

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-34

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2008 Survey Report

Lake Murvaul

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July 31, 2009

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake Murvaul were surveyed in 2008 using electrofishing and trap netting, and in 2009 using gill netting. Anglers were surveyed from March 2007 through May 2007 and March 2009 through May 2009 with a roving creel survey. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Lake Murvaul is a 3,820-acre impoundment constructed in 1958 on Murvaul Creek in the Sabine River Basin. Structural habitat is mainly inundated timber and natural shoreline features. Native aquatic plant abundance is limited, but hydrilla coverage has increased in recent years and has provided submersed aquatic vegetation habitat. Giant salvinia was found and removed adjacent to a boat ramp on the reservoir.
- **Management history:** The trophy largemouth bass fishery at Lake Murvaul has been a focus of fisheries management efforts for many years. The fishery is currently managed with a 14- to 21-inch protective slot-length limit with a 5-fish daily bag, of which only one fish can be greater than 21 inches. Florida largemouth bass were stocked in 2008 and 2009 to maintain this trophy fishery. Other important sport fish include channel catfish and crappie. Both species are managed with statewide harvest regulations.
- **Fish community:**
 - **Prey species:** Both gizzard shad and threadfin shad were present in the latest survey. Over 50% of gizzard shad were small enough to be available as prey to most sport fish. Bluegill is the most abundant sunfish species in the reservoir and serves as an excellent prey source for predators.
 - **Catfishes:** Gill netting catch rates of channel catfish were higher in 2009 than in the past two surveys. In addition, there were many channel catfish collected above legal length (12 inches) during the latest survey. Thirty-six percent of all angling effort at Lake Murvaul was directed towards catfish from March through May 2009. Anglers caught 1.2 catfish per hour of fishing and harvested 93% of all legal fish caught.
 - **Largemouth bass:** Electrofishing catch rates of all largemouth bass in 2008 were slightly lower than previous surveys. However, the percentage of fish longer than 14 inches was higher than previous years and in line with trophy management objectives. Fish body condition was adequate, indicating adequate prey availability. Growth rates of largemouth bass were moderate. Twenty-three percent of the directed effort from March through May 2009 at Lake Murvaul was from anglers targeting largemouth bass; which placed largemouth bass directed effort third behind crappie and catfish.
 - **Crappie:** Trap netting catch rates of crappie in 2008 were moderate. Directed angling effort was highest for crappie compared to other species in the 2009 spring survey period. Anglers caught 1.5 fish per hour and harvested all legal-size crappie from March through May 2009.
- **Management strategies:** Conduct electrofishing surveys every other year beginning in 2010, and general monitoring with trap nets in 2012 and gill nets in 2013. Invasive aquatic vegetation surveys will be conducted annually. Technical guidance will be given to controlling authority regarding invasive aquatic vegetation management as necessary. Largemouth bass will continue to be managed with a 14- to 21-inch slot-length limit. Florida largemouth bass stocking is recommended annually to maintain the trophy fishery. Spring-quarter (March through May) angler creel surveys will be conducted every 4 years beginning 2013.

INTRODUCTION

This document is a summary of fisheries data collected from Lake Murvaul from June 2008 through May 2009. 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 fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2008 and 2009 data for comparison.

Reservoir Description

Lake Murvaul is located on Murvaul Creek in the Sabine River Basin. It was constructed by the Panola County Fresh Water Supply District in 1957 for municipal and industrial water supply and public recreation. It has a drainage area of approximately 115 square miles. At conservation pool elevation, the reservoir covers 3,820 acres, shoreline length is 29 miles, and shoreline development index is 6.7 (Table 1). Water levels are relatively stable; average annual fluctuation is generally less than 2 feet (Figure 1). Boating access is available at four locations and shoreline access for anglers is adequate. Primary structural shoreline habitat consisted of natural shoreline. Almost 20% of shoreline has been modified with bulkhead. Even though the reservoir has lacked aquatic vegetation in recent years, hydrilla and native emerged aquatic vegetation coverage was substantially higher in 2008. Lake Murvaul received national recognition during the 1960s for its trophy native largemouth bass fishery. Lake Murvaul was one of the first reservoirs in Texas to be stocked with Florida largemouth bass. The introduction of Florida largemouth bass in this reservoir has further enhanced the trophy fishery. From 1987 to 1997, anglers caught 6 largemouth bass >13 lbs that have been entered into TPWD's ShareLunker Program. The current waterbody record for largemouth bass is 14.87 lbs.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Brice 2005) included:

1. Conduct fall electrofishing survey in 2005 to monitor the largemouth bass population and assess the effectiveness of the slot-length limit harvest regulation.
Action: Due to low water levels in fall 2005, the supplemental electrofishing survey was conducted in 2006. Data from 2006 was examined along with 2008 electrofishing data to assess the slot-length limit.
2. Conduct a roving angler creel survey during the spring quarter 2006 to monitor angler utilization and fishing success.
Action: Due to low water in spring 2006, the creel survey was conducted from March through May 2007. Another spring creel survey was conducted from March through May 2009.
3. Stock Florida largemouth bass in 2006 and 2007 at a rate of 50 fish/acre to enhance the trophy potential of the largemouth bass population.
Action: Florida largemouth bass stocking was conducted in 2008 and 2009.
4. Provide information to inform anglers of fishing opportunities.
Action: District staff provided fisheries information to Lake Murvaul Marina and the controlling authority.

Harvest regulation history: Sport fishes in Lake Murvaul are currently managed with statewide regulations except for largemouth bass (Table 2). Largemouth bass are managed with a 14- to 21-inch slot-length limit and 5-fish daily bag of which only one fish can be over 21 inches. This regulation was implemented in September 1999. The previous regulation was a 14-inch minimum length limit.

Stocking history: Lake Murvaul was stocked with channel catfish several times between 1967 and 1979. These stockings were successful in establishing a reproducing population. The channel catfish fishery is

popular among anglers at the reservoir. Florida largemouth bass were first stocked in Lake Murvaul in 1972. This was one of the first reservoirs to be stocked with Florida largemouth bass in Texas. The complete stocking history is presented in Table 3.

Vegetation/habitat history: During past surveys, Lake Murvaul has exhibited moderate densities of aquatic vegetation, with hydrilla coverage at approximately 27% of the reservoir surface area. From 2000 to 2007, submerged aquatic vegetation coverage was low. Following low-water conditions from drought in 2005, hydrilla coverage has increased in subsequent surveys. Waterhyacinth was discovered several years ago, but following physical removal, it has not returned.

METHODS

Fishes were collected by electrofishing (1.0 hour at 12, 5-min stations), trap netting (5 net nights at 5 stations), and gill netting (5 net nights at 5 stations). Since the last survey report, two roving angler creel surveys were conducted from March through May 2007 and March through May 2009. The creel surveys consisted of 4, randomly-selected weekdays and 5, randomly-selected weekend days. Each day was partitioned into 3, 4-hour survey periods, which were randomly selected for each survey day. Aquatic vegetation surveys and habitat surveys were conducted in September 2008. Catch-per-unit-effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for trap nets and gill nets, as the number of fish caught per net night (fish/nn). All survey sites were randomly selected and electrofishing, gill netting, vegetation, habitat, and creel surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2008).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)], and condition indices [relative weight (Wr)] were calculated for 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 = $100 \times \text{SE of the estimate/estimate}$) 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 12 randomly-selected largemouth bass (range 13.1 to 14.9 inches) in 2008. A category-3 age sample was conducted for largemouth bass in 2006 by randomly collecting up to 5 fish per 0.39-inch group, which allowed for calculation of mean length at ages 1, 2, and 3. Crappie ages were determined using otoliths from up to 5 fish per inch group. Genetic analysis of the largemouth bass population was not conducted because Florida largemouth bass were stocked in the reservoir in 2008. Source for water level data was the United States Geological Survey (USGS) website.

RESULTS AND DISCUSSION

Habitat: Natural features were present along 79% of the shoreline at Lake Murvaul. Bulkhead and boat docks account for 19% of the shoreline. Hydrilla (250 acres) was the only submersed aquatic plant species observed during the survey period. Native emerged vegetation covered 128 acres and included American lotus, smartweed, water primrose, waterleaf, bulrush, cutgrass, and duck potato. Alligatorweed, a non-native emerged species, covered 4 acres. Details of the 2008 structural habitat and aquatic vegetation survey are found in Table 4. Giant salvinia was discovered in the water near the most popular boat ramp during spring 2009 and physically removed. Further investigation did not locate any more giant salvinia.

Creel: Directed fishing effort by anglers during the previous two spring-quarter creel surveys was highest for crappie and catfish followed by largemouth bass (Table 5). Total spring fishing effort for all species at Lake Murvaul was 32,438 h in 2009, which was higher than in 2007 (25,057 h) (Table 6). Anglers spent an estimated \$139,885 in direct expenditures during spring 2009 and \$116,006 in spring 2007 (Table 6).

Prey species: The 2008 electrofishing catch rate of gizzard shad was 188/h, which was more than twice

the catch rate during the 2006 survey, but similar to the 2004 survey (Figure 2). Index of vulnerability (IOV) was moderate, indicating that 58% of gizzard shad were available to existing predators. Threadfin shad were also present (Appendix A). Bluegill was the most abundant sunfish species during the 2008 electrofishing survey (773/h) (Figure 4). Bluegill were not as abundant as in 2006 (1,052/h) but the 2008 electrofishing catch rate was more than twice that in 2004. Redear sunfish, redbreast sunfish, and longear sunfish serve as additional prey species in the reservoir.

Channel catfish: Gill net catch rate of channel catfish in 2009 was 24.0/nn, which was higher than in 2005 (21.2/nn) and 2001 (18.2/nn) (Figure 7). Body condition was adequate with mean W_r for most inch groups around 90 (Figure 7). The population size structure of channel catfish was desirable. Twenty-four percent of all channel catfish ≥ 11 inches were longer than 16 inches (PSD = 24, Figure 7). The March through May 2009 creel survey indicated that directed effort for channel catfish was 3.4 h/acre, which was higher than the 2007 spring angler survey (2.3 h/acre) (Table 8). Catfish anglers caught 1.3 fish/h in spring 2007 and 1.2 fish/h in spring 2009. The catfish fishery at Lake Murvaul is highly consumptive with anglers harvesting over 90% of legal-sized fish caught (Table 8, Figure 8). Harvested fish ranged in size from 10 to 20 inches in spring 2007 and 12 to 18 inches in spring 2009 (Figure 8).

Largemouth bass: The electrofishing catch rate of largemouth bass in 2008 was 117/h, which was lower than the 2006 survey (156/h), but higher than 2004 (92/h) (Figure 9). However, the catch rate of stock-size fish (fish ≥ 8 inches) was higher in 2008 (61/h) than in the previous two surveys. Size structure indices (PSD and RSD-P) have increased in recent surveys and approach levels recommended by Gabelhouse (1984) for trophy management of the largemouth bass fishery. Growth of largemouth bass was moderate. The average lengths-at-age in 2006 were 10.5 inches (age 1), 13.5 inches (age 2) and 15.8 inches (age 3) (Table 9). There has been no detectable decline in growth rates in the past three surveys. The average age at 14 inches (13.1 to 14.9 inches) was 2.1 years ($N = 12$; range 2 – 3 years) in 2008. The age-and-growth analysis in 2006 collected fish up to age 9 (Figure 10). Condition of largemouth bass was desirable with mean W_r for most inch groups >95 (Figure 9). A table of predicted weights at length for Lake Murvaul largemouth bass can be found in Appendix B.

Anglers targeting largemouth bass fished 2.2 h/acre during March through May 2009 compared to 0.9 h/acre during March through May 2007 (Table 10). Total angling catch rate of largemouth bass was lower in spring 2009 (0.5 fish/h) than in spring 2007 (1.1 fish/h) (Table 10). Anglers targeting largemouth bass in spring 2009 caught 0.3 fish/h within the protective slot limit, which was higher than the catch rate of largemouth bass smaller than the lower end of the protected size range (0.2 fish/h) (Table 10). Anglers released 100% of legal fish caught in spring 2007 and 72% in spring 2009 (Table 10). The only harvest observed in spring 2009 consisted of fish below the slot length limit (Figure 11).

Crappie: Trap netting for crappie in Lake Murvaul has traditionally been an effective survey gear. Catch rate of white crappie in fall 2008 (5.4/nn) was similar to 2004 (5.0/nn) and 2000 (6.6/nn) (Figure 12). Black crappie catch rates were higher in 2008 (9.2/nn) compared to 2004 (3.6/nn) but much lower than in 2000 (17.3/nn) (Figure 14). White crappie grew faster than black crappie, but age-4 fish were collected from both species (Figures 13 and 15). Anglers targeting crappie fished 11,620 hours in spring 2009, which was similar to 10,767 hours in spring 2007 (Table 11). Angling catch rate of crappie (both species combined) was 1.5 fish/h in spring 2009, compared to 1.8 fish/h in spring 2007. Anglers harvested 100% of legal-length crappie during the 2009 spring survey and 96% in 2007 (Table 11). Harvested crappie ranged in length from 9 to 15 inches in spring 2009 and 10 to 15 inches in spring 2007 (Figure 16).

Fisheries management plan for Lake Murvaul, Texas

Prepared – July 2009

ISSUE 1: The presence of invasive aquatic vegetation at Lake Murvaul has the potential to threaten water quality, native aquatic vegetation, and angler access. Currently, hydrilla is present in the upper end of the reservoir. If hydrilla spreads to areas in the lower reservoir, it could become problematic for lakeside homeowners. Giant salvinia was found and physically removed from the water near the most popular boat launch on the reservoir. Even though no more giant salvinia has been found, the potential exists that it could still be present in the reservoir. Lake Murvaul's close proximity to other area water bodies that contain giant salvinia is a concern. The reservoir should be continuously monitored for giant salvinia presence. Alligatorweed is present and may become problematic along certain shorelines.

MANAGEMENT STRATEGY

1. Continue to provide technical guidance to the controlling authority regarding invasive aquatic plant management.
2. Conduct annual surveys to monitor trends and estimate coverage of invasive aquatic vegetation.

ISSUE 2: Lake Murvaul has traditionally been a high-quality largemouth bass fishery. The introduction of Florida largemouth bass and the 14- to 21-inch slot-length limit has enhanced the fishery.

MANAGEMENT STRATEGY

1. Conduct spring-quarter (March through May) creel surveys every 4 years beginning in 2013 to monitor angling effort and catch rates for largemouth bass.
2. Conduct electrofishing surveys in fall every 2 years beginning 2010 to monitor relative abundance, growth, and size structure of largemouth bass and prey species populations.
3. Request annual stocking of Florida largemouth bass (50 fish/acre) to maintain the trophy aspect of the fishery.
4. Solicit input from the controlling authority and Lake Murvaul Marina regarding the potential to implement a trophy largemouth bass volunteer angler reporting program at the reservoir to document angler catches of largemouth bass >21 inches.
5. Provide largemouth bass length-to-weight conversion table to Lake Murvaul Marina and anglers. This conversion table will be updated as new data are available.

ISSUE 3: Anglers and stakeholders should be informed about fisheries management activities, fishing opportunities, and other issues at Lake Murvaul.

MANAGEMENT STRATEGIES

1. Continue to provide news releases to the print and broadcast media.
2. Continue to provide fisheries presentations to the public regarding issues/opportunities at Lake Murvaul.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes annual invasive aquatic vegetation surveys, a supplemental electrofishing survey in 2010, spring-quarter creel survey 2013, and required electrofishing, trap netting, and gill netting surveys in 2012-2013 (Table 12). Annual vegetation surveys are necessary to monitor the status of invasive aquatic vegetation and to provide coverage estimates to the controlling authority. Spring-quarter creel surveys will be conducted to monitor angling effort and catch rates. Because the slot-length limit for largemouth bass is more restrictive

than the statewide 14-inch minimum length limit, supplemental electrofishing in 2010 will be conducted to monitor the largemouth bass and prey fish populations.

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Monthly Water Levels

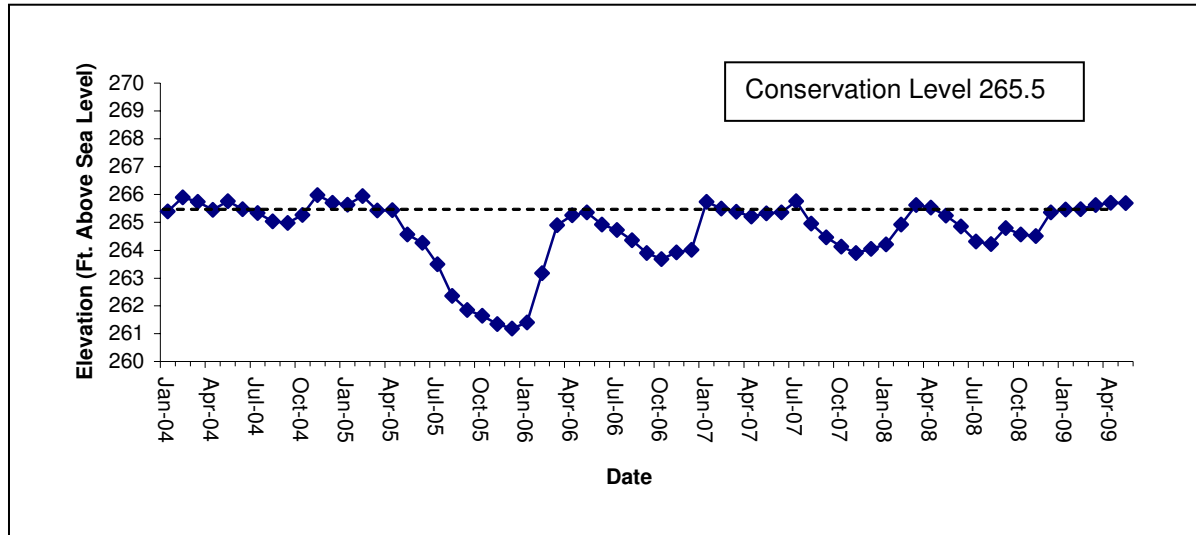


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Lake Murvaul, Texas. Horizontal line denotes conservation pool level (265.5 msl).

Table 1. Characteristics of Lake Murvaul, Texas.

Characteristic	Description
Year constructed	1958
Controlling authority	Panola County Fresh Water District
County	Panola
Reservoir type	Tributary
Shoreline development index (SDI)	6.7
Conductivity	253 umhos/cm

Table 2. Harvest regulations for Lake Murvaul, Texas.

Species	Bag Limit	Minimum-Maximum Length (inches)
Catfish, channel	25	12 - No Limit
Catfish, flathead	5	18 - No Limit
Bass, largemouth	5	14 – 21 ^a
Crappie, white and black crappie, their hybrids and subspecies	25 (in any combination)	10 - No Limit

^a Largemouth bass 14 inches and less or 21 inches and greater may be retained. Only one largemouth bass 21 inches or greater may be retained each day.

Table 3. Stocking history of Murvaul, Texas. Life stages are fingerlings (FGL), advanced fingerlings (AFGL), adults (ADL) and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species mean total length (Mean TL; in) is given. For years where there were multiple stocking events for a particular species and life stage the mean TL is an average for all stocking events combined.

Species	Year	Number	Life Stage	Mean TL (in)
Channel catfish	1967	3,000	AFGL	7.9
	1968	6,000	AFGL	7.9
	1969	5,000	AFGL	7.9
	1973	3,000	AFGL	7.9
	1979	181,084	AFGL	7.9
	Total	198,084		
Florida Largemouth bass	1972	200	AFGL	5.0
	1980	380	ADL	11.8
	1989	6	ADL	13.5
	1997	95,235	FGL	1.3
	1998	95,000	FGL	1.1
	1999	102,680	FGL	1.3
	2008	171,250	FGL	1.5
	2009	177,523	FGL	1.6
	Total	642,274		
Largemouth bass	1972	10,000	UNK	UNK
	Total	10,000		

Table 4. Survey of littoral zone and physical habitat types, Lake Murvaul, Texas, 2008. A linear shoreline distance (miles) was recorded for each habitat type found. Surface area (acres) and percent of reservoir surface area was determined for each type of aquatic vegetation species found.

Habitat type	Shoreline distance		Surface area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Natural shoreline	17.47	52.6		
Natural shoreline with boat docks	8.73	26.3		
Bulkhead with boat docks	6.24	18.8		
Rocky shoreline	0.77	2.3		
Native emerged vegetation			128	3.78
Hydrilla			250	7.38
Alligatorweed			4	0.12

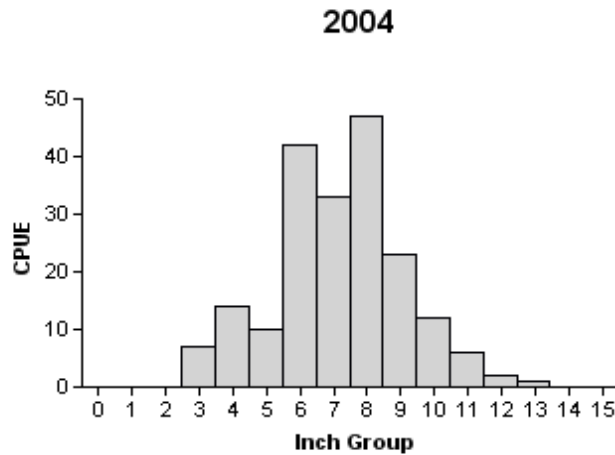
Table 5. Percent directed angler effort by species for Lake Murvaul, Texas, 2007 – 2009. Surveys were spring quarter only (March through May).

Species	Year	
	2007	2009
Largemouth bass	11.7	23.0
Catfish	31.3	35.6
Crappie	43.0	35.8
Sunfish	2.9	4.4
Anything	11.2	1.14

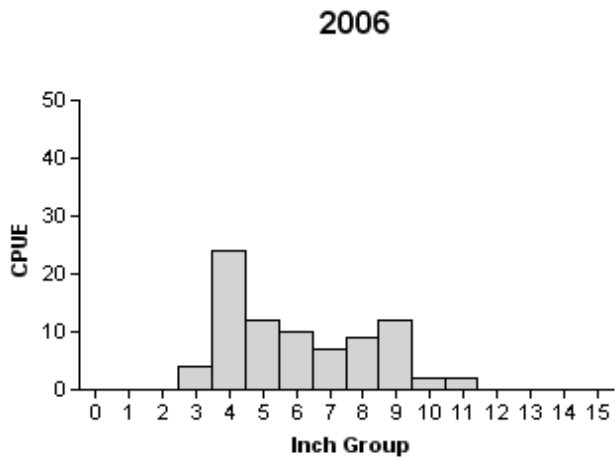
Table 6. Total fishing effort (h) for all species and total directed expenditures at Lake Murvaul, Texas, 2007 – 2009. Surveys were spring quarter only (March through May).

Creel statistic	Year	
	2007	2009
Total fishing effort	25,057	32,438
Total directed expenditures	\$116,006	\$139,885

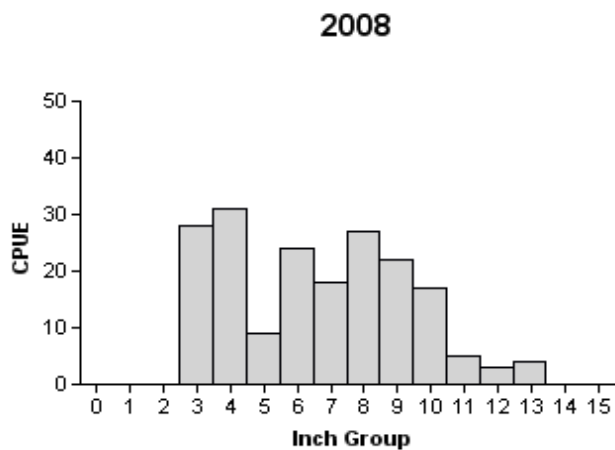
Gizzard Shad



Effort = 1.0
 Total CPUE = 197.0 (20; 197)
 IOV = 53.8 (8.4)



Effort = 1.0
 Total CPUE = 82.0 (24; 82)
 IOV = 69.5 (8.4)



Effort = 1.0
 Total CPUE = 188.0 (18; 188)
 IOV = 58.5 (6.1)

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, Lake Murvaul, Texas, 2004, 2006, and 2008.

Redbreast Sunfish

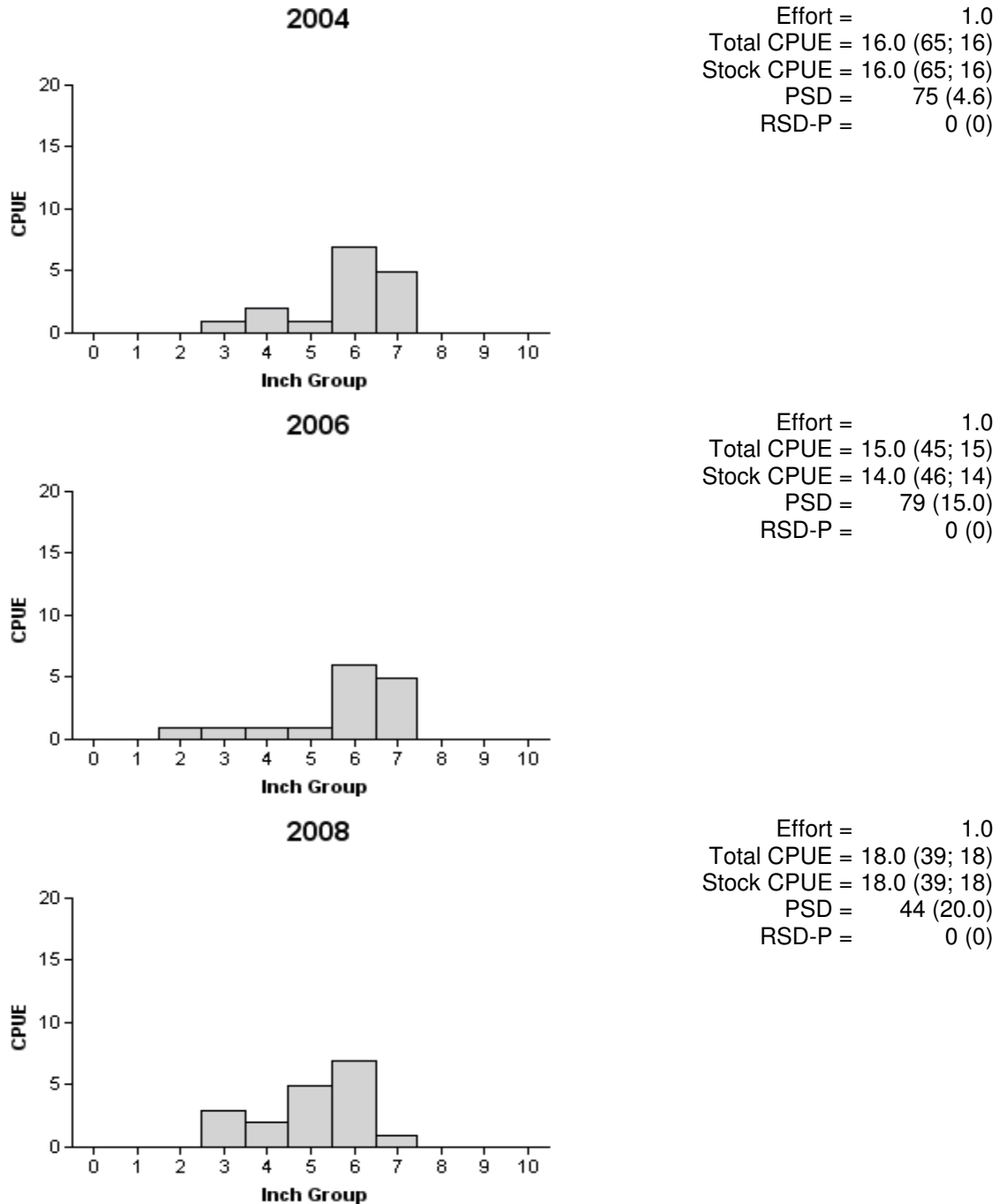


Figure 3. Number of redbreast sunfish caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Murvaul, Texas, 2004, 2006, and 2008.

Bluegill

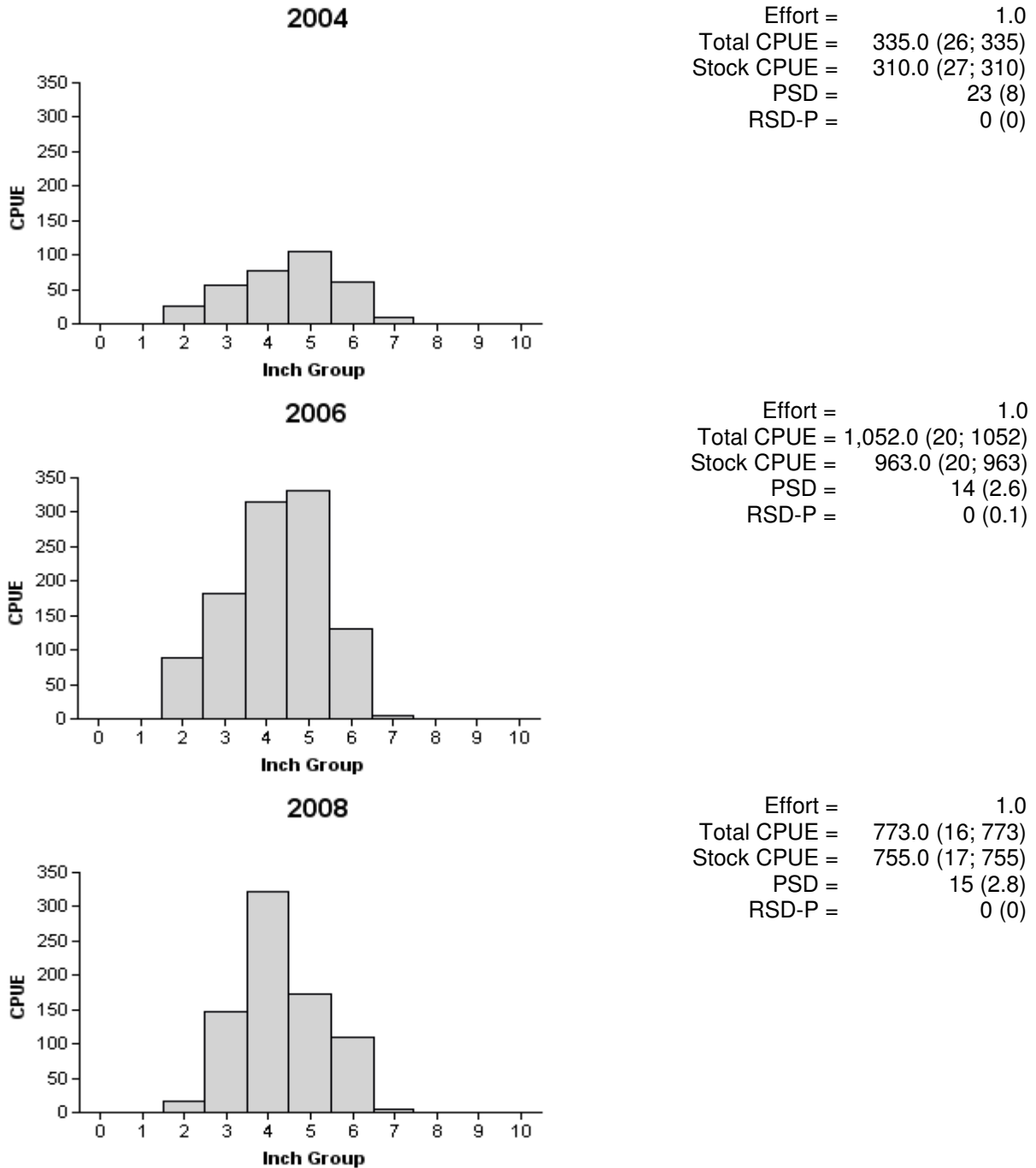


Figure 4. Number of bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Murvaul, Texas, 2004, 2006, and 2008.

Redear Sunfish

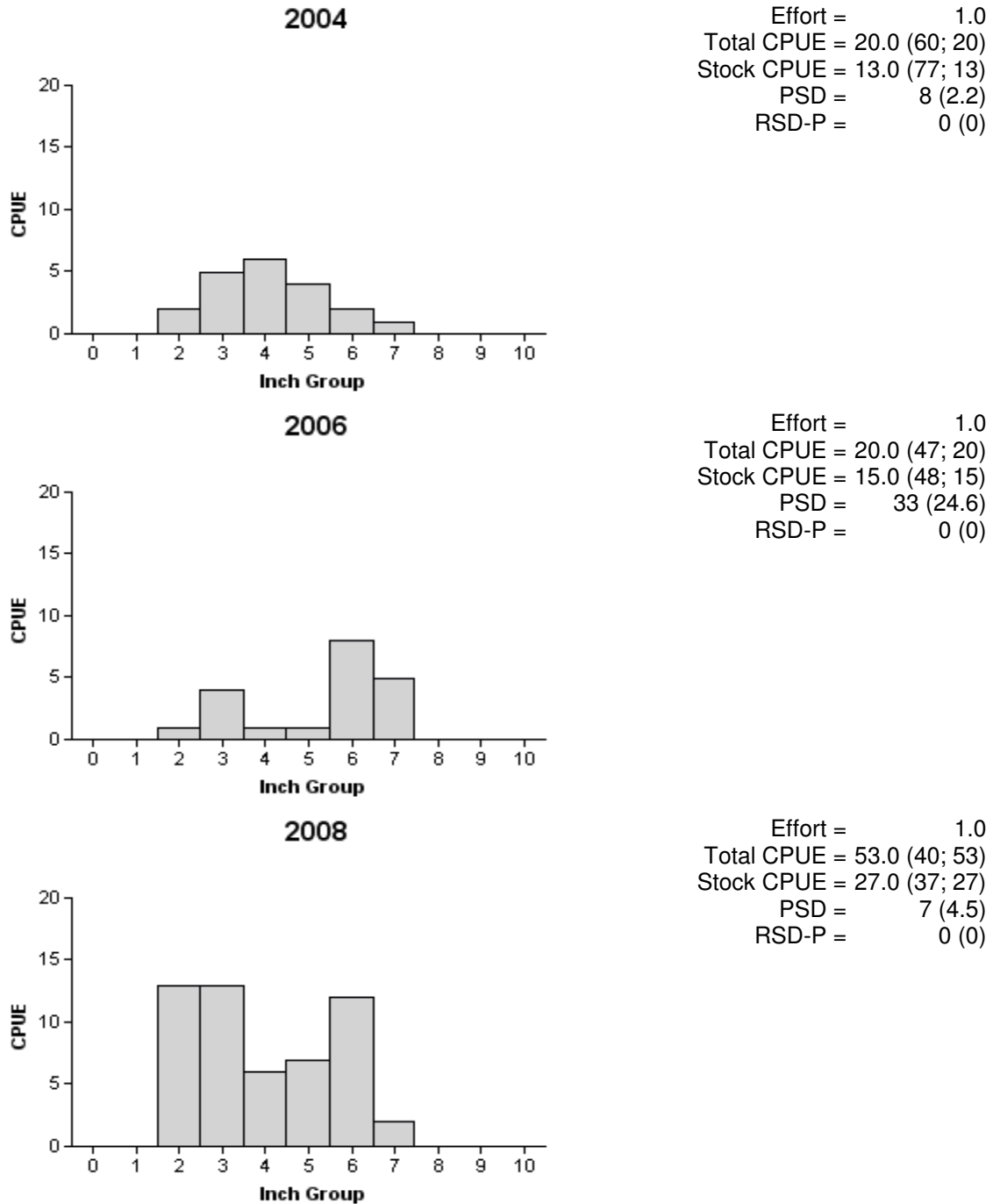


Figure 5. Number of redear sunfish caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Murvaul, Texas, 2004, 2006, and 2008.

Sunfishes

Table 7. Creel survey statistics for sunfishes at Lake Murvaul, Texas during spring quarter surveys (March through May), 2007 and 2009, where total catch per hour is for anglers targeting sunfishes and total harvest is the estimated number of sunfishes harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year	
	2007	2009
Directed effort (h)	730 (60)	1,442 (43)
Directed effort/acre	0.2 (60)	0.4 (43)
Total catch per hour	4.8 (60)	4.2 (48)
Total harvest	3,680 (84)	14,629 (82)
Harvest/acre	1.1 (84)	4.3 (82)
Percent legal released	59.5	37.9

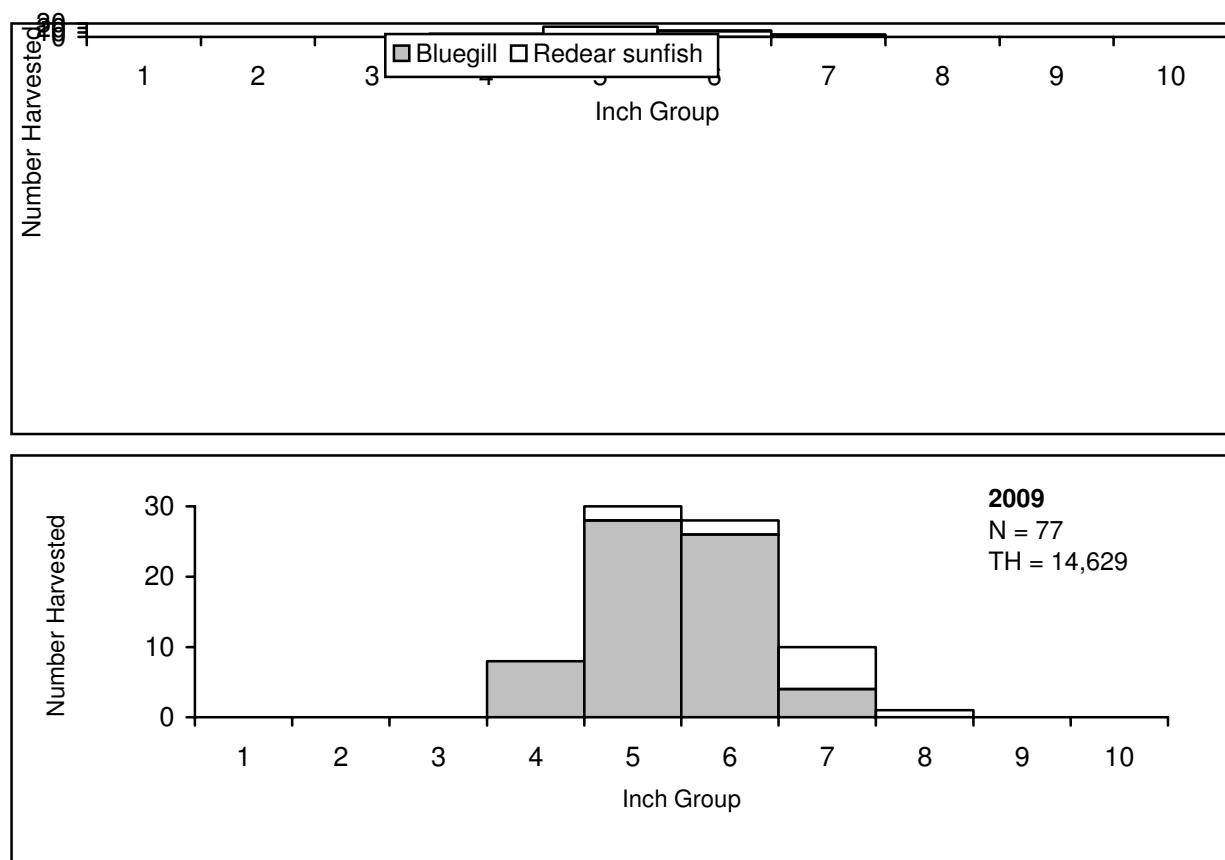
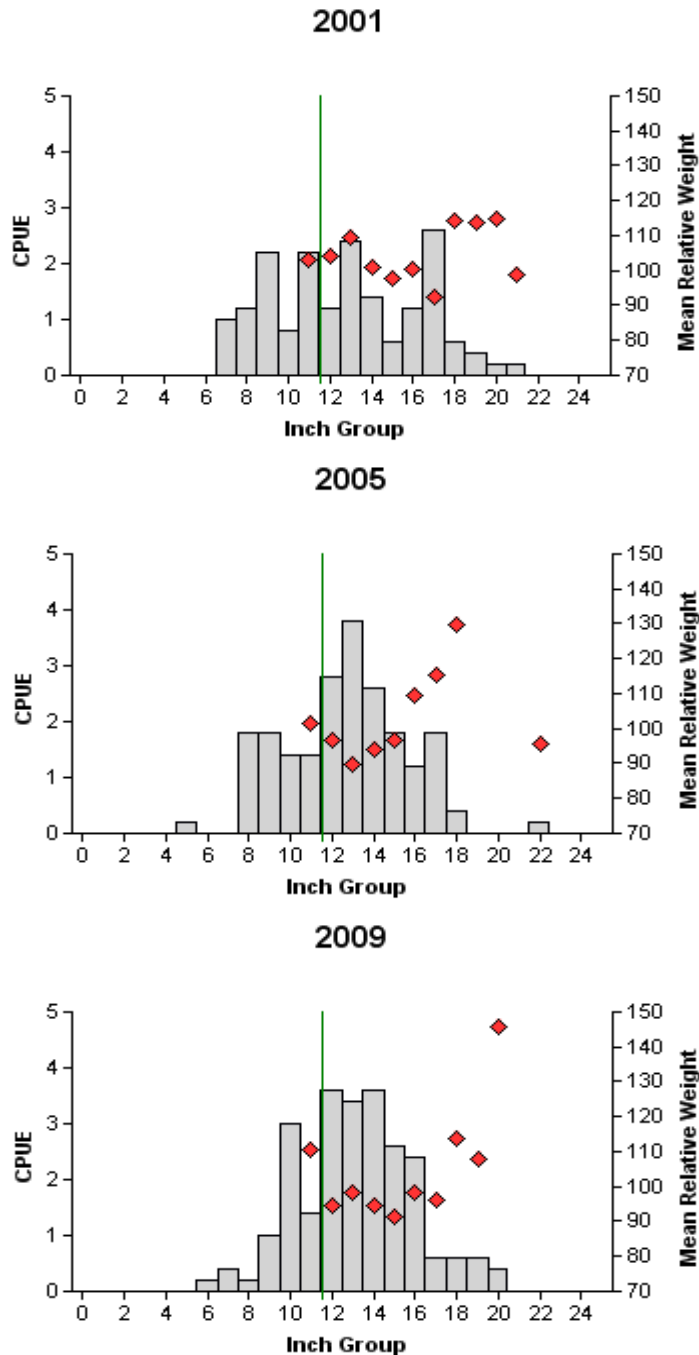


Figure 6. Length frequency of harvested bluegill and redear sunfish observed during spring (March through May) creel surveys at Lake Murvaul, Texas, 2007 and 2009, all anglers combined. N is the number of harvested sunfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

Channel Catfish



Effort = 5.0
 Total CPUE = 18.2 (34; 91)
 Stock CPUE = 13.0 (36; 65)
 PSD = 40 (7)
 RSD-P = 0 (0)

Effort = 5.0
 Total CPUE = 21.2 (14; 106)
 Stock CPUE = 16.0 (17; 80)
 PSD = 22 (6.3)
 RSD-P = 0 (0)

Effort = 5.0
 Total CPUE = 24.0 (51; 120)
 Stock CPUE = 19.2 (50; 96)
 PSD = 24 (3.5)
 RSD-P = 0 (0)

Figure 7. Number of channel catfish 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, Lake Murvaul, Texas, 2001, 2005, and 2009. Vertical lines indicate the minimum length limit.

Channel Catfish

Table 8. Creel survey statistics for channel catfish at Lake Murvaul, Texas during spring quarter surveys (March through May), 2007 and 2009, 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	
	2007	2009
Directed effort (h)	7,830 (19)	11,544 (18)
Directed effort/acre	2.3 (19)	3.4 (18)
Total catch per hour	1.3 (40)	1.2 (32)
Total harvest	10,146 (22)	13,980 (35)
Harvest/acre	3.0 (22)	4.1 (35)
Percent legal released	3.0	6.5

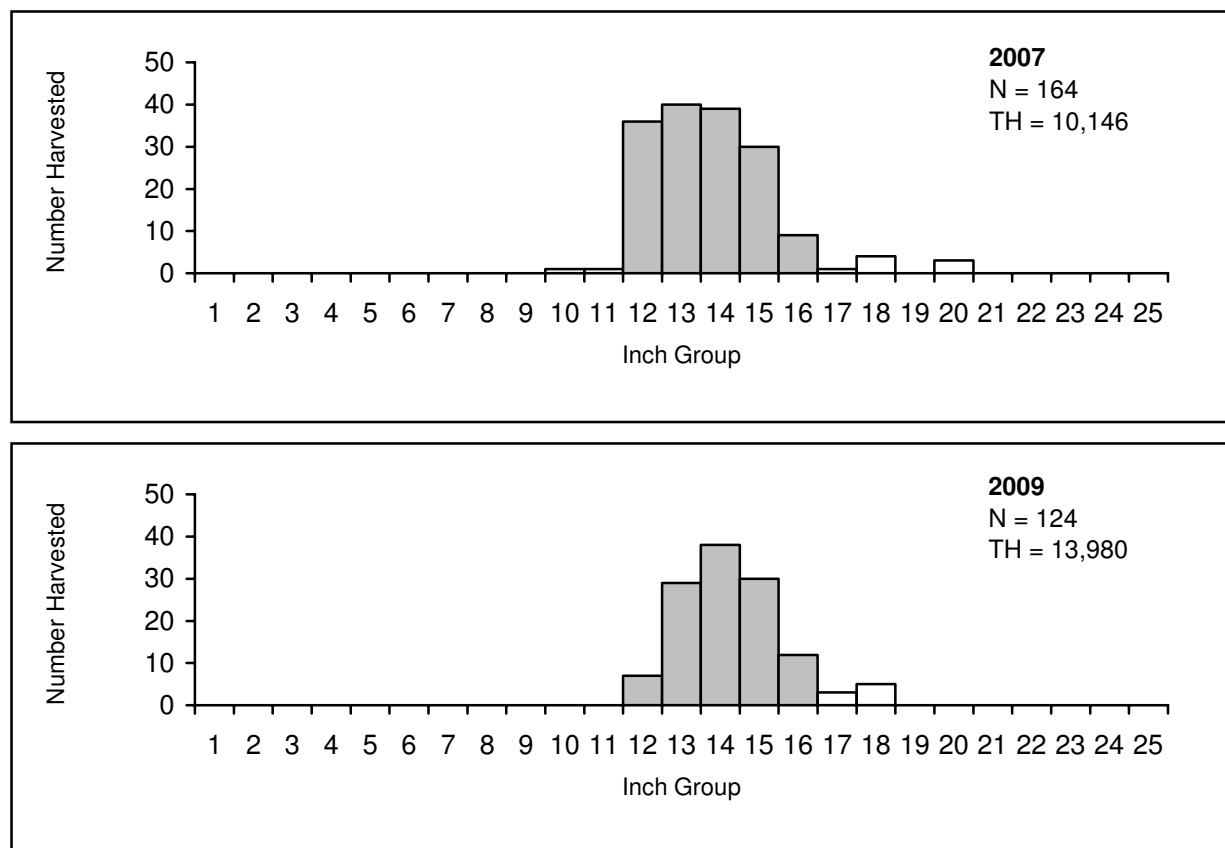
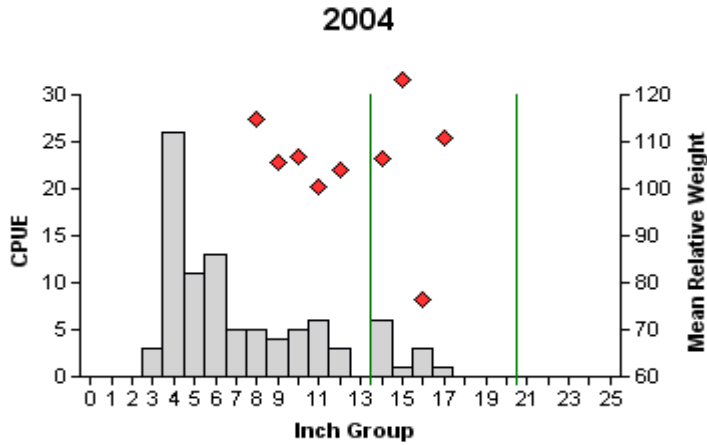


Figure 8. Length frequency of harvested channel catfish observed during spring (March through May) creel surveys at Lake Murvaul, Texas, 2007 and 2009, all anglers combined. N is the number of harvested channel catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

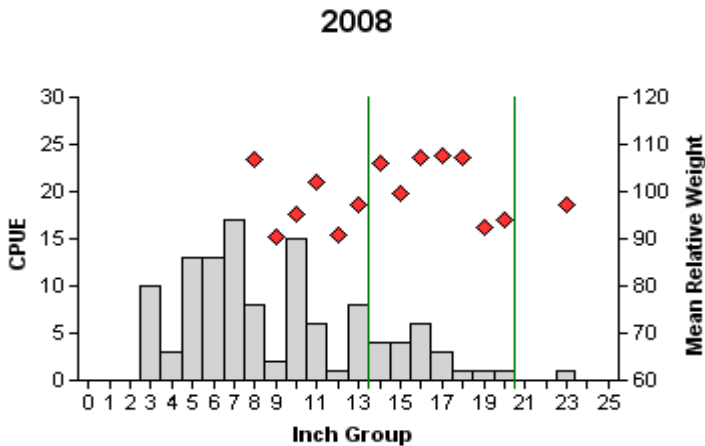
Largemouth Bass



Effort = 1.0
 Total CPUE = 92.0 (19; 92)
 Stock CPUE = 34.0 (21; 34)
 PSD = 41 (11.8)
 RSD-P = 15 (8.4)



Effort = 1.0
 Total CPUE = 156.0 (13; 156)
 Stock CPUE = 56.0 (15; 56)
 PSD = 38 (8.5)
 RSD-P = 23 (7.4)



Effort = 1.0
 Total CPUE = 117.0 (26; 117)
 Stock CPUE = 61.0 (29; 61)
 PSD = 49 (12.3)
 RSD-P = 28 (9.3)

Figure 9. 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, Lake Murvaul, Texas, 2004, 2006, and 2008. Vertical lines indicate the lower and upper end of the slot-length limit.

Largemouth Bass

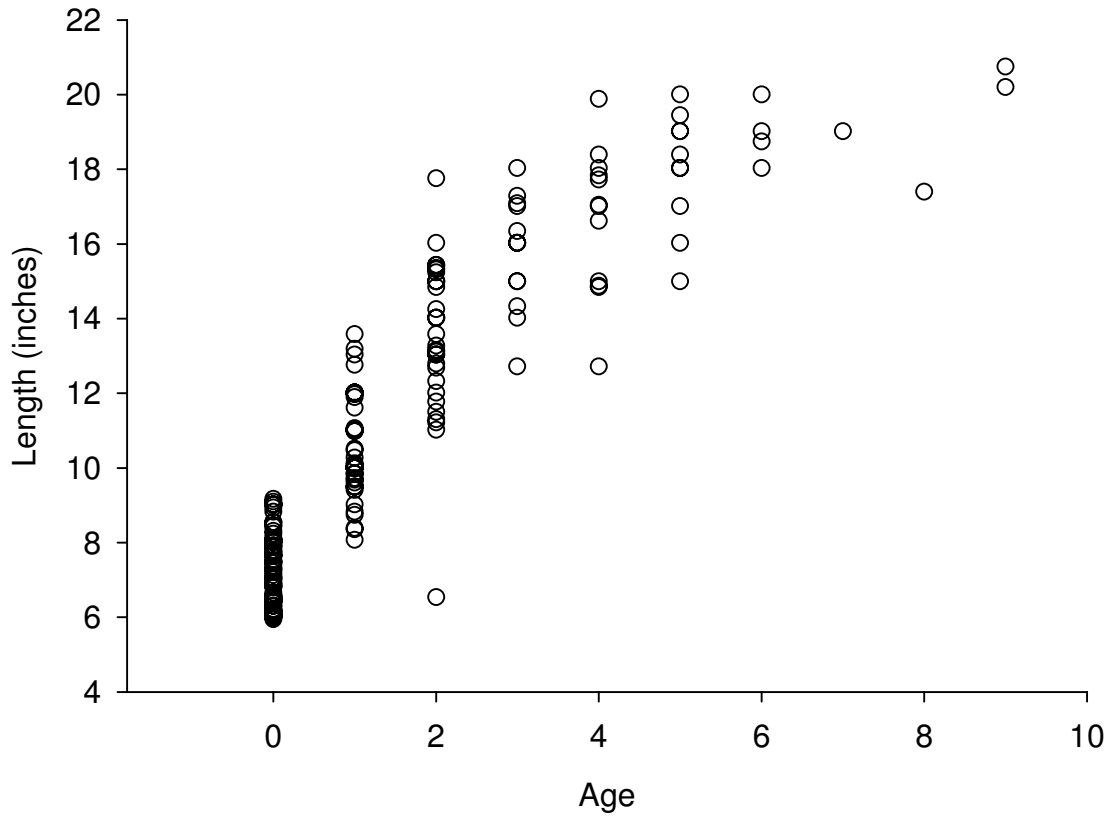


Figure 10. Length at age for largemouth bass collected by electrofishing at Lake Murvaul, Texas, Fall 2006.

Table 9. Average length (inches) at capture for largemouth bass (sexes combined) ages 1 – 3 collected in fall electrofishing surveys, Lake Murvaul, Texas, 2003, 2004, 2006. Lengths are followed by the relative standard error and sample size in parentheses (RSE; N).

Year	Age (years)		
	1	2	3
2003	10.4 (2.9; 12)	13.9 (3.7; 8)	16.0 (3.3; 8)
2004	11.0 (4.4; 11)	13.4 (5.0; 7)	15.8 (2.9; 5)
2006	10.5 (1.8; 48)	13.5 (2.8; 31)	15.8 (2.4; 14)

Largemouth Bass

Table 10. Creel survey statistics for largemouth bass at Lake Murvaul, Texas during spring quarter surveys (March through May), 2007 and 2009, 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	
	2007	2009
Directed effort (h)	2,928 (28)	7,462 (24)
Directed effort/acre	0.9 (28)	2.2 (24)
Total catch per hour	1.1 (47)	0.5 (26)
Total harvest	0 (0)	712 (292)
Harvest/acre	0 (0)	0.2 (292)
Percent legal released	100	72

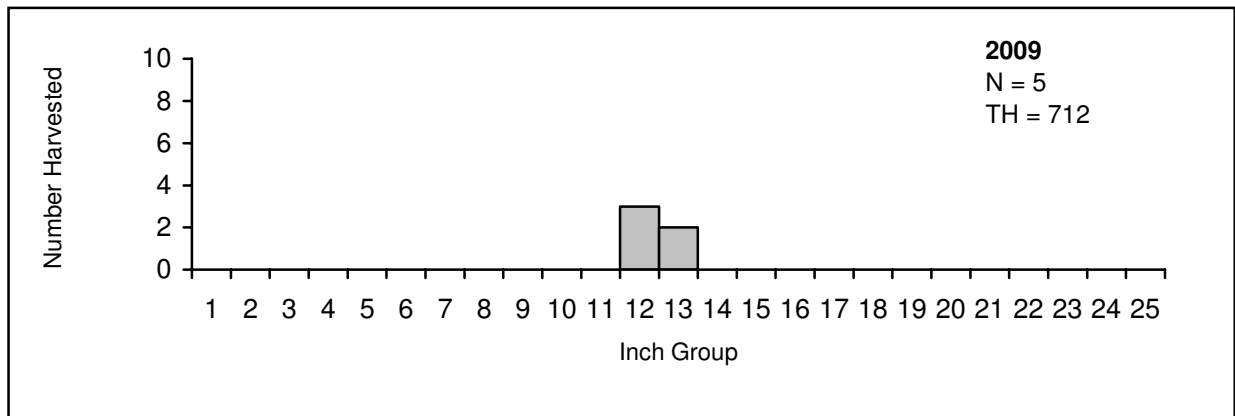
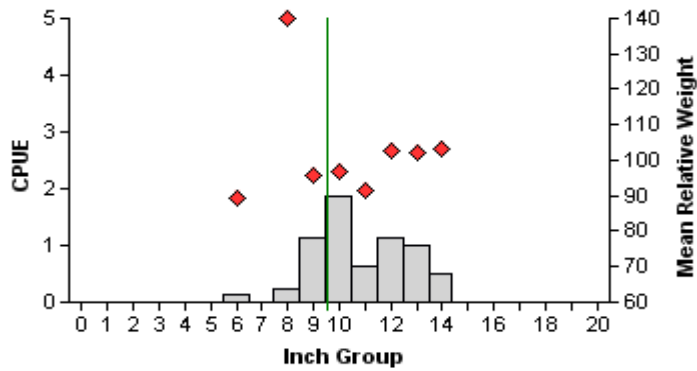


Figure 11. Length frequency of harvested largemouth bass observed during spring (March through May) creel surveys at Lake Murvaul, Texas, 2009, all anglers combined. N is the number of harvested largemouth bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

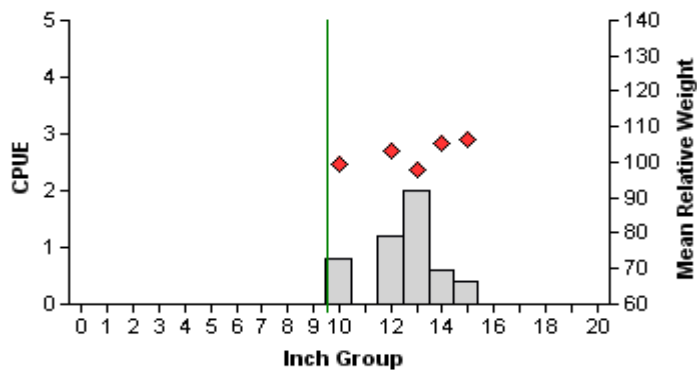
White Crappie

2000



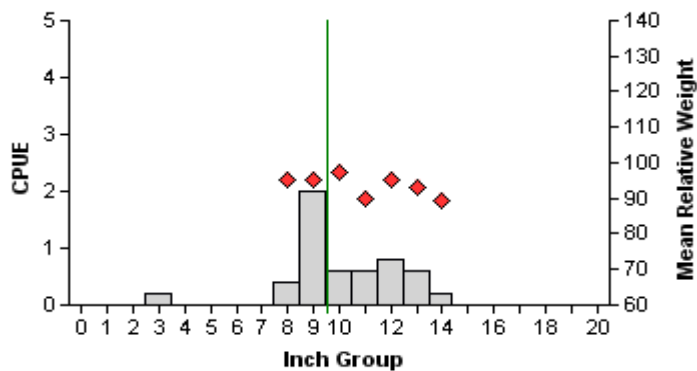
Effort = 8.0
 Total CPUE = 6.6 (17; 53)
 Stock CPUE = 6.6 (17; 53)
 PSD = 98 (1.9)
 RSD-P = 77 (5.6)

2004



Effort = 5.0
 Total CPUE = 5.0 (36; 25)
 Stock CPUE = 5.0 (36; 25)
 PSD = 100 (0.0)
 RSD-P = 100 (0)

2008



Effort = 5.0
 Total CPUE = 5.4 (81; 27)
 Stock CPUE = 5.2 (86; 26)
 PSD = 100 (0)
 RSD-P = 54 (4.6)

Figure 12. 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, Lake Murvaul, Texas, 2000, 2004, and 2008. Vertical line indicates the minimum length limit.

White Crappie

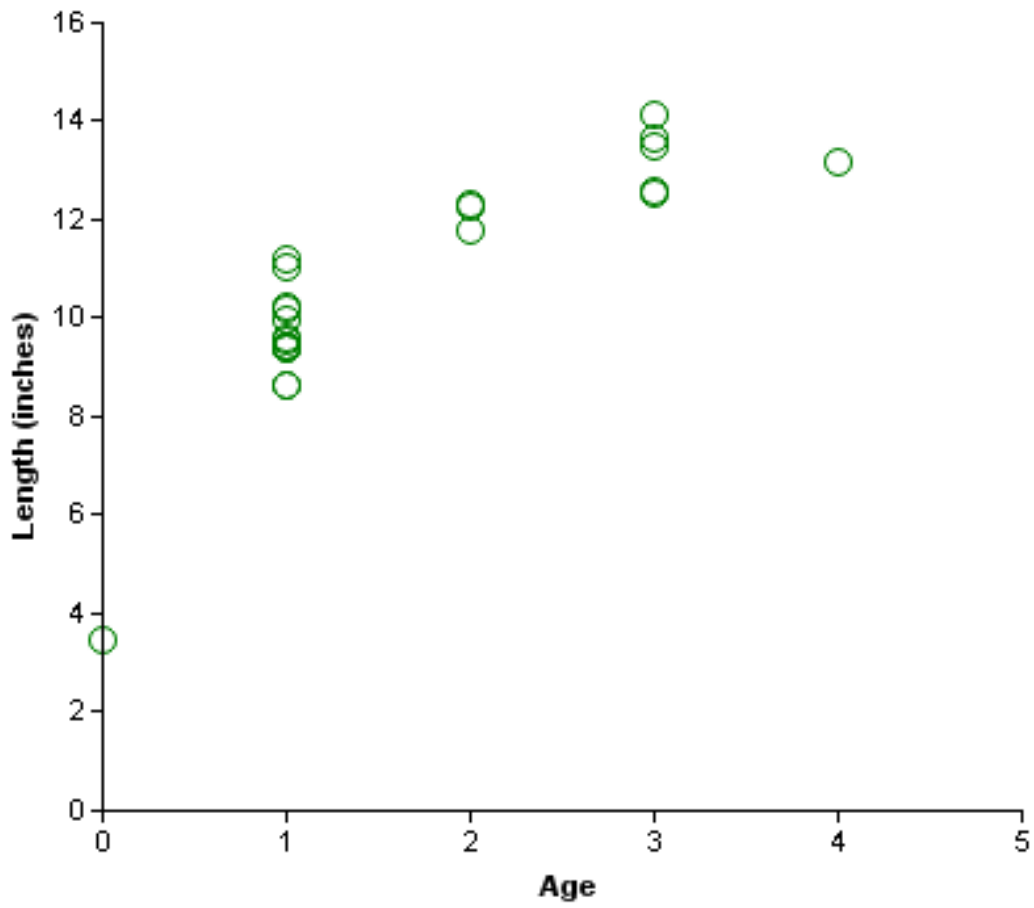


Figure 13. Length at age for white crappie collected by trap netting at Lake Murvaul, Texas, Fall 2008.

Black Crappie

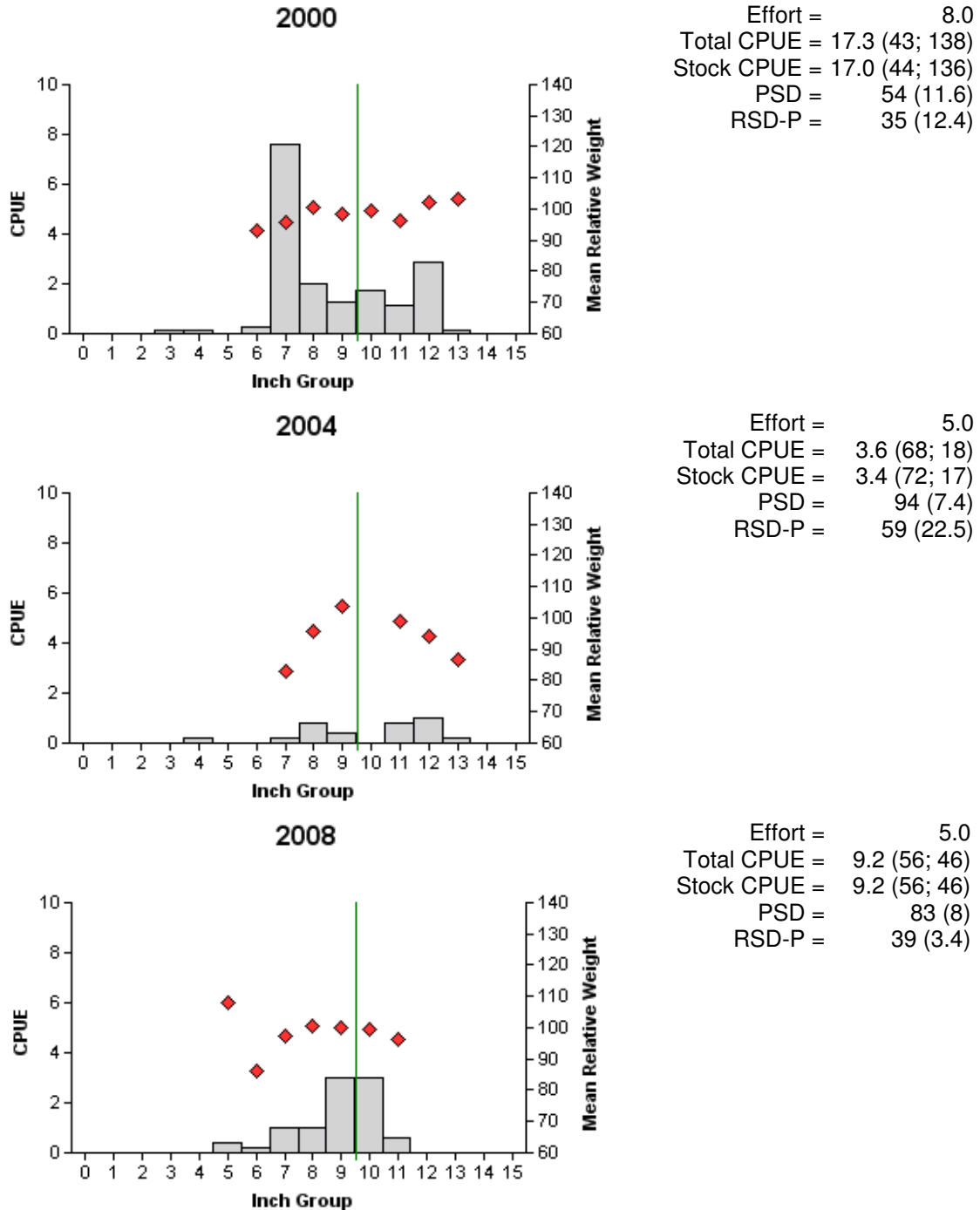


Figure 14. Number of black crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Murvaul, Texas, 2000, 2004, and 2008. Vertical line indicates the minimum length limit.

Black Crappie

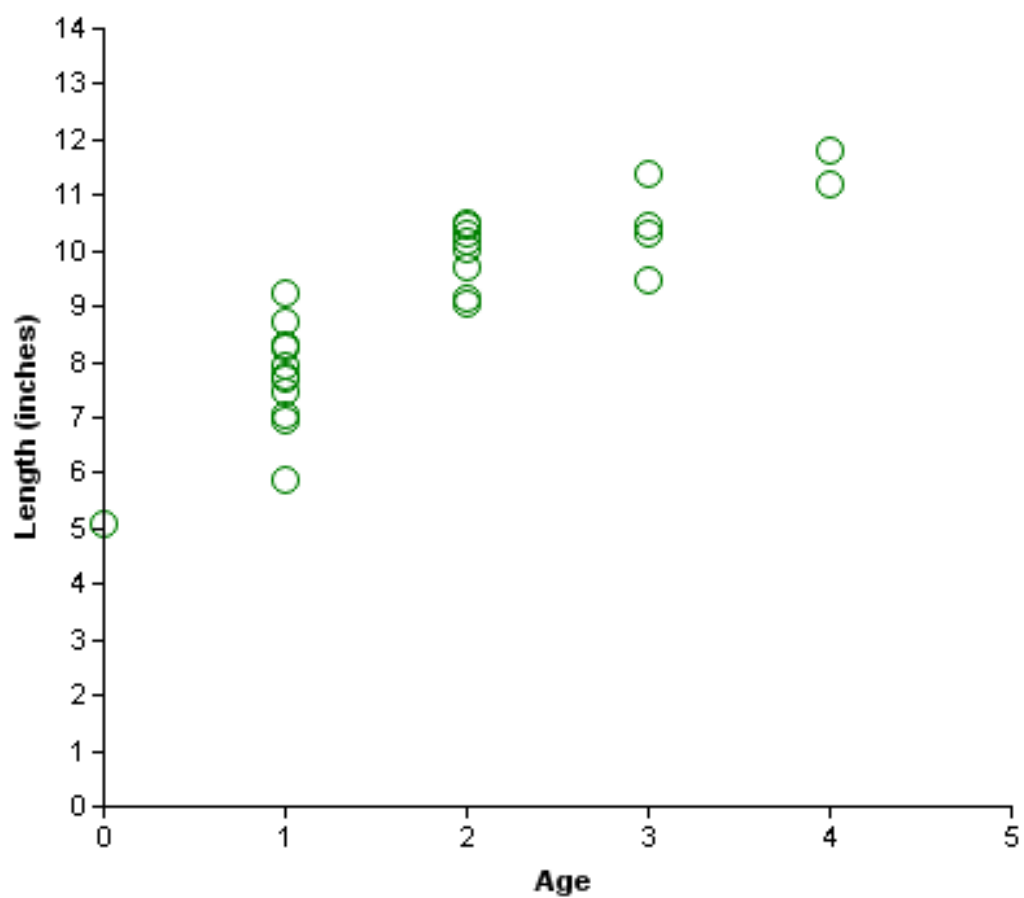


Figure 15. Length at age for black crappie collected by trap netting at Lake Murvaul, Texas, Fall 2008.

Crappie

Table 11. Creel survey statistics for crappie at Lake Murvaul, Texas during spring quarter surveys (March through May), 2007 and 2009, where total catch per hour is for anglers targeting crappie and total harvest is the estimated number of crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year	
	2007	2009
Directed effort (h)	10,767 (14)	11,620 (18)
Directed effort/acre	3.2 (14)	3.4 (18)
Total catch per hour	1.8 (21)	1.5 (35)
Total harvest	9,664 (33)	5,760 (88)
Harvest/acre	2.9 (33)	1.7 (88)
Percent legal released	4.0	0

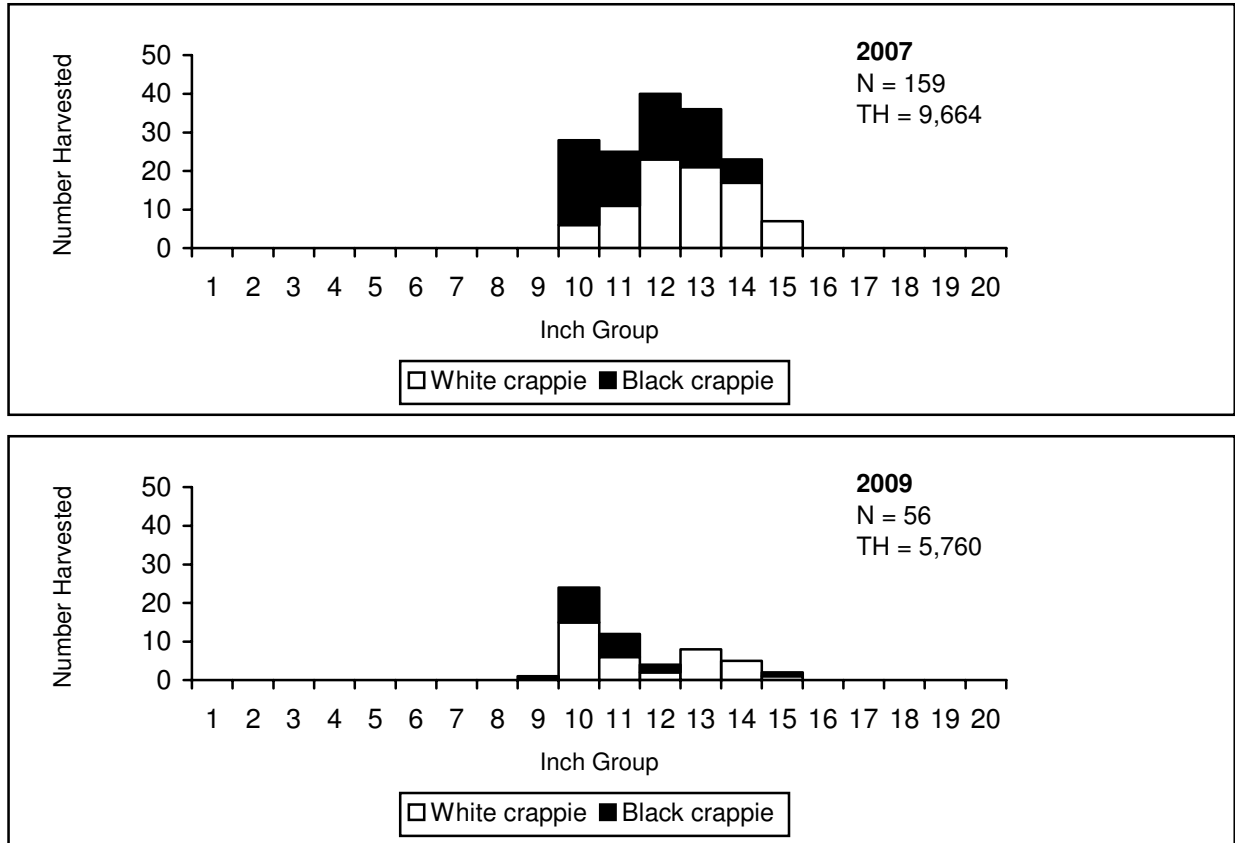


Figure 16. Length frequency of harvested crappie observed during spring (March through May) creel surveys at Lake Murvaul, Texas, 2007 and 2009, all anglers combined. N is the number of harvested crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 12. Proposed sampling schedule for Lake Murvaul, Texas. Gill netting surveys are conducted in the spring, vegetation surveys are conducted in the summer, and electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

Survey Year	Vegetation	Electrofisher	Trap Net	Gill Net	Creel	Report
Summer 2009 - Spring 2010	A					
Summer 2010 - Spring 2011	A	A				
Summer 2011 - Spring 2012	A					
Summer 2012 - Spring 2013	S	S	S	S	A	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Lake Murvaul, Texas, 2008-2009.

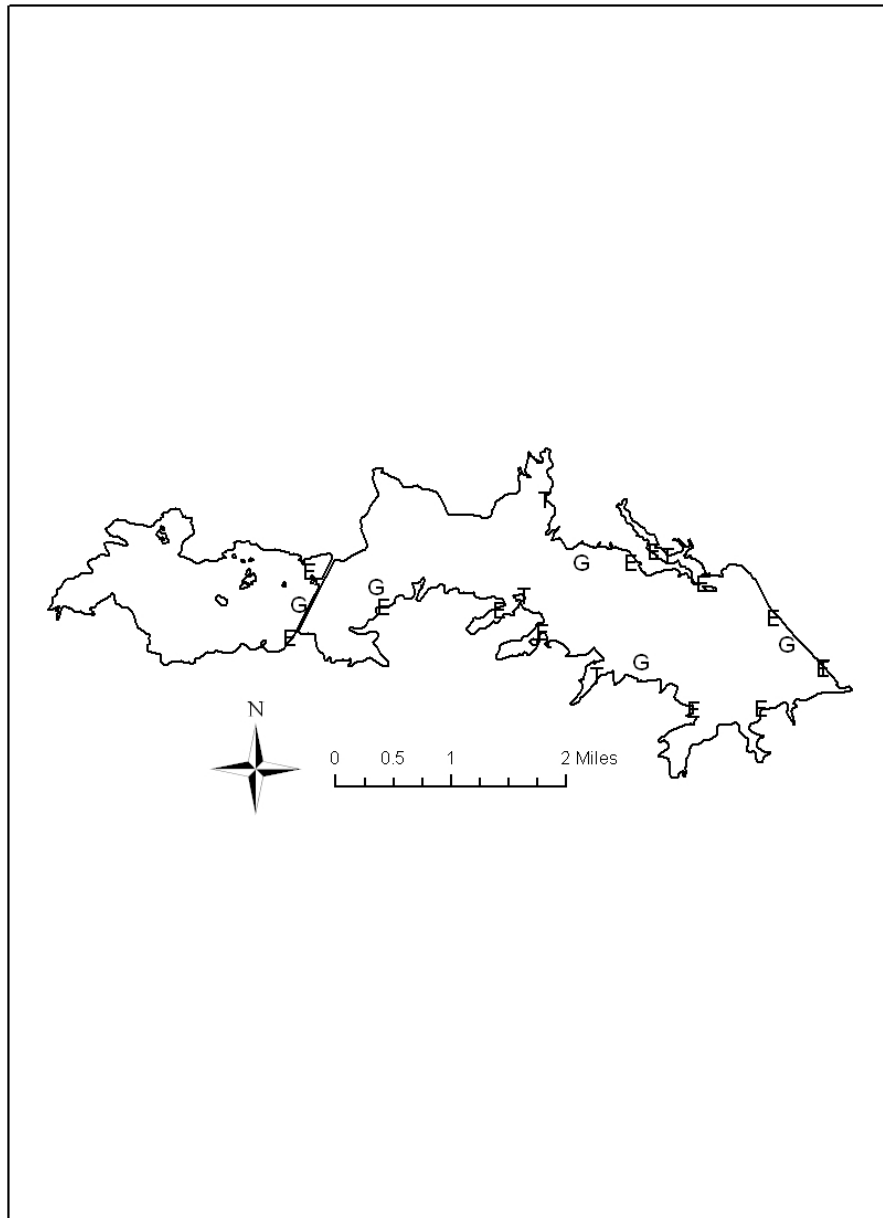
Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					188	188.0
Threadfin shad					187	187.0
Channel catfish	120	24.0				
Redbreast sunfish					18	18.0
Warmouth					1	1.0
Bluegill					773	773.0
Longear sunfish					98	98.0
Redear sunfish					53	53.0
Spotted sunfish					1	1.0
Largemouth bass					117	117.0
White crappie			27	5.4		
Black crappie			46	9.2		

APPENDIX B

Length/Weight Table for Largemouth Bass
Lake Murvaul, Texas

Total length (inches)	Weight (pounds)	Total length (inches)	Weight (pounds)
14.00	1.50	20.25	5.62
14.25	1.59	20.50	5.88
14.50	1.70	20.75	6.14
14.75	1.80	21.00	6.41
15.00	1.92	21.25	6.69
15.25	2.03	21.50	6.97
15.50	2.16	21.75	7.27
15.75	2.28	22.00	7.57
16.00	2.42	22.25	7.89
16.25	2.55	22.50	8.21
16.50	2.70	22.75	8.54
16.75	2.85	23.00	8.88
17.00	3.00	23.25	9.23
17.25	3.16	23.50	9.60
17.50	3.33	23.75	9.97
17.75	3.51	24.00	10.35
18.00	3.69	24.25	10.74
18.25	3.87	24.50	11.14
18.50	4.07	24.75	11.56
18.75	4.27	25.00	11.98
19.00	4.48	25.25	12.42
19.25	4.69	25.50	12.86
19.50	4.91	25.75	13.32
19.75	5.14	26.00	13.79
20.00	5.38		

Predicted weights at length were developed using largemouth bass lengths and weights collected during Texas Parks and Wildlife fall electrofishing surveys from 1997, 2000, 2003, 2004, and 2006. The current lake record largemouth bass (14.87 pounds, 24.5 inches) was also used to develop the regression equation.

APPENDIX C

Location of sampling sites, Lake Murvaul, Texas, 2008-2009. Gill netting, trap netting, and electrofishing stations are indicated by G, T, and E, respectively.