PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-4

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2013 Fisheries Management Survey Report

Kemp Reservoir

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TABLE OF CONTENTS

SURVEY AND MANAGEMENT SUMMARY

Fish populations in Kemp Reservoir were surveyed in 2013 using electrofishing. Historical data are presented with the 2013 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Kemp Reservoir is a 15,104-acre impoundment located on the Wichita River in the Red River Basin approximately 50 miles west of Wichita Falls. It had a primarily natural and rocky shoreline. The reservoir elevation has fluctuated greatly the last 4 years from 2 feet above conservation pool (1,144.0 mean sea level) to >25 feet below. Kemp water quality is somewhat saline and highly conductive. It has had annual golden alga blooms since 2002 that have had an adverse effect on the fish populations.

- **Management History:** Historically important sport fish include Striped Bass, White Bass, Largemouth Bass, White Crappie, and catfishes. Golden alga fish kills began in 2002 and have continued annually since. In response, Striped Bass were stocked in 2002, 2004, and 2005 with no apparent recruitment to the fishery. Excess fry from state hatcheries were stocked in 2009. In 2005, Florida Largemouth Bass fingerlings were stocked but not a single Largemouth Bass was sampled in 2009. Channel Catfish were stocked in 2005 and 2009. Blue Catfish were stocked in 2002. Kemp has always been managed with statewide regulations.

- **Fish Community**
  - **Prey species:** The Gizzard Shad survey catch rate was the lowest ever documented possibly because of high conductivity at time of survey. No Bluegill or other sunfishes were collected. In the past, Bluegill abundance was extremely low but they were present.

  - **Catfishes:** The planned 2014 gill net survey did not occur because of extreme low reservoir elevations. Blue Catfish have not been collected since the 2004 gill net survey. Channel Catfish were sampled in September, 2010 using a non-standard gill net survey. Flathead Catfish were last observed during the May 2004 gill net survey.

  - **Temperate basses:** The planned 2014 gill net survey did not occur because of extreme low reservoir elevations. White Bass were collected during a non-standard gill net survey performed during the Fall of 2010. No Striped Bass were caught during the 2010 gill net surveys. The last capture of a Striped Bass occurred in 2006.

  - **Black bass:** Historically, Spotted Bass were the most abundant bass species, but their presence has not been documented since golden alga blooms began in 2002. In 2013, one Largemouth Bass was sampled during the electrofishing survey, the first since 2005 when they were stocked earlier in the year.

  - **White Crappie:** The planned 2014 trap net survey did not occur because of extreme low reservoir elevations. In the past, White Crappie have always been present but in low abundance near where the river enters the reservoir.

- **Management Strategies:** Conduct general monitoring with trap nets, gill nets and electrofishing surveys in 2017-2018.

INTRODUCTION

This document is a summary of fisheries data collected from Kemp Reservoir in 2013. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2013 data for comparison.

Reservoir Description

Kemp Reservoir is a 15,104-acre impoundment constructed in 1923 on the Wichita River. It is located in Baylor County approximately 50 miles west of Wichita Falls and is operated and controlled by the City of Wichita Falls and Wichita County Irrigation District No. 2. Primary uses include irrigation, flood control, municipal water supply, and recreation. Kemp has a watershed area of 2,086 mi^2. Sedimentation is a problem with 23.2% of the storage capacity and 1,183 acres of surface area being lost from 1971 to 2006 (Austin et al. 2006). In addition, when the reservoir is down 3 feet from conservation pool, 2,451 surface acres are cut off from the rest of the reservoir (Austin et al. 2006). Mean reservoir depth when at full pool is 16 feet and shoreline development index is 7.3. Conductivity in August was 7,570 μmhos/cm. Habitat at time of sampling consisted of natural shoreline and rocks. Water level has fluctuated since 2010 from above conservation pool to >25 feet below conservation pool (Figure 1). Boat access consisted of seven public boat ramps. The Waggoner Ranch based in Vernon, TX controls shoreline access to the reservoir and charges $15 per person for a three day pass. Bank fishing is available at the public access points including the boat ramps. Golden alga *Prymnesium parvum* has caused annual fish kills since 2002 and has severely impacted the sport fishery. Other descriptive characteristics for Kemp Reservoir are in Table 1.

Angler Access

Kemp Reservoir has seven public boat ramps and no private boat ramps. Only the Moonshine boat ramp was available for part of the survey year. The Waggoner Ranch had extended the ramp during the survey period. All other ramps were out of the water. Additional boat ramp characteristics are in Table 2. The Waggoner Ranch charges a $15/per person entry fee that is good for three days. Shoreline access is limited to the public boat ramp areas and other shoreline access points.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Mauk and Howell 2010) included:

1. Because of constant golden alga blooms and resulting kills, stockings would only occur if surplus fish were made available.
   Action: No stockings have occurred in the last four years.
2. Because of constant golden alga blooms and resulting kills occurring during the standardized gill net survey, we would try non-standard fall gill netting to determine presence/absence of species we weren't seeing otherwise.
   Action: Performed a fall gill net survey in September of 2010. We collected Channel Catfish and White Bass which were not being captured in standard surveys.
3. With the spread of zebra mussels and other invasive species, we wanted to make the public and reservoir authorities aware of what to do to prevent their spread and what to do if they suddenly appear.
   Action: Spoke and gave material about invasive species to all gate keepers. Requested that gate keepers post invasive species information since all visitors must go by them to access the reservoir.

Harvest regulation history: Sport fish species in Kemp Reservoir have always been managed using statewide regulations (Table 3).

Stocking history: In the years since golden alga was identified in 2002, Kemp has been stocked with Blue and Channel Catfish, Striped Bass and, Florida Largemouth Bass in attempts to rebuild population abundances. The complete stocking history is in Table 4.

Vegetation/habitat management history: Kemp Reservoir has no significant vegetation/habitat management history.

Water Transfer: Kemp Reservoir, in the Red River basin, is used primarily for irrigation by the Wichita County Water Irrigation District. However, beginning in 2009 the city of Wichita Falls began receiving 10% of their municipal water supply from Kemp. To use the naturally salty water, a large reverse osmosis water treatment plant was placed into full operation. The briny, reject water from this plant is then pumped via pipeline directly into the Wichita River. TPWD completed a monitoring project to assess the impacts of this operation in 2014 finding no impact at the concentration that was dumped back into the river. The city has a permit allowing them to return much more than they did during the study and it was not determined whether the amount permitted would affect the river biota or not. Another major use of Kemp is for cooling water at a coal-fired power plant located near Oklaunion, Texas and operated by West Texas Utilities. The sale of this water provides an additional revenue source for the city of Wichita Falls.

METHODS

Fish were collected by electrofishing (1 hour at 12, 5-min stations) Catch per unit effort for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). However, the number of sampling sites were decreased to coincide with current reservoir surface acreage at time of sampling,

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight (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). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics.

Source for water level data was the United States Geological Survey (USGS 2014).

RESULTS AND DISCUSSION

Habitat: A physical habitat survey conducted in 2013 indicated that the littoral zone habitat consisted primarily of natural shoreline (Table 5). The previous physical habitat survey was conducted in 2009 (Mauk and Howell 2010). There was a significant decrease in submersed aquatic vegetation and rocky shoreline since 2009 survey because of the extreme drop in water elevation.

Prey species: Electrofishing catch rates of Gizzard Shad and Bluegill were 31.0/h and 0.0/h, respectively. Index of vulnerability for Gizzard Shad was 77, indicating that most Gizzard Shad were available to existing predators. Total CPUE of Gizzard Shad was lower than all previous surveys (Figure 3) and could be caused by extremely high conductivity at time of survey, affecting the efficacy of the electrofishing. Total CPUE of Bluegill has always been extremely low (1.5-29.0/hr) but this is the first time that no Bluegill were caught (Figure 4).

Blue Catfish: A 2014 gill netting survey was not completed as scheduled because extreme low reservoir elevations made launching a boat impossible.

Channel Catfish: A 2014 gill netting survey was not completed as scheduled because extreme low reservoir elevations made launching a boat impossible.

White Bass: A 2014 gill netting survey was not completed as scheduled because extreme low reservoir elevations made launching a boat impossible.

Largemouth Bass: The electrofishing CPUE of Largemouth Bass was 1.0/h in 2013 (Figure 5), a slight improvement than in 2009, when no fish were sampled. In 2005, the CPUE was 25.0/h which was a function of the 2005 survey being conducted after a Florida Largemouth Bass stocking and all bass sampled were ≤10 inches and were all from the 2005 year class.

White Crappie: A 2013 trap netting survey was not completed as scheduled because extreme low reservoir elevations made launching a boat impossible.

Fisheries management plan for Kemp Reservoir, Texas

Prepared – July 2014

ISSUE 1: Golden alga has severely impacted the reservoir from roughly January through May since 2002. This has acted to greatly displace fish and cause population losses. This has especially affected the Blue Catfish, Striped Bass, Spotted Bass, Largemouth Bass and White Crappie populations.

MANAGEMENT STRATEGIES

1. Request Blue Catfish, Channel Catfish, and Largemouth Bass only when they are available as surplus from the state hatchery program if water quality and quantity conditions indicate the potential for survival.

2. Continue to provide the public with information on golden alga effects and management actions as conditions warrant.

ISSUE 2: 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:

Until there are years free of golden alga bloom induced fish kills, no additional standardized sampling will be conducted. Sport fish species have been negatively impacted to the point that until the populations have a chance to recover, standard sampling will likely provide little new information. At this time, angler effort and interest has been greatly reduced because of the annual golden alga blooms and current high entrance fees. Standard sampling will be conducted in 2017-2018 to quantify species populations. If annual golden alga blooms end, additional sampling will be considered to monitor fish population recovery.

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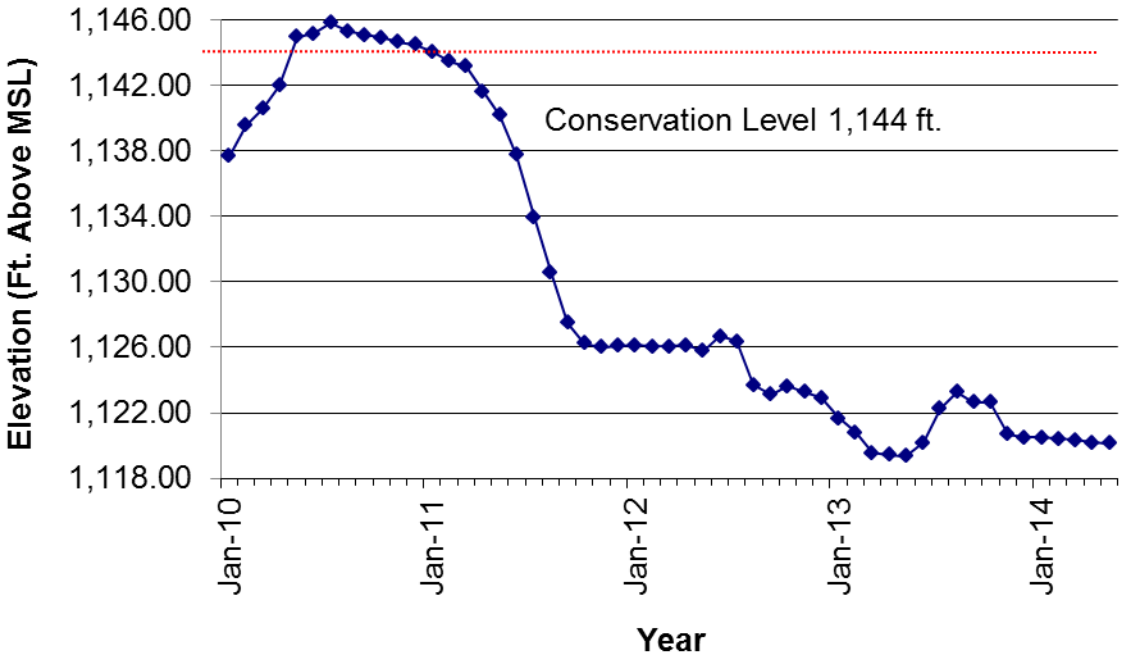


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Kemp Reservoir, Texas.

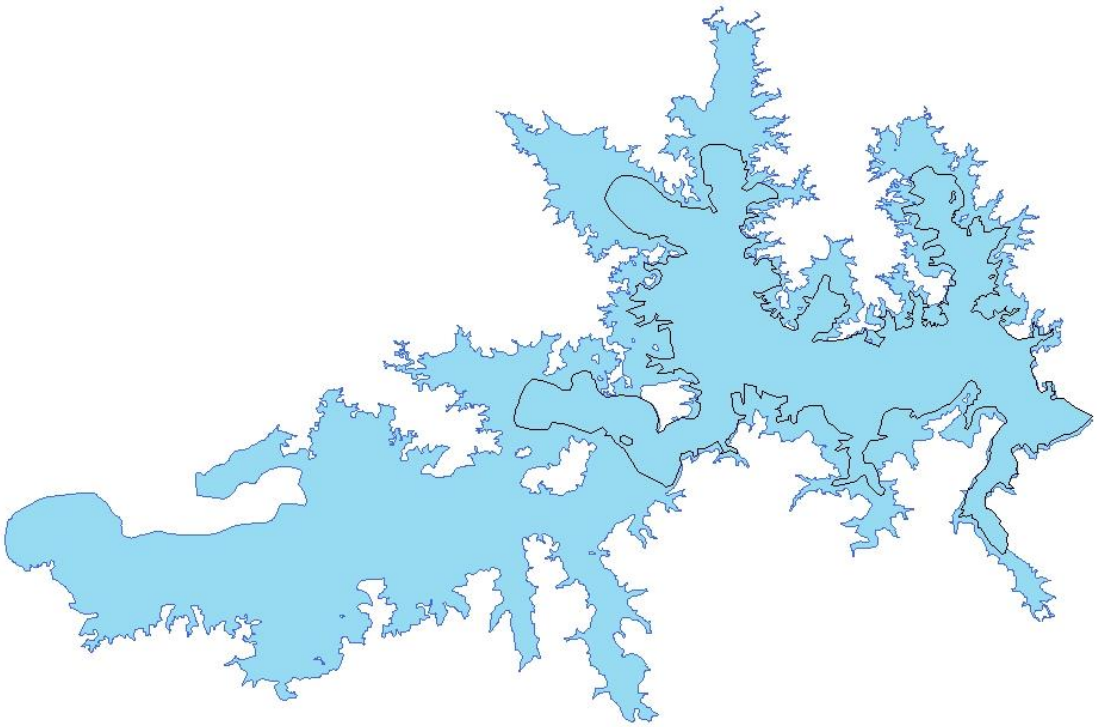


Figure 2. Lake map for Kemp Reservoir, Texas. Dark inside line indicates actual shoreline in 2014.

Table 1. Characteristics of Kemp Reservoir, Texas.

Characteristic	Description
Year Constructed	1923
Controlling authorities	City of Wichita Falls and Wichita County WID No. 2
County	Baylor
Reservoir type	Mainstem
Shoreline Development Index (SDI)	7.3
Conductivity	7,570 umhos/cm

Table 2. Boat ramp characteristics for Kemp Reservoir, Texas, August, 2013. Reservoir elevation at time of survey was 1,123.4 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Moonshine Bay	33.74800 -99.15552	Y	30	1,121	Ramp out of water. Extension has occurred
Kinkaid Park	33.76905 -99.15483	Y	25	N/A	Out of water. Extension is not feasible
McKinney Point	33.78635 -99.15715	Y	5	N/A	Out of water. Extension is not feasible
Herring Point	33.77708 -99.16928	Y	5	N/A	Out of water. Extension is not feasible
Alman Point	33.77030 -99.18453	Y	5	N/A	Out of water. Extension is not feasible
Bates Bay	33.73270 -99.23047	Y	25	N/A	Out of water. Extension is not feasible
Weddle Point	32.74807 -99.20830	Y	10	N/A	Out of water. Extension is not feasible

Table 3. Harvest regulations for Kemp Reservoir.

Species	Bag Limit	Length Limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Striped	5	18-inch minimum
Bass, Largemouth	5	14-inch minimum
Bass, Spotted	(in any combination)	None
Crappie, White	25	10-inch minimum

Table 4. Stocking history of Kemp (Baylor County), Texas. Life stages are fry (FRY), 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)
Blue Catfish	1989	165,496	FGL	2.5
	1990	168,011	FGL	2.0
	1991	143,977	FGL	2.6
	2002	112,857	FGL	2.0
	Total	590,341		
Channel Catfish	1967	17,500	AFGL	7.9
	1969	6,000	AFGL	7.9
	1970	12,000	AFGL	7.9
	1971	300	UNK	UNK
	1972	210,000	AFGL	7.9
	2005	297,239	FGL	3.1
	2009	97,512	FGL	4.0
	Total	640,551		
Florida Largemouth Bass	1977	174,200	FRY	0.9
	1990	415,356	FRY	0.7
	1999	414,186	FGL	1.5
	2005	194,404	FGL	1.5
	Total	1,198,146		
Largemouth Bass	1967	7,500	UNK	UNK
	1970	100,000	UNK	UNK
	1971	35,000	UNK	UNK
	Total	142,500		
Red Drum	1954	58	UNK	UNK
	1955	16	UNK	UNK
	1956	1,304	UNK	UNK
	1957	4	UNK	UNK
	1981	204,837	UNK	UNK
	Total	206,219		

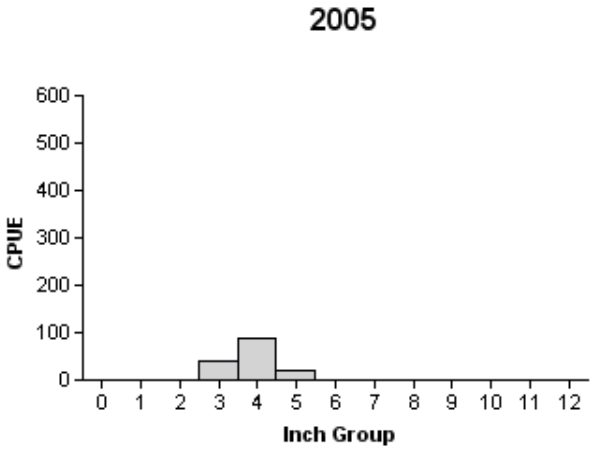
Table 4. (continued)

Striped Bass	1979	81,961	UNK	UNK
	1981	211,102	UNK	UNK
	1983	164,859	UNK	UNK
	1987	28,000	FGL	2.0
	1988	167,386	FRY	1.0
	1989	130,355	FGL	1.2
	1992	20,800	FGL	1.3
	1992	60,057	FRY	0.9
	1993	126,674	FGL	1.1
	1994	83,543	FGL	1.1
	1994	4,000,000	FRY	0.8
	1995	82,796	FGL	1.1
	1995	3,000,000	FRY	0.8
	1997	33,323	FGL	1.1
	1998	728	AFGL	5.9
	1998	82,700	FGL	1.3
	1999	98,087	FGL	1.4
	2002	116,311	FGL	1.5
	2004	37,796	FGL	1.7
	2005	149,771	FGL	1.6
	2009	186,119	FRY	0.3
	Total	8,862,368		
Threadfin Shad	1999	725	ADL	3.5
	Total	725		

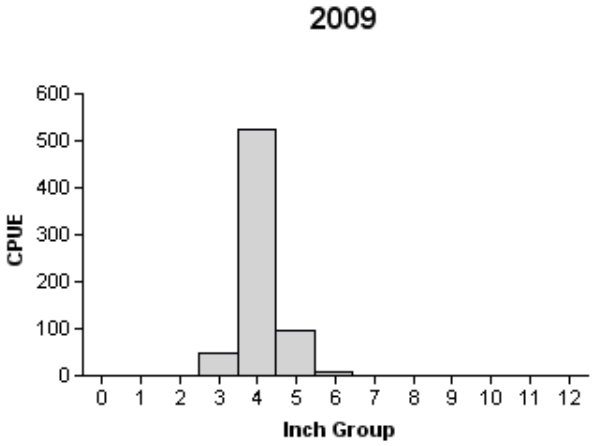
Table 5. Survey of structural habitat types, Kemp Reservoir, Texas, 2013. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Gravel	0.5 miles	1.1
Natural	32.7 miles	66.5
Rocky	15.9 miles	32.4
Standing timber	737.4 acres	4.9

Gizzard Shad



Effort = 2.0
Total CPUE = 154.5 (23; 309)
Stock CPUE = 2.0 (59; 4)
IOV = 99 (0.7)



Effort = 2.0
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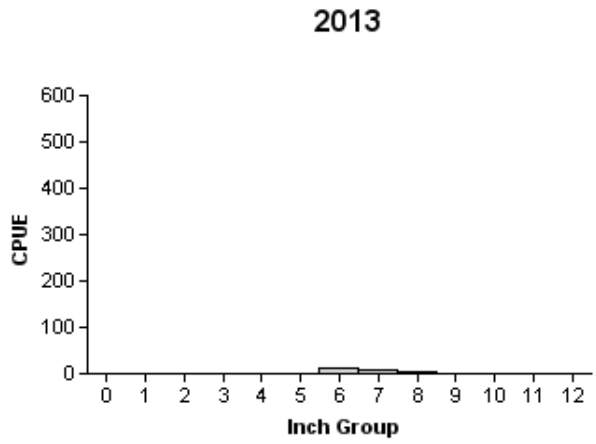
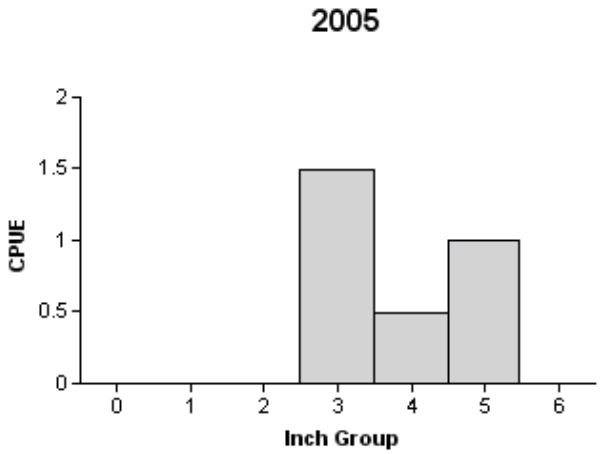
Stock CPUE = 0.0 (0; 0)
IOV = 100 (0)



Effort = 1.0
Total CPUE = 31.0 (44; 31)
Stock CPUE = 16.0 (51; 16)
IOV = 77 (4.3)

Figure 3. Number of Gizzard Shad caught per hour (CPUE, bars) and population indices RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Kemp Reservoir, Texas, 2005, 2009, and 2013.

Bluegill



Effort = 2.0
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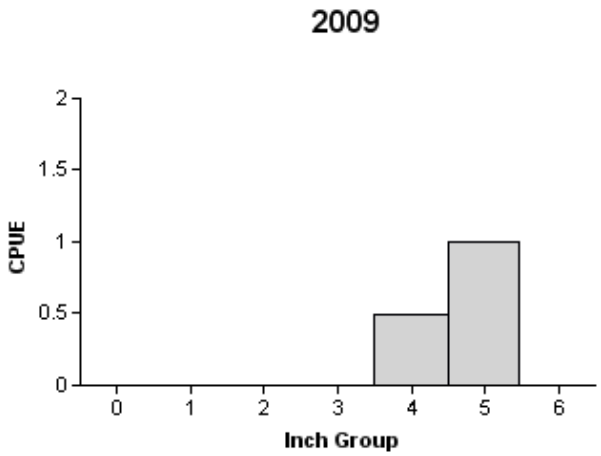
Stock CPUE = 3.0 (43; 6)
PSD = 0 (48.2)



Effort = 2.0
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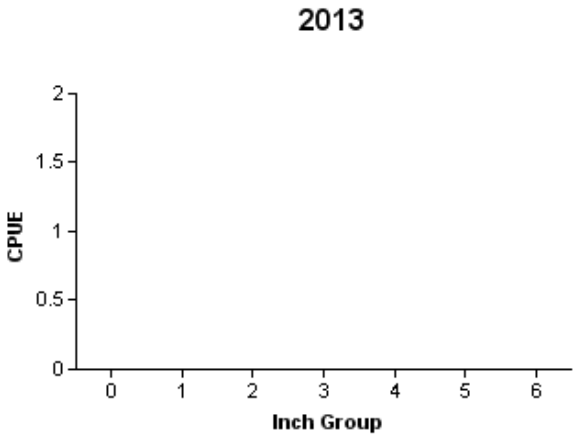
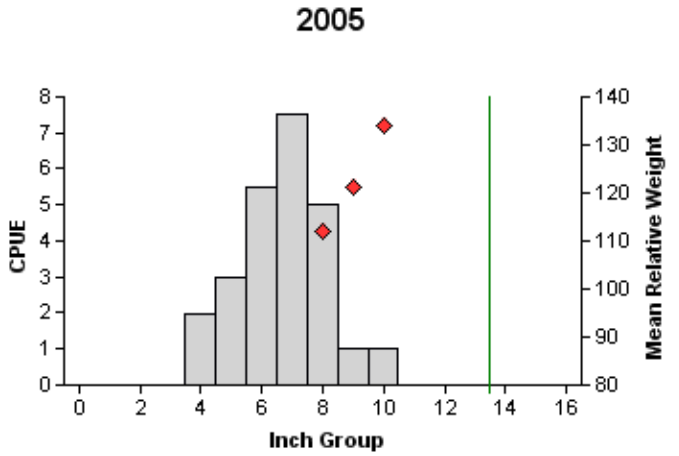
Stock CPUE = 1.5 (73; 3)
PSD = 0 (76.1)



Effort = 1.0
Total CPUE = 0.0 (0; 0)
Stock CPUE = 0.0 (0; 0)
PSD = 0 (-1)

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, Kemp Reservoir, Texas, 2005, 2009 and 2013.

Largemouth Bass



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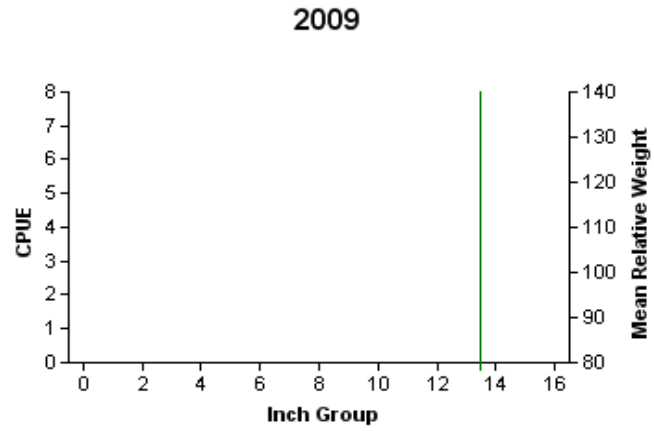
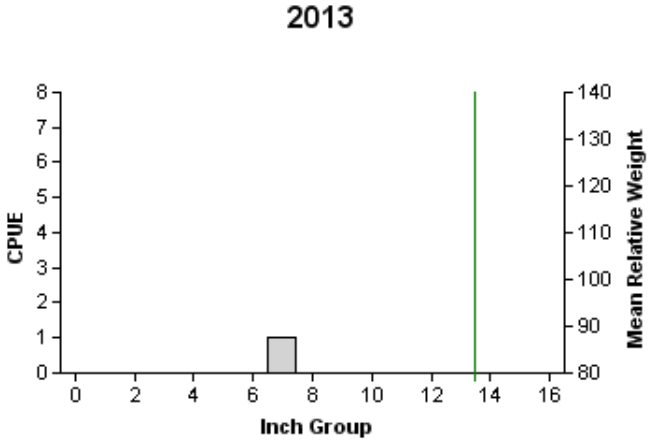
Stock CPUE = 7.0 (27; 14)
PSD = 0 (119.9)



Effort = 2.0
Total CPUE = 0.0 (0; 0)
Stock CPUE = 0.0 (0; 0)
PSD = 0 (0)



Effort = 1.0
Total CPUE = 1.0 (100; 1)
Stock CPUE = 0.0 (0; 0)
PSD = 0 (-1)

Figure 5. 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, Kemp Reservoir, Texas, 2005, 2009 and 2013. Line indicates minimum size limit at time of sampling.

Table 6. Proposed sampling schedule for Kemp Reservoir, Texas. Survey period is June through May. 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	Electrofish Fall(Spring)	Trap net	Gill net	Habitat		Access	Creel survey	Report
				Structural	Vegetation			
2014-2015								
2015-2016								
2016-2017								
2017-2018	S	S	S	S	S	S		S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected from electrofishing (2013) from Kemp Reservoir, Texas.

	Gill Nets		Trap Nets		Electrofishing	
Species	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					31	31.0
Largemouth Bass					1	1.0

APPENDIX B

Location of sampling sites, Kemp Reservoir, Texas, 2013. Electrofishing stations are indicated by E.