

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-1

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2010 Survey Report

Kurth Reservoir

Prepared by:

Dan Ashe, Assistant District Management Supervisor
and
Todd Driscoll, District Management Supervisor

Inland Fisheries Division
District 3-D, Jasper, Texas



Carter P. Smith
Executive Director

Gary Saul
Director, Inland Fisheries

July 31, 2011

TABLE OF CONTENTS

Survey and Management Summary..... 2

Introduction 3

Reservoir Description 3

Management History 3

Methods 4

Results and Discussion..... 4

Fisheries Management Plan..... 6

Literature Cited 8

Figures and Tables9-17

 Reservoir Characteristics (Table 1) 9

 Harvest Regulations (Table 2) 9

 Stocking History (Table 3)..... 10

 Vegetation Survey (Table 4) 11

 Percent Directed Angler Effort Per Species (Table 5)..... 11

 Total Fishing Effort and Fishing Expenditures (Table 6)..... 11

 Sunfish (Figure 1, Table 7) 12

 Largemouth bass (Figures 2-3; Table 8-9) 13

 Crappies (Figures 4; Table 9) 16

 Proposed Sampling Schedule (Table 10)..... 17

Appendix A

 Catch rates for all species from all gear types..... 18

Appendix B

 2010 Kurth Lake survey questionnaire 19

Appendix C

 Map of 2011 sampling locations 21

SURVEY AND MANAGEMENT SUMMARY

Fish populations in Kurth Reservoir were surveyed in 2011 using gill netting and electrofishing. Anglers were surveyed from March through May 2011 with an access point creel. Aquatic vegetation and access surveys were conducted in 2010. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Kurth Reservoir is an impoundment on a small, unnamed tributary of the Angelina River in the Neches River Basin. The City of Lufkin is the controlling authority and primary use of the reservoir is recreation. However, the city may provide industrial water to a mining company in the near future. At conservation pool (197.5 ft. msl), Kurth Reservoir is 726 acres in size, has a shoreline length of 15 miles, and a mean depth of 15 feet. Boat and bank access is adequate, with one boat ramp present. Habitat in the lake consists primarily of flooded timber and aquatic vegetation (primarily hydrilla). Most of the land surrounding the reservoir is used for timber production.
- **Management history:** Important sport fish include largemouth bass, white and black crappie, and catfish. The fishery is managed under current statewide regulations. Hydrilla was first discovered at Kurth Reservoir in 1999, and coverage reached 34% in 2002. In 2002, a vegetation management plan was developed and 1,000 triploid grass carp were stocked at a rate of 5 fish/vegetated acre in an attempt to reduce hydrilla coverage to 10-15%. Grass carp have had little effect on hydrilla, and in 2010 coverage exceeded 45%.
- **Fish community**
 - **Prey species:** A fall electrofishing survey could not be conducted due to excessive vegetation coverage. However, threadfin and gizzard shad, bluegill, and redear sunfish were observed during the spring 2011 electrofishing survey and were available as prey for predators.
 - **Catfishes:** The gill net catch rate of both channel and blue catfish has declined steadily over past surveys. Two channel catfish were caught in 2011 indicating poor recruitment. Kurth Reservoir supports only a limited catfish fishery.
 - **Temperate basses:** Palmetto bass were stocked annually from 1994-1998. The fishery never developed and stocking was discontinued. As expected, gill net catch rates have declined over time with no palmetto bass observed in 2011 gill net or creel surveys.
 - **Largemouth bass:** Largemouth bass were relatively abundant in spring electrofishing surveys. Population size structure indicated good recruitment and an abundance of fish 10 - 18 inches in length. Largemouth bass were the most sought-after species at Kurth Reservoir.
 - **Crappies:** White and black crappie were present in the reservoir. Angler catch (0.6/hour) and total spring quarter (March-May 2011) harvest (669 fish) reflected an adequate crappie fishery.
- **Management strategies:** Continue to monitor hydrilla coverage via annual aquatic vegetation surveys. Conduct spring electrofishing surveys in 2013 and 2015. Conduct fall electrofishing, gill net, and creel surveys in 2014/2015. Continue to request Florida largemouth stockings. Propose implementation of a 16-inch maximum length limit for largemouth bass. Request the City of Lufkin improve access and parking areas.

INTRODUCTION

This document is a summary of fisheries data collected from Kurth Reservoir in 2010-2011. 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 2010-2011 data for comparison.

Reservoir Description

Kurth Reservoir is a 726-acre impoundment constructed in 1950 on a small, unnamed tributary of the Angelina River in the Neches River Basin (Table 1). It is located approximately 5 miles north of Lufkin and is operated and controlled by the City of Lufkin. The primary use of the reservoir is recreation, but the city may provide industrial water to a mining company in the near future. A pumping station on the Angelina River provides the ability to adjust the reservoir water level. Secchi disc readings typically exceed six feet. Habitat at time of sampling consisted of overhanging brush, concrete, some standing timber, and emergent and submerged vegetation. Native aquatic plants present were spikerush, cattail, bulrush, pondweed, and American lotus. Hydrilla, a non-native, was first discovered in 1999 and water hyacinth has been present in trace amounts. Vandalism prompted the city to construct a locked gate at the reservoir entrance. Public access is provided during daylight hours via annual permits, access keys, and a single boat ramp.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Ashe and Driscoll 2007) included:

1. Continue to monitor aquatic vegetation annually. If hydrilla coverage were to expand beyond acceptable coverage within the next 4 years, meet with controlling authority officials and angling public to develop a vegetation management plan.
Action: Vegetation surveys have been conducted annually with hydrilla coverage expanding from 32-47% coverage since 2007. Discussions with city officials reflect no concerns with the current hydrilla coverage.
2. Continue to remain vigilant to identify giant salvinia during annual aquatic vegetation surveys with plans to initiate eradication or control response if plants were found. Place signs near the boat ramp to educate the public of giant salvinia identification and to remind boaters to inspect their trailers before launching a boat to minimize the risk of introducing plants from one water body to another.
Action: Vegetation surveys have been conducted annually with no giant salvinia observed. Additionally, personnel have been observant for giant salvinia during all other surveys with no plants found. Signs have been placed near the boat ramp educating the public about giant salvinia.
3. Continue to recommend access improvements to the controlling authority.
Action: Access improvements have been recommended to the City of Lufkin. The city has recently increased access fees and both Texas Parks and Wildlife Department (TPWD) and anglers have suggested that these fees be used to improve the access area. The city has tentatively agreed to make improvements in the near future.
4. Encourage anglers to document catches of trophy-sized largemouth bass at the kiosk near the reservoir entrance and to stock FLMB at a rate of 100 fish/acre in 2008 and 2009.
Action: The kiosk with appropriate forms has been maintained. However, angler reporting is low and the program will be discontinued. FLMB were stocked in 2008-2010 at a rate of 100 fish/acre.

Harvest regulation history: Sport fishes in Kurth Reservoir are currently managed with statewide regulations (Table 2).

Stocking history: Triploid grass carp (1,000) were stocked in 2002. Florida largemouth bass were stocked periodically from 1977-2002 and annually from 2008-2010. Blue catfish were introduced in 1995. Palmetto bass were stocked annually from 1994-1998. The complete stocking history is in Table 3.

Vegetation/habitat history: Hydrilla was first discovered in Kurth Reservoir in 1999. In 2002, hydrilla coverage had expanded to cover 34% of the reservoir surface area. Triploid grass carp were stocked at 5 fish/vegetated-acre in an effort to reduce hydrilla coverage but had little effect. Hydrilla has increased and coverage was 48% in 2010. Native vegetation consisted of cattail, spikerush, American lotus, pondweed, and bulrush. Native vegetation comprised 107 surface acres (15%) (Table 4). Structural habitat consisted of overhanging brush and concrete along the dam.

Water transfer: Kurth Reservoir is primarily used for recreation. The City of Lufkin has 19,100 acre-feet of annual water rights and may contract with a mining company to provide industrial water in the future.

METHODS

Fishes were collected by electrofishing (1 hour at 12, 5-min stations) during March (largemouth bass only) and by gill netting in February (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 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). Aquatic vegetation and access surveys were performed 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 weight (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics and for creel statistics and SE was calculated for structural indices. Average age of 14-inch (13.5 – 14.5 inches) largemouth bass collected in the spring was determined from otoliths.

An access creel survey (9 days) was conducted from March through May 2011 to assess angler use and catch in accordance with the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009). Total angler catch of largemouth bass \geq 4, 7, and 10 pounds was also estimated. Anglers were asked if released fish were within weight categories.

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of overhanging brush, emergent and submerged vegetation, and concrete (Ashe and Driscoll 2007). Hydrilla was the dominant habitat type available for sport fishes in Kurth Reservoir (Table 4).

Creel: An access point creel survey was conducted in the spring of 2011. Total estimated angling effort was 13,293.5 hours (18.3 hours/acre; Table 6). The largemouth bass fishery was most popular (83% of angling effort), followed by crappie and sunfish, respectively (Table 5).

Prey species: No new information was collected on prey species during 2011 through directed sampling since fall electrofishing could not be conducted as a result of excessive vegetation coverage. Ashe and Driscoll (2007) reported gizzard shad, threadfin shad, and bluegill as the primary prey species. Electrofishing catch rates in 2003, the most recent year when an assessment was conducted, were 73.0/h, 48.0/h, and 289.0/h for these species, respectively. Angler catch rate from the spring creel survey was 5.9 fish/h for all sunfish and 1,605 bluegill and redear sunfish were harvested accounting for 30% of all fish caught (Table 7 and Figure 1).

Catfishes: Blue, channel, and flathead catfishes were present in Kurth Reservoir. Historically, catfish abundance has been limited. Blue catfish were introduced in 1995 (Table 3). Few blue catfish have been caught during spring gill net surveys since their introduction, which indicates poor survival and/or limited recruitment. Catch rates peaked at 3.8/nn in 2001 and no fish were observed in 2007 or 2011. However, one blue catfish was observed harvested during the 2011 creel survey. Channel catfish gill net catch rates from the last three surveys were low (range = 0 – 0.8/nn), and only two fish were collected in 2011 (Appendix A). During the 2011 spring creel survey no directed effort for catfish was observed.

Palmetto bass: Palmetto bass were stocked annually from 1994 through 1998. An abundant population was observed in 2001 with gill net catch rates of 9.2/nn (Ashe and Driscoll 2007). However, angler interest in the fishery never developed and stocking was discontinued. As expected, abundance has declined over time with a catch rate of 4.0/nn in 2007 and no fish caught in 2011. Creel surveys did not detect any directed effort or harvest of palmetto bass.

Largemouth bass: Fall electrofishing was cancelled in 2006 and 2010 due to hydrilla coverage that would have hindered survey efficiency. Spring electrofishing surveys reflect stable largemouth bass abundance and recruitment, as catch rates were 104.0, 212.0, and 133.0/h in 2007, 2009, and 2011, respectively (Figure 2). Size structure indices (PSD range=69-73; PSD-14 range=42-50) reflected a quality largemouth bass population. Growth of largemouth bass was adequate; average age at 14 inches (13.5 - 14.5 inches) was 2.7 years (N = 13; range = 2 – 6 years).

The 2011 spring creel survey reflected high angler effort for largemouth bass (11,092.5 h; 15.3 h/ac). Total estimated catch was 5,896 fish; 59% were \geq 14 inches and 11.5% of these fish were harvested, 14% were \geq 4 pounds, and 2% were \geq 7 pounds (Table 8 and Figure 3).

In March 2011, all 122 registered anglers who had purchased a 2011 access permit were sent a questionnaire regarding 2010 trophy largemouth bass catch and their opinion of the overall fishery and current largemouth bass regulations (Appendix B). A total of 52 surveys were returned for a response rate of 44%. Approximately 55% of the respondents indicated they fished for trophy bass while 45% indicated they targeted overall numbers of fish. Using reported catch and the 44% response rate, the survey estimated that 423 largemouth bass > 7 pounds and 28 fish > 10 pounds were caught in 2010. Survey respondents were very satisfied with the fishery, and 65% indicated they would like more restrictive largemouth regulations.

Crappies: White and black crappie were present in the reservoir. Historically, trap net catch rates have been low (0.2/nn). In 2006, experimental trap netting procedures were used to potentially increase crappie catch but only one black crappie was collected (Ashe and Driscoll 2007). Since that time trap netting has been discontinued due to sampling inefficiency.

Creel data reflected a productive crappie fishery that was second only to the black bass fishery in terms of total fishing effort (11.5%). During the spring of 2011, angler catch (0.6/h) and harvest (0.9/acre - 669 fish) was adequate (Table 9 and Figure 4).

Fisheries management plan for Kurth Reservoir, Texas

Prepared – June 2011.

ISSUE 1: Hydrilla in Kurth Reservoir was first documented by TPWD in 1999. In 2002, hydrilla coverage reached 34% of the reservoir surface area. At the request of Abitibi Consolidated, triploid grass carp were stocked at a rate of 5 fish/vegetated-acre in 2002 to reduce hydrilla coverage. Abitibi Consolidated ceased operations and sold the lake to the City of Lufkin. Hydrilla coverage in 2010 was 47% and has posed no problems for the city. However, coverage may pose problems relative to future plans to provide industrial water.

MANAGEMENT STRATEGY

1. Continue to monitor aquatic vegetation annually. If hydrilla is problematic for the city or prompts angler complaints, meet with both groups to develop a vegetation management plan.

ISSUE 2: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, giant salvinia can multiply rapidly fouling swimming beaches, restricting angler access, and uptake nutrients that benefit native vegetation. The financial costs of controlling and/or eradicating 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 and literature so they can educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Discuss invasive species when presenting to constituent and user groups.
5. Document existing and future inter-basin water transfers to facilitate potential invasive species responses.

ISSUE 3: In 2011, recommendations were provided to the City of Lufkin regarding improvements to the boat ramp (i.e. road surface repairs and boat ramp improvements). The city has recently increased access fees to the public. Permit holders who have purchased access rights have expressed a need for improvements to the parking area and boat ramp.

MANAGEMENT STRATEGY

1. Continue to recommend improvements at the access point.
2. Submitted request for Boater Access Funding to improve access facilities under the Dingell-Johnson Sport Fish Restoration Act boating access sub-activity 9520 in June 2011.

ISSUE 4: Largemouth bass abundance and size structure reflect a quality population. The documented catch of 13.2-pound (2005) and 12.7-pound bass (2007) via the kiosk at the reservoir entrance, and the estimated catch of 86 fish > 7 pounds from the spring 2011 creel survey and 423 fish > 7 pounds during 2010 reflect high trophy bass potential.

MANAGEMENT STRATEGY

1. Stock 100% pure FLMB at a rate of 100 fish/acre annually to increase numbers of largemouth bass capable of obtaining trophy size.

ISSUE 5: In March 2011, all access permit holders were sent a questionnaire concerning overall satisfaction with the largemouth bass fishery and seeking their opinions regarding future harvest regulations. Approximately 65% of respondents indicated that they would favor more restrictive largemouth bass regulations to potentially improve trophy bass abundance (60% favored a 16-inch maximum length limit).

MANAGEMENT STRATEGY

1. Recommend a 16-inch maximum length limit with a 5 fish bag limit (only exception for \geq 13-pound fish entered into ShareLunker program).
2. Monitor success of the regulation change by conducting biennial spring electrofishing surveys and access creel survey every four years.
3. Administer a mail-out questionnaire to permit holders every 2 years to estimate catch of largemouth bass > 7 pounds

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes annual aquatic vegetation surveys and mandatory monitoring in 2014-2015 (Table 10). Annual aquatic vegetation surveys are required to monitor hydrilla coverage. Additionally, a spring electrofishing survey will be conducted in 2013 and 2015 to closely monitor the largemouth bass fishery. A spring creel survey (March-May) will be conducted in 2015 to monitor angler use of the reservoir. Largemouth bass growth and genetic analysis will be examined every four years.

LITERATURE CITED

- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- Ashe, D., and T. Driscoll. 2007. Statewide freshwater fisheries monitoring and management program survey report for Kurth Reservoir, 2006. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-32, Austin.
- Guy, C.S., R.M. Neuman, D.W. Willis, and R.O. Anderson. 2007. Proportional size distribution (PSD): A further refinement of population size structure index terminology. Fisheries 32(7):348.

Table 1. Characteristics of Kurth Reservoir, Texas .

Characteristic	Description
Year constructed	1950
Controlling authority	City of Lufkin
County	Angelina
Reservoir type	Secondary stream
Shoreline Development Index (SDI)	4.0
Conductivity	175 umhos/cm

Table 2. Harvest regulations for Kurth Reservoir.

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, palmetto	5	18 - No Limit
Bass, spotted	5 ^a	No Limit – No Limit
Bass, largemouth	5 ^a	14 – No Limit
Crappie: white and black, their hybrids and subspecies	25 (in any combination)	10 - No Limit

^a Bag limit for spotted and largemouth bass is 5 in the aggregate.

Table 3. Stocking history of Kurth Reservoir, Texas. Life stages are fry (FRY), fingerlings (FGL), 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)
Black crappie	1969	2,000		UNK
	Total	2,000		
Blue catfish	1995	60,041	FGL	2.0
	1996	41	ADL	15.8
	Total	60,082		
Florida largemouth bass	1977	32,000	FRY	1.0
	1994	41,572	FGL	1.1
	1998	40,000	FGL	1.0
	2001	13,996	FGL	1.3
	2002	56,851	FGL	1.5
	2008	78,129	FGL	1.7
	2009	75,404	FGL	1.6
	2010	73,743	FGL	1.6
Total	411,695			
Palmetto bass (striped X white bass hybrid)	1982	5,795	UNK	UNK
	1994	8,835	FGL	1.6
	1995	103,845	FRY	0.4
	1996	11,787	FGL	1.1
	1997	12,230	FGL	1.1
	1998	12,708	FGL	1.3
	Total	155,200		
Triploid grass carp	2002	2,000	FGL	UNK
	Total	2,000		

Table 4. Survey of aquatic vegetation, Kurth Reservoir, Texas, 2008-2010. Acreage of each species and percent of total surface area coverage (in parentheses) are presented.

Species	2008	2009	2010
American lotus	0 (0)	21 (2.9)	22 (3.0)
Spikerush	7 (<1)	7 (<1)	7 (<1)
Bulrush	0 (0)	0 (0)	0 (0)
Cattail	21 (2.9)	21 (2.9)	23 (3.2)
Pondweed	10 (1.4)	10 (1.4)	55 (7.6)
Hydrilla	239 (32.9)	276 (38.0)	346 (47.7)

Table 5. Percent directed angler effort by species for Kurth Reservoir, Texas, March through May, 2007 and 2011.

Species	Year	
	2007	2011
Sunfish	2.6	5.1
Black Bass	82.6	83.4
Crappie	7.6	11.5
Anything	7.2	0.0

Table 6. Total fishing effort (h) for all species and total directed expenditures at Kurth Reservoir, Texas, March through May, 2007 and 2011.

Creel Statistic	Year	
	2007	2011
Total fishing effort	8,190.8	13,293.5
Total directed expenditures	\$25,608	\$50,333

Sunfish

Table 7. Creel survey statistics for sunfish (bluegill and redear sunfish) for Kurth Reservoir from March through May 2007 and 2011, where total harvest is the estimated number of sunfish harvested by all anglers. Relative standard errors (RSE) are in parentheses. There was no directed angler effort for sunfish in 2007.

Creel Survey Statistic	2007	2011
Directed effort (h)	-	675.9 (60)
Directed effort/acre	-	0.9 (60)
Total catch per hour	-	5.9 (35)
Total harvest	1,714 (96)	1,605 (72)
Harvest/acre	2.4 (96)	2.2 (72)
Percent legal released	61.9	70.2

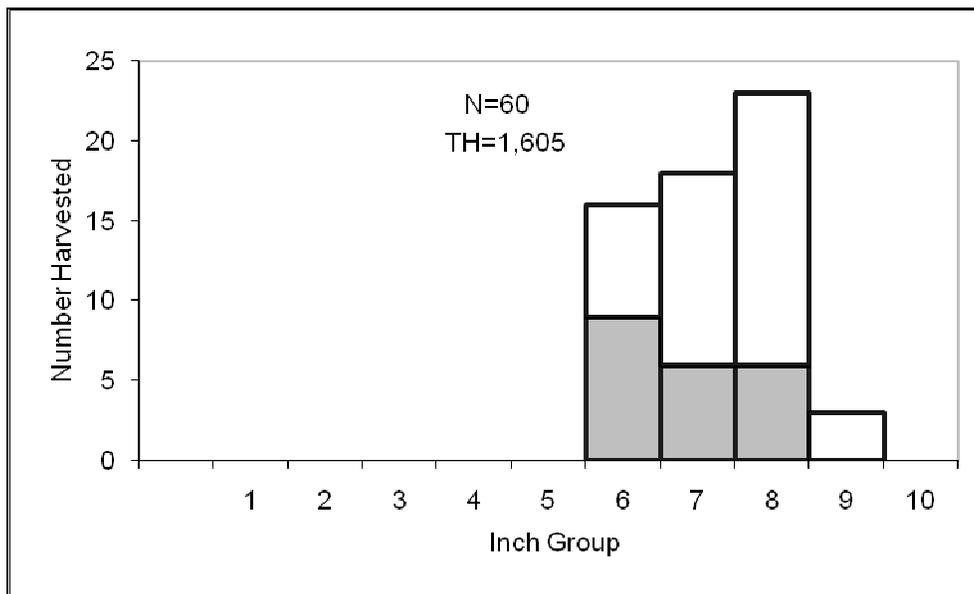


Figure 1. Length frequency of harvested bluegill (grey) and redear sunfish (white) observed during creel surveys at Kurth Reservoir, Texas, March - May 2011, all anglers combined. N is the total number of harvested bluegill and redear sunfish observed during creel surveys, and TH is the total estimated harvested bluegill and redear sunfish for the creel period.

Largemouth bass

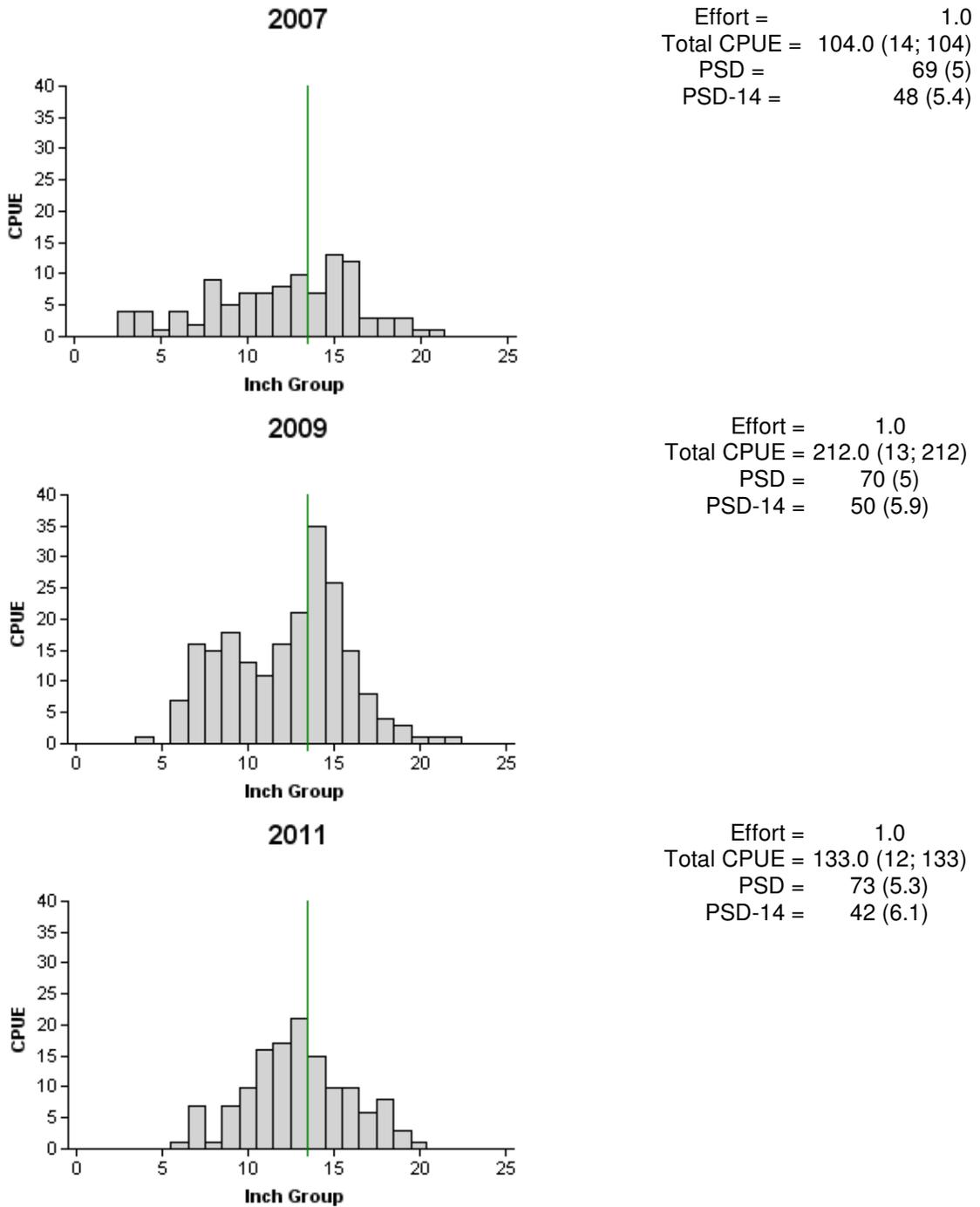


Figure 2. Number of largemouth bass caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring electrofishing surveys, Kurth Reservoir, Texas, 2007, 2009, and 2011. Vertical lines indicate minimum length limit at time of survey.

Largemouth bass

Table 8. Creel survey statistics for largemouth bass for Kurth Reservoir from March - May 2007 and 2011, 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. For estimated catch of 4, 7, and 10-pound fish, the percentages of total catch are provided.

Creel Survey Statistic	2007	2011
Directed effort (h)	6,766.9 (50)	11,092.5 (20)
Directed effort/acre	9.3 (50)	15.3 (20)
Total catch per hour	0.6 (15)	0.6 (16)
Total catch		
4 – 6.9 pound fish		842 – 14.3%
7 – 9.9 pound fish		65 – 1.1%
≥ 10 pound fish		21 – 0.4%
Total harvest	455 (67)	401 (68)
Harvest/acre	0.6 (67)	0.6 (68)
Percent legal released	80.9	88.5

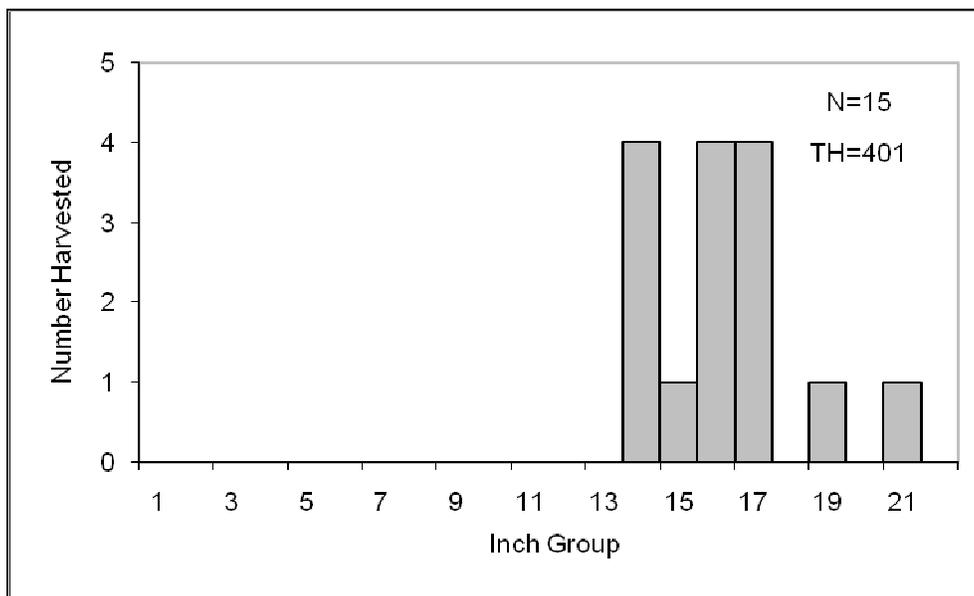


Figure 3. Length frequency of harvested largemouth bass observed during creel surveys at Kurth Reservoir, Texas, March through May 2011, all anglers combined. N is the number of harvested largemouth bass observed during creel surveys, and TH is the total estimated harvest for the creel period. There was no tournament retained fish observed during the time of the survey.

Table 9. Results of genetic analysis of largemouth bass collected by fall electrofishing, Kurth Reservoir, Texas, 2007 and 2011. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass, Fx = first or higher generation hybrid between a FLMB and a NLMB.

Year	Sample size	Genotype			% FLMB alleles	% pure FLMB
		FLMB	Fx	NLMB		
2007	79	0	78	1	49.7	0.0
2010	30	0	30	0	41.0	0.0

Crappies

Table 10. Creel survey statistics for crappie (black and white) for Kurth Reservoir from March through May 2007 and 2011, 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	2007	2011
Directed effort (h)	622.6 (68)	1,525.2 (41)
Directed effort/acre	0.9 (68)	2.1 (41)
Total catch per hour	1.3 (59)	0.6 (105)
Total harvest	1,346 (82)	668 (100)
Harvest/acre	1.9 (82)	0.9 (100)
Percent legal released	20.4	8.8

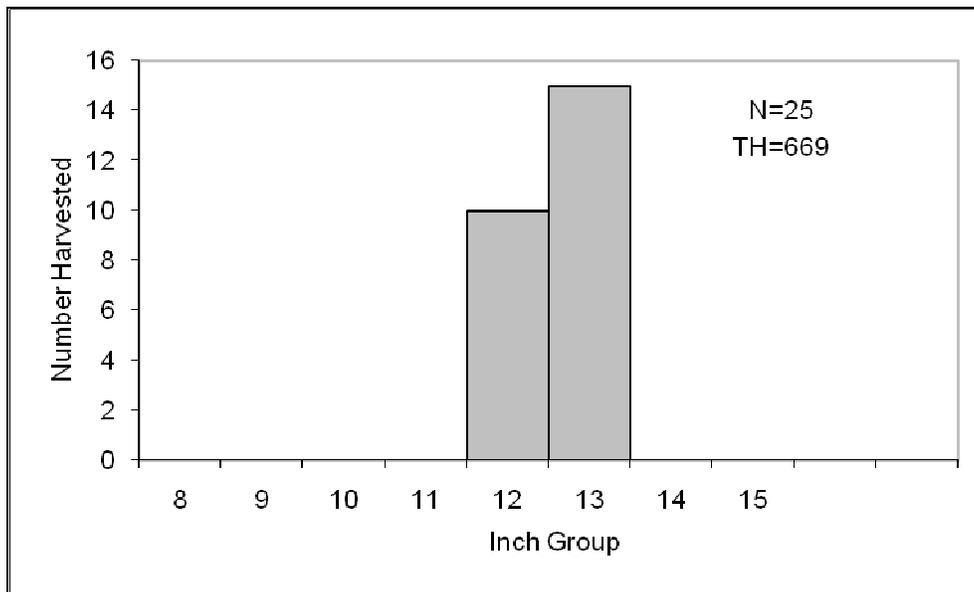


Figure 4. Length frequency of harvested black crappie observed during creel surveys at Kurth Reservoir, Texas, March - May 2011, all anglers combined. N is the number of harvested black crappie observed during creel surveys, and TH is the total estimated harvest for the creel period. There was no observed white crappie harvest.

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

Survey Year	Fall Electrofisher	Spring Electrofisher	Gill Net	Angler Access	Vegetation	Creel
2011-2012					A	
2012-2013		A			A	
2013-2014					A	
2014-2015	S	A	S	S	S	A

APPENDIX A

Number (N) and catch rate (CPUE) of target species collected from all gear types from Kurth Reservoir, Texas, 2011.

Species	Gill Netting		Electrofishing	
	N	CPUE	N	CPUE
Longnose gar	2	0.4		
Channel catfish	2	0.4		
Warmouth	1	0.2		
Largemouth bass	17	3.4	133	133.0
White crappie	1	0.2		

APPENDIX B

Texas Parks and Wildlife Department Inland Fisheries Division

You purchased an annual Kurth Lake membership in 2010. This is a questionnaire that is part of official research being conducted by Texas Parks and Wildlife concerning Kurth Lake.

Information gained from this questionnaire will enable TPWD to make most informed decisions regarding future fisheries management strategies. Your cooperation is extremely important to the completion of this research. Your answers will not be connected with your name and all information you provide will remain strictly confidential.

Please take the time to complete this questionnaire and return it in the enclosed postage-paid envelope. If you should have any questions, please contact Todd Driscoll, District Fisheries Biologist (409) 384-9572; todd.driscoll@tpwd.state.tx.us

1. How many times did you fish at Kurth Lake during calendar year 2010? _____ times

2. Overall, how satisfied are you with fishing at Kurth Lake? **(Circle one)**

Not at all Satisfied	Slightly Satisfied	Moderately Satisfied	Very Satisfied	Extremely Satisfied
1	2	3	4	5

3. Which is most important to you when targeting bass at Kurth Lake? **(Circle one)**

1 The chance to catch large numbers of bass regardless of their size

2 The chance to catch a trophy bass

4. During calendar year 2010, how many total largemouth bass did you and other anglers fishing with you catch that were:

_____ Greater than 7 pounds _____ Greater than 10 pounds

5. In 2010, what was the weight of the largest bass caught by you or other anglers fishing with you? _____ pounds

6. TPWD biologists can manage largemouth bass populations at Kurth Lake using various regulations to provide fishing opportunities based on what anglers prefer. The current 14-inch minimum length limit has created a quality fishery at Kurth Lake. However, regulations that further control harvest of bass could be implemented to provide increased fish numbers and larger average size. Which choice do you prefer? **(Circle one)**

1 Keep the current 14-inch length limit
skip question 7

2 Implement more restrictive harvest regulations

7. Please **RANK** the following restrictive regulations according to your most preferred (1) to your least preferred (3) of the following options.

_____ A 14-21 inch slot length limit with a 5 fish daily bag. Bass 14 inches or less or 21 inches or greater may be retained. Only one bass 21 inches or greater may be retained each day.

_____ A 16-24 inch slot length limit with a 5 fish daily bag. Bass 16 inches or less or 24 inches or greater may be retained. Only one bass 24 inches or greater may be retained each day.

_____ A 16-inch maximum length limit with a 5 fish daily bag. Only bass 16 inches or less may be retained. Bass 24 inches or longer may be temporarily held in a live well and immediately weighed using personal scales. Fish weighing 13 pounds or more may be donated to the ShareLunker Program. Bass not donated or not accepted by TPWD must be immediately released into Kurth Lake.

8. In terms of recreational fishing, do you believe the amount of aquatic vegetation in Kurth Lake is **(Circle one)**

Not Enough	About Right	Too Much
1	2	3

9. Do you believe the annual entrance fee of \$120 at Kurth Lake is **(Circle one)**

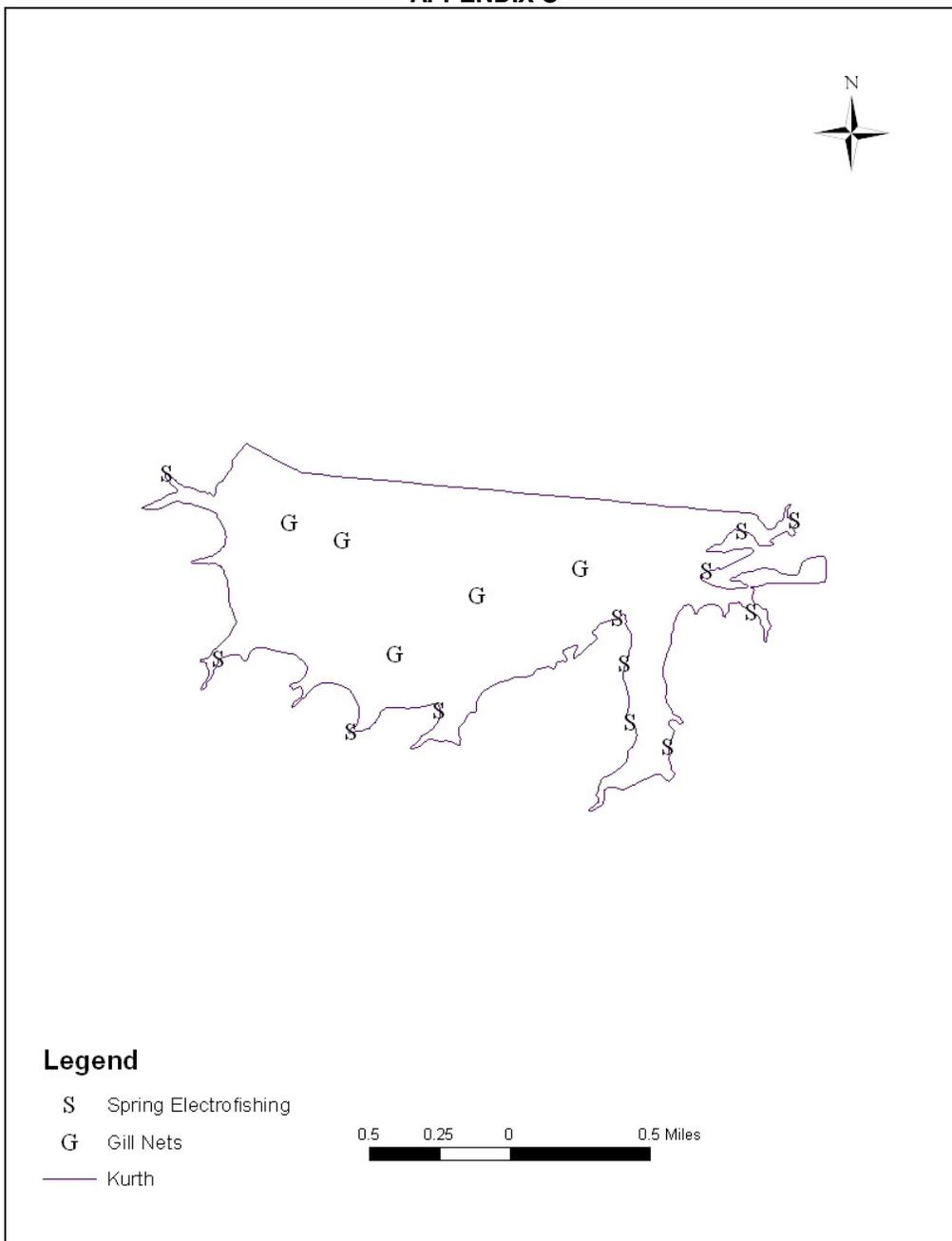
Not Enough	About Right	Too Much
1	2	3

10. Please select what you feel would be a fair value annual entrance fee price **(Circle one)**
 \$30 \$60 \$90 \$120 \$150 \$180 \$210

11. What is the maximum amount you would be willing to pay for an annual entrance pass? Put another way, if the annual entrance fee were above this value, you would no longer purchase one. \$ _____

Please provide any other comments below:

APPENDIX C



Location of sampling sites, Kurth Reservoir, Texas, 2011. Gill netting and spring electrofishing stations are indicated by G, and S, respectively.