PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-35

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2009 Survey Report

Lake Waxahachie

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SURVEY AND MANAGEMENT SUMMARY

The Lake Waxahachie fish community was surveyed from June 2009 through May 2010 using electrofishing, gill netting, and trap netting. A vegetation survey was conducted in August 2009. A roving creel survey, conducted from March through May 2007, collected angler use and harvest information. This report summarizes results of these surveys and contains a management plan based on those findings.

- **Reservoir Description:** Lake Waxahachie is a 553-acre reservoir on Prong Creek (a tributary of the Trinity River), Texas, built to provide water for municipal and industrial purposes. Boat access is adequate, but bank angler access is limited. There are no handicap-specific facilities. Fluctuating water levels have limited growth of beneficial native submersed and emergent plant species around the reservoir. Prolonged periods of low water levels and subsequent lack of available habitat have resulted in limited year-class strength of several species.

- **Management History :** Important sport fish include channel catfish, white bass, largemouth bass, and white and black crappie. The management plan from the 2005 survey report included: stocking blue catfish (100/acre in 2006 and 2007); providing angler information on size limits; continued monitoring of the largemouth bass population in 2009; and conducting a spring quarter creel survey in 2007. Largemouth bass were managed under a 14- to 18-inch inch slot-length limit from 1991-2002 and reverted to the statewide limit in September 2003. Additional blue catfish were stocked in 2007.

- **Fish Community**
  - **Prey species:** Gizzard shad provide adequate forage for sport fishes; however threadfin shad are typically low in abundance. Bluegill, redear sunfish, and longear sunfish all add to the prey base and the fishery at Lake Waxahachie. However, sunfish populations have shifted towards dominance by larger individuals, thereby limiting their availability as forage.

  - **Catfishes:** Gill net catch rate of channel catfish declined from previous surveys. Blue catfish were not collected in 2006; however stockings in 2003, 2005, and 2007 have resulted in a low density population observed in 2010 gill net surveys. Almost all blue catfish were of harvestable size.

  - **White bass:** White bass continued to exhibit inconsistent recruitment and low abundance likely due to variable water levels and drought conditions in 2005-2006. Body condition of white bass in surveys was adequate, and most were legal size.

  - **Largemouth bass:** Abundance of largemouth bass has remained high and consistent with previous surveys, although size structure was still poor. Body condition and growth rate remained poor for most size classes.

  - **Crappie:** White and black crappie were both present in the reservoir, and were the most sought after species in the spring creel survey at Lake Waxahachie.

  - **Management Strategies:** Standard surveys will be conducted in 2013-2014 to monitor sport fish and prey populations. Continue to monitor the success of blue catfish stockings during routine gill netting in 2014. Coordinate with the City of Waxahachie to monitor the hydrilla if needed. Continue to seek additional opportunities for habitat improvements. Conduct a quantitative assessment of the aquatic plant community during routine habitat survey in 2013. We will also seek additional opportunities to promote the fishery.

INTRODUCTION

This document is a summary of fisheries data collected from Lake Waxahachie from June 2009 through May 2010 and creel data collected from March through May 2007.The purpose of this document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2009 and 2010 data for comparison where appropriate.

Reservoir Description

Lake Waxahachie is a 553-acre reservoir on Prong Creek (a tributary of the Trinity River), Texas, built to provide water for municipal and industrial purposes. Boat access is adequate, but bank angler access is limited. There are no handicap-specific facilities. Since 2000, the water level has remained below conservation pool except for brief periods from 2004 to 2005, and 2007 (Figure 1). The reservoir contains a diversity of littoral habitat types. Hydrilla *(Hydrilla verticillata)* has continued to decline since 1998 when it was becoming problematic around the city water intake structure and swimming beach (Bonds and Ott 1999). Hydrilla covered 5 acres in August 2005, but was only observed in trace amounts in August 2009. American pondweed *(Potamogeton nodosus)*, southern naiad *(Najas guadalupensis),* chara *(Chara spp.),* water willow *(Justicia americana),* and smartweed *(Polygonum sp.)* were present in the reservoir, although coverage is limited by fluctuating water levels (Figure 1). Boat access consisted of three public boat ramps. Bank fishing access was restricted to Waxahachie City Park. Other descriptive characteristics for Lake Waxahachie are in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Ott and Bister 2006) included:

1. Stock blue catfish *(Ictalurus furcatus)* at 100/acre in 2006 and 2007.
   Action: Blue catfish were stocked in 2005, were not available in 2006, but were stocked in 2007.
2. Provide lake-specific regulation posters to vendors of angling-oriented businesses serving the Lake Waxahachie vicinity. Maintain regulation signs previously posted at public and private boat ramps on Lake Waxahachie.
   Action: Lake-specific regulation posters were distributed to angling-oriented businesses in the Lake Waxahachie area.
3. Continue monitoring size distribution and population genetics of largemouth bass (*Micropterus salmoides*) during routine electrofishing sampling in fall 2009.
   Action: Continued monitoring of size distribution and population genetics was conducted as recommended in fall 2009.
4. Conduct a spring-quarter creel survey of Lake Waxahachie to characterize angler use and intended effort for the fish community.
   Action: A roving creel survey was conducted in spring 2007.
5. Make efforts to quantify hydrilla abundance in 2009. Provide technical assistance regarding the control of hydrilla to the controlling authority, as necessary.
   Action: Hydrilla coverage was assessed in 2009; only a trace amount was detected. Because of water level fluctuation, no hydrilla control has been required.

Harvest regulation history: Largemouth bass regulations reverted from a 14- to 18-inch slot-size limit to a 14-inch minimum-length limit on September 1, 2003. All other sport fishes in Lake Waxahachie are managed with statewide harvest regulations (Table 2). Regulations have not changed since the last survey.

Stocking history: Lake Waxahachie was stocked with threadfin shad (*Dorosoma petenense*) in 1987. Initial stocking of Florida strain largemouth bass (*Micropterus salmoides floridanus)* was conducted in 1988

and the lake was restocked in 1997 and 1998. Blue catfish were stocked in 2003, 2005, and 2007. The complete stocking history is presented in Table 3.

Vegetation/habitat history: Lake Waxahachie has historically supported a diverse aquatic vegetation community. In recent surveys, submerged aquatic vegetation (American pondweed, southern naiad, and coontail) formed a fringe in littoral areas (Bonds and Ott 1999; Ott and Bister 2002; Ott and Beck 2006). In 2009, American pondweed, southern naiad, and chara were present along with emergent vegetation including water willow, smartweed, and sedges *(Cyperus spp.).* Vegetation has been limited in recent years due to fluctuating water levels and developed shoreline. Hydrilla was identified in the reservoir in 1995 (unpublished data, author), and spread to cover 10% of the reservoir by 1998 (Bonds and Ott 1999). Since that time, inconsistent low water levels have reduced the coverage of hydrilla to trace amounts. Pilot introductions of several native aquatic plant species were conducted in 2007. Species included wild celery *(Vallisneria americana)*, Illinois pondweed (*P. Illinoensis),* water star-grass *(Heteranthera dubia),* pickerel weed *(Pontederia cordata*), and bull tongue *(Sagittaria spp.)*

METHODS

Fishes were collected by electrofishing (1 hour at 12, 5-min stations), gill netting (5 net nights at 5 stations), and trap netting (5 net nights at 5 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for gill and trap nets, as the number of fish per net night (fish/nn). All survey stations were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009). A roving creel survey consisting of 9 survey days (4 weekdays, 5 weekend days) was conducted from March through May 2007 to estimate angler catch and harvest rates and angling effort in accordance with Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009). A vegetation survey was conducted in August 2009.

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), as defined by Guy et al. (2007)], and condition indices [relative weights (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for gizzard shad *(Dorsoma cepedianum)*, (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. For largemouth bass, ages were determined for all fish with lengths ranging from 3.8-17.8 inches, using otoliths from 101 specimens. For black crappie (*Pomoxis nigromaculatus*) and white crappie *(Pomoxis annularis)*, ages were determined using otoliths from 6 specimens for each species with lengths ranging from 9.2-9.8 inches for black crappie and 8.9-10.8 inches for white crappie. For white bass (*Morone chrysops*), ages were determined using otoliths from 11 specimens with lengths ranging from 9.4-10.9 inches. Water level data were obtained from the United States Geological Survey web site (USGS 2010).

RESULTS AND DISCUSSION

Habitat: Aquatic vegetation in Lake Waxahachie continues to be limited by persistent low water levels (2-3 feet below conservation pool, Figure 1). Submersed aquatic species (American pondweed, southern naiad, and chara) occurred in low abundance and distribution was less than one acre for all species combined. Emergent vegetation was largely restricted to undeveloped areas and covered approximately 7% of reservoir surface area (Table 4). Species such as water willow, smartweed, sedges, and rattlebox (*Sesbania drummondii*) may provide beneficial habitat when they are eventually inundated. Hydrilla is present in the reservoir, however has remained at trace levels since the last survey. The plant has the potential to interfere with boat or bank angling access and will need to be monitored during habitat surveys. Due to rapid drop in water level following native plant introductions in 2007 submersed species (wild celery, water star grass, and Illinois pondweed) were rapidly exposed to desiccation. Both emergent species (pickerel weed and bull tongue) continued to persist.

Creel: Crappie were the most highly sought species group with 38% of total directed effort. Largemouth bass was the second most sought after species group, accounting for 17% of the directed effort. Catfish anglers were responsible for only 6% of the directed effort; however 39% of anglers targeted "anything" which may account for some of the effort towards catfish. Total fishing effort in spring 2007 was estimated at 9,434 hours and total directed expenditures were $22,414.

Prey species: Electrofishing catch of gizzard shad in 2009 (72/h) was higher than in 2005 (41/h), but well below the catch rate observed in 2001 (183/h) (Figure 2). Index of vulnerability (IOV) for gizzard shad was adequate; indicating that 56% of gizzard shad were available to predators (Figure 2). Threadfin shad are also present in the reservoir (Appendix A). Bluegill (*Lepomis macrochirus*) CPUE was high in 2009 (399/h) and was similar to previous surveys in 2001 (405/h) and 2005 (311/h) (Figure 3). Body condition was high for all size classes ($W_r \geq 100$), and the size structure of bluegill shifted towards larger individuals in 2009. Longear (*Lepomis megalotis)* and redear sunfish (*Lepomis microlophus*) also provide a valuable addition to the prey base (Figures 4 and 5). Redear sunfish PSD was 21, and body condition was good ($W_r \geq 85$) for all size classes (Figure 5).

Catfish: Blue catfish were not collected in surveys prior to 2010. Blue catfish were stocked in 2003, 2005, and 2007 (Table 3), and a low density population was observed in 2010 (Figure 6). Gill net catch rate in 2010 (2.0/nn) was low and size distribution suggested most fish are available for harvest (Figure 6). Body condition was moderately high ($W_r \geq 90$) and indicated adequate prey availability. Although growth rate was not quantified, size distribution of fish stocked from 2003-2007 suggests rapid growth. Channel catfish *(I. punctatus)* abundance in 2010 (gill net catch rate = 3.8/nn) was lower than 2006 (6.2/nn) and 2001 (10.8/nn) but size distribution remained consistent in 2010 (PSD-12 = 82) (Figure 7). Body condition for all size classes was moderate ($W_r > 90$). Catfish accounted for only 6% of the directed angling effort in the 2007 spring creel survey (Table 5), and few harvested fish were observed in the creel survey (Figure 8). More than a third of anglers (39%) in the creel survey indicated they were targeting anything, which may account for some additional effort toward catfish.

White bass: The gill net catch rate of white bass (4.8/nn) improved from the 2006 survey (2.2/nn), but was lower than the catch rate observed in 2002 (7.6/nn) (Figure 9). This may be due to low year class strength in drought years of 2005 and 2006. The average age of white bass at 10 inches (9.4-10.9 inches) was 1.7 years (N =11, range 1-2 years); and body condition ($W_r \geq 100$) improved over previous years. The proportion of legal-sized fish collected in gill nets was high (PSD-10 = 83). No directed angling effort for white bass was observed in the spring 2007 creel survey; however, white bass accounted for an estimated 7% of all fish caught by anglers.

Largemouth bass: The electrofishing catch rate of stock-length (>8 inches) largemouth bass was 64/h in 2009 (Figure 10) and declined from previous surveys (107/h in 2005 and 81/h in 2001). CPUE of largemouth bass available for harvest was low. Body condition ($W_r \leq 90$) and size distribution of the population continues to be poor (PSD = 19 in 2005 and 2009). Insufficient numbers of 13- to 15-inch fish were collected in 2005 and 2009 to allow analysis of age and growth. Therefore, in 2009 all largemouth bass less than 20 inches in length (N = 101, 3.8-17.8 inches) were collected and aged (Figure 11). Growth analysis indicated that few largemouth bass reach 14 inches before age 4. Mean length of age 1, 2, and 3 year-old largemouth bass was 6.2, 9.8, and 11.0 inches, respectively. The percentage of Florida bass alleles (33%) has increased since previous surveys in 2005 and 2001 (26% and 22%, respectively). Only one of the 29 age-0 specimens collected in 2009 was a pure FLMB (Table 8). Largemouth bass were the second most sought after species in the spring 2007 creel survey accounting for 17% of directed angling effort (Table 5) and total angler catch rate was 0.6/h.

Crappie : Crappie accounted for the highest directed angler effort (38%) for a species group in the 2007 spring creel survey (Table 5). Both white and black crappie are present in the reservoir and trap net CPUE was similar for both species (2.0/nn and 3.2/nn for white and black crappie, respectively). Catch rate of white crappie declined from 2005 (8.8/nn), but was similar to catch rate in 2001 (1.8/nn) (Figure 12). Body condition was moderately high ($W_r \geq 90$) and size distribution was also adequate (PSD = 80). The average

age of white crappie at 10 inches (8.9-10.9 inches) was 1.5 years (N = 6, range 1-2 years). Catch rate of black crappie was higher than in 2005 (2.2/nn) although only one legal fish was collected in 2009 trap net surveys (Figure 13). Harvested black crappie were observed in the creel survey up to 13 inches in length (Figure 14).

Fisheries management plan for Lake Waxahachie, Texas

Prepared – July 2010

ISSUE 1: Littoral vegetation and structure to provide cover for small fish is insufficient in the reservoir.

MANAGEMENT STRATEGY

1. Seek additional opportunities to implement habitat introduction projects at Lake Waxahachie.
2. Request appropriate plant species from the East Texas Woods and Waters Native Plant Nursery at Texas Freshwater Fisheries Center which may be established in Lake Waxahachie.

ISSUE 2: Stockings of blue catfish in 2003, 2005, and 2007 have resulted in a low-density blue catfish population.

MANAGEMENT STRATEGIES

1. Re-evaluate the success of blue catfish stockings through standard gill net sampling in spring 2014.

ISSUE 3: Hydrilla has been present at Lake Waxahachie since 1995 but has declined in area since 1998.

MANAGEMENT STRATEGIES

1. Coordinate with the controlling authority (City of Waxahachie) to monitor the hydrilla as needed.
2. Conduct a quantitative assessment of the aquatic plant community during routine habitat survey in 2013.

ISSUE 4: The sunfish population at Lake Waxahachie has potential to be utilized as a sport fishery.

MANAGEMENT STRATEGIES

1. Seek opportunities to promote sunfish fisheries through press releases and organizations such as Dallas Fly Fishers.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes standard monitoring in 2013-2014 (Table 11).

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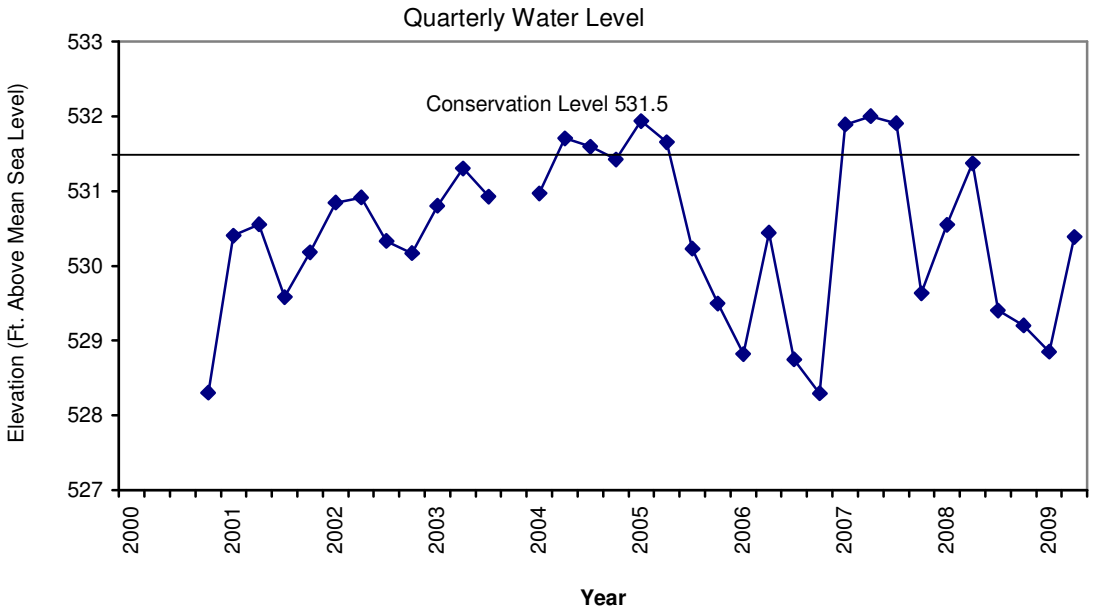


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Lake Waxahachie, Texas. Horizontal line represents conservation level.

Table 1. Characteristics of Lake Waxahachie, Texas.

Characteristic	Description
Year completed	1958
Controlling authority	City of Waxahachie
County	Ellis
Reservoir type	Tributary
Shoreline Development Index (SDI)	2.8
Conductivity	240 umhos/cm

Table 2. Harvest regulations for Lake Waxahachie, Texas.

Species	Bag Limit	Minimum-maximum length (inches)
Catfish: channel and blue, 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, their hybrids and subspecies	25 (in any combination)	10-No limit

Table 3. Stocking history of Lake Waxahachie. Size categories are: FGL =1-3 inches; ADL = adults.

Species	Year	Number	Size
Threadfin shad	1987	1,000	ADL
	Total	1,000	
Blue catfish	2003	57,658	FGL
	2005	49,594	FGL
	2007	55,200	FGL
	Total	162,452	
Florida largemouth bass	1988	69,459	FGL
	1997	70,051	FGL
	1998	69,011	FGL
	Total	208,521	

Table 4. Vegetation survey was conducted in 2009. 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 found.

Shoreline habitat type	Surface area	
	Acres	Percent of reservoir surface area
Native emergent		
Rattlebox	36	6.5
Smartweed, sedge		
Water willow,		
Pickerel weed	1.0	<1
Native submerged		
Bushy Pondweed	0.2	<1
Pondweed	0.3	<1
Chara	0.1	<1
Non-native (prohibited)		
Hydrilla	tr	<1

[1] Abiotic habitat features.

Table 5. Percent directed angler effort by species for Lake Waxahachie, Texas, March-May 2007.

Species	Year
	Spring 07
Largemouth bass	17
Crappie spp.	38
Catfish spp.	6
Anything	39

Table 6. Total fishing effort (h) for all species and total directed expenditures at Lake Waxahachie Texas, March-May 2007.

Creel Statistic	Year
	Spring 07
Total fishing effort	9,434
Total directed expenditures	$ 22,414

Gizzard shad

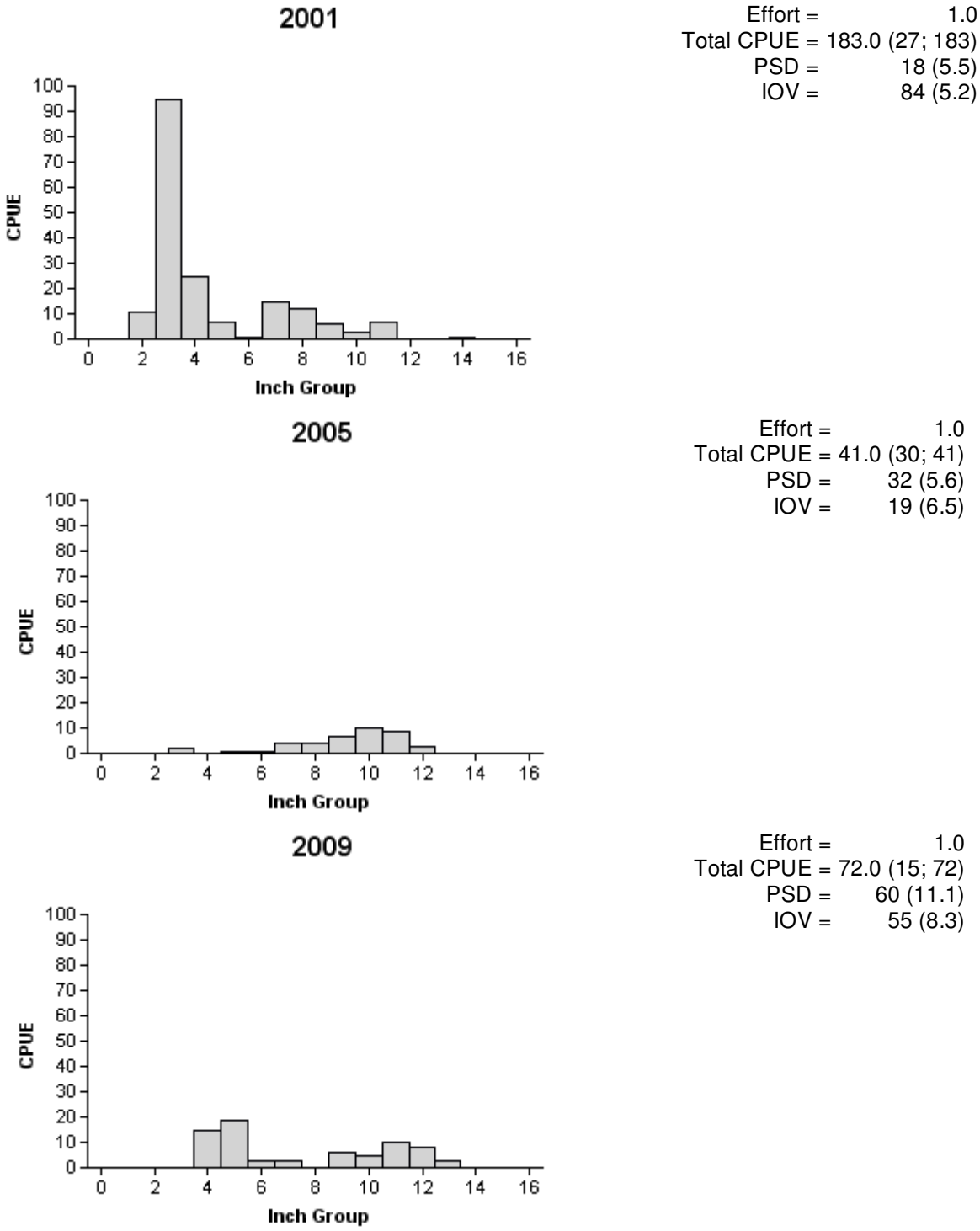


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Waxahachie, Texas, 2001, 2005, and 2009.

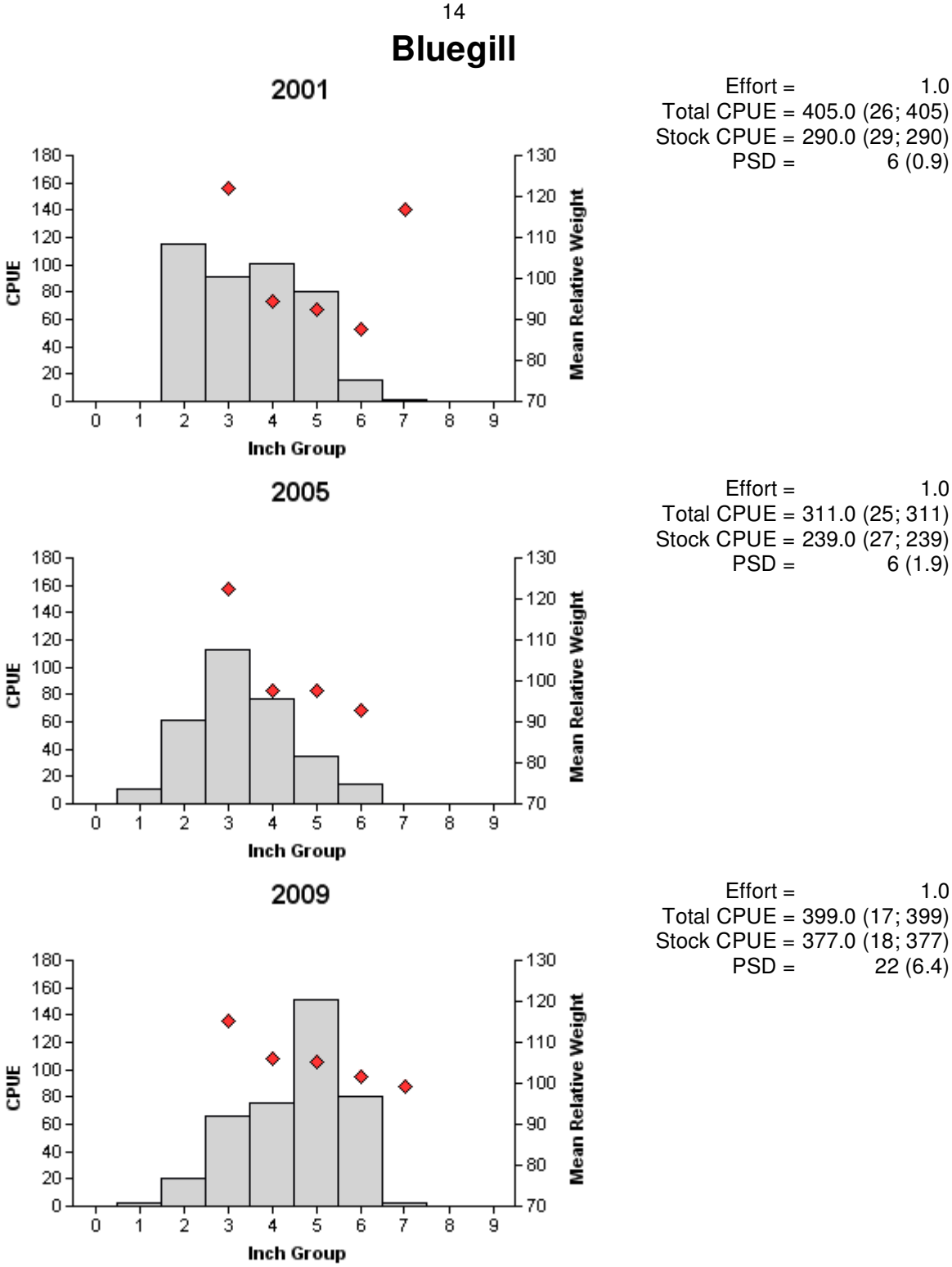
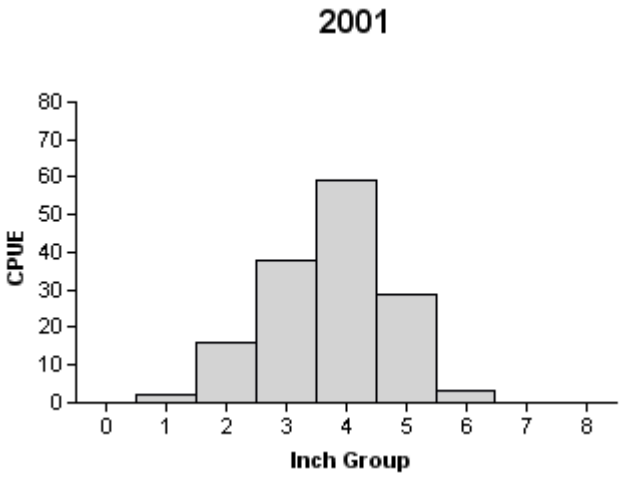
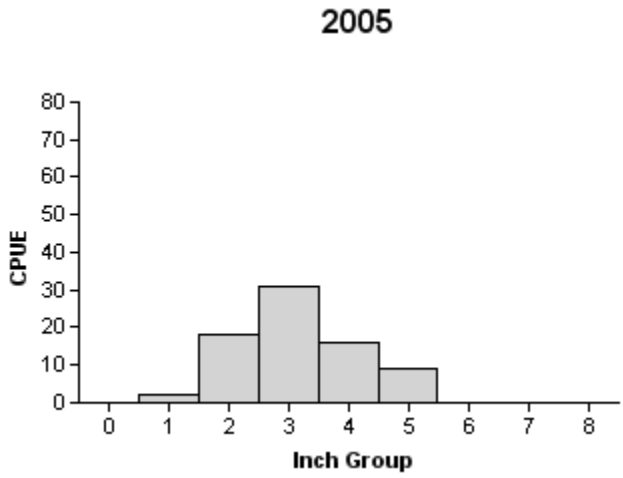


Figure 3. Number of bluegill caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Waxahachie, Texas, 2001, 2005, and 2009.

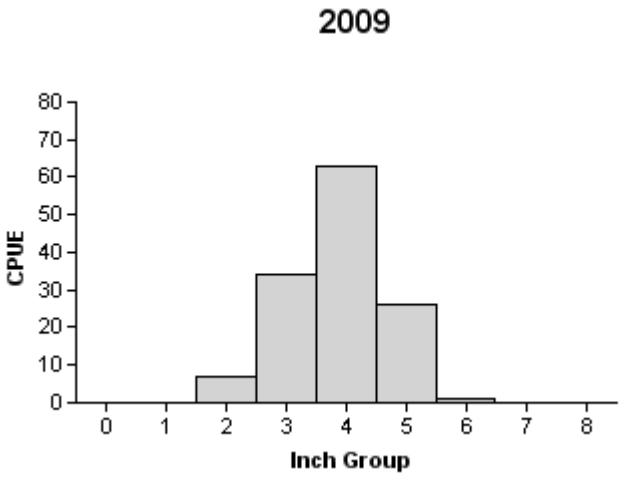
Longear sunfish



Effort = 1.0
Total CPUE = 147.0 (46; 147)
Stock CPUE = 147.0 (46; 147)



Effort = 1.0
Total CPUE = 76.0 (23; 76)
Stock CPUE = 76.0 (23; 76)



Effort = 1.0
Total CPUE = 131.0 (36; 131)
Stock CPUE = 131.0 (36; 131)

Figure 4. Number of longear sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE are in parentheses) for fall electrofishing surveys, Lake Waxahachie, Texas, 2001, 2005, and 2009.

Redear sunfish

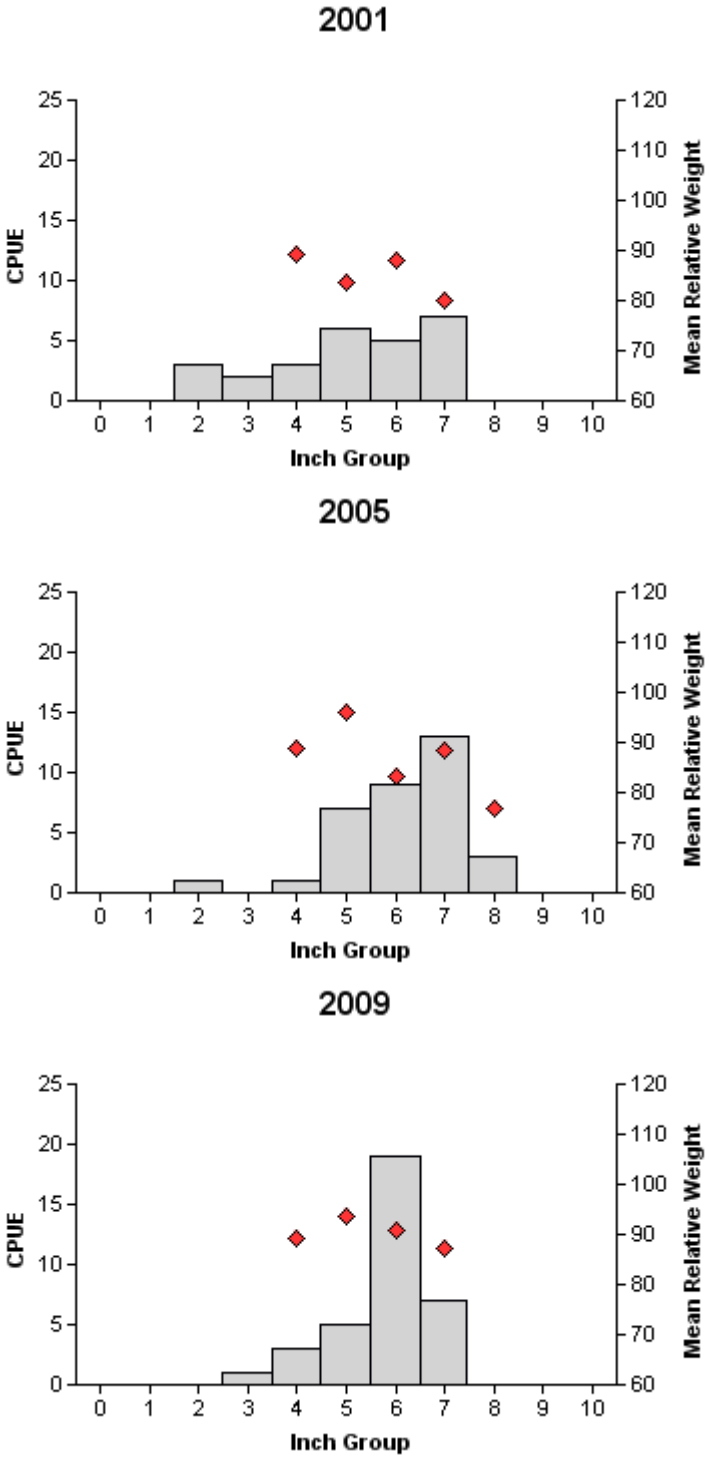


Figure 5. Number of redear sunfish caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Waxahachie, Texas, 2001, 2005, and 2009.

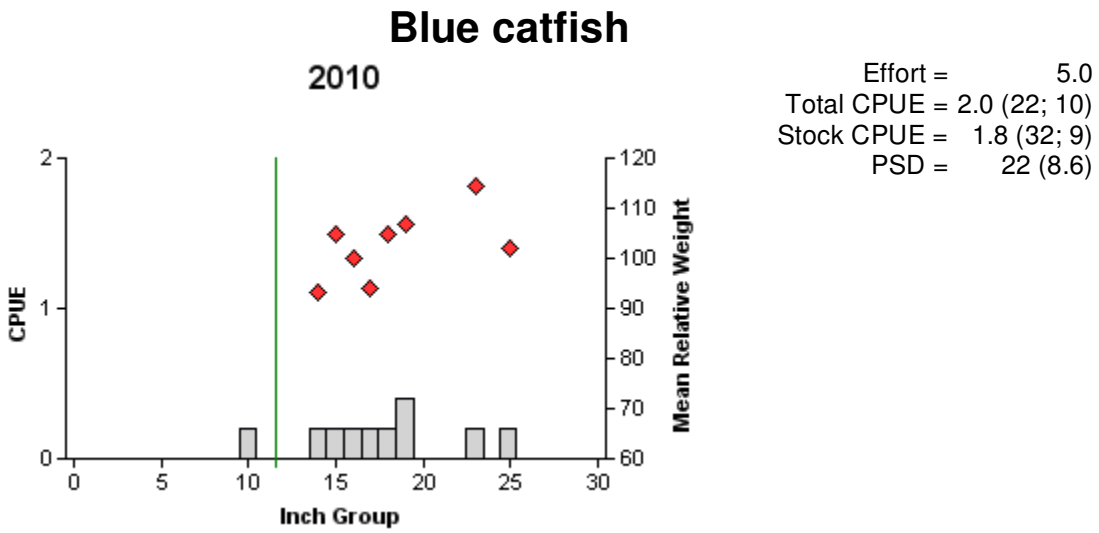


Figure 6. Number of blue catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Waxahachie, 2010; no blue catfish were collected in the 2002 or 2006 surveys. Vertical line represents length limit at time of survey.

Channel catfish

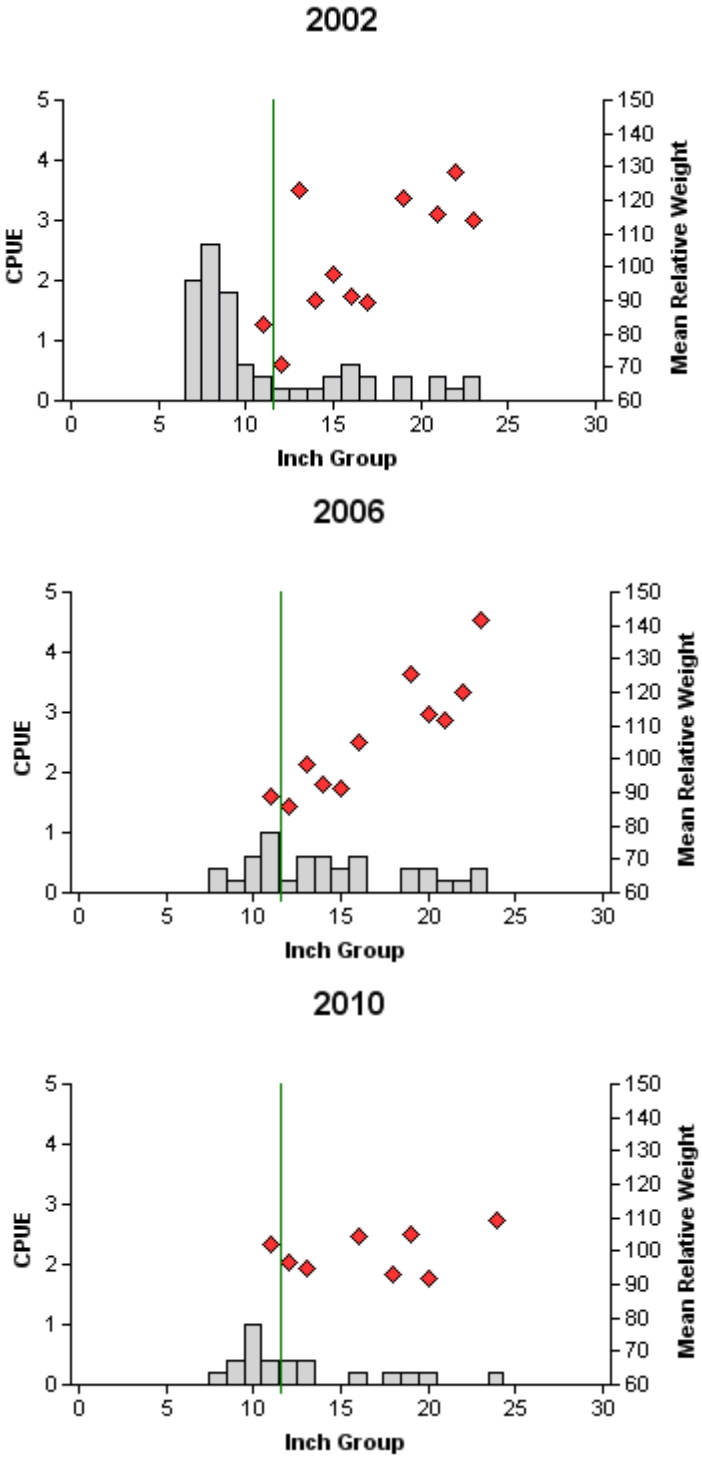


Figure 7. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Waxahachie, Texas, 2002, 2006, and 2010. Vertical lines represent length limit at time of survey.

Catfish

Table 7. Creel survey statistics for catfish at Lake Waxahachie March-May 2007, where total catch per hour is for anglers targeting catfish and total harvest is the estimated number of catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year
	Spring 2007
Directed effort (h)	547
Directed effort/acre	1.0
Total catch per hour	0.3
Total harvest	10 (108)
Blue	5.4 (100)
Channel	5.4 (100)
Harvest/acre	0.02 (100)
Blue	<0.1 (100)
Channel	<0.1 (100)
Percent legal released	46

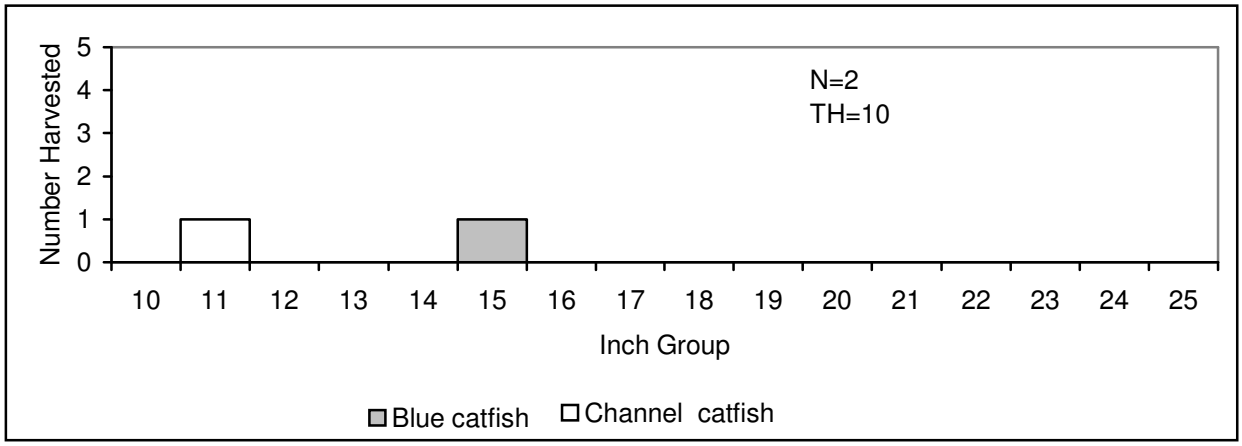
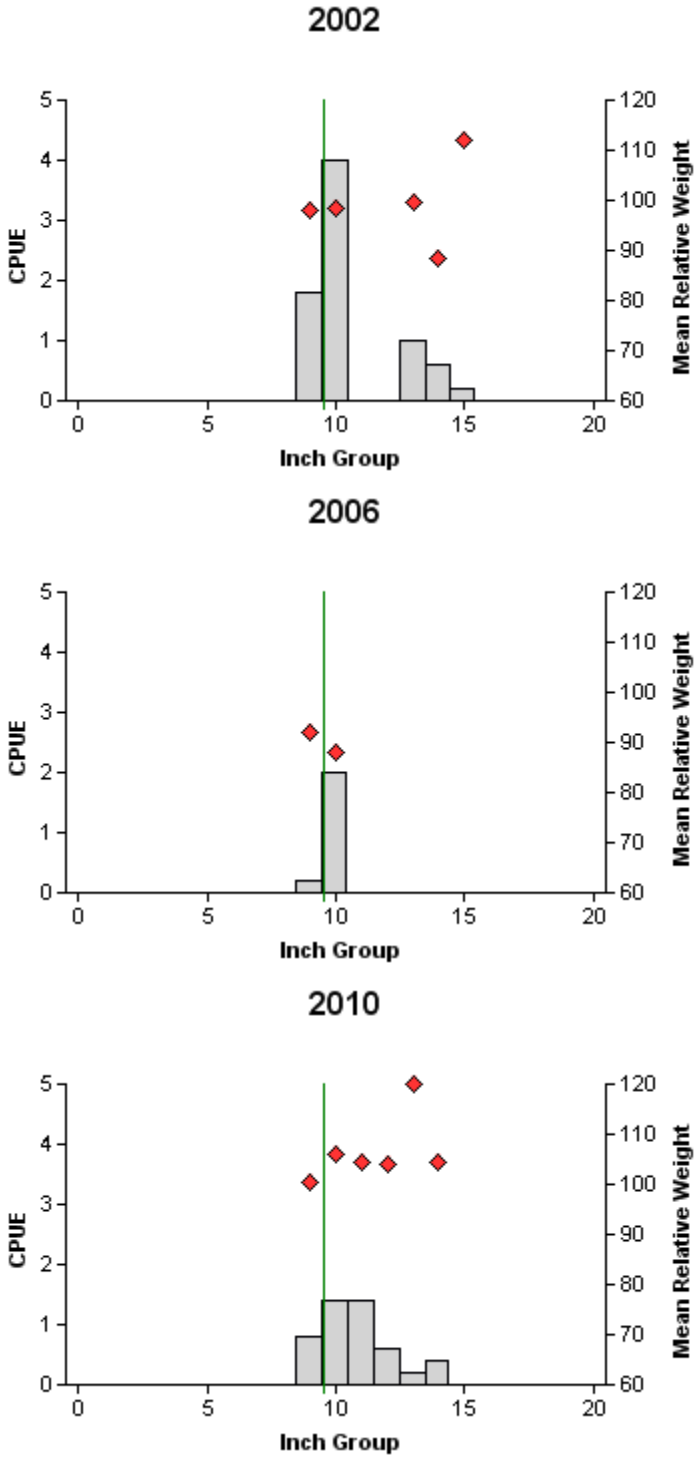


Figure 8. Length frequency of harvested channel catfish observed during creel surveys at Lake Waxahachie, Texas, March through May, 2007, all anglers combined. N is the number of harvested catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

White bass



Effort =	5.0
Total CPUE =	7.6 (43; 38)
Stock CPUE =	7.6 (43; 38)
PSD =	100 (0)
PSD-10 =	76 (14.2)

Effort =	5.0
Total CPUE =	2.2 (27; 11)
Stock CPUE =	2.2 (27; 11)
PSD =	100 (0)
PSD-10 =	91 (8.6)

Effort =	5.0
Total CPUE =	4.8 (22; 24)
Stock CPUE =	4.8 (22; 24)
PSD =	100 (0)
PSD-10 =	83 (10.6)

Figure 9. Number of white bass 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, Lake Waxahachie, Texas, 2002, 2006, and 2010. Vertical lines represent length limit at time of survey.

Largemouth bass

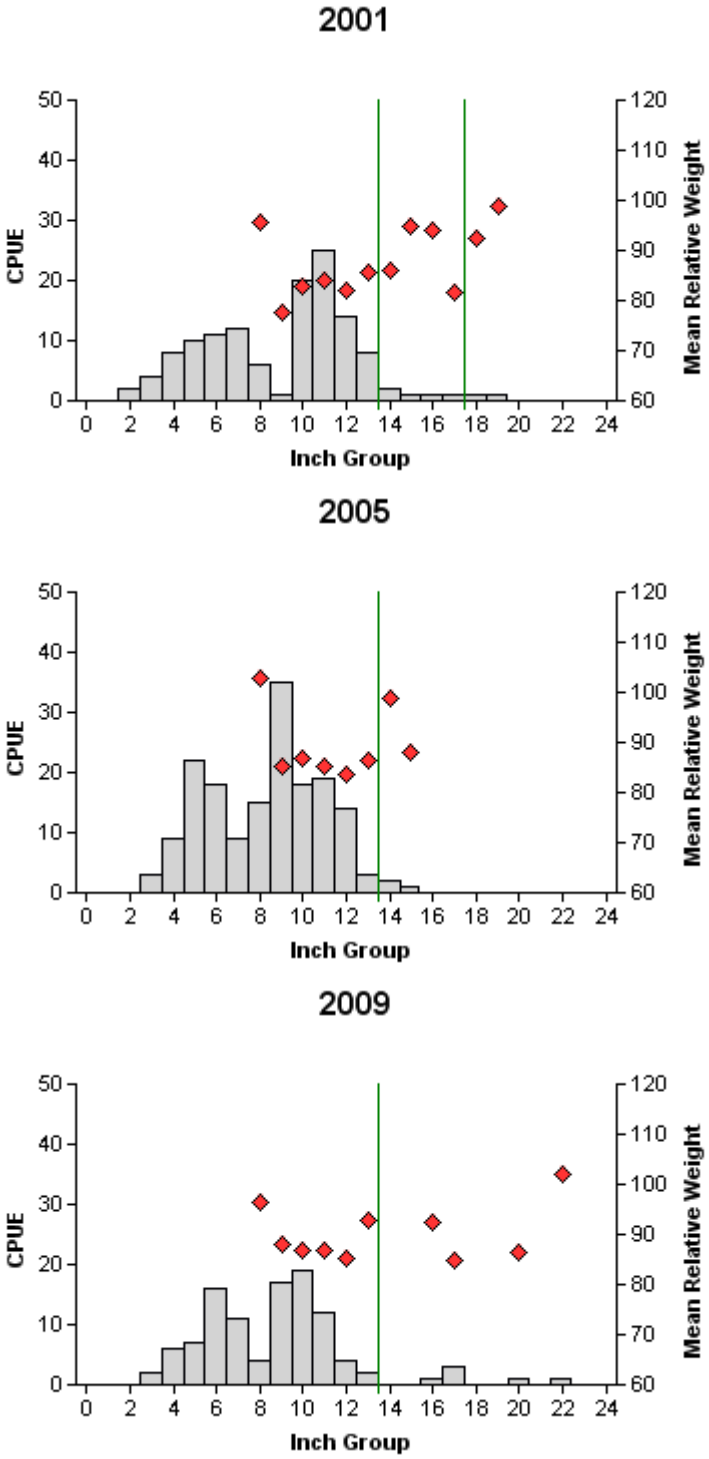


Figure 10. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Waxahachie, Texas, 2001, 2005, and 2009. Vertical lines indicate the lower and upper bounds of the protected slot length limit (2001) or the length limit at time of survey.

Largemouth bass

Table 8. Creel survey statistics for largemouth bass at Lake Waxahachie from March-May 2007, where total catch per hour is for anglers targeting all 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
	Spring 2007
Directed effort (h)	1,649 (40)
Directed effort/acre	3.0 (40)
Total catch per hour	0.6 (35)
Total harvest	0 (0)
Harvest/acre	0 (0)
Percent legal released	100

Largemouth bass

Table 9. Results of genetic analysis of largemouth bass collected by fall electrofishing at Lake Waxahachie, Texas, 1998, 2001, 2005, and 2009. In 2009 microsatellite DNA analysis was used to determine largemouth bass genetic composition and results may not be directly comparable to historic data. FLMB=Florida largemouth bass, NLMB=Northern largemouth bass, F1=first generation hybrid between a FLMB and a NLMB, Fx=second or higher generation hybrid between a FLMB and a NLMB.

Year	Sample size	Genotype				% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	NLMB		
1998[a]	17	2	3	9	3	43	12
2001	30	0	5	14	11	22	0
2005	30	1	1	22	6	26	3
2009	29	1	0	25	3	33	3

[a]-FLMB stocked the same year as survey

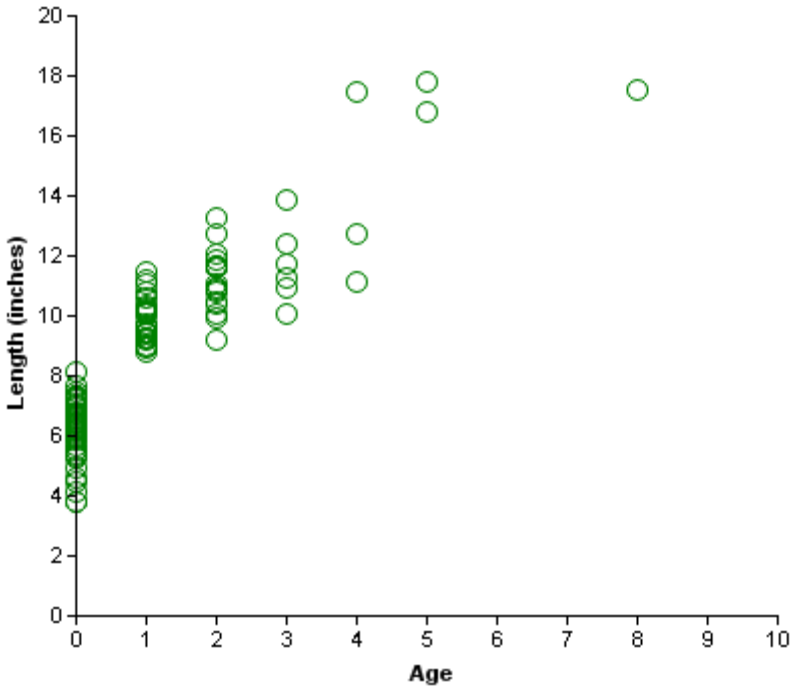


Figure 11. Length at age (inches) of largemouth bass (N=101) (sexes combined) collected in fall electrofishing, Lake Waxahachie, Texas November 2009.

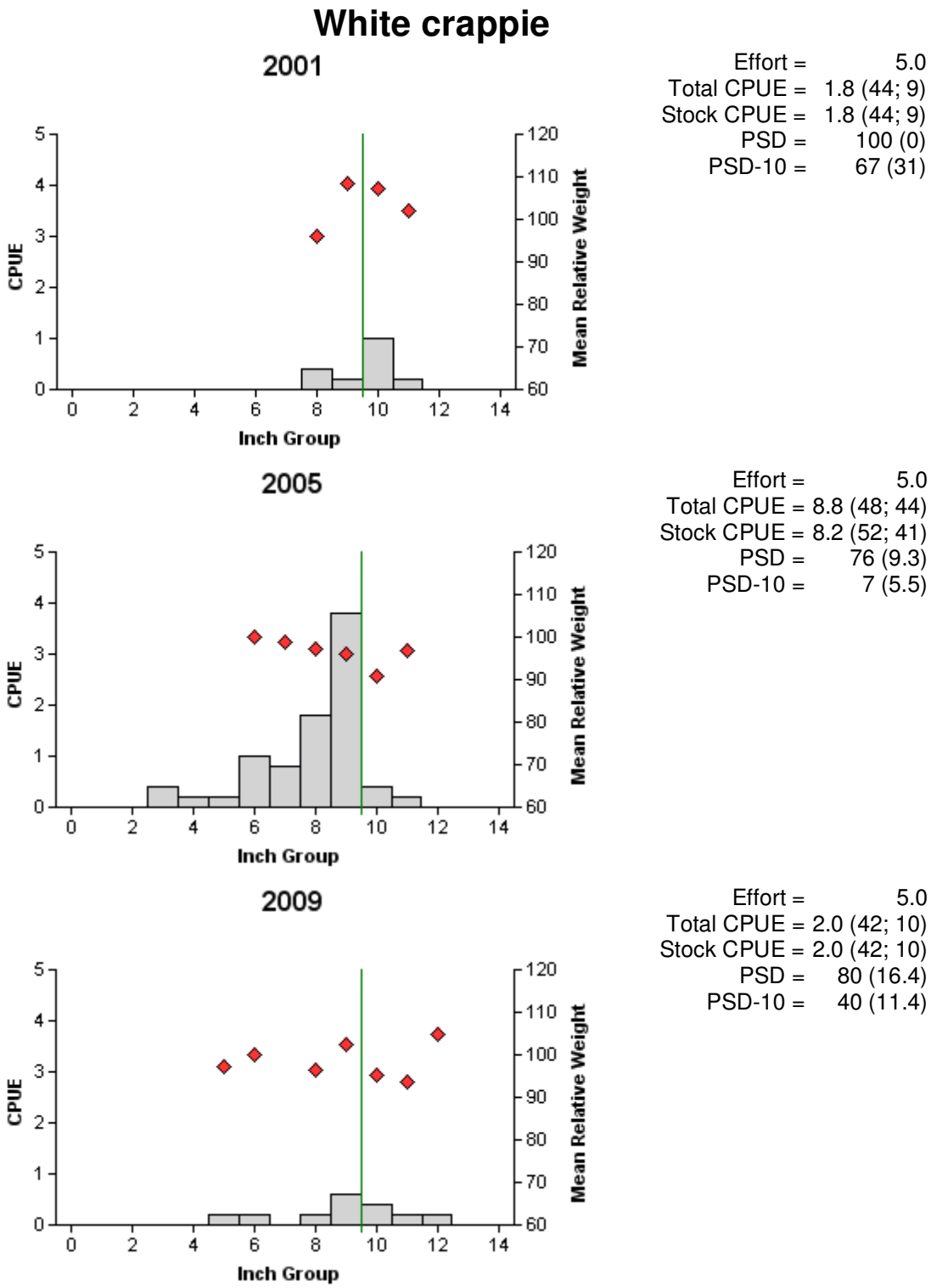
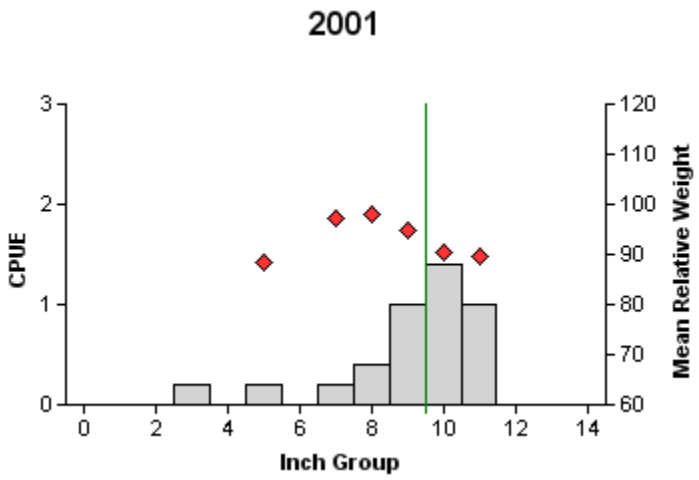
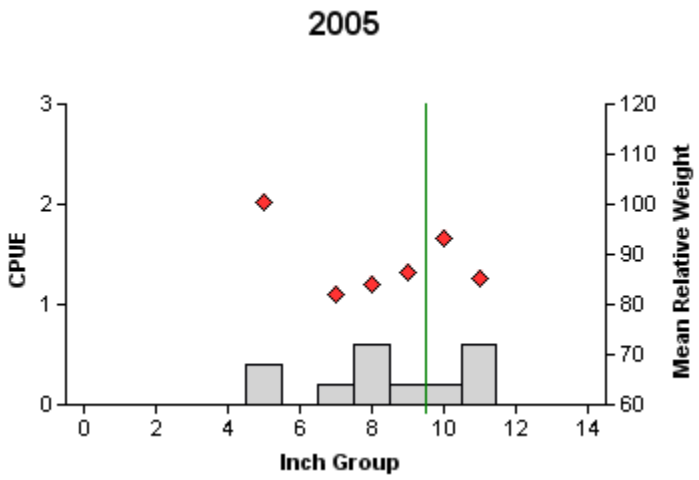


Figure 12. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall trap net surveys, Lake Waxahachie, Texas, 2001, 2005, and 2009. Vertical lines represent length limit at time of survey.

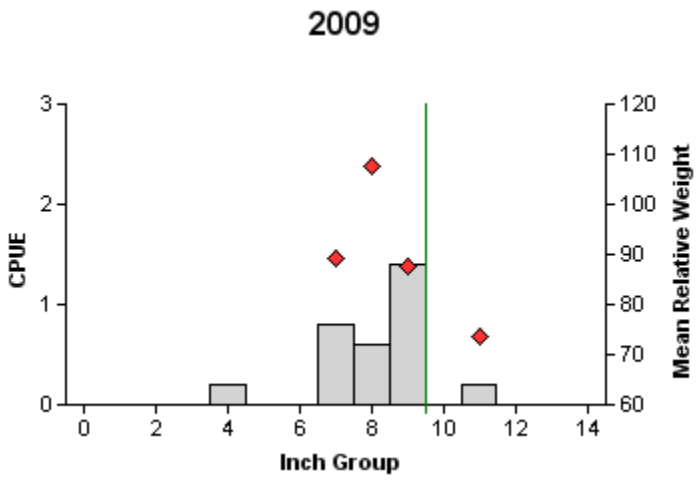
Black Crappie



Effort = 5.0
Total CPUE = 4.4 (23; 22)
Stock CPUE = 4.2 (25; 21)
PSD = 90 (10)
PSD-10 = 57 (6.9)



Effort = 5.0
Total CPUE = 2.2 (33; 11)
Stock CPUE = 2.2 (33; 11)
PSD = 73 (4)
PSD-10 = 36 (14)



Effort = 5.0
Total CPUE = 3.2 (85; 16)
Stock CPUE = 3.0 (84; 15)
PSD = 73 (5.1)
PSD-10 = 7 (9.3)

Figure 13. Number of black crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall trap net surveys, Lake Waxahachie, Texas, 2001, 2005, and 2009. Vertical lines represent length limit at time of survey.

Crappie

Table 10. Creel survey statistics for crappie at Lake Waxahachie, Texas, March-May 2007, 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
Directed effort (h)	3,591 (34.2)
Directed effort/acre	6.5 (34.2)
Total catch per hour	1.1 (63.2)
Total harvest	117 (94.1)
White	56 (90.0)
Black	61 (97.9)
Harvest/acre	0.2 (89.5)
White	0.1 (90.0)
Black	0.1 (97.9)
Percent legal released	53

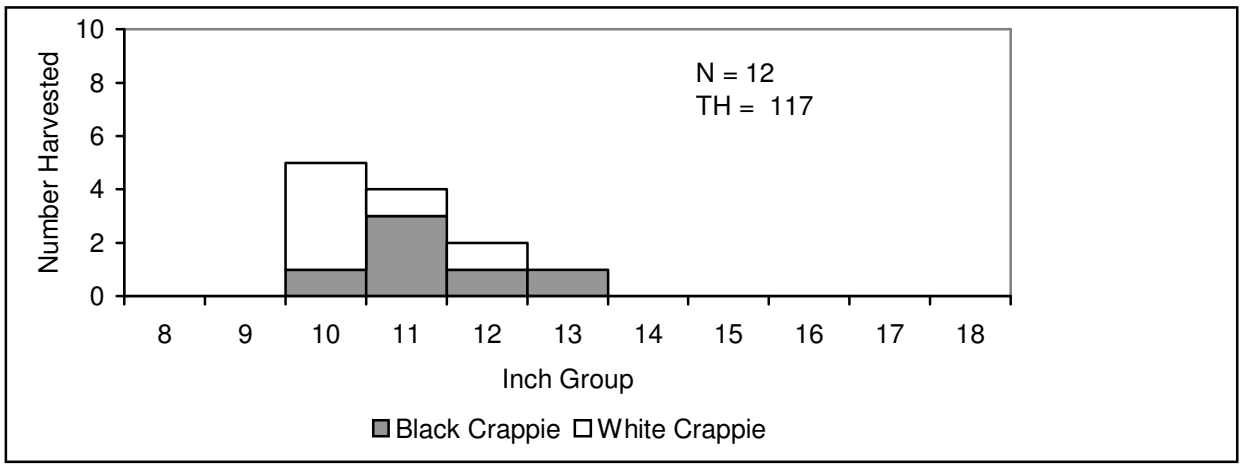


Figure 14. Length frequency of harvested crappie observed during creel surveys at Lake Waxahachie, Texas, March-May 2007, all anglers combined. N is the number of harvested crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 11. Proposed sampling schedule for Lake Waxahachie, Texas. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

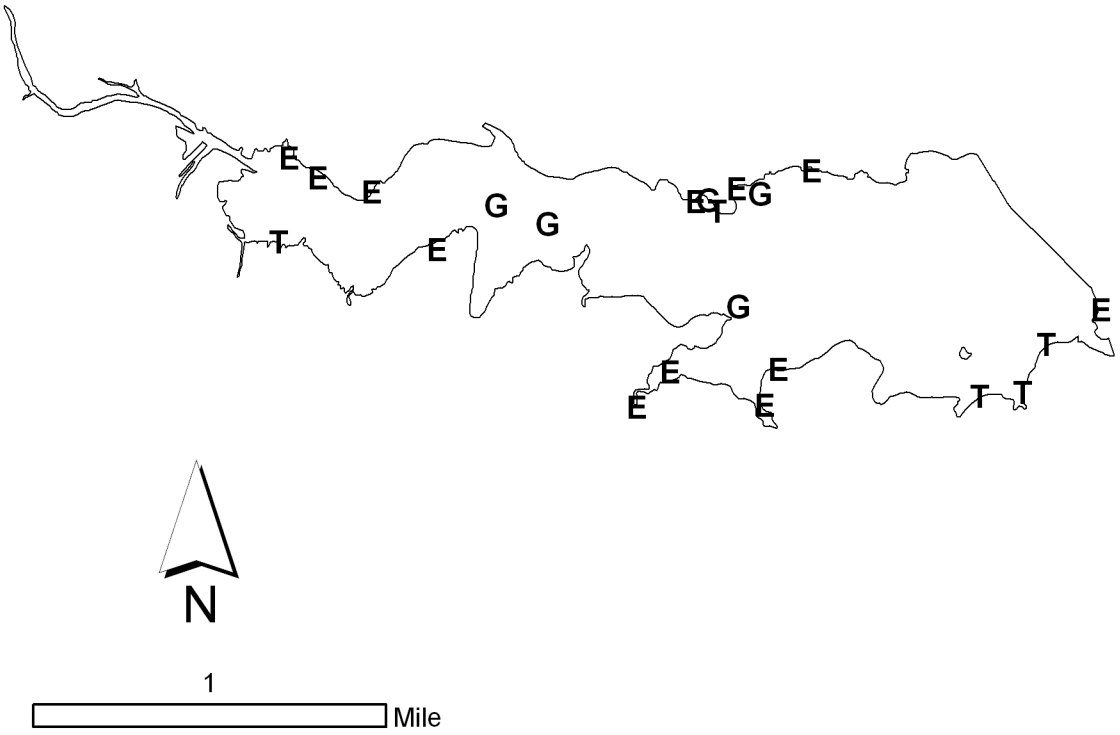
Survey Year	Electrofishing	Trap Net	Gill Net	Vegetation	Report
2010-2011					
2011-2012					
2012-2013					
2013-2014	S	A	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Lake Waxahachie, 2009-2010.

Species	Gill netting		Trap netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					72	72
Threadfin shad					1	1
Blue catfish	10	2				
Channel catfish	19	3.8				
White bass	24	4.8				
Green sunfish					1	1.0
Warmouth					3	3.0
Bluegill					399	399.0
Longear sunfish					131	131.0
Redear sunfish					35	35.0
Largemouth bass					106	106.0
White crappie			10	2.0		
Black crappie			16	3.2		

APPENDIX B



Location of sampling sites, Lake Waxahachie, Texas, 2009-2010. Trap netting, gill netting, and electrofishing stations are indicated by T, G, and E, respectively.