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STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2009-10 Survey Report

Kickapoo Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations at Kickapoo Reservoir were surveyed in 2009 using trap nets and electrofishing and in 2010 using gill nets. This report summarizes the results of the surveys and contains a management plan based on those findings.

- **Reservoir Description:** Kickapoo Reservoir is a 6,028-acre impoundment located on the Little Wichita River in the Red River Basin approximately 30 miles west of Wichita Falls. It has a primarily rocky shoreline with flooded terrestrial habitat. The reservoir was within 10 feet of conservation pool (1,045 msl) from January of 2006 through March 2010. Kickapoo water quality is considered good for municipal use, but tends to be turbid from surrounding clay soils.

- **Management history:** Important sport fish include catfish, white bass, largemouth bass and white crappie. The 2006 management plan recommended maintaining the genetic integrity of the existing pure northern strain largemouth bass population as a defined source for Texas Parks and Wildlife Department (TPWD) hatchery brood stock program. The reservoir is popular for its white crappie population. Kickapoo has always been managed with statewide regulations.

- **Fish Community**
  - **Prey species:** Gizzard shad catch rate was slightly below average for the reservoir but was still considered as an abundant prey base for game fish. The catch per unit effort (CPUE) for bluegill was lower than previous surveys.

  - **Catfishes:** Blue catfish were well represented in the 2010 gill net survey, but CPUE was down slightly from 2006. The 2010 gill net survey did not collect any channel catfish and only one was caught during the 2006 survey. There is still an extant population as evidenced by capture in trap nets and by the 2006 creel survey. Flathead catfish also observed during the 2010 gill net survey.

  - **White bass:** Few white bass were sampled in 2010, but the catch rate was up compared to the 2006 survey. It is believed that the white bass were on their spawning run so were not very vulnerable during the gill net survey.

  - **Largemouth bass:** Largemouth bass had a slightly higher electrofishing catch rate than the 2005 survey, but were still below the historical average. The reservoir had recently been at a low elevation and adequate habitat for spawning and nursery areas was lacking. Genetic analysis in 2009 again showed that only northern strain largemouth bass were present and that no Florida largemouth influence has been observed.

  - **White crappie:** The 2009 trap net CPUE was higher than the 2005 survey and was near the historical average for the reservoir. Natural reproduction continued to be good with an adequate abundance of legal-size fish >10 inches. The majority of legal sized crappie were located in the lower half of the reservoir while sublegal crappie dominated the upper portion. Crappie growth was below the regional average until age 2, at which point it became average to above average.

- **Management Strategies:** Maintain the genetic integrity of the existing largemouth bass population as a pure northern strain population by not introducing any Florida strain largemouth bass. Continue conducting electrophoretic testing every four years when largemouth bass are collected.

INTRODUCTION

This document is a summary of fisheries data collected from Kickapoo Reservoir in 2009 and 2010. The purpose 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 important sport fish and prey species. Historical data is also presented for comparison.

Reservoir Description

Kickapoo Reservoir is a 6,028-acre impoundment constructed in 1945 on the Little Wichita River. It is located in Archer County approximately 30 miles west of Wichita Falls and is operated and controlled by the City of Wichita Falls. Primary uses include municipal water supply and recreation. Mean depth was 14.2 ft. with a maximum depth of 43.4 ft. (TWDB 2001). TWDB (2001) stated that Kickapoo reservoir has a drainage of approximately 275 mi^2 and a shoreline length of 62 miles, shoreline development index was 5.5, and the reservoir impounds 85,825 ac/ft of water when full. Conductivity was 436 µmhos/cm during the June 29, 2009 habitat survey. Habitat at time of sampling consisted of flooded terrestrial vegetation, rocks and boat docks. Water level has fluctuated since 2006, reaching its lowest elevation in early 2009 when the reservoir water level was about 10 feet below conservation pool (Figure 1). Boat access consisted of two boat ramps, one public and a private one charging a $2.00 launch fee. Bank fishing is available at the public access points including the boat ramp. A popular fee fishing barge ($4.00 with a 2 rod limit) and camp also operates on the reservoir. Other descriptive characteristics for Kickapoo are in Table 1.

Management History

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

1. Maintain the genetic integrity of the existing largemouth population as a pure northern strain population and as a possible source for TPWD hatchery program brood stock.
   Action: Did not stock any Florida largemouth bass. Genetic integrity was confirmed by genetic analysis in 2009. Northern largemouth bass were collected twice during the last four year period for hatchery brood stock use.
2. Kickapoo had traditionally been viewed by anglers as a good crappie reservoir with other game fish species being underutilized. This reservoir also supported a good catfish population and improved largemouth bass size structure. Increases in water elevation provided improved spawning and recruitment conditions for a couple of years.
   Action: Promoted the reservoir fisheries and the refurbished boat ramp through various media outlets.

Harvest regulation history: Sport fish species in Kickapoo Reservoir have always been managed using statewide regulations (Table 2).

Stocking history: There have not been any recent supplemental stockings since management surveys have indicated adequate populations and reproduction of sport fish. Blue catfish were stocked in 1986, 1990 and 1991 to introduce an additional sport fish species to the reservoir. The complete stocking history is in Table 3.

Vegetation/habitat history: Kickapoo has no significant vegetation/habitat management history. Noxious vegetation has never been documented at the reservoir. The only aquatic vegetation noted during the 2009 vegetation survey was two small patches of water primrose.

Water Transfer: Kickapoo Reservoir, in the Red River basin, is used primarily by the city of Wichita Falls for municipal and industrial uses. Raw water travels to the city through a large underground pipeline that is gravity fed. Since water does not have to be mechanically pumped, it tends to be the favored surface water choice when the lake elevation is relatively high. Small amounts of untreated water are also used by lake lot owners for irrigation purposes. The city also sells water from Kickapoo to the cities of Olney and Archer City to supplement their municipal water sources. For Olney, Kickapoo water is pumped to city lakes that include Cooper Reservoir and Olney City Lake. These two lakes are in the upper Brazos River basin which results in an inter-basin transfer of raw water.

METHODS

Fishes were collected by electrofishing (1.5 hours at 18 five-minute stations), gill netting (10 net nights at 10 stations), and trap netting (10 net nights at 10 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 caught per net night (fish/nn). All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 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 (DiCenzo et al. 1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. Ages were determined using otoliths from 5 to 10 fish per inch group. Source for water level data was the United States Geological Survey.

RESULTS AND DISCUSSION

Habitat: A physical habitat survey conducted June 29, 2009 indicated that the littoral zone habitat consisted primarily of nondescript or rocky shoreline (Table 4). The previous physical habitat survey was conducted in 2005 (Howell and Mauk 2006). Very few manmade changes to the physical habitat had occurred during the four year period. The reservoir elevation has fluctuated from near full to 10 feet below full during the last four years which has influenced available habitat, the fish populations, and sampling.

Prey species: Electrofishing catch rates of bluegill and gizzard shad were 28.7/h and 338.7/h, respectively. Index of vulnerability for gizzard shad was high, indicating that 99.0% of gizzard shad were available to predators. This was similar to IOV estimates in previous years. The total CPUE for gizzard shad of 338.7/h was lower in 2009 compared to the 2005 survey (Figure 2) and slightly below the high historical average of 380.2/h). Total CPUE of bluegill of 28.7/h was also lower than the 2005 survey (Figure 3) and slightly below the historical average (33.9/h).

Blue catfish: Blue catfish 2010 gill net CPUE (6.3/nn) was down slightly from the 2006 (9.0/nn) and 2002 CPUE (13.2/nn; Figure 4). They remained the most abundant catfish species sampled every gill net survey since 1994, with good numbers of legal size fish up to 33 inches observed during the 2010 survey. A lake record of 35.6 pounds was established in 2004.

Channel catfish: No channel catfish were observed in the 2010 gill net survey and low catch rates were also observed in the 2006 survey (CPUE = 0.1/nn; Figure 5). Both surveys are well below the CPUE of 1.7/nn recorded in 2002. There are channel catfish present as evidenced by channel catfish being observed during 2009 trap netting and they were well documented in the 2006 creel survey (Howell and Mauk 2006).

White bass: The gill net catch rate for white bass was 0.5/nn in 2010, which was slightly up from 2006

(0.3/nn), but down from 2002 (21.6/nn; Figure 6). Those caught this year were in the upper portion of the reservoir and it is believed that the majority of the population was unavailable to the sampling gear because they were on a spawning run up the tributaries.

Largemouth bass: The electrofishing CPUE of largemouth bass was 6.0/h in 2009, a slight increase from the survey in 2005 (5.3/h), but well down from the 2001 survey (114.7/h) when many young of the year were sampled (Figure 7). Age and growth remained at or above ecological region averages (Table 6). The 2009 electrofishing survey was adversely affected by low reservoir conditions that did not allow near shore electrofishing combined with a general lack of suitable habitat at the sampling sites. Kickapoo is utilized as a northern strain largemouth bass procurement reservoir for the hatchery system (Table 5).

White crappie: The trap net catch rate of white crappie was 52.7/nn in 2009, higher than the previous survey of 2005 (24.7/nn), but lower than 2001 (136.4/nn; Figure 9). PSD had doubled to 32 over the previous survey as has PSD-P (19). Stock CPUE was higher than the previous two surveys at 27.1/nn. Wr's were adequate being around 100. Growth rates compared to the ecological average are typically slow in the first two years of growth, but by age 3 and 4 were better than the ecological average (Table 7). The average growth rate to 10 inches (9.0 to 10.9 inches) was 2.8 years in 2009 (N = 19: range 2 – 6).

Fisheries management plan for Kickapoo Reservoir, Texas

Prepared – July 2010

ISSUE 1: Maintain and monitor the genetic integrity of the existing largemouth bass population as a pure northern strain population and a source for TPWD hatchery program brood stock. Locations with pure northern strains of largemouth bass are limited in Texas.

MANAGEMENT STRATEGIES

1. Do not stock any Florida largemouth bass at Kickapoo. It is the uppermost public impoundment in the watershed and should maintain the genetic integrity of its largemouth bass population.

2. Continue to monitor for Florida strain influence by conducting regular electrophoretic testing.

ISSUE 2: Lake Kickapoo has traditionally been viewed by anglers as a good crappie reservoir with other game fish species being present. The reservoir can produce good populations of other game species depending on reservoir elevation and available habitat. Little fishing pressure exists on the reservoir except when good populations exist and are promoted. Recent increases in water elevation should improve game fish populations in the future.

MANAGEMENT STRATEGY

1. Promote the fisheries when appropriate through news releases and when talking to the public.

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant Salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc… so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

SAMPLING SCHEDULE JUSTIFICATION:

Standard surveys will be conducted every 4 years to monitor species relative abundances and body conditions.

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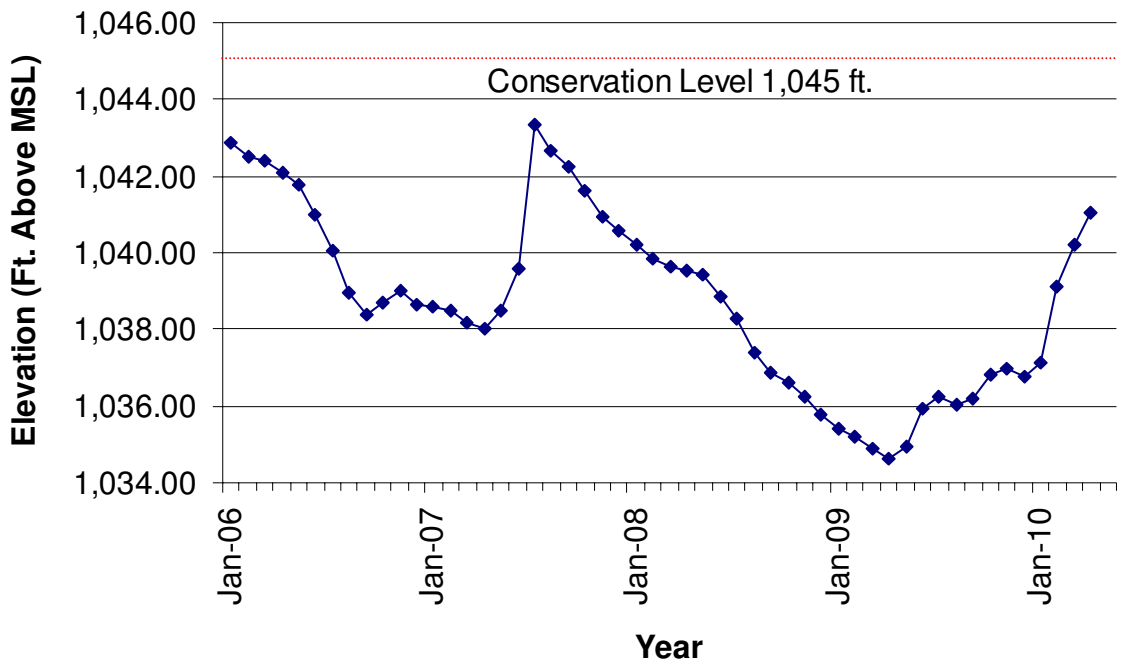


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Kickapoo Reservoir, Texas.

Table 1. Characteristics of Kickapoo Reservoir, Texas.

Characteristic	Description
Year Constructed	1945
Controlling authority	City of Wichita Falls
County	Archer
Reservoir type	Tributary
Shoreline Development Index (SDI)	5.5
Conductivity	436 µmhos/cm

Table 2. Harvest regulations for Kickapoo Reservoir.

Species	Bag Limit	Length Limit (inches)
Catfish: Channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 minimum
Catfish, Flathead	5	18 minimum
Bass, White	25	10 minimum
Bass, Largemouth	5	14 minimum
Crappie, White	25	10 minimum

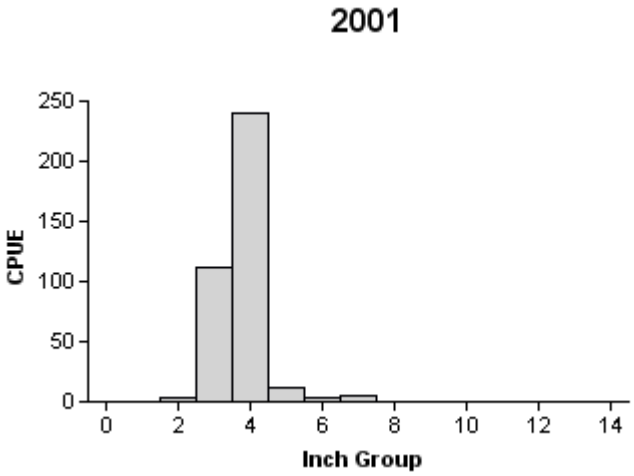
Table 3. Stocking history of Kickapoo, Texas. Life stages are fingerlings (FGL), advanced fingerlings (AFGL) and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species mean total length (Mean TL; 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)
Blue catfish	1986	18,475	FGL	3.0
	1990	63,162	FGL	2.0
	1991	62,039	FGL	2.1
	Total	143,676		
Channel catfish	1969	10,000	AFGL	7.9
	1971	88,375	AFGL	7.9
	1972	50,000	AFGL	7.9
	1973	1,000	UNK	UNK
	Total	149,375		
Largemouth bass	1970	100,000	UNK	UNK
	Total	100,000		

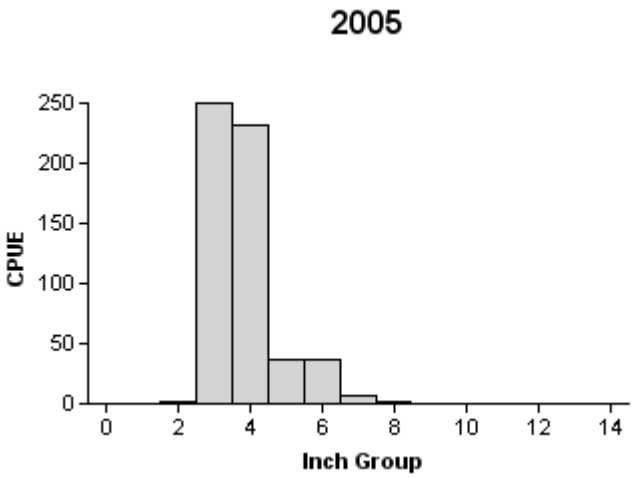
Table 4. Survey of littoral zone and physical habitat types, Kickapoo Reservoir, Texas on June 29, 2009. A linear shoreline distance (miles) was recorded for each habitat type found. Surface area (acres) and percent of reservoir surface area was determined for each offshore habitat type identified.

Shoreline habitat type	Shoreline Distance		Surface Area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Gravel	4.2	13.7		
Natural	16.5	53.0		
Rocky shore	10.4	33.4		
Total shoreline length	31.1			
Habitat adjacent to shoreline				
Boat docks			3.8	<0.1
Native floating vegetation			0.1	<0.1

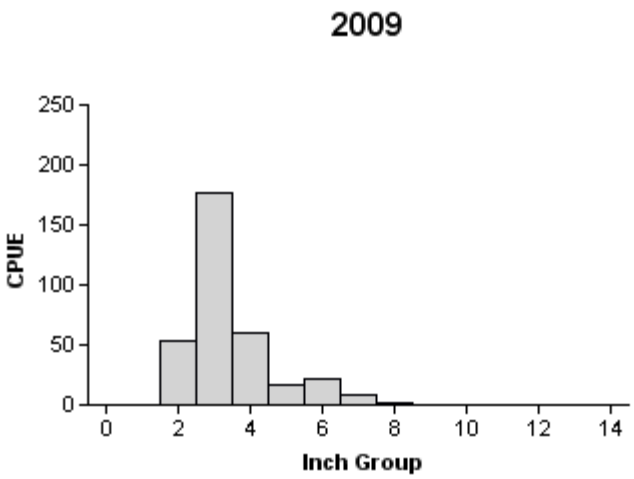
Gizzard Shad



Effort = 1.5
Total CPUE = 376.0 (20; 564)
Stock CPUE = 6.0 (61; 9)
IOV = 99.65 (0.3)



Effort = 1.5
Total CPUE = 564.0 (31; 846)
Stock CPUE = 7.3 (44; 11)
IOV = 99.76 (0.2)

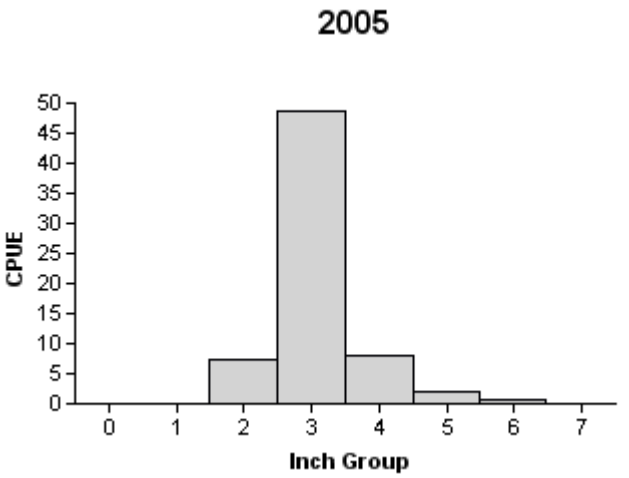


Effort = 1.5
Total CPUE = 338.7 (37; 508)
Stock CPUE = 11.3 (43; 17)
IOV = 99.02 (0.5)

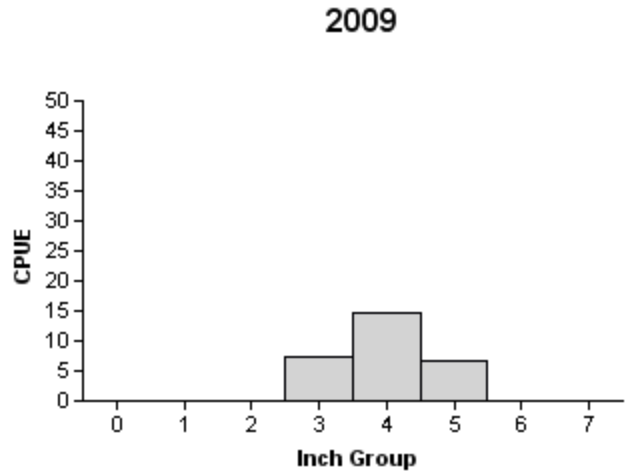
Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Kickapoo Reservoir, Texas, 2001, 2005, and 2009.

Bluegill

Effort = 1.5
Total CPUE = 38.0 (31; 57)
Stock CPUE = 29.3 (29; 44)
PSD = 0 (50.5)
PSD-P = 0 (0)



Effort = 1.5
Total CPUE = 66.7 (36; 100)
Stock CPUE = 59.3 (34; 89)
PSD = 1 (1.2)
PSD-P = 0 (0)



Effort = 1.5
Total CPUE = 28.7 (45; 43)
Stock CPUE = 28.7 (45; 43)
PSD = 0 (51.2)
PSD-P = 0 (0)

Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Kickapoo Reservoir, Texas, 2001, 2005, and 2009.

Blue Catfish

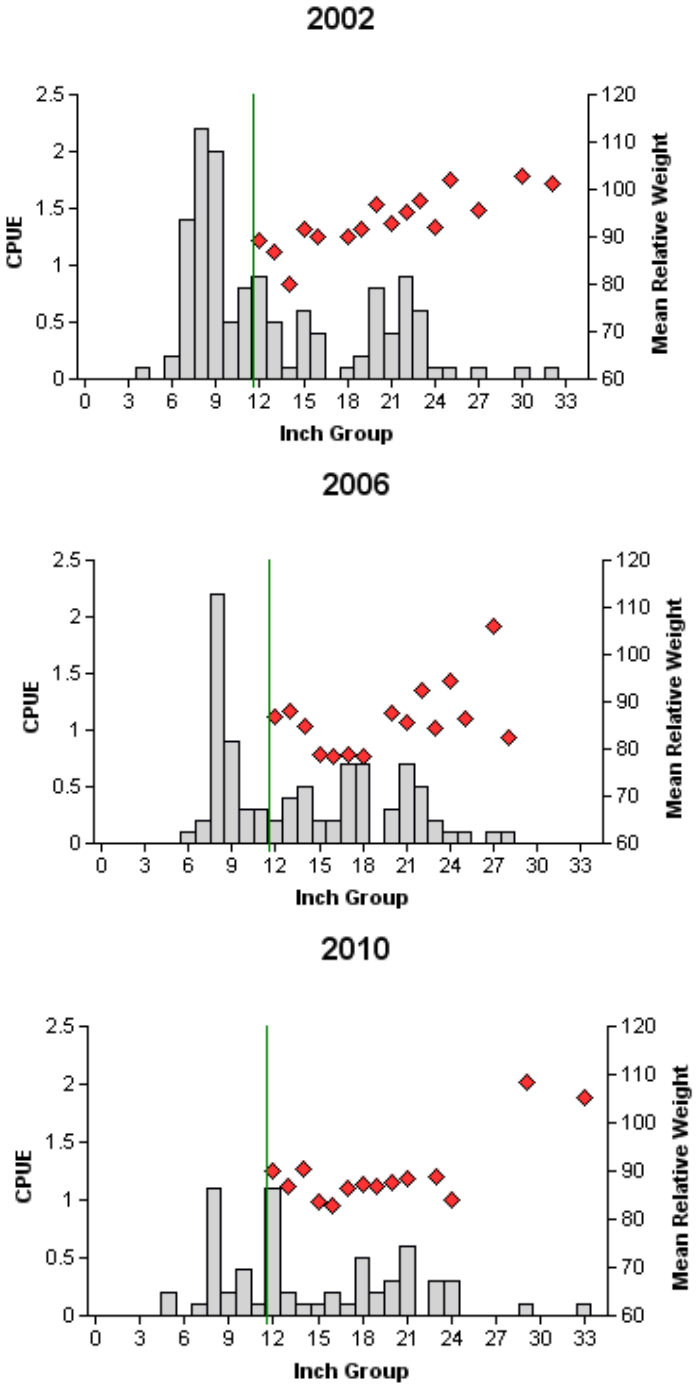
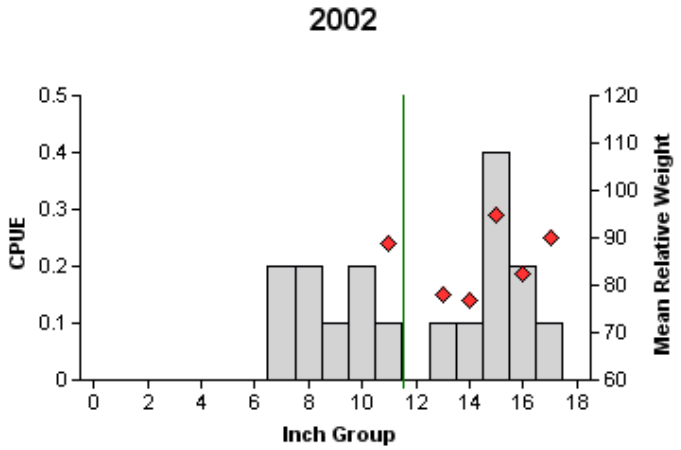
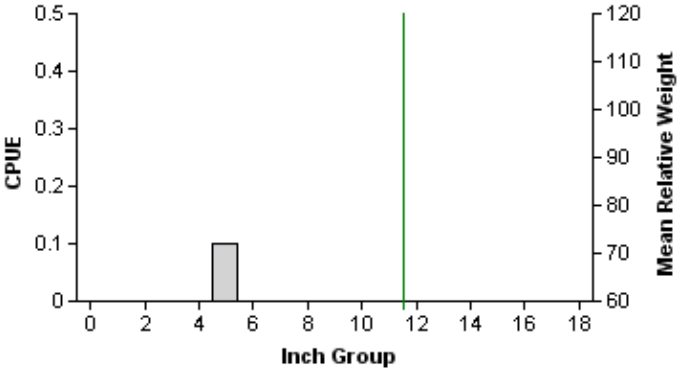


Figure 4. Number of blue catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Kickapoo Reservoir, Texas, 2002, 2006, and 2010. Line indicates minimum size limit at time of sampling.

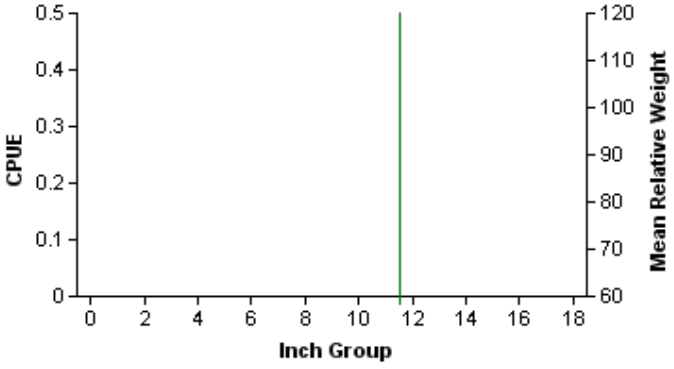
Channel Catfish



Effort = 10.0
Total CPUE = 1.7 (36; 17)
Stock CPUE = 1.0 (39; 10)
PSD = 30 (17.6)
PSD-P = 0 (0)



Effort = 10.0
Total CPUE = 0.1 (100; 1)
Stock CPUE = 0.0 (0; 0)
PSD = 0 (0)
PSD-P = 0 (0)



Effort = 10.0
Total CPUE = 0.0 (0; 0)
Stock CPUE = 0.0 (0; 0)
PSD = 0 (0)
PSD-P = 0 (0)

Figure 5. 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 netting surveys, Kickapoo Reservoir, Texas, 2002, 2006, and 2010. Line indicates minimum size limit at time of sampling.

White Bass

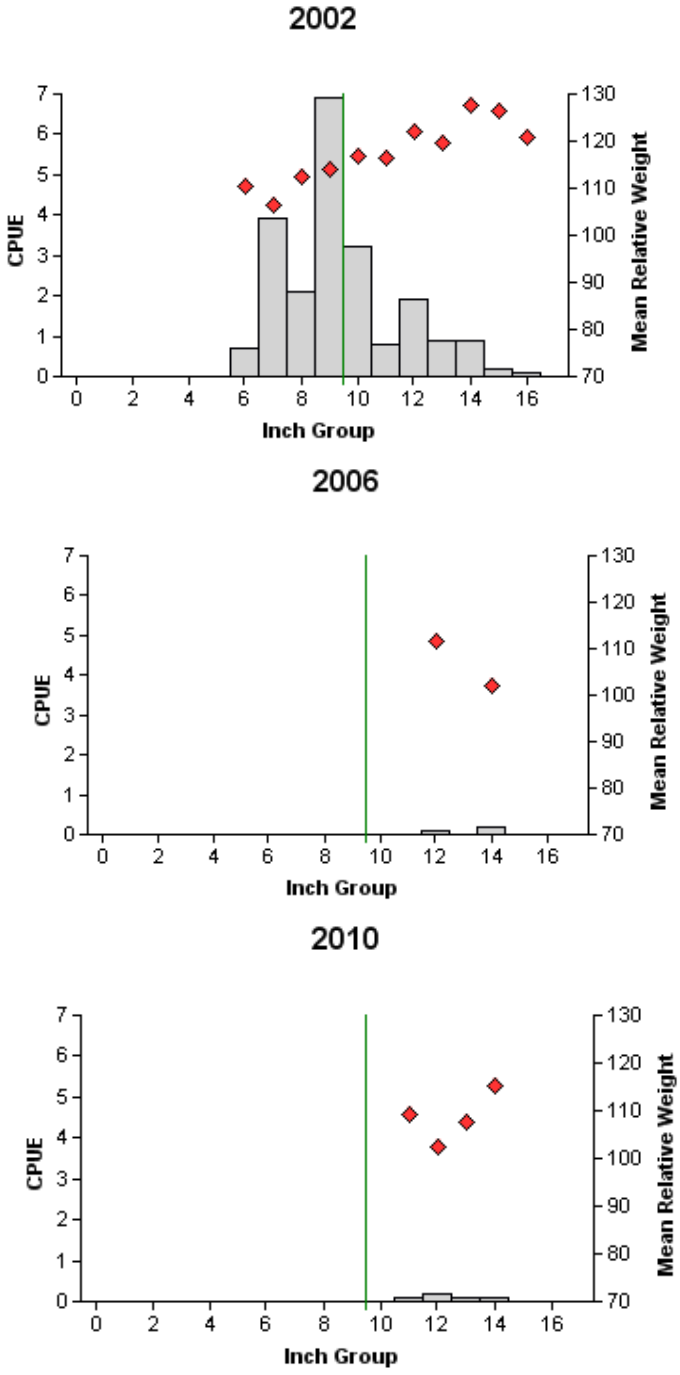


Figure 6. Number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Kickapoo Reservoir, Texas, 2002, 2006, and 2010. Line indicates minimum size limit at time of sampling.

Largemouth Bass

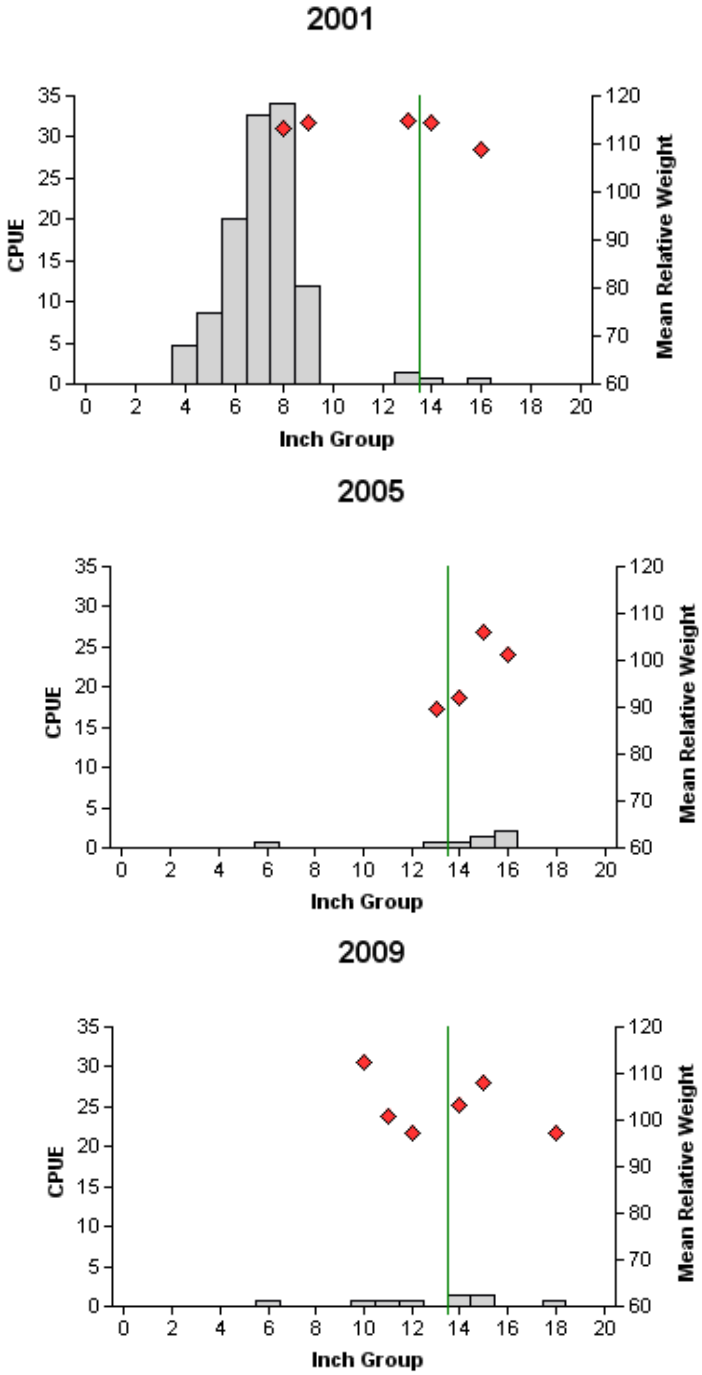


Figure 7. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Kickapoo Reservoir, Texas, 2001, 2005, and 2009. Line indicates minimum size limit at time of sampling.

Largemouth Bass

Table 5. Results of genetic analysis of largemouth bass collected by fall electrofishing, Kickapoo Reservoir, Texas, 1997, 2001, 2005, 2006, and 2009. On March 26, 2006, largemouth bass were collected from anglers at a tournament for use in TPWD fish hatcheries. 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.

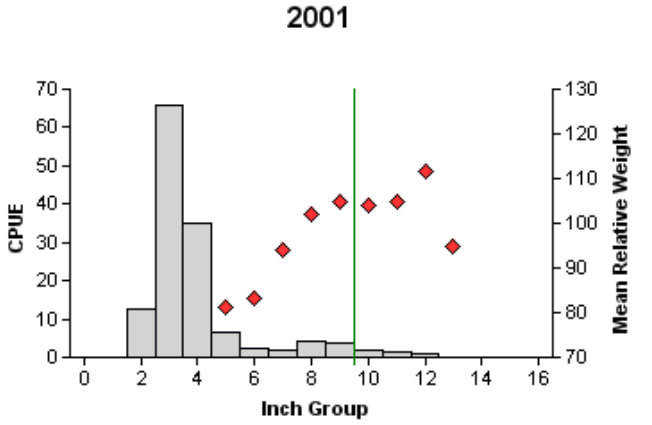
		Genotype				
Year	Sample size	FLMB	F1 or Fx	NLMB	% FLMB alleles	% pure FLMB
1997	15	0	0	15	0	0
2001	30	0	0	30	0	0
2005	1	0	0	1	0	0
2006	64	0	0	64	0	0
2009	2	0	0	2	0	0

Table 6. Mean length at age of capture for largemouth bass (sexes combined) collected during fall electrofishing surveys, Lake Kickapoo, Texas. Sample sizes are in parentheses.

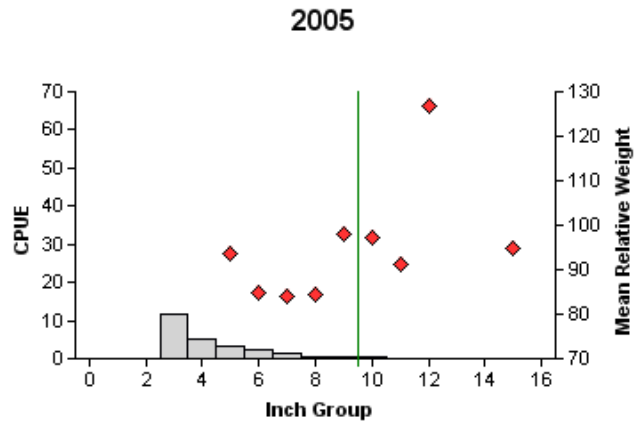
	Length (inches) at age				
Year	1	2	3	4	5
1994	10.6(12)	12.9(19)		16.7(1)	
1997	11.5(1)	12.6(6)	14.7(1)		
2001		13.9(3)			
2009	10.2 (1)	14.1(5)			18.5 (1)
Averages*	10.1	12.9	15.1	16.9	18.3

* Ecological region 5 averages from Prentice (1987); lengths derived for October 15.

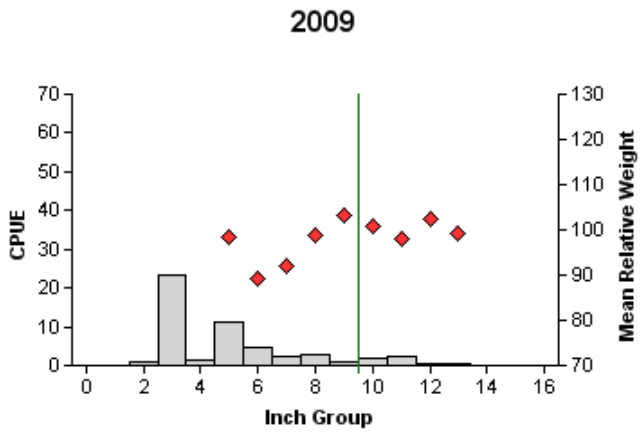
White Crappie



Effort = 10.0
Total CPUE = 136.4 (30; 1364)
Stock CPUE = 22.6 (41; 226)
PSD = 54 (15.2)
PSD-P = 18 (3.1)



Effort = 16.0
Total CPUE = 24.7 (16; 395)
Stock CPUE = 8.0 (16; 128)
PSD = 16 (2.8)
PSD-P = 9 (2.4)



Effort = 10.0
Total CPUE = 52.7 (40; 527)
Stock CPUE = 27.1 (15; 271)
PSD = 32 (6.8)
PSD-P = 19 (4)

Figure 8. 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 netting surveys, Kickapoo Reservoir, Texas, 2001, 2005, and 2009. Line indicates minimum size limit at time of sampling.

Table 7. Mean length at age of capture for white crappie (sexes combined) collected during fall trap netting surveys, Lake Kickapoo, Texas. Sample sizes are in parentheses.

	Length (inches) at age					
Year	1	2	3	4	5	6
1994	4.8 (6)	7.1 (19)	10.1 (9)	12.0 (2)	12.7 (2)	10.9 (2)
1997	4.6 (6)	6.6 (16)	9.3 (10)	10.7 (3)	10.9 (2)	
2000	5.0 (6)	6.9 (9)	6.2 (3)			9.4 (2)
2001	6.2 (14)	8.6 (17)	10.7 (6)	12.3 (5)		11.6 (4)
2009	5.9 (20)	7.8 (38)	10.5 (31)	11.8 (7)	11.4 (1)	10.6 (1)
Averages*	6.9	8.9	10.3	11.3	11.9	12.4

* Ecological region 5 averages from Prentice (1987); lengths derived for November 15.

Table 8. Proposed sampling schedule for Kickapoo Reservoir, Texas. Gill net surveys are conducted in the spring, while electrofishing and trap net surveys are conducted in the fall. S denotes standard survey and A denotes additional survey.

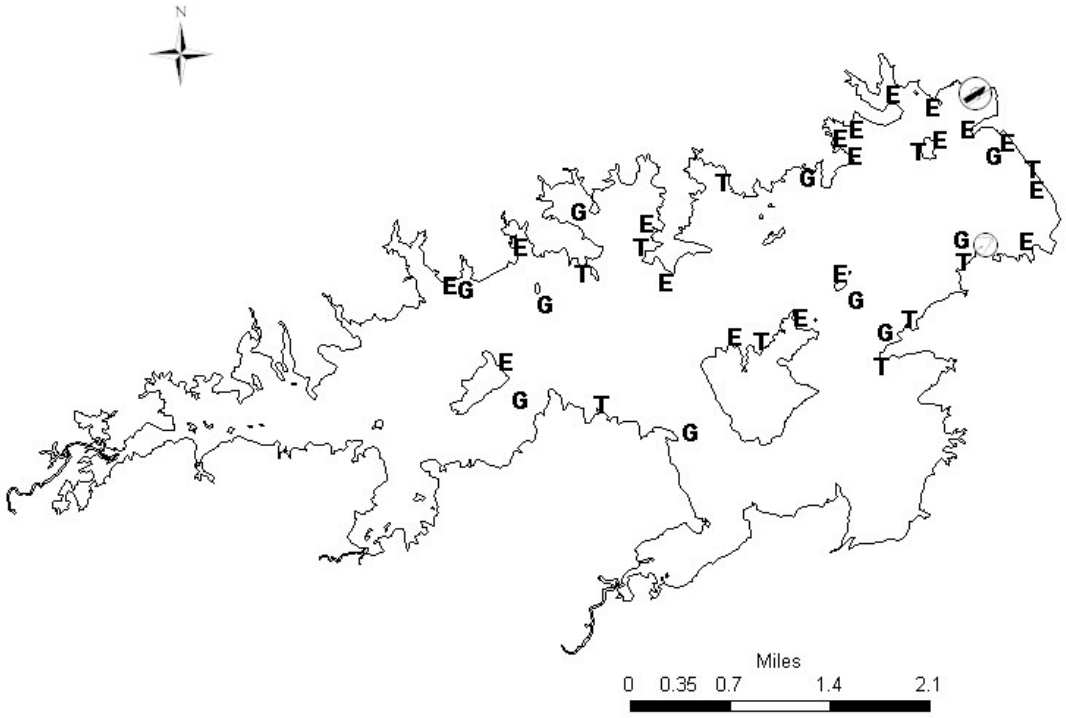
Survey Year	Electrofish	Trap Net	Gill Net	Creel	Report
Fall 2010-Spring 2011					
Fall 2011-Spring 2012					
Fall 2012-Spring 2013					
Fall 2013-Spring 2014	S	S	S		S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected from all gear types from Kickapoo Reservoir, Texas, 2009-2010. Only targeted species were recorded for electrofishing.

	Gill Nets		Trap Nets		Electrofishing	
Species	N	CPUE	N	CPUE	N	CPUE
Longnose gar	8	0.8				
Gizzard shad	14	1.4	1	0.1	508	338.7
Common carp			2	0.2		
River carpsucker	3	0.3	2	0.2		
Smallmouth buffalo	3	0.3	3	0.3		
Blue catfish	63	6.3				
Channel catfish	0	0.0	5	0.5		
Flathead catfish	1	0.1				
White bass	5	0.5	1	0.1		
Green sunfish					1	0.7
Orangespotted sunfish			1	0.1		
Bluegill			15	1.5	43	28.7
Longear sunfish			1	0.1	40	26.7
Largemouth bass					9	6.0
White crappie	11	1.1	527	52.7		
Freshwater drum	3	0.3				

APPENDIX B



Location of sampling sites, Kickapoo Reservoir, Texas, 2009-2010. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Boat ramp symbol signifies boat ramp.