

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-30-R-34

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2008 Survey Report

Lake Fork Reservoir

Prepared by:

Kevin W. Storey and Aaron K. Jubar
Inland Fisheries Division
District 3B, Tyler, Texas



Carter P. Smith
Executive Director

Phil Durocher
Director, Inland Fisheries

July 31, 2009

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.....	7
Literature cited.....	9
Figures and tables.....	10-20
Water level (Figure 1).....	10
Reservoir characteristics (Table 1)	10
Harvest regulations (Table 2).....	11
Stocking history (Table 3).....	12
Percent directed angler effort per species (Table 4).....	13
Total fishing effort and fishing expenditures (Table 5)	13
Channel catfish (Figure 2; Table 6).....	14
Largemouth bass (Figures 3-5; Tables 7-8).....	15
White crappie & black crappie (Figure 6; Table 9)	19
Proposed sampling schedule (Table 10).....	20
Appendix A	
Map of 2008-2009 sampling locations	21
Appendix B	
Invasive aquatic vegetation	22
Appendix C	
Water body records for Lake Fork Reservoir.....	23
Appendix D	
Lake Fork Trophy Bass Survey.....	24
Appendix E	
Waterhyacinth distribution in August 2008.....	25

SURVEY AND MANAGEMENT SUMMARY

Largemouth bass in Lake Fork Reservoir were surveyed in 2008 and 2009 using electrofishing. Anglers were surveyed with an access point creel survey, and a vegetation survey was conducted to assess waterhyacinth distribution. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Lake Fork Reservoir is a 27,264-acre impoundment located on Lake Fork Creek, a tributary of the Sabine River, approximately five miles northwest of Quitman, Texas. Water levels have been stable for the past 12 months, remaining within one foot of conservation pool elevation. Total coverage of hydrilla in summer 2007 (1.5% of reservoir surface area) was reduced as compared with 2006 (3.8%) and 2005 (4.8%) (Storey and Jubar 2008). Eurasian watermilfoil appears to have displaced hydrilla in some areas and occupied the same total area (418 acres) as hydrilla in summer 2007.
- **Management history:** Important sport fishes include largemouth bass, crappie (white and black), and channel catfish. The management plan from the 2008 survey report included continued stocking of Florida largemouth bass (FLMB). The 16- to 24-inch slot-length limit continues to be evaluated through annual electrofishing surveys and an access creel survey. District staff continued to promote the Lake Fork Trophy Bass Survey. Waterhyacinth abundance and distribution is monitored through annual vegetation surveys and recommendations are made to continue annual herbicide treatments to attempt to control its spread.
- **Fish community**
 - **Prey species:** Although no assessments were made of prey fish populations in fall 2008 or spring 2009, it is evident there are adequate sources of food for largemouth bass and other predators based on the high relative weights of largemouth bass. The majority of gizzard shad in past surveys were available as prey for adult largemouth bass and most bluegill and redear sunfish collected were less than four inches in length, representing suitable sizes for most size classes of bass (Storey and Jubar 2008).
 - **Catfishes:** Catfish accounted for 3% of total angler effort. Channel catfish were the predominant catfish species although flathead catfish, blue catfish, and yellow bullheads were also present. Total catch per hour in the creel survey was 1.86/h and harvest rate was 0.98/h.
 - **Temperate basses:** White bass, yellow bass, and white x yellow bass hybrids were all present in the reservoir. There is a limited fishery for yellow bass and anglers continued to report catching white bass. Two white bass were observed during the creel survey.
 - **Largemouth bass:** Largemouth bass are the most popular game fish in Lake Fork, accounting for over 87% of total angler effort in 2008–2009. Size distribution remained consistent and relative weights were high. Largemouth bass continued to grow rapidly.
 - **Crappie:** Crappie accounted for 8.8% of total directed effort in 2008–2009. The vast majority of crappie observed in creel surveys were black crappie (82%). During the winter quarter (December 2008 through February 2009), 59% of the annual harvest of crappie was observed, although angler effort was third compared with other quarters.
- **Management strategies:** Annual actions include: stocking FLMB to enhance largemouth bass genetics, spring and fall electrofishing for largemouth bass, an access point creel survey, annual vegetation surveys of waterhyacinth and promotion of the Lake Fork Trophy Bass Survey.

3
INTRODUCTION

This document is a summary of fisheries data collected from Lake Fork Reservoir June 2008 through May 2009. The purpose of the document is to provide an annual update to fisheries information contained in a more comprehensive report composed every four years, most recently completed in August 2008 (Storey and Jubar 2008). This document serves a second purpose by updating the 2008 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. Relevant historical data are presented with the 2008 and 2009 data for comparison.

Reservoir Description

Lake Fork Reservoir is a 27,264-acre reservoir impounded in 1980 on Lake Fork Creek and Caney Creek. It is located approximately five miles northwest of Quitman, Texas, in Wood, Rains and Hopkins Counties. It is operated and controlled by the Sabine River Authority (SRA) primarily as a municipal water supply and for recreation. The reservoir was hypereutrophic with a Carlson's Trophic State Index (TSI) chl-a of 55.7 µg/L (Texas Commission on Environmental Quality 2008). Descriptions of fisheries habitat features (e.g., structural and aquatic vegetation) and angler access were described in a previous report (Storey and Jubar 2008). Water level remained within about one foot of conservation pool elevation for the last two years (Figure 1). Other descriptive characteristics for Lake Fork Reservoir are shown in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Storey and Jubar 2008) included:

1. Stock FLMB fingerlings (25/acre) annually.
Action: Annual stocking of 682,702 FLMB fingerlings was conducted in 2009.
2. Continue to evaluate the 16- to 24-inch slot length limit.
Action: Annual electrofishing surveys were conducted in fall 2008 and spring 2009 to monitor the largemouth bass population, and an annual access point creel survey was employed to monitor directed angler effort, catch and harvest. The Lake Fork Trophy Bass Survey has yielded some of the most valuable information on the effectiveness of the slot limit in maintaining the quality of the largemouth bass fishery. Since March 2003, 33% of fish reported as measured were above the upper end of the slot length limit (24 inches). The estimated angler catch rate of this size range of fish in the 2008-2009 creel survey was 0.001/hr.
3. Conduct invasive aquatic plant monitoring and control.
Action: A vegetation survey was conducted in September 2008 which showed waterhyacinth is spreading at an accelerated rate. Staff posted notices about the dangers posed by giant salvinia at area boat ramps and businesses and a number of false-sightings have been investigated. Landowners continue to submit aquatic vegetation treatment proposals to treat a variety of noxious and problematic aquatic vegetation. Alligatorweed is the most common target plant.
4. Promote the Lake Fork Trophy Bass Survey.
Action: District biologists provided monthly summaries of catches by weight-class to participating marinas, outdoor writers, and Division administrators. News releases summarizing survey results have been distributed through media contacts as appropriate. District staff is working on a manuscript summarizing six years of data from the survey.
5. Increase angler awareness of the fisheries resources at Lake Fork
Action: District staff provided laminated posters on Lake Fork fishing regulations and the Lake Fork Trophy Bass Survey for display at boat ramps and local businesses. A new poster which features identifying characteristics of giant salvinia was created by district staff and posted at area boat ramps and marinas. Biologists provided information on fisheries resources of Lake Fork through telephone interviews and written news releases

to interested outdoor writers. Information on Lake Fork recreational facilities was provided to anglers by mail, e-mail, or by telephone.

Harvest regulation history: Sport fishes in Lake Fork Reservoir are managed with statewide regulations with the exception of largemouth bass and crappie (Table 2). A detailed harvest regulation history is provided in the most recent 4-year summary report (Storey and Jubar 2008).

Stocking history: Lake Fork Reservoir has a long history of FLMB stockings. Other species (e.g., spotted bass, channel catfish, blue catfish, flathead catfish, bluegill, and redear sunfish) were stocked on one to four occasions prior to 1985. A detailed stocking history is provided in the most recent 4-year summary report (Storey and Jubar 2008) and Table 3.

Vegetation/habitat history: Lake Fork Reservoir supports a diverse mix of aquatic vegetation species, including invasive species such as hydrilla, Eurasian watermilfoil, waterhyacinth, and alligatorweed. A detailed aquatic vegetation history is provided in the most recent 4-year summary report (Storey and Jubar 2008). Water hyacinth continued its recent expansion.

METHODS

Largemouth bass were collected by electrofishing (2 hours at 24, 5-min stations) in spring and fall. Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. Survey sites were randomly selected. An access point angler creel survey consisting of 36 survey days (4 weekdays, 5 weekend days per quarter from June 2008 through May 2009) was conducted to estimate angler catch and harvest rates and angling effort in accordance with Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2008). An aquatic vegetation survey for waterhyacinth was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2008).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)], and relative weight (W_t) were calculated for target fishes according to Anderson and Neumann (1996). Relative standard error ($RSE = 100 \times [SE \text{ of the estimate} / \text{estimate}]$) was calculated for all CPUE statistics and for creel statistics and SE was calculated for structural indices. Ages were determined for largemouth bass using otoliths from 15 specimens with lengths ranging from 15 to 17 inches. A sample of 30 age-0 largemouth bass were collected by electrofishing in fall 2008 and subjected to genetic analysis using DNA microsatellite analysis in accordance with Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2008).

The Lake Fork Trophy Bass Survey was continued using methods described in Storey and Jubar (2008).

Water elevation data (Figure 1) was obtained from the SRA website at http://www.sra.dst.tx.us/basin/lake_fork_monthly.asp.

RESULTS AND DISCUSSION

Habitat: Reservoir water elevation remained within about one foot of conservation pool for the past two years, a change over declines observed during the previous 2 to 3 years of drought (Figure 1). Waterhyacinth coverage was estimated at 39 acres (Appendix B and E), representing a considerable increase from the 2007 estimate of 12 acres. This spread has been facilitated by mild winters and lack of herbicide applications during 2007. Waterhyacinth spread to areas within Little Caney Creek in summer 2008.

Creel: Directed fishing effort by anglers was highest for largemouth bass (87.2%), followed by crappie (8.8%), and catfish (3.0%), which was similar to previous years (Table 4). Total fishing effort for all species (1,128,269 h) and total directed expenditures (\$15,338,593) from June 2008 through May 2009

were at the highest levels compared with previous years despite public concerns about the state of the U.S. economy (Table 5). As expected, the highest effort (719,991 h) and trip expenditures (\$8,691,204) were observed during the spring quarter (March through May). In fact, spring quarter expenditures were almost as high as the entire year's expenditures in 2007-2008. Trip expenditures during spring 2009 were 31.3% higher than in spring 2008 and approximately twice the increase seen from spring 2007(16.6%).

Prey species: No prey fish assessments were conducted in fall 2008, but were described in a previous report (Storey and Jubar 2008).

Channel catfish: Catfish remained the third most popular group in terms of directed angler effort, accounting for 3% of total effort. Fishing effort in 2008-2009 was similar to the previous year but was the lowest level observed since June 2002 to date (Table 6). Despite this, the estimated harvest of catfish (243,991) was by far the highest of any year in this review. Harvested fish ranged in length from 12 to 24 inches (Figure 2). Anglers harvested 78% of catfish caught in 2008-2009, but 27% of legal-sized channel catfish caught were released (Table 6). Other catfish species, including blue catfish, flathead catfish, and yellow bullhead were present in the reservoir but contributed little to the fishery.

Temperate basses: White bass, yellow bass and white x yellow bass hybrids are present in the reservoir. Population characteristics for temperate basses were described in a previous report (Storey and Jubar 2008) Two white bass were harvested in the creel survey, and anglers reported increasing frequency of catches of this species.

Largemouth bass: The largemouth bass population has remained stable and continues to provide a high quality fishery. Population size structure remained stable with PSD in spring samples ranging from 73-78 (Figure 3) and estimates from fall samples ranging from 34-50 (Figure 4) during the past three electrofishing surveys. Body condition was above average, indicating the presence of abundant and readily available prey fish populations. Mean relative weight of all sizes of fish within the protected slot limit were above 85 in both spring and fall, with the exception of one inch class in spring 2009. Largemouth bass in Lake Fork grow to the lower end of the protected slot length limit, in three or four years; average age at 16 inches (mean=16.6 inches, range=15.2–17.9 inches) was 3.8 years (N=15; range=2-7 years).

Lake Fork continued to receive high directed angler effort for largemouth bass. In 2008-2009, largemouth bass angling effort (30.1 h/acre) accounted for 87% of total fishing effort and was higher than in previous years (Table 7). The spring 2009 creel quarter (March through May) received 59% of the total annual effort observed at Lake Fork and accounted for 68% of the total directed effort for largemouth bass, slightly higher than that observed in spring 2008 (61%). Bass fishing in summer (June through August) accounted for 16% of total annual effort, fall (September through November) accounted for 9% and winter (December through February) was the slowest season with 4% of total fishing effort. Total directed expenditures in 2008-2009 were estimated at \$15,338,593, a 41% increase over expenditures in 2007-2008 (Table 5).

Catch rate for anglers targeting largemouth bass during 2008-2009 (0.41/h) was similar to other years (range 0.34-0.45/h) and the estimated number of bass caught (23.88/acre) was the highest observed level (Table 7). In 2008-2009, fish within the protected slot limit (16-24 inches) accounted for 44.1% of released largemouth bass, similar to amounts observed in 2007-2008 (42.6%) and 2006-2007 (42.7%). Fish below the slot limit accounted for 55.7% of releases. In 2008-2009, largemouth bass harvest was 0.04/hour. An estimated 99,140 fish were harvested during this time period and 86% of these were released following weigh-ins by anglers participating in live-release tournaments (Figure 5).

Standard fisheries sampling methods do not effectively sample fish longer than the upper end of the slot length limit (≥ 24 inches), making evaluation of the 16- to 24-inch slot limit difficult. Catch rate of largemouth bass ≥ 24 inches reported in creel surveys by largemouth bass anglers was low (0.001/h), and accounted for 0.2% of bass released by all anglers, identical to values observed in 2007-2008 (Storey and

Jubar 2008). The Lake Fork Trophy Bass Survey (see Appendix D) has provided an alternative method of collecting data on trophy-sized fish and it provides evidence that the slot limit is providing anglers the opportunity to catch large numbers of fish over 24 inches. Between March 2003 and April 2009, a total of 9,979 largemouth bass were reported in the Lake Fork Trophy Bass Survey by anglers from 47 states and the District of Columbia. Anglers measured 63.5% of their entries, and 33.0% of these were ≥ 24 inches. Fish in the 22- and 23-inch classes were most abundant of the measured entries, representing 28.5% and 30.9% of the total, respectively. Anglers weighed 83.2% of their entries, and of these fish, 15.7% were ≥ 10 pounds. By far, the vast majority of entries were 7 pound (40.9%) and 8 pound fish (29.3%). The top 5 states of reporting-angler origin were Texas (62.4%), Oklahoma (6.6%), Missouri (6.0%), Louisiana (5.0%), and Arkansas (3.8%). As expected, most trophy fish catches occurred during spring.

In 2008, FLMB allele frequency of age-0 fish was 52.0%, within the range observed since 1989 (32–58%) (Table 8). No pure Florida bass were observed in the sample of age-0 fish collected in fall 2008.

Crappie: Crappie were the second most popular sport fish at Lake Fork (Table 4). During 2008-2009, directed effort for crappie (98,751 h) was similar to the previous year (97,518 h) but lower than most other years (Table 9). Total crappie angler catch rate (black and white combined) (1.93/h) was higher than the three previous years but lower than rates observed from 2002-2005 (Table 9). The estimated number of crappie caught during 2008-2009 was 16.82/ac, the highest level observed compared with previous years. Crappie harvest rate (0.76/h) was similar to the previous year (0.82/h), but higher than the three preceding years. Total estimated crappie harvest (242,961) was considerably higher than in previous years.

Black crappie continue to be the dominant species harvested in the 2008-2009 creel survey (82.0%), which was similar to 2007-2008 (83.0%). The 10-inch class was the most abundant size class of crappie harvested (black and white combined) and accounted for 23.7% of fish observed in creel surveys. Angler compliance with the 10-inch minimum length limit in effect from March through November was high; illegal fish accounted for 3% of harvest during this time. During the winter quarter (December through February) when no minimum length limit is in effect, crappie measuring less than 10 inches accounted for 69% of the quarter's total harvest (Figure 6), higher than the three previous years (44%, 39% and 43%). The winter quarter accounted for 59% of the year's crappie harvest, but directed effort for crappie (12,275 h) was third highest after spring (39,158 h) and fall (38,865 h).

Fisheries management plan for Lake Fork Reservoir, Texas

Prepared – July 2009.

ISSUE 1: Lake Fork has a well-established history of producing trophy largemouth bass.

MANAGEMENT STRATEGIES

1. Stock FLMB (25/acre) annually to maintain trophy largemouth bass catch potential.
2. Monitor genetic composition of age-0 largemouth bass population by assessing allele frequency from samples collected during annual fall electrofishing.
3. Continue to monitor the largemouth bass population with biannual electrofishing surveys (spring and fall).
4. Continue to conduct annual access creel survey to monitor the fishery and collect data on catch, harvest and fishing effort.
5. Use results from the Lake Fork Trophy Bass survey to monitor angler catches of trophy bass (≥ 24 inches and/or ≥ 7 pounds).
6. Communicate proper handling techniques for large (≥ 7 pounds) bass (e.g., promote news release of proper holding to minimize lower jaw injuries).

ISSUE 2: Lake Fork contains four prominent invasive aquatic plants: hydrilla, waterhyacinth, Eurasian watermilfoil and alligatorweed. Although hydrilla is listed as an invasive aquatic plant, it has not created access problems on Lake Fork and it is generally considered an important component of the reservoir's aquatic habitat. Eurasian watermilfoil is not considered problematic but it does appear to be displacing hydrilla from certain areas. Waterhyacinth was first documented in Lake Fork in 1993. By 1995, coverage had increased considerably. Herbicide treatments using 2,4-D were first conducted by the TPWD Aquatic Habitat Enhancement staff (AHE) in 1996. From 1998 to present, waterhyacinth gradually spread westward to many sections of the reservoir. Alligatorweed has expanded as water levels increased following drought. Although landowners complain about alligatorweed presence, many anglers have adapted techniques to fish this plant. Landowners submit aquatic vegetation treatment proposals more frequently for this plant than for any other species. District staff will continue efforts to educate resource users about identification of new invasive aquatic threats such as giant salvinia.

MANAGEMENT STRATEGIES

1. Conduct annual monitoring of distribution and acreage of waterhyacinth in Lake Fork.
2. Recommend annual spraying of waterhyacinth using herbicide purchased by the SRA.
3. Release alligatorweed fleabeetles in areas infested with alligatorweed if insects become available.
4. Investigate reports of unusual or unknown aquatic plants in Lake Fork by anglers and homeowners at the earliest possible opportunity.
5. Continue to review aquatic vegetation treatment proposals submitted by Lake Fork homeowners for control of noxious aquatic vegetation.
6. Continue efforts to educate the public on identification of invasive aquatic plants and consequences of their introductions into public water.

ISSUE 3: Participation in the Lake Fork Trophy Bass Survey has declined this past year. This survey contributes vital information on the trophy component of the largemouth bass population not easily obtained by traditional sampling methods.

MANAGEMENT STRATEGIES

1. Continue the Lake Fork Trophy Bass Survey to obtain information on the catches of largemouth bass ≥ 7 pounds as well as fish ≥ 24 inches. Data gathered through this program will be used to quantify the catches of trophy bass as well as to monitor the performance of the slot limit.
2. Provide monthly summaries of catches by weight class to participating marinas and local media.

Produce news releases summarizing survey results and distribute information on a statewide basis.

3. Continue to promote the program by providing laminated posters for display at public and private boat ramps and in area businesses. Provide marina ledgers to participants on a monthly basis.
4. Implement strategies to maintain high rates of angler participation.

ISSUE 4: Angler awareness of the fisheries resources at Lake Fork other than largemouth bass could be enhanced. There is an opportunity to inform anglers of the significant fisheries for channel catfish and white bass. Fisheries regulations need to be prominently displayed and clearly communicated to anglers.

MANAGEMENT STRATEGIES

1. Continue to provide posters detailing fisheries regulations in effect at Lake Fork to local fishing-related businesses that serve the Lake Fork area for display in stores and at boat ramps.
2. Continue to provide information to anglers on fisheries regulations and identification of temperate basses (white bass and yellow bass) in Lake Fork.
3. Continue to produce news releases promoting the fisheries resources of Lake Fork for distribution to local lake papers and other media outlets.
4. Continue to provide information packets on Lake Fork facilities to interested anglers by mail and e-mail.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes annual electrofishing sampling in spring and fall to monitor the largemouth bass population (Table 10), a gill net survey to monitor catfish species in spring 2012, and a standard ongoing annual access creel survey to monitor the lake's fisheries. Waterhyacinth distribution and abundance will continue to be monitored through a vegetation survey.

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.
- DiCenzo, V. J., M. J. Maceina, and M. R. Stimpert. 1996. Relations between reservoir trophic state and gizzard shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.
- Storey, K. W and A.K. Jubar. 2007 Statewide freshwater fisheries monitoring and management program, Lake Fork, Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Performance Report, Project F-30-R-32, Job A, 34 pages.
- Storey, K. W and A.K. Jubar. 2008 Statewide freshwater fisheries monitoring and management program, Lake Fork, Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Performance Report, Project F-30-R-33, Job A, 35 pages.
- Texas Commission on Environmental Quality. 2008. Trophic Classification of Texas Reservoirs: 2008 Texas Water Quality Inventory and 303(d) List. 15pp.

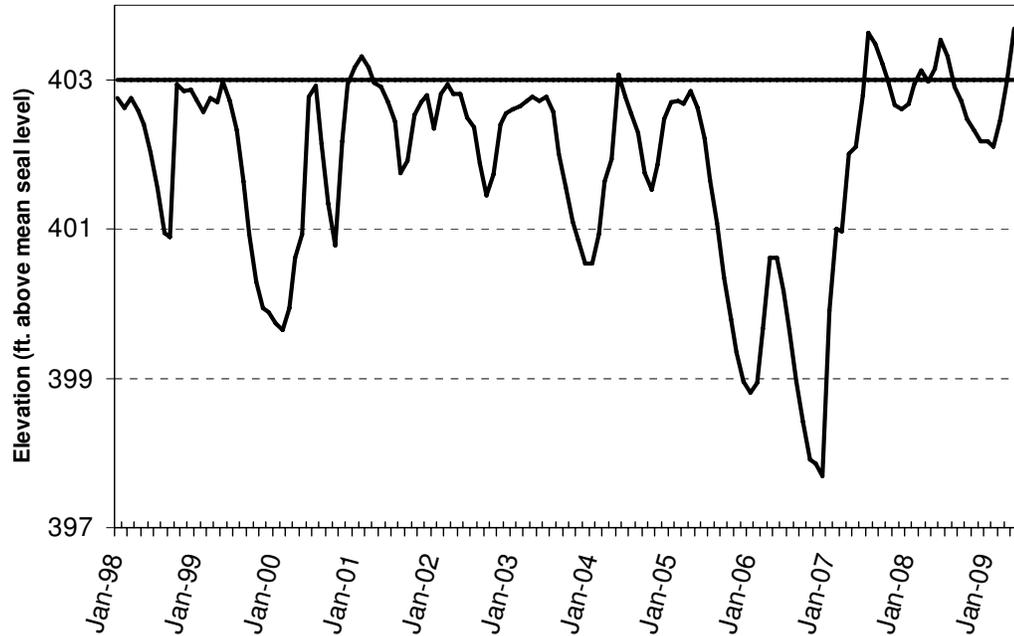


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Lake Fork Reservoir, Texas, January 1998 through May 2009. Bold horizontal line indicates conservation pool elevation; 403 ft. msl.

Table 1. Characteristics of Lake Fork Reservoir, Texas.

Characteristic	Description
Year constructed	1980
Controlling authority	Sabine River Authority
Surface area	27,264 acres
Counties	Wood (location of dam), Hopkins, Rains
Reservoir type	Mainstream
Mean depth	12.0 ft.
Maximum depth	70.0 ft.
Shoreline development index (SDI)	13.5
Conductivity	135 μ mho / cm
Secchi disc range	4 – 6 ft.
Watershed area	490 mi ²

Table 2. Harvest regulations for Lake Fork Reservoir, 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 (1 fish 24 inches or longer)	16 – 24 slot length limit
Crappie, white and black, their hybrids and subspecies	25 (in any combination)	10 ¹ - No limit

¹The minimum length limit is waived from December 1st to the last day of February each year. Anglers must harvest the first 25 crappie caught, regardless of size, with no catch-and-release or culling.

Table 4. Percent directed angler effort by species for Lake Fork Reservoir, Texas, June 2002 through May 2009.

Species	Year						
	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
Catfish	4.58	6.28	4.74	6.15	5.90	3.91	3.03
Yellow bass	0.13	0.03	0.39	-	0.09	-	-
Sunfish	0.96	0.35	0.45	-	1.08	-	-
Largemouth bass	75.11	71.81	77.79	81.57	80.32	84.37	87.15
Crappie	18.90	20.88	16.63	12.27	12.61	11.15	8.75
Anything	0.33	0.65	-	-	-	0.56	1.06

Table 5. Total fishing effort (h) for all species and total directed expenditures (and associated RSEs in parentheses) at Lake Fork Reservoir, Texas, June 2002 through May 2009.

Species	Year						
	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
Total fishing effort	757,177 (13)	649,856 (10)	786,911 (16)	717,074 (11)	807,892 (12)	874,230 (14)	1,128,269 (16)
Total directed expenditures	\$6,295,707 (19)	\$5,307,165 (18)	\$7,143,221 (22)	\$6,339,343 (17)	\$7,858,137 (17)	\$10,909,542 (22)	\$15,338,593 (24)

Table 6. Creel survey statistics for catfish (channel, blue, and flathead catfish combined) at Lake Fork Reservoir from June 2002 through May 2003, to June 2008 through May 2009, where total catch per hour is for anglers targeting catfish and total harvest is the estimated number of channel catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year						
	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
Directed effort (h)	34,657 (24)	40,809 (19)	37,311 (24)	44,109 (18)	47,663 (18)	34,213 (26)	34,221 (32)
Directed effort/acre	1.25 (24)	1.47 (19)	1.35 (24)	1.62 (18)	1.75 (18)	1.25 (26)	1.26 (32)
Total catch per hour	1.01 (33)	1.44 (24)	1.29 (37)	1.07 (27)	1.34 (24)	1.02 (24)	1.86 (36)
Catch/acre	1.90 (54)	2.87 (25)	2.74 (57)	1.90 (39)	3.21 (37)	3.67 (58)	11.45 (74)
Harvest per hour	0.65 (34)	1.44 (24)	0.84 (38)	0.78 (30)	0.89 (27)	0.86 (26)	0.98 (56)
Harvest/acre	1.32 (33)	1.85 (25)	2.02 (36)	1.14 (23)	2.18 (27)	2.66 (39)	8.95 (67)
Total harvest	36,071 (33)	50,466 (25)	55,165 (36)	31,031 (23)	59,404 (27)	72,585 (39)	243,991 (67)
Percent legal released	13.6	28.8	32.1	0.5	20.3	65.8	26.7

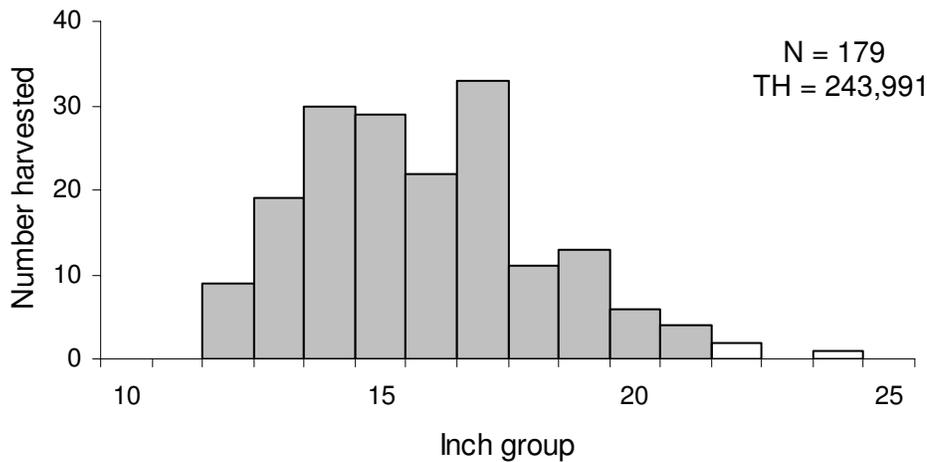


Figure 2. Length frequency of harvested channel catfish observed during creel surveys at Lake Fork Reservoir, Texas, June 2008 through May 2009, all anglers combined. N is the number of harvested channel catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

Largemouth bass - spring

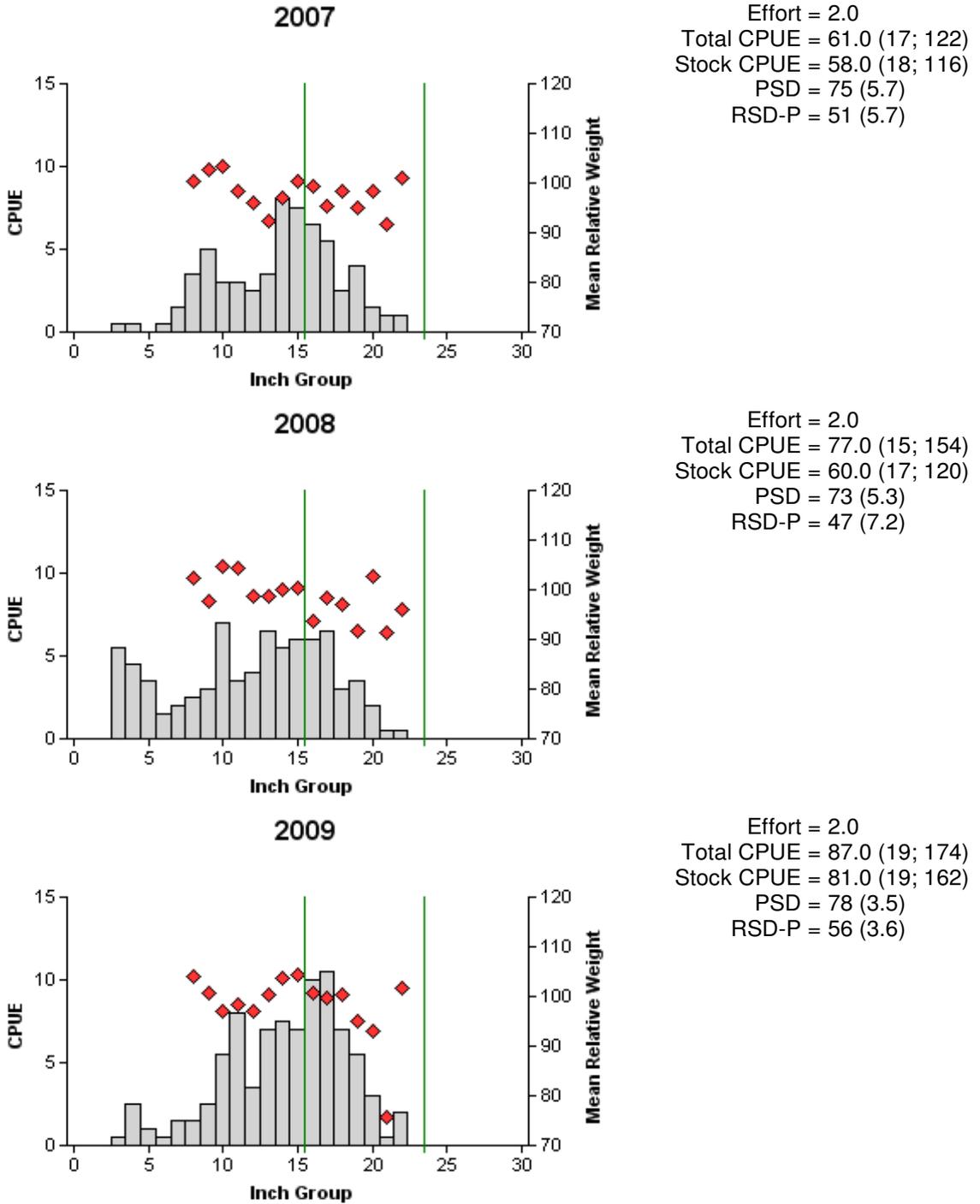


Figure 3. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for structural indices are in parentheses) for spring electrofishing surveys, Lake Fork Reservoir, Texas, 2007 through 2009. Vertical lines indicate the lower and upper bounds of the protected slot length limit at time of survey.

Largemouth bass - fall

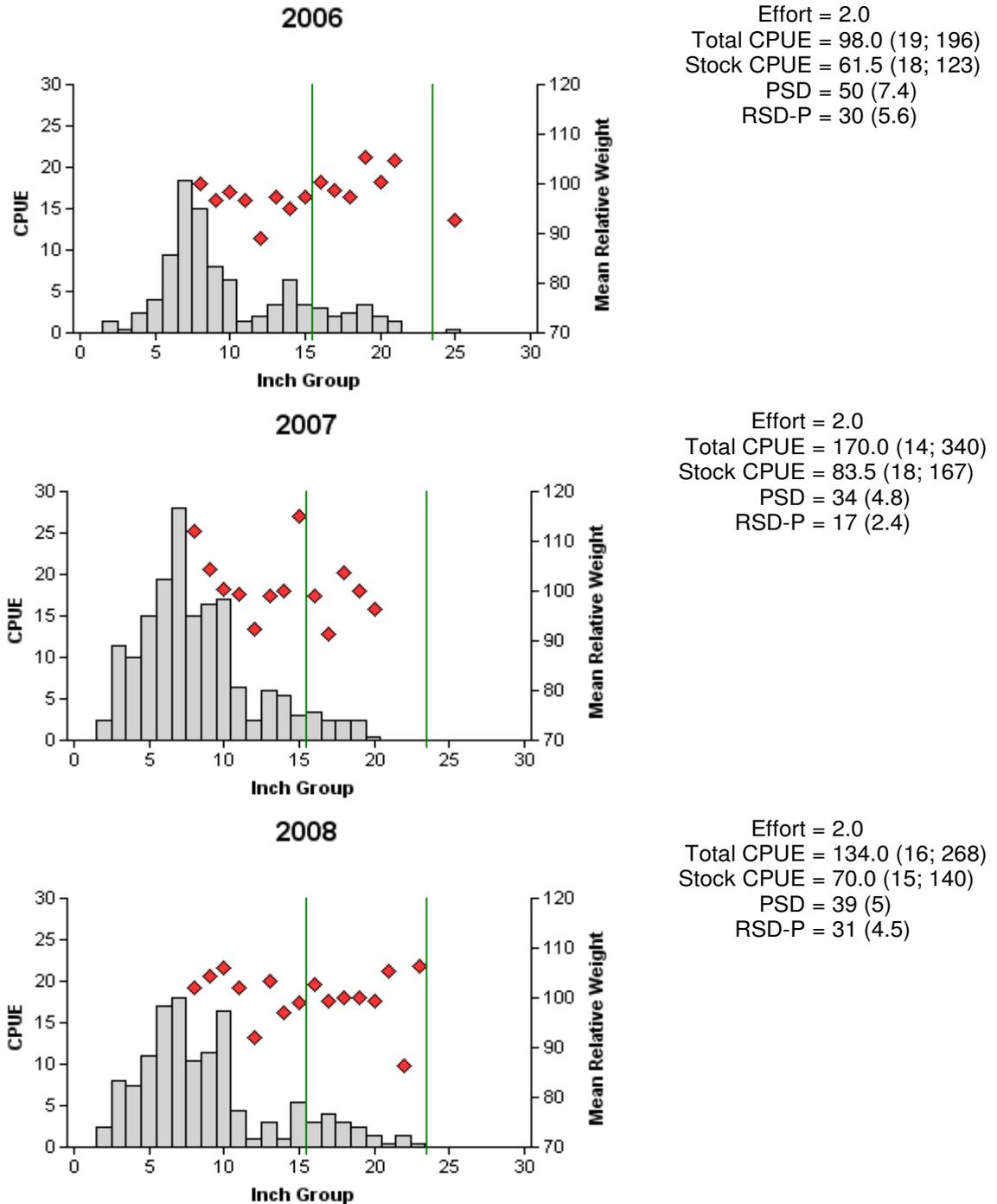


Figure 4. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for structural indices are in parentheses) for fall electrofishing surveys, Lake Fork Reservoir, Texas, 2006 through 2008. Vertical lines indicate the lower and upper bounds of the protected slot length limit at time of survey.

Table 7. Creel survey statistics for largemouth bass at Lake Fork Reservoir from June 2002 through May 2003, to June 2008 through May 2009, where total catch per hour is for anglers targeting largemouth bass and total harvest is the estimated number of largemouth bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year						
	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
Directed effort (h)	568,700 (14)	466,640 (12)	612,123 (17)	584,952 (12)	648,899 (13)	737,589 (15)	983,325 (17)
Directed effort/acre	20.54 (14)	16.85 (12)	22.11 (17)	21.46 (12)	23.80 (13)	27.05 (15)	30.07 (17)
Total catch per hour	0.34 (9)	0.36 (9)	0.45 (8)	0.44 (8)	0.40 (8)	0.41 (8)	0.41 (8)
Catch/acre	8.25 (18)	7.40 (15)	11.99 (21)	11.82 (18)	11.54 (17)	17.73 (22)	23.88 (23)
Harvest* per hour	<0.01 (97)	0.01 (60)	0.03 (24)	0.01 (50)	0.02 (25)	0.03 (25)	0.04 (21)
Harvest*/acre	0.11 (49)	0.41 (38)	1.00 (12)	0.20 (27)	0.94 (29)	0.75 (31)	3.64 (47)
Total harvest*	2,925 (49)	11,140 (38)	27,184 (12)	5,346 (27)	25,545 (9)	20,490 (31)	99,140 (47)
Percent legal released	58.8	66.0	71.5	58.8	57.3	57.4	55.9

*Harvest includes traditional harvest and fish temporarily retained during live release fishing tournaments

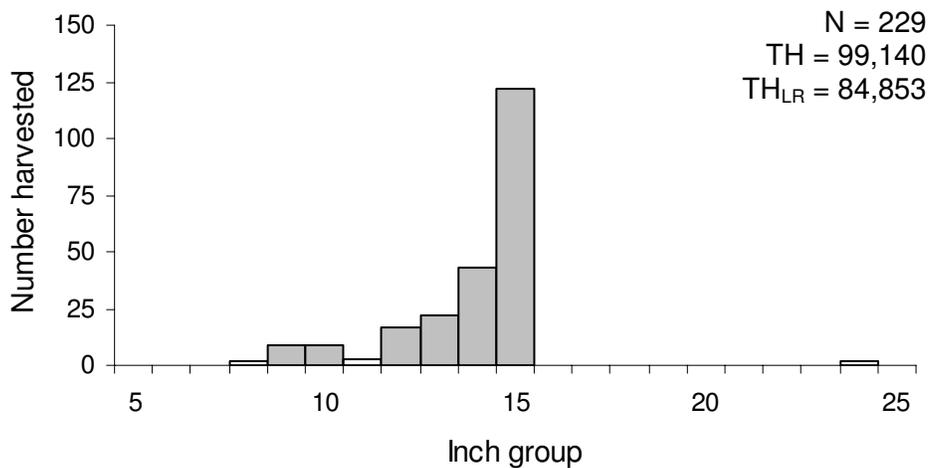


Figure 5. Length frequency of harvested largemouth bass observed during creel surveys at Lake Fork Reservoir, Texas, June 2008 through May 2009, all anglers combined. N is the number of harvested largemouth bass observed during creel surveys which includes fish transported to weigh-ins at live-release tournaments. TH is the total estimated harvest for the creel period and TH_{LR} is the total estimated number of fish retained by anglers participating in live-release tournaments.

Table 8. Results of genetic analysis of Age-0 largemouth bass collected by fall electrofishing, Lake Fork Reservoir, Texas, 1989 through 2008. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass, F1 = first generation intergrade between an FLMB and an NLMB, Fx = second or higher generation intergrade between an FLMB and an NLMB. Since 2006 analyses have been conducted using DNA microsatellite analysis. Prior to that time starch gel electrophoresis was employed.

Year	Sample size	Genotype					% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	Combined intergrades	NLMB		
1989	30	2	8	13	21	7	31.7	6.7
1990	30	1	12	15	27	2	44.2	3.3
1991	30	4	5	15	20	4	51.8	13.3
1992	35	3	11	16	27	5	39.3	8.6
1993	35	2	7	18	25	8	33.6	5.7
1994	35	1	3	23	26	8	38.6	2.9
1995	35	0	8	17	25	10	31.4	0.0
1996	35	5	7	19	26	2	53.7	14.3
1997	50	4	12	27	39	6	40.3	8.0
1998	54	1	6	37	43	10	31.9	1.8
1999	35	2	14	10	24	9	34.3	5.7
2000	55	4	15	29	44	7	50.5	7.3
2001	56	3	6	28	34	19	31.9	5.4
2002	50	6	14	28	42	2	58.0	12.0
2003	50	3	33	10	43	4	41.0	6.0
2004	50	2	13	31	44	4	54.0	4.0
2005	59	2	3	51	54	3	43.1	3.0
2006	30	0	^a	^a	30	0	48.0	0.0
2007	30	0	^a	^a	30	0	53.4	0.0
2008	30	0	1	29	30	0	52.0	0.0

^aAnalysis did not separate F1 from Fx hybrids

Table 9. Creel survey statistics for crappie (white and black combined) at Lake Fork Reservoir from June 2002 through May 2003, to June 2008 through May 2009, where total catch per hour is for anglers targeting crappie and total harvest is the estimated number of crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year						
	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
Directed effort (h)	143,115 (13)	135,708 (13)	130,894 (18)	88,012 (14)	101,904 (13)	97,518 (16)	98,751 (20)
Directed effort/acre	5.17 (13)	4.90 (13)	4.73 (18)	3.23 (14)	3.74 (13)	3.58 (16)	3.62 (20)
Total catch per hour	2.37 (20)	2.17 (16)	2.03 (19)	1.62 (20)	1.69 (24)	1.86 (27)	1.93 (30)
Catch/acre	14.95 (22)	11.65 (21)	11.05 (29)	5.49 (17)	10.96 (31)	11.45 (35)	16.82 (47)
Harvest per hour	0.80 (21)	0.93 (18)	0.64 (21)	0.44 (28)	0.68 (24)	0.82 (27)	0.76 (29)
Harvest/acre	6.01 (28)	4.92 (26)	4.29 (41)	1.36 (31)	6.34 (40)	4.78 (32)	8.91 (48)
Total harvest	163,921 (28)	134,060 (26)	116,857 (41)	37,020 (31)	172,981 (40)	130,368 (32)	242,961 (48)
Percent legal released	3.5	3.6	2.0	5.4	5.1	7.3	4.6

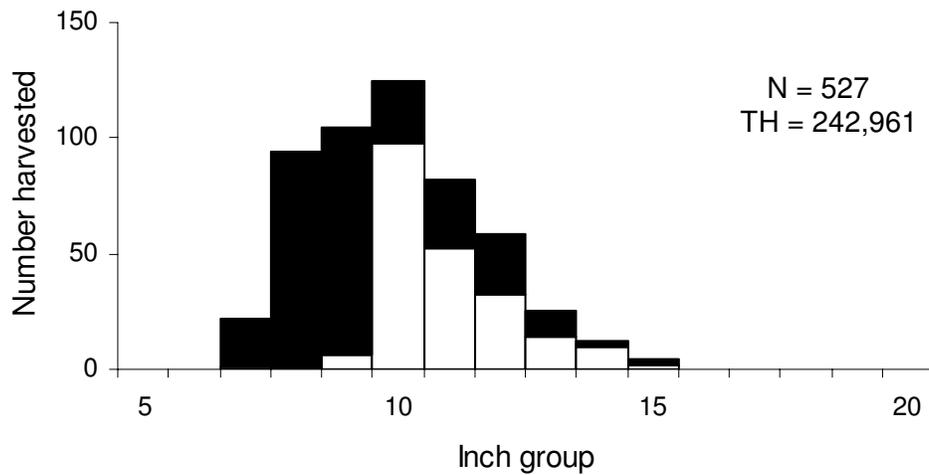
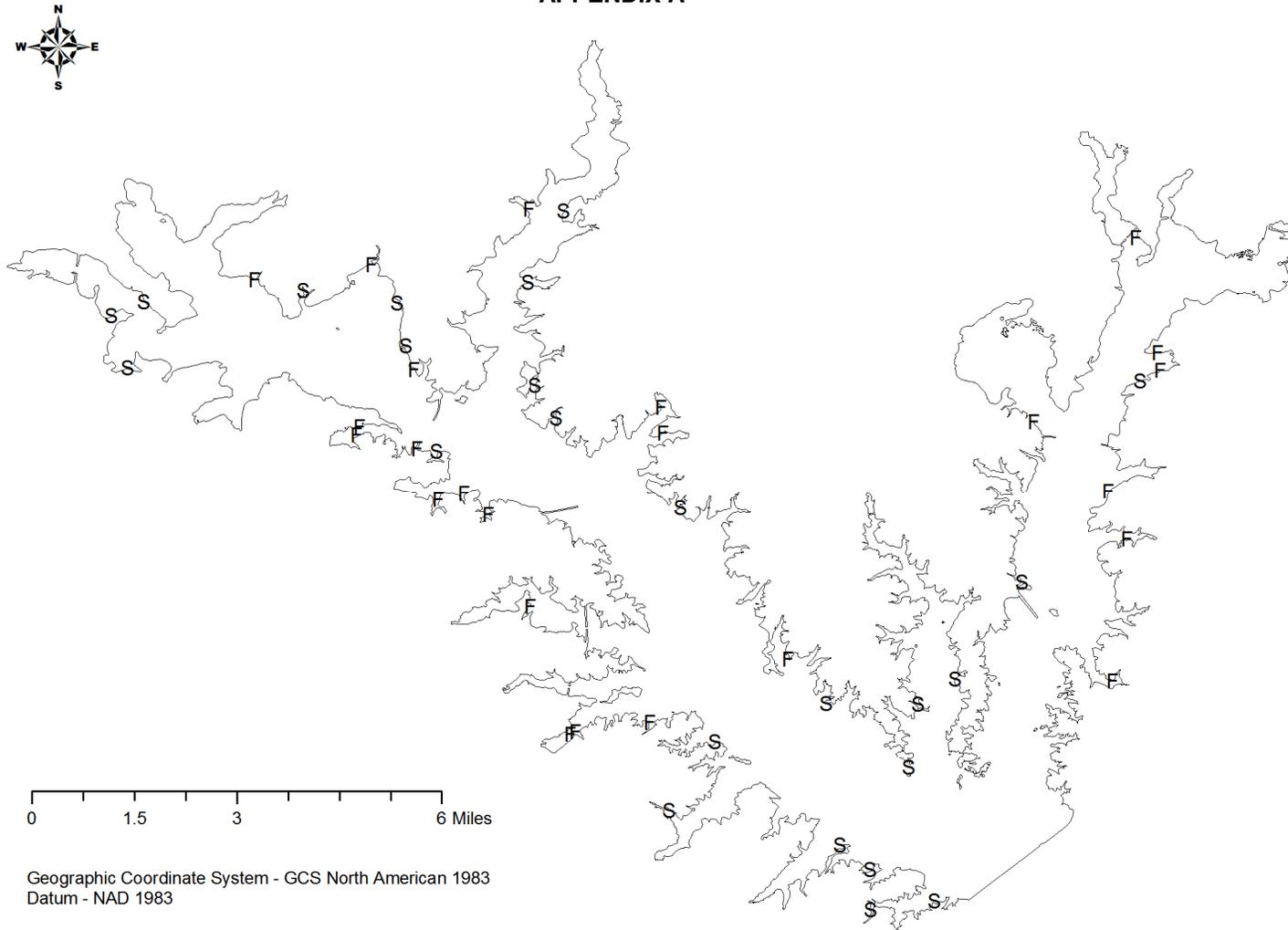


Figure 6. Length frequency of harvested crappie (white and black combined) observed during creel surveys at Lake Fork Reservoir, Texas, June 2008 through May 2009, all anglers combined. Open bars represent crappie harvested in summer, fall and spring quarters and black bars represent crappie harvested in winter quarter (December to February). N is the number of harvested crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 10. Proposed sampling schedule for Lake Fork Reservoir, 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 Spring	Electrofishing Fall	Gill netting	Creel survey	Vegetation survey	Habitat survey	Report
Summer 2009-Spring 2010	A	A		A	A		A
Summer 2010-Spring 2011	A	A		A	A		
Summer 2011-Spring 2012	A	S	S	A	S	S	S
Summer 2012-Spring 2013	A	A		A			

APPENDIX A



Location of fall electrofishing (F), and spring electrofishing (S) sites, Lake Fork Reservoir, Texas, 2008-2009.

Appendix B

Waterhyacinth and hydrilla surface area coverage (acres) at Lake Fork, Texas, estimated in summer (August or September) for various years.

Species	Year											
	1996	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Waterhyacinth	40	125	7	130	50	6	3	49	74	10	12	39
Hydrilla	3,900	4,750	3,027	N/A	98	873	1,773	3,701	1,414	1,047	417	N/A

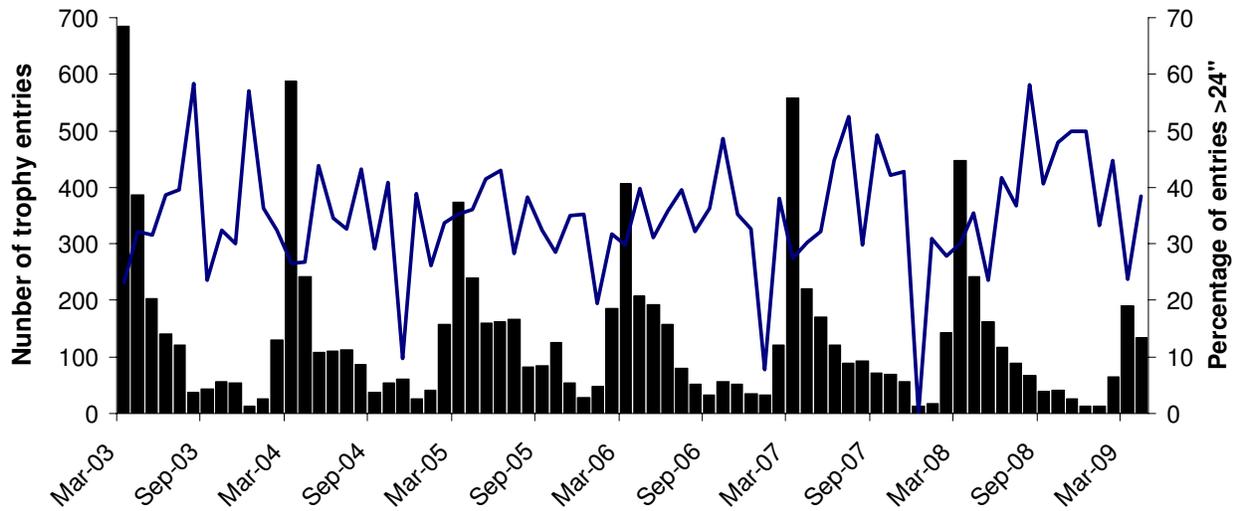
Appendix C

Water body records, all tackle category, for Lake Fork as of 6/8/2009

Species	Weight (lbs)	Length (inches)	Date certified	Gear
Bass, hybrid yellow ^a	4.75	19.00	3/12/2005	Rod & reel
Bass, largemouth ^a	18.18	25.50	1/24/1992	Rod & reel
Bass, spotted	3.03	17.00	9/13/2007	Rod & reel
Bass, white	3.97	18.25	2/8/2006	Rod & reel
Bass, yellow	1.37	12.25	11/19/1997	Rod & reel
Bluegill	1.61	11.50	7/9/1995	Rod & reel
Bowfin ^a	17.65	36.50	2/21/1993	Rod & reel
Buffalo, bigmouth	36.00	33.50	10/19/1997	Rod & reel
Buffalo, smallmouth	57.75	-	11/8/2007	Rod & reel
Bullhead, black	2.48	16.25	2/1/1995	Cane Pole
Bullhead, yellow ^a	3.20	16.25	3/22/1997	Rod & reel
Carp, common	36.50	36.50	4/10/1999	Trotline
Catfish, blue	89.00	49.25	3/1/2002	Trotline
Catfish, channel	25.33	35.50	5/9/2007	Trotline
Catfish, flathead	100.00	55.00	4/27/2007	Trotline
Crappie, black ^a	3.92	18.50	4/27/2003	Rod & reel
Crappie, white	3.19	17.00	2/5/1993	Rod & reel
Drum, freshwater	14.01	27.50	6/24/1995	Rod & reel
Gar, longnose	6.40	33.50	4/18/1993	Trotline
Gar, spotted	10.31	39.00	4/19/2003	Bow & arrow
Sunfish, hybrid	0.23	6.65	9/14/1999	Fly rod
Sunfish, longear ^a	0.48	7.50	6/1/1998	Rod & reel
Sunfish, orangespotted ^a	0.18	6.00	11/26/2005	Rod & reel
Sunfish, redear	1.27	12.75	6/2/1995	Rod & reel
Warmouth	0.84	9.5	5/16/2004	Rod & reel

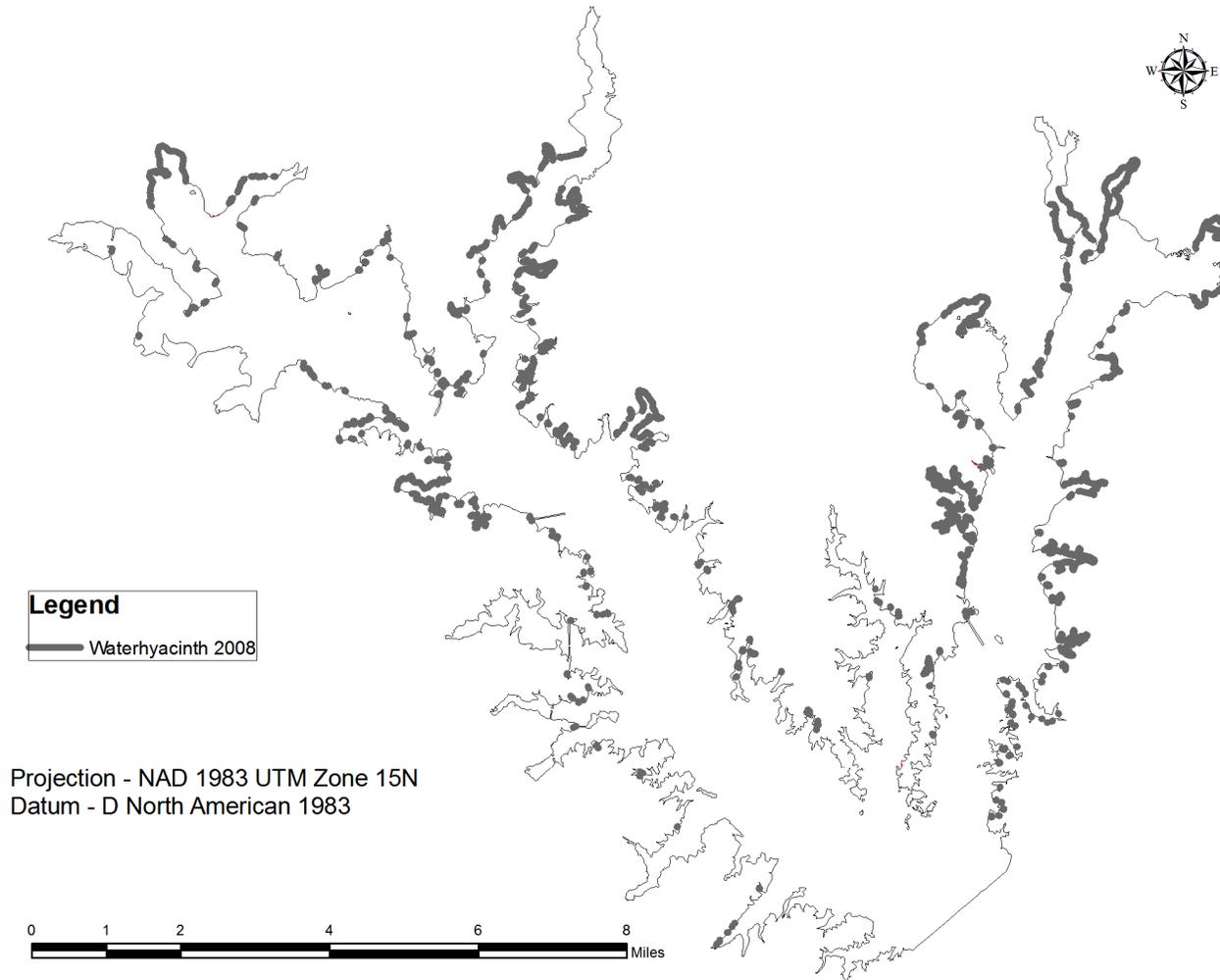
^aState record

Appendix D



Monthly total numbers of largemouth bass entries reported (solid bars) in the Lake Fork Trophy Bass Survey, March 2003 – April 2009, and percentage of monthly entries that were ≥ 24 inches (line). Numbers represent combined weighed and estimated entries.

Appendix E



Distribution of waterhyacinth in Lake Fork, September 2008. Total coverage was estimated to be 39 acres. Display of coverage not to scale.