004 were age 2 (mean TL = 12.8 in). Reproduction of Imperials was documented through genetic analysis of age-1 fish in 2005; Imperial channel catfish influence was 43%.

Directed effort, catch rate, and harvest of channel catfish all noticeably declined from 2003 to 2004 (Table 7). Directed fishing effort for channel catfish was nearly 3,000 h in 2003, but dropped off to only 713 h in 2004. However, much of the catfish directed effort was aimed at catfishes as a group and not at specific species, and directed effort for catfishes increased from the creel period in 2003 to the creel period in 2004 (Table 6). Harvest of channel catfish was high in 2003 (9,496 fish), and anecdotal evidence suggested that harvest of channel catfish began in late summer 2002. Size of harvested fish primarily ranged from 12- to 16-in long, but fish as large as 23-in long were kept (Figure 8). There was some illegal harvest, too (Figure 8).

Largemouth bass: The electrofishing catch rate of stock-length largemouth bass was 22.4/h in 2005, lower than the 50.0/h in 2004. Although CPUE was lower in 2005, size structure remained very good as RSD-14 and RSD-P both increased (Figure 9). Body condition was very good in 2004 and 2005; W_r ranged from 99 to 115 (Table 8). Largemouth bass genetic composition was principally composed of Florida largemouth bass influence (Table 9).

A fishery developed for largemouth bass in 2003 and increased in 2004 with nearly 1,500 h of directed effort (Table 10). Angler catch per hour doubled from 0.31 fish/h to 0.62 fish/h from 2003 to 2004, and harvest was negligible (Table 10; Figure 10).

White crappie: The trap net catch rate of white crappie was 7.9/nn in 2005, down from 15.3/nn in 2004

(Figure 11). No fish under 9-in long were collected in 2004 with 17 net nights (Figure 12), and most of these fish, at least those from 9- to 12-in long, were likely age-1 fish, albeit based on a small sample size of four fish. However, some reproduction did occur in 2004 as evidenced by five age-1 fish that were aged in 2005 (mean length 9.9 in; range 6.2 to 11.4 in). Larger fish from the 2005 survey also had excellent growth; average age at 12 inches (11.0 to 12.9 inches) was 1.9 years (N = 13; range = 1 – 2).

Size structure of white crappie has been unbalanced, based on PSDs of over 90, since 2004 (Figure 11). This likely resulted from an expanding population taking advantage of abundant nutrients and forage. Although PSD only dropped from 100 in 2004 to 92 in 2005, size structure was different; for the first time since white crappie became self-supporting, small fish were collected. Seven white crappie under 10 in long were collected in 2005, and all but one was an age-0 fish. Body condition of white crappie was excellent in 2005; mean W_r was 110 (N = 21) for fish over 10-in long.

As of 2004 a significant fishery for white crappie had not developed in Kirby Reservoir (Table 11). That changed in spring 2005 (Figure 13); anecdotal evidence from angler contacts indicated that large numbers of white crappie were caught and harvested.

Saugeye: Multiple year classes, based on histogram analysis, appeared for the first time in fall 2005 and spring 2006 in electrofishing and gill net surveys (Figures 14 and 15). Modal length of age-1, age-2, and age-3+ fish captured from gill nets in 2006 was 12-, 17-, and 23-in long, respectively. Relative abundance and size structure of saugeye, based on gill net surveys, indicated that saugeye have certainly become established, enough so to provide a fishable population. As of 2004, however, there was no angler directed effort or angler catch of saugeye, based on creel surveys. Anecdotal evidence from angler contacts and from catches made by district staff while fishing Kirby Reservoir suggests that saugeye are being sought and caught by anglers.

Fisheries management plan for Kirby Reservoir, Texas

Prepared – July 2006.

ISSUE 1: White crappie recruitment may have been poor in 2004 and 2005 despite adequate water levels and habitat or, possibly, trap nets failed to collect small fish.

MANAGEMENT STRATEGIES

1. Monitor white crappie population annually with trap nets, with additional effort if necessary, to assess recruitment.

ISSUE 2: Saugeye do not reproduce and must be stocked to maintain a population and fishery. Anecdotal evidence suggests that anglers are now seeking and catching saugeye.

MANAGEMENT STRATEGIES

1. Stock saugeye fingerlings annually at 50 fish/acre.
2. Inform anglers about availability of quality saugeye population through verbal and written communication.

ISSUE 3: With water levels maintained near full pool, flooded terrestrial vegetation will eventually disappear. Previous efforts to establish aquatic vegetation have failed. Bulrush, however, is doing well and spreading, but additional habitat may be necessary as woody cover declines.

MANAGEMENT STRATEGY

1. Install another 140 habitat structures and, if FishAmerica grant is secured, place 110 Berkeley Fish Habs in strategic areas of the littoral zone.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes annual trap net sampling for white crappie unless sufficient reproduction and recruitment is achieved. Electrofishing, hoop net, and gill net surveys will be conducted every other year beginning in 2007 to maintain quality trend data (Table 13). Mandatory monitoring will occur in 2009/2010.

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

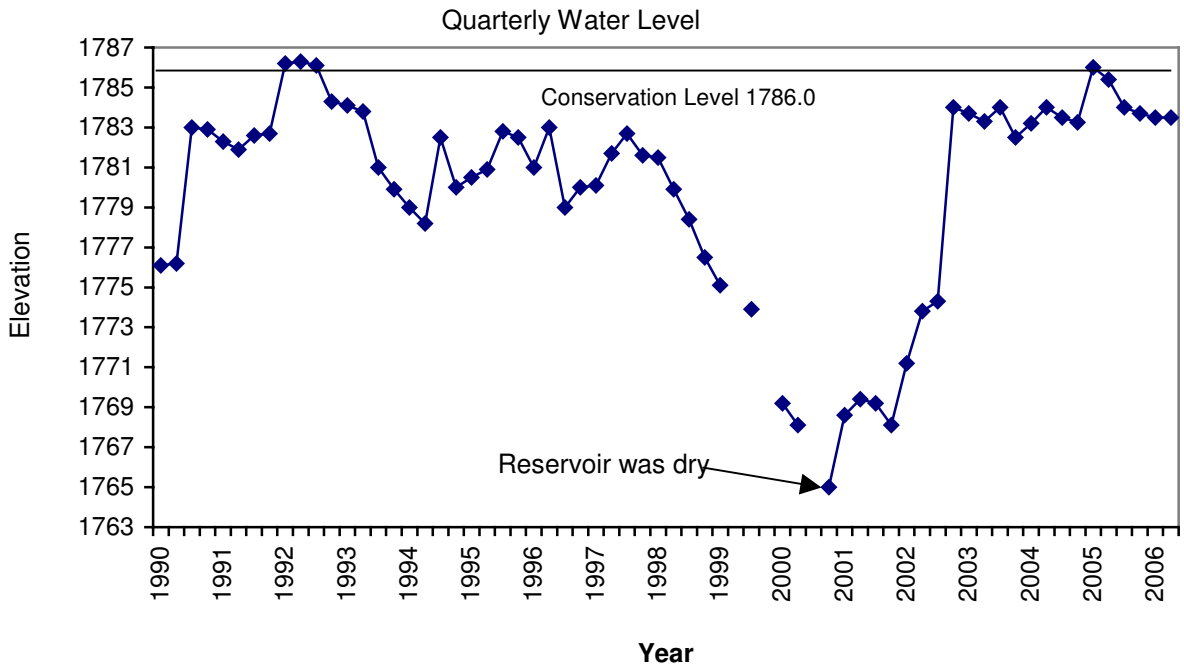


Figure 1. Quarterly water level elevations in feet above mean sea level recorded for Kirby Reservoir, Texas.

Table 1. Characteristics of Kirby Reservoir, Texas.

Characteristic	Description
Year constructed	1928
Controlling authority	City of Abilene
County	Taylor
Reservoir type	Tributary
Shoreline Development Index	2.22
Conductivity	909 umhos/cm

Table 2. Harvest regulations for Kirby 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, largemouth	5	14 – No Limit
Crappie, white and black crappie, their hybrids and subspecies	25 (in any combination)	10- No Limit
Saugeye	3	18 – No Limit

Table 3. Stocking history of Kirby Reservoir, Texas, since fall 2000. Size categories are: FRY =<1 inch; FGL = 1-3 inches; and ADL = adults.

Species	Year		Number	Size
Threadfin shad	2002		300	ADL
Golden shiner	2000		100	ADL
Fathead minnow	2000		500	ADL
Blue catfish	2001		74,000	FGL
Channel catfish	2001		73,794	FGL
	2004		1,621	FGL
		Total	75,415	
Inland silverside	2001		200	ADL
Bluegill	2001		475	ADL
	2001		370,196	FGL
		Total	370,671	
Flathead catfish	2003		44	ADL
Largemouth bass	2003		8,775	FGL
	2004		76,290	FGL
		Total	85,065	
Florida largemouth bass	2002		51,315	FGL
White crappie	2002		79	ADL
Saugeye	2001		704,701	FRY
	2002		143,101	FRY
	2004		37,425	FGL
	2005		15,806	FGL
		Total	901,033	

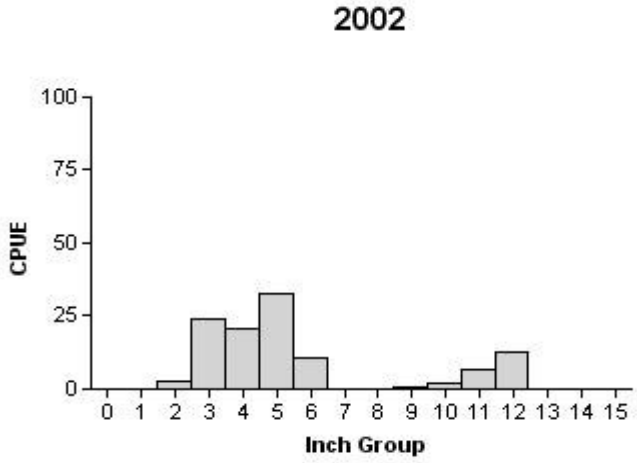
Table 4. Percent directed angler effort by species for Kirby Reservoir, Texas, 2003 – 2004.

Species	Year	
	2003	2004
Channel catfish	15	3
Catfishes	41	47
Common carp	< 1	< 1
Sunfishes	< 1	2
Largemouth bass	3	7
White crappie	1	2
Anything	38	38

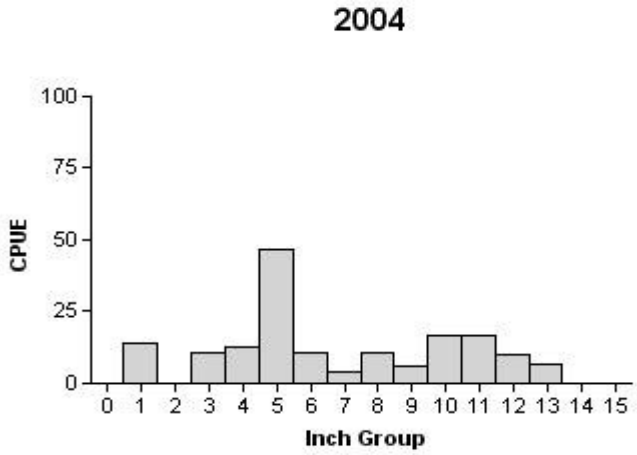
Table 5. Total fishing effort (h) for all species and total directed expenditures ($) at Kirby Reservoir, Texas, March-August, 2003 - 2004.

Creel Statistic	Year	
	2003	2004
Total fishing effort	19,770	22,481
Total directed expenditures	$25,405	$50,133

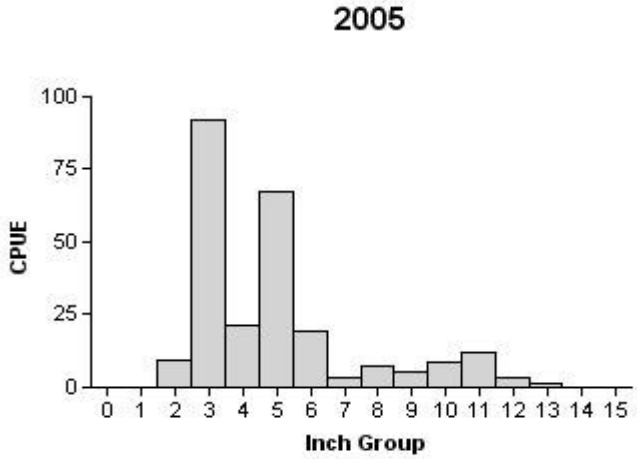
Gizzard Shad



Effort = 1.0
Total CPUE = 115.0 (23; 115)
IOV = 80.0 (7.0)



Effort = 1.0
Total CPUE = 168.0 (12; 168)
IOV = 59.0 (11.0)



Effort = 1.3
Total CPUE = 251.2 (41; 314)
IOV = 85.0 (7.0)

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, Kirby Reservoir, Texas, 2002, 2004, and 2005.

Bluegill

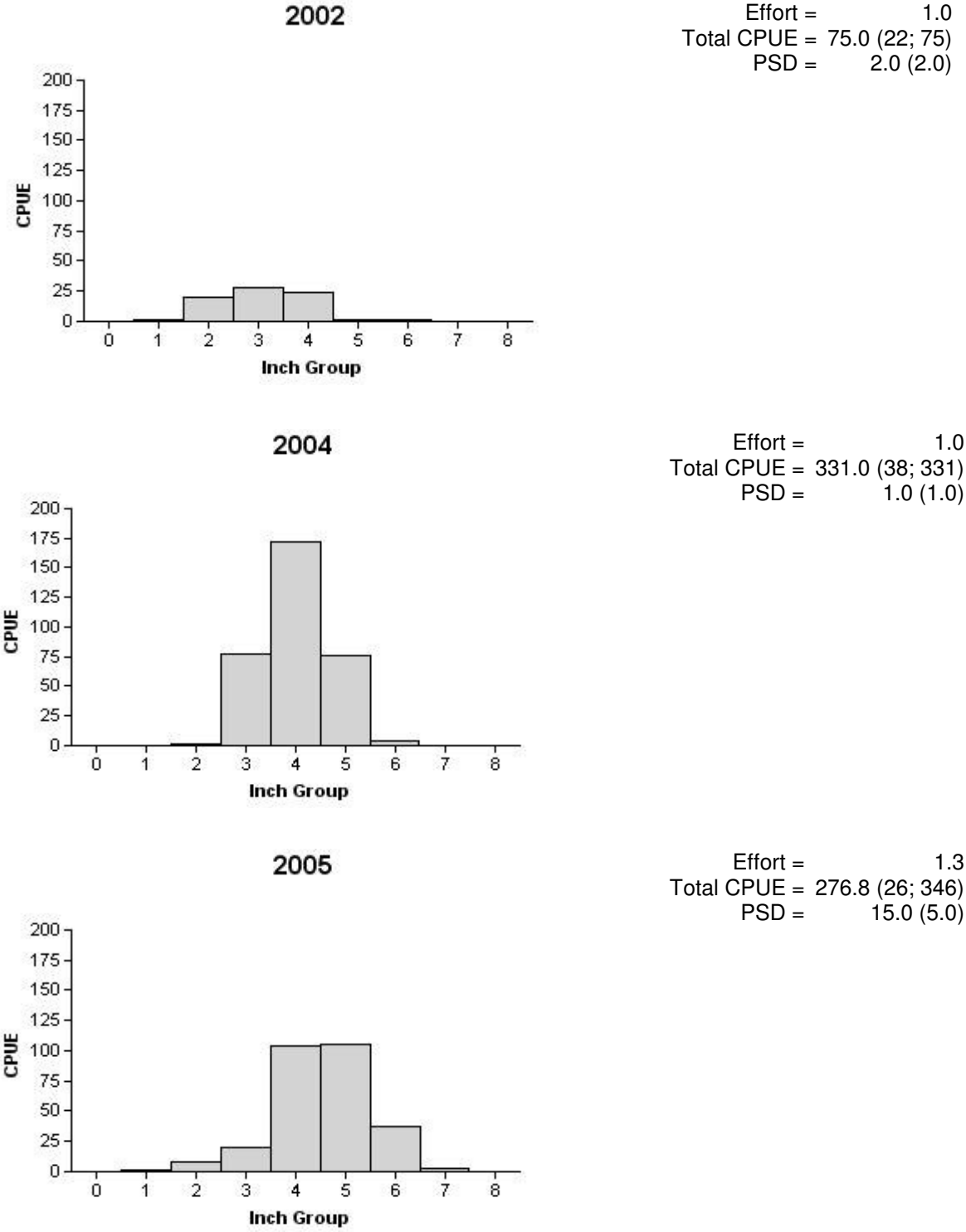
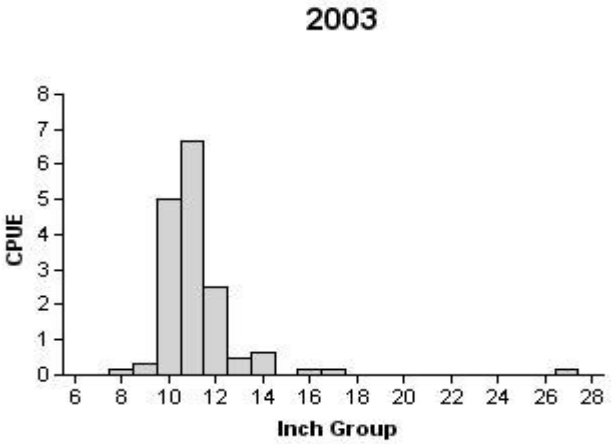
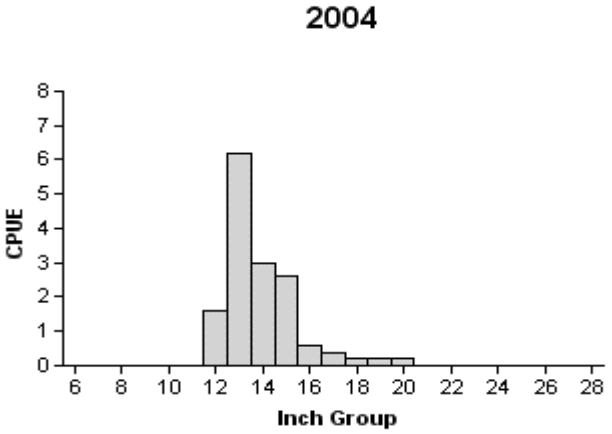


Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for PSD are in parentheses) for fall electrofishing surveys, Kirby Reservoir, Texas, 2002, 2004, and 2005.

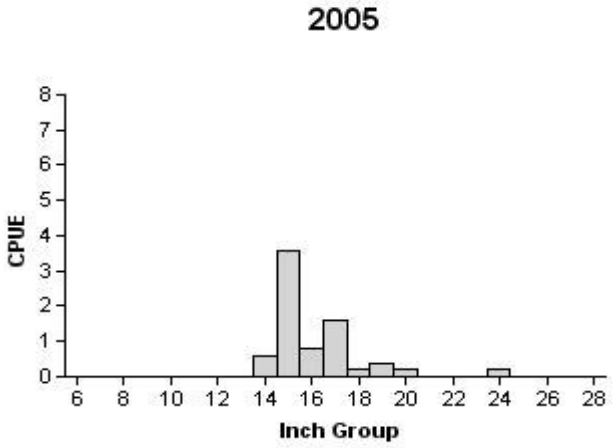
Blue Catfish



Effort = 6.0
Total CPUE = 16.3 (43; 98)
CPUE-12 = 4.2 (28; 25)
PSD = 4.0 (5.0)



Effort = 5.0
Total CPUE = 15.0 (45; 75)
CPUE-12 = 15.0 (45; 75)
PSD = 1.0 (2.0)



Effort = 5.0
Total CPUE = 7.6 (27; 38)
CPUE-12 = 7.6 (27; 38)
PSD = 5.0 (3.0)

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, Kirby Reservoir, Texas, 2003, 2004, 2005, and 2006.

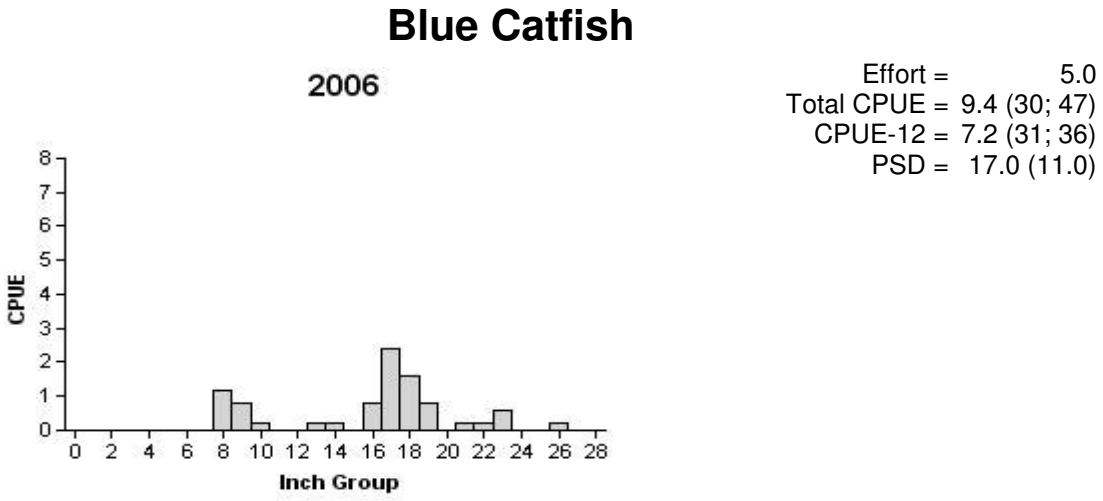


Figure 4. Continued.

Table 6. Creel survey statistics for blue catfish at Kirby Reservoir from March through August 2003-2004, 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
Directed effort (h)	7,973.00* (20)	10,537.00* (15)
Directed effort/acre	10.80* (20)	14.20* (15)
Total catch per hour	Not applicable	Not applicable
Total harvest	1,261.00 (83)	182.00 (453)
Harvest/acre	1.70 (83)	0.20 (453)
Percent legal released	8	0

Asterisk denotes directed effort combined for all catfish species.

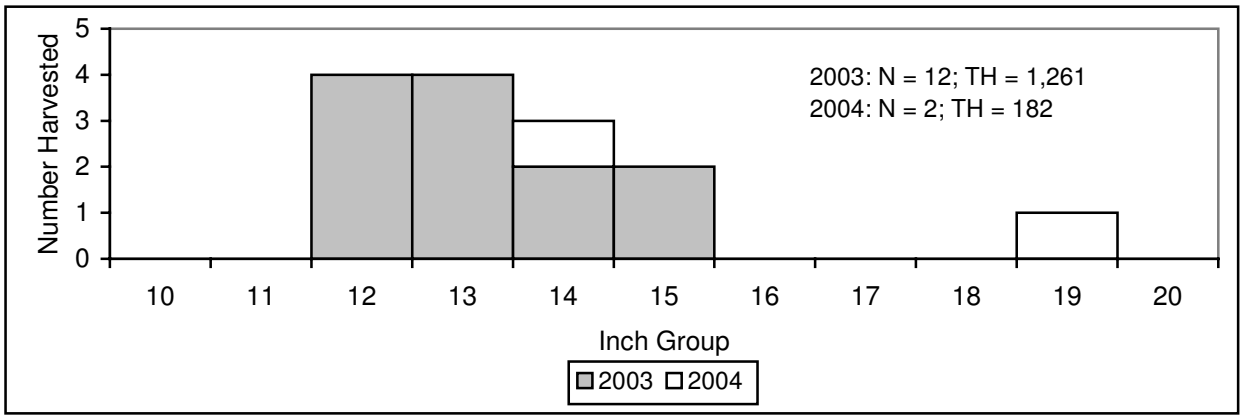
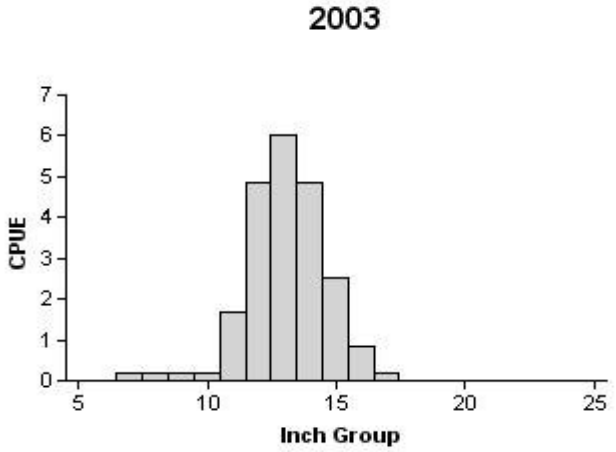
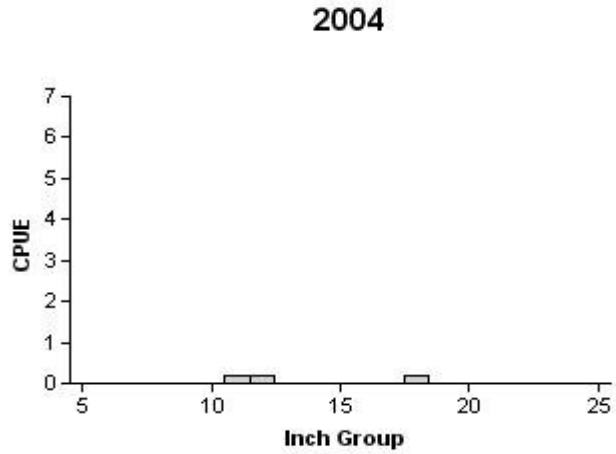


Figure 5. Length frequency of harvested blue catfish observed during creel surveys at Kirby Reservoir, Texas, March through August, 2003 and 2004, all anglers combined. N is the number of harvested blue catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

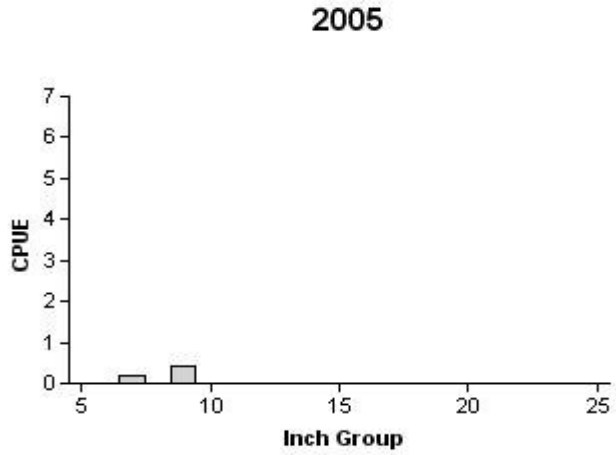
Channel Catfish



Effort =	6.0
Total CPUE =	21.5 (35; 129)
CPUE-12 =	19.2 (34; 115)
PSD =	5.0 (1.0)



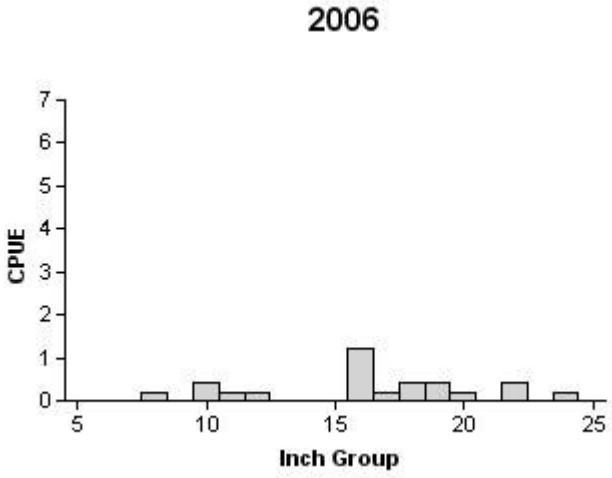
Effort =	5.0
Total CPUE =	0.6 (33; 3)
CPUE-12 =	0.4 (100; 2)
PSD =	33.0 (22.0)



Effort =	5.0
Total CPUE =	0.6 (0; 3)
CPUE-12 =	0.0 (0; 0)
PSD =	0.0 (0.0)

Figure 6. 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, Kirby Reservoir, Texas, 2003, 2004, 2005, and 2006.

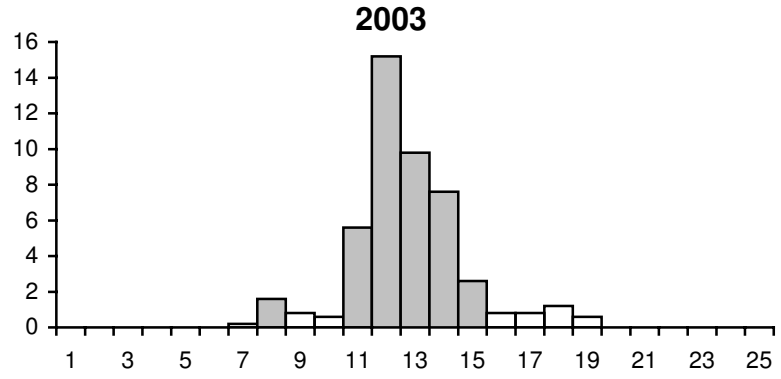
Channel Catfish



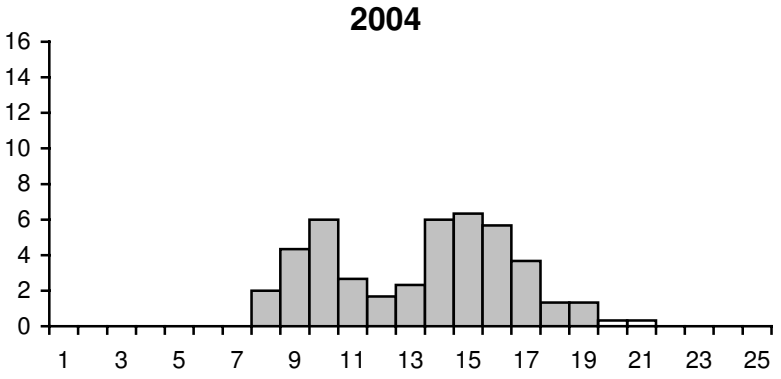
Effort = 5.0
Total CPUE = 4.0 (29; 20)
CPUE-12 = 3.2 (36; 16)
PSD = 88.0 (13.0)

Figure 6. Continued.

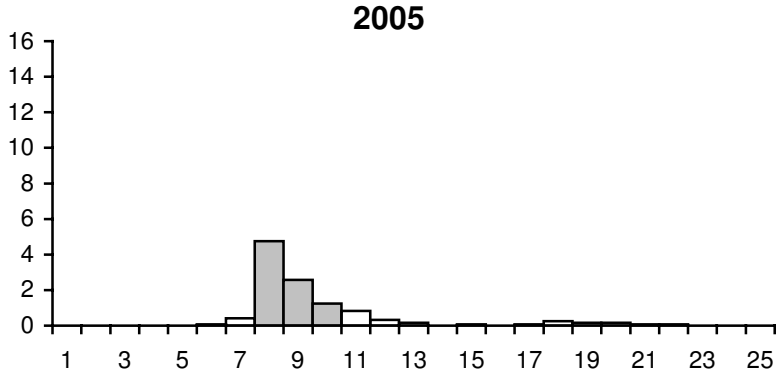
Channel Catfish



Effort = 5.0
Total CPUE = 47.4 (46; 237)
CPUE-12 = 38.6 (53; 193)
PSD = 8.0 (5.0)



Effort = 3.0
Total CPUE = 44.0 (20; 132)
CPUE-12 = 29.0 (20; 87)
PSD = 40.0 (7.0)



Effort = 12.0
Total CPUE = 11.3(36; 136)
CPUE-12 = 1.4(82; 17)
PSD = 37.0(19.0)

Figure 7. 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 hoop net surveys, Kirby Reservoir, Texas, 2003, 2004, 2005, and 2006.

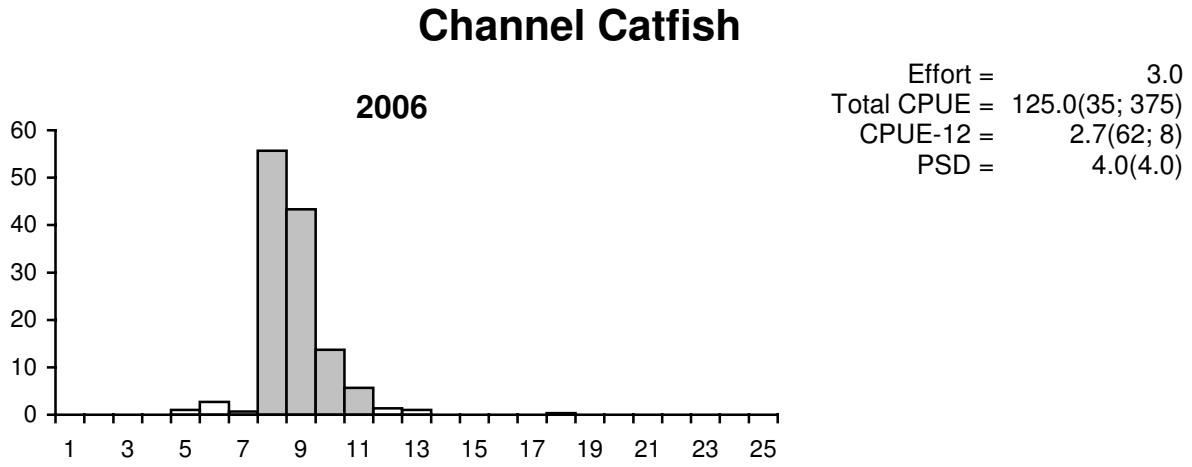


Figure 7. Continued.

Table 7. Creel survey statistics for channel catfish at Kirby Reservoir from March through August, 2003 and 2004, 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
Directed effort (h)	2,996.00 (31)	713.00 (49)
Directed effort/acre	4.05 (31)	0.96 (49)
Total catch per hour	0.62 (47)	0.30 (71)
Total harvest	9,496.00 (69)	1903.00 (37)
Harvest/acre	12.83 (69)	2.57 (37)
Percent legal released	39	18

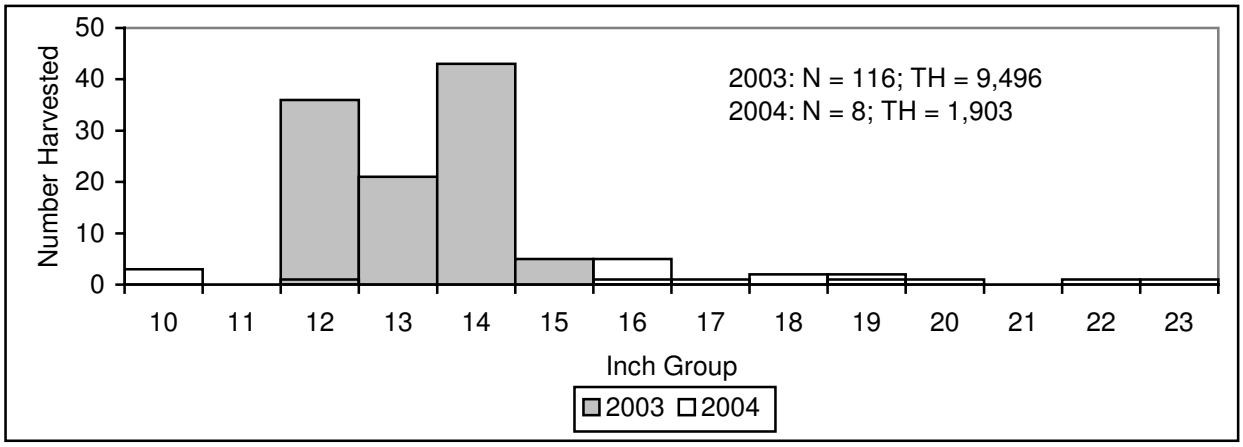
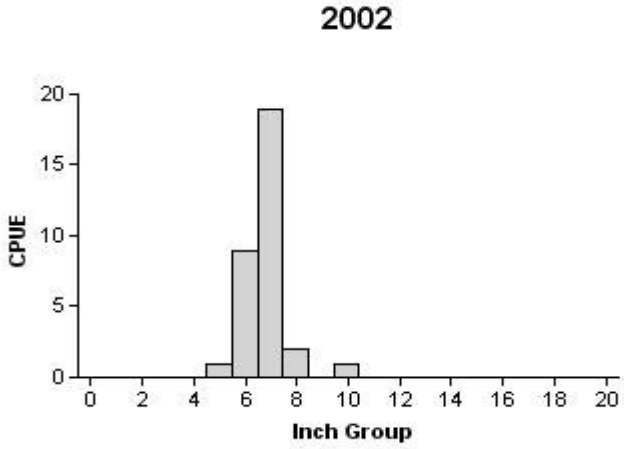
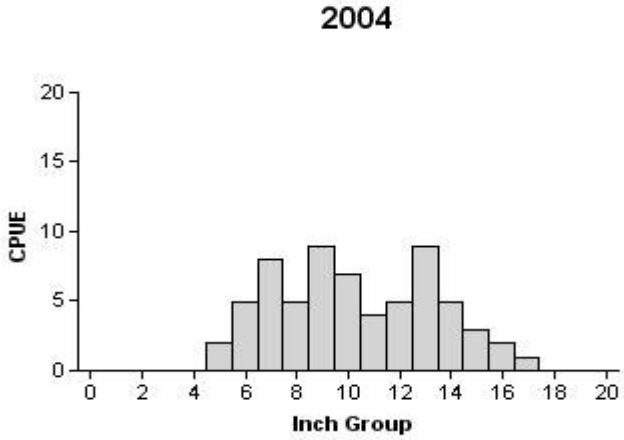


Figure 8. Length frequency of harvested channel catfish observed during creel surveys at Kirby Reservoir, Texas, March through August, 2003 and 2004, all anglers combined. N is the number of harvested channel catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

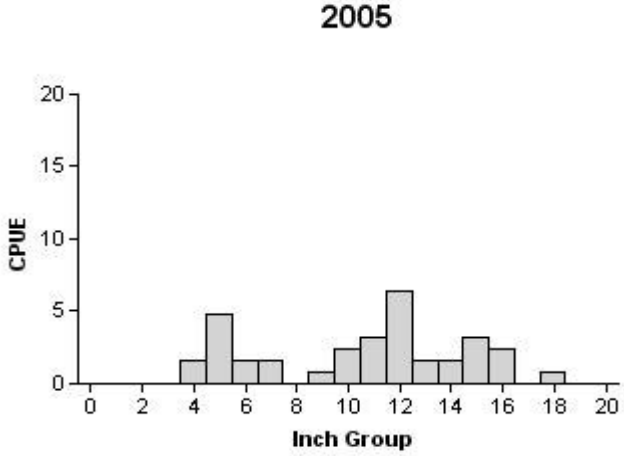
Largemouth Bass



Effort =	1.0
Total CPUE =	32.0 (23; 32)
Stock CPUE =	3.0 (72; 3)
CPUE-14 =	0.0 (0; 0)
PSD =	0.0 (0.0)
RSD-P =	0.0 (0)
RSD-14 =	0.0 (0)



Effort =	1.0
Total CPUE =	65.0 (25; 65)
Stock CPUE =	50.0 (28; 50)
CPUE-14 =	11.0 (30; 11)
PSD =	50.0 (5.0)
RSD-P =	12.0 (4.0)
RSD-14 =	22.0 (6.0)



Effort =	1.3
Total CPUE =	32.0 (20; 40)
Stock CPUE =	22.4 (19; 28)
CPUE-14 =	8.0 (36; 10)
PSD =	71.0 (10.0)
RSD-P =	29.0 (8.0)
RSD-14 =	36.0 (9.0)

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, Kirby Reservoir, Texas, 2002, 2004, and 2005.

Largemouth Bass

Table 8. Mean relative weight and sample size (N) of largemouth bass in size-classes (in) collected from fall electrofishing surveys, Kirby Reservoir, Texas, 2004 and 2005.

	Mean relative weight and number (N) in size-classes (in)		
Year	8.0 – 11.9	12.0 – 14.9	≥ 15.0
2004	99 (N = 27)	107 (N = 20)	115 (N = 10)
2005	99 (N = 8)	100 (N = 12)	109 (N = 8)

Table 9. Results of genetic analysis of largemouth bass collected by fall electrofishing, Kirby Reservoir, Texas, 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.

		Genotype					
Year	Sample size	FLMB	F1	Fx	NLMB	% FLMB alleles	% pure FLMB
2005	33	17	4	12	0	81.6	52.0

Table 10. Creel survey statistics for largemouth bass at Kirby Reservoir from March through August, 2003 and 2004, 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
Directed effort (h)	523.00 (56)	1,481.00 (56)
Directed effort/acre	0.71 (56)	2.00 (56)
Total catch per hour	0.31 (38)	0.62 (40)
Total harvest	0.00 (0)	107.00 (290)
Harvest/acre	0.00 (0)	0.14 (290)
Percent legal released	Not applicable	72.00

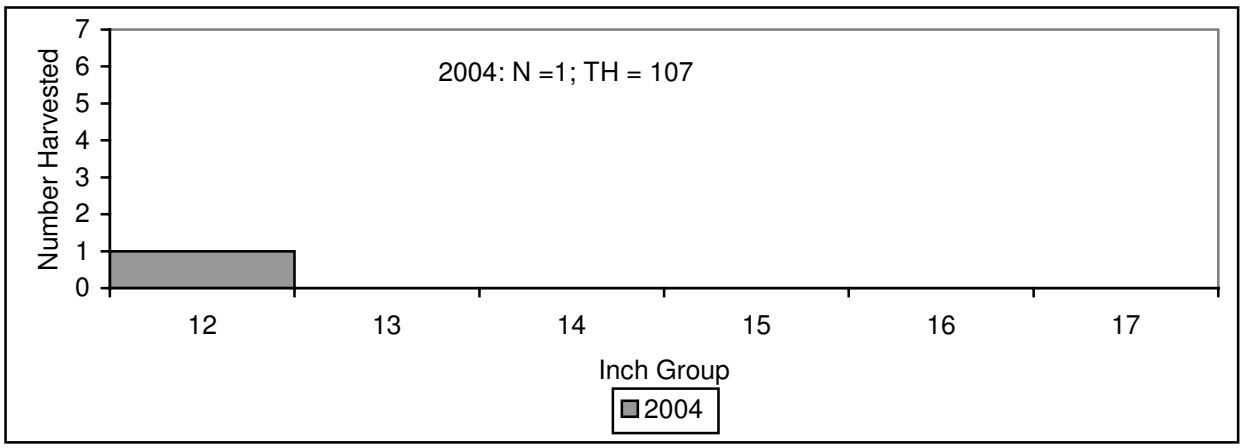
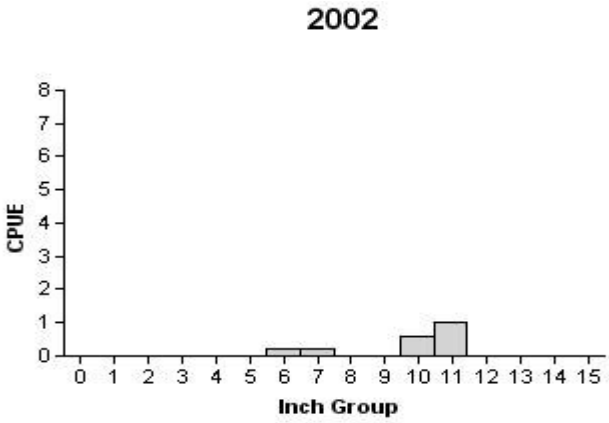
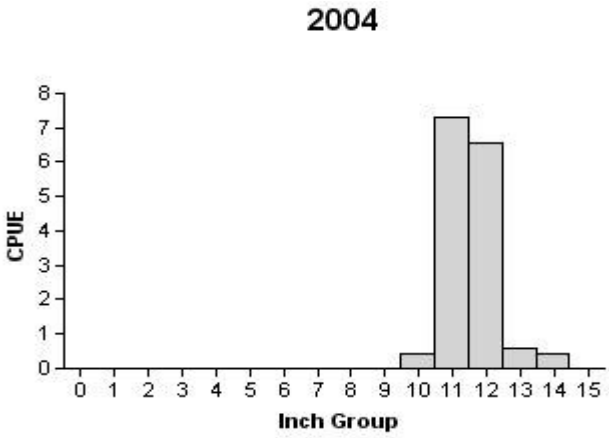


Figure 10. Length frequency of harvested largemouth bass observed during creel surveys at Kirby Reservoir, Texas, March through August, all anglers combined, in 2004. N is the number of harvested largemouth bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

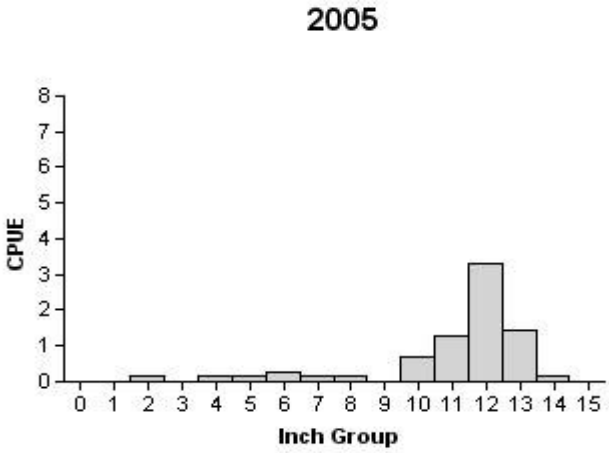
White Crappie



Effort =	5.0
Total CPUE =	2.0 (80; 10)
Stock CPUE =	2.0 (80; 10)
CPUE-10 =	1.6 (75; 8)
PSD =	80.0 (4.0)
RSD-10 =	80.0 (4.0)



Effort =	7.0
Total CPUE =	15.3 (59; 107)
Stock CPUE =	15.3 (59; 107)
CPUE-10 =	15.3 (59; 107)
PSD =	100.0 (0.0)
RSD-10 =	100.0 (0.0)



Effort =	7.0
Total CPUE =	7.9 (30; 55)
Stock CPUE =	7.6 (32; 53)
CPUE-10 =	6.9 (36; 48)
PSD =	92.0 (6.0)
RSD-10 =	91.0 (6.0)

Figure 11. 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, Kirby Reservoir, Texas, 2002, 2004, and 2005.

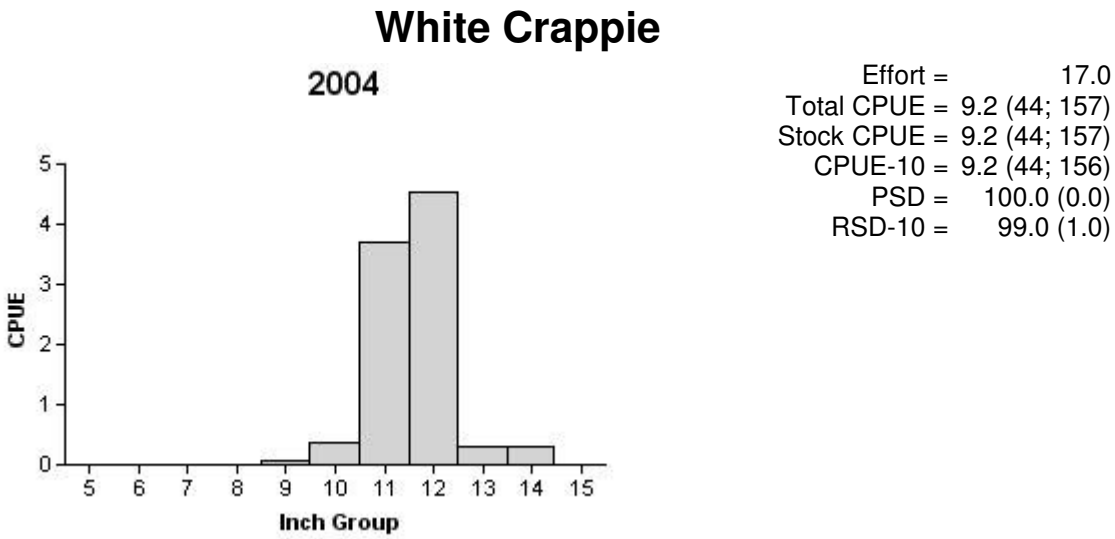


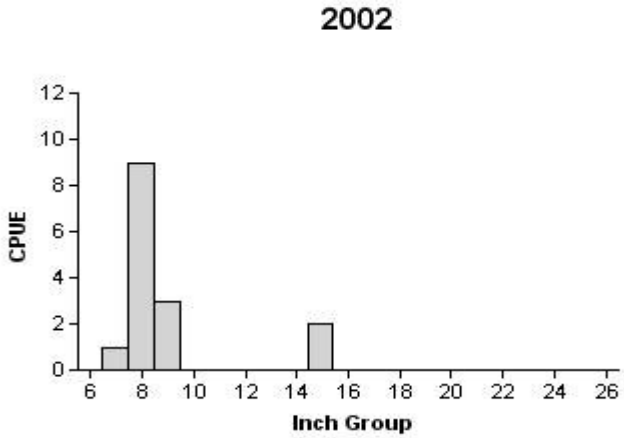
Figure 12. Number of white crappie caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys (seven random net nights with ten additional non-standard net nights), Kirby Reservoir, Texas, 2004.

Table 11. Creel survey statistics for white crappie at Kirby Reservoir from March through August in 2003 and 2004, 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

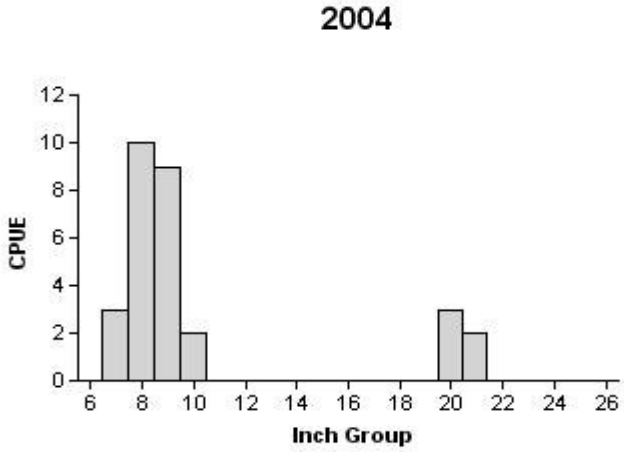
Creel Survey Statistic	Year	
	2003	2004
Directed effort (h)	257.00 (95)	391.00 (65)
Directed effort/acre	0.35 (95)	0.53 (65)
Total catch per hour	0.00	0.03 (100)
Total harvest	0.00	0.00
Harvest/acre	0.00	0.00
Percent legal released	Not applicable	Not applicable

Figure 13. Crappie anglers at Kirby Reservoir, spring 2005.

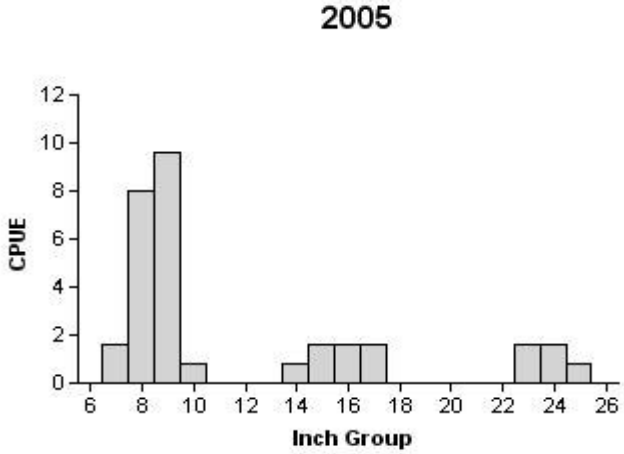
Saugeye



Effort = 1.0
Total CPUE = 15.0 (34; 15)
CPUE-18 = 0.0 (0; 0)
PSD = 40.0 (27.0)



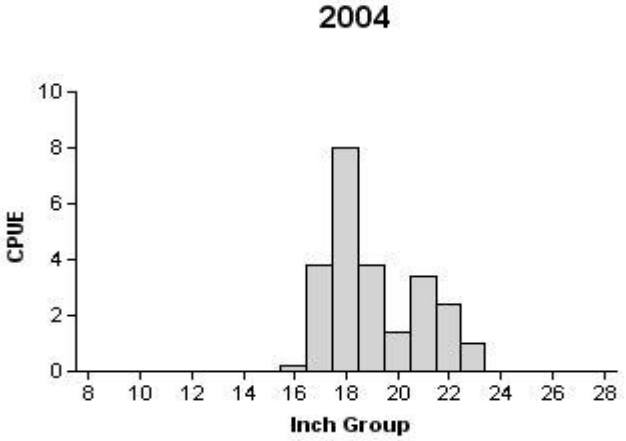
Effort = 1.0
Total CPUE = 29.0 (26; 29)
CPUE-18 = 5.0 (52; 5)
PSD = 31.0 (16.0)



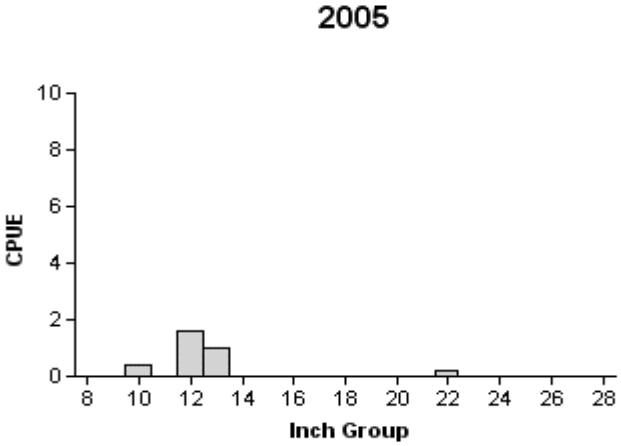
Effort = 1.3
Total CPUE = 29.6 (22; 37)
CPUE-18 = 4.0 (62; 5)
PSD = 48.0 (11.0)

Figure 14. Number of saugeye caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Kirby Reservoir, Texas, 2002, 2004, and 2005.

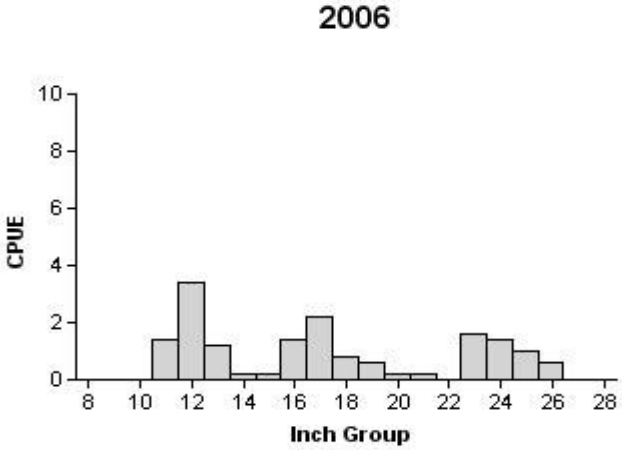
Saugeye



Effort = 5.0
Total CPUE = 24.0 (46; 120)
CPUE-18 = 20.0 (45; 100)
PSD = 100.0 (0.0)
RSD-18 = 83.0 (1.0)



Effort = 5.0
Total CPUE = 3.2 (44; 16)
CPUE-18 = 0.2 (100; 1)
PSD = 6.0 (6.0)
RSD-18 = 6.0 (6.0)



Effort = 5.0
Total CPUE = 16.4 (16; 82)
CPUE-18 = 6.4 (25; 32)
PSD = 63.0 (8.0)
RSD-18 = 39.0 (11.0)

Figure 15. Number of saugeye 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, Kirby Reservoir, Texas, 2004, 2005, and 2006.

Table 12. Proposed sampling schedule for Kirby Reservoir, Texas. Gill netting and hoop 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	Hoop Net	Creel	Report
Fall 2006-Spring 2007		A				
Fall 2007-Spring 2008	A	A	A	A	A	
Fall 2008-Spring 2009		A				
Fall 2009-Spring 2010	S	S	S	S	A	S

APPENDIX A

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

Species	Gill Netting		Trap Netting		Hoop Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE	N	CPUE
Gizzard shad							314	251.2
Threadfin shad							32	25.6
Blue catfish	47	9.4			3	0.3		
Channel catfish	20	4.0			136	11.3		
Flathead catfish	2	0.4						
Redbreast sunfish							1	0.8
Green sunfish							23	18.4
Bluegill							346	276.8
Redear sunfish							2	1.6
Largemouth bass							40	32
White crappie			55	7.9				
Saugeye	82	16.4					37	29.6

APPENDIX B

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