PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2013 Fisheries Management Survey Report

Lake Fork

Prepared by:

Kevin W. Storey, District Management Supervisor
and
Daniel L. Bennett, Assistant District Management Supervisor

Inland Fisheries Division
District 3B, Tyler, Texas

Carter Smith
Executive Director

Gary Saul
Director, Inland Fisheries

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake Fork were surveyed in 2012 and 2013 using electrofishing, and in 2014 using gill netting and electrofishing. A vegetation survey was conducted in August 2013. Anglers were surveyed with an access point creel survey from June 2012 to May 2013. Historical data are presented with the 2012-2014 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:** Lake Fork is a 27,264-acre impoundment located on Lake Fork Creek, a tributary of the Sabine River, approximately five miles northwest of Quitman, Texas and approximately 70 miles east of Dallas, Texas.

- **Management History:** Important sport fishes include Largemouth Bass, crappies (White and Black), and Channel Catfish. The management plan from the 2012 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. The Lake Fork Trophy Bass Survey was completed in May 2013. Water hyacinth abundance and distribution has been monitored through annual vegetation surveys although low reservoir water elevations through 2014 limited the spread of the plant and also made chemical treatment impractical.

- **Fish Community**
  - **Prey species:** Abundant shad (Threadfin and Gizzard) and sunfish populations provided the basis for prey populations for Largemouth Bass and crappies. The majority of shad and sunfish species were available as prey for adult Largemouth Bass.

  - **Catfishes:** Catfishes have historically accounted for the third highest angler effort at Lake Fork. Although Flathead Catfish, Blue Catfish, and Yellow Bullheads are also present, Channel Catfish was the only species encountered in gill net sampling and in creel surveys. The majority of Channel Catfish collected in gill nets were large enough to be legally retained.

  - **Temperate basses:** White Bass, Yellow Bass, White x Yellow Bass hybrids, and Palmetto Bass were all present in the reservoir. The White Bass population has become more abundant as evidenced by increases in gill net catches, harvest in creel surveys, and limited directed fishing effort. Yellow Bass harvest was also observed during creel surveys.

  - **Largemouth Bass:** Largemouth Bass are the most popular game fish in Lake Fork, accounting for the majority of total angler effort in the last seven survey years. Catch rates in fall and spring samples have varied as reservoir elevation and available habitat have changed.

  - **Crappies:** Directed angler effort for crappies was second in importance of total directed effort. More White Crappie were harvested than Black Crappie in creel surveys between June 2012 and May 2013. Anglers harvested more crappies in the fall quarter (September – November) than at any other time.

- **Management Strategies:** Annual actions include: stocking FLMB; spring and fall electrofishing for Largemouth Bass population assessment; an access point creel survey to monitor angler effort, catch, and harvest rates; annual vegetation surveys of water hyacinth distribution and abundance. In addition, the water hyacinth management plan will be used to guide treatment activities.

INTRODUCTION

This document is a summary of fisheries data collected from Lake Fork June 2012 through May 2014. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. The most recent report was a biennial update to fisheries information completed in July 2012 (Storey 2012). 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 for comparison.

Reservoir Description

Lake Fork 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 55.4 µg/L (Texas Commission on Environmental Quality 2011). Descriptions of structural habitat features were presented in a previous report (Storey and Jubar 2008). A vegetation survey was conducted in 2013. Reservoir water elevations declined from June 2012 through September 2013 to a low of approximately 6 feet below conservation pool elevation (CPE) (Figure 1). Since that time, elevations have increased to a level of 3 feet below CPE by the end of May 2014. Other descriptive characteristics for Lake Fork are shown in Table 1.

Angler Access

Lake Fork has five free public boat ramps and numerous privately-owned boat ramps with launch fees. Bank fishing access is limited to areas near public boat ramps, in the Sabine River Authority day-use park on Highway 154, and at a number of private access areas. Additional characteristics of free public boat ramps are presented in Table 2.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Storey 2012) included:

1. Management of the Largemouth Bass fishery.

   Actions:
   - FLMB fingerlings were stocked in 2012 (693,736), 2013 (523,512) and 2014 (502,318).
   - Conducted genetic analysis on sample of Largemouth Bass collected during fall electrofishing; 57% FLMB allele composition, 6.7% of the sampled fish were FLMB and the remainder were first generation (6.7%) and second or higher generation intergrades (86.6%) (Fx) between FLMB and northern largemouth bass (NLMB).
   - Conducted electrofishing sampling in fall 2012 and 2013 and spring 2013 and 2014 to monitor relative abundance, size distribution, and condition of Largemouth Bass, and relative abundance and size distribution of prey species.
   - Conducted access point creel surveys from June 1, 2012 to May 31, 2013 to estimate angler catch, harvest, and effort.
   - Monitored angler catches of trophy bass $\geq$ 24 inches and/or 7 pounds through the Lake Fork Trophy Bass Survey through May 2013.
   - Communicated proper handling techniques for large bass through posting of information at display boards at boat ramps and in fishery-related businesses at Lake Fork.

2. Management of invasive aquatic plants.

   Actions:
   - Aquatic vegetation surveys and post-treatment surveys were not conducted in 2011 because the lake elevation was 7.5 feet below conservation pool elevation and any existing native and invasive aquatic vegetation was exposed on the shoreline. A rapid assessment was done in May 2012 to monitor the re-emergence of water hyacinth at sites which had historically been problematic and in areas where anglers had reported observing the plant.

- Staff continued to post materials regarding invasive aquatic plants at area boat ramps and local businesses at Lake Fork.
- Contacted and educated marina owners about invasive species, and provided them with posters, literature, etc. so they could communicate these messages to their customers.
- Worked to educate the public about invasive species through the use of media and the Internet.
- Made a speaking point about invasive species when presenting to constituent and user groups.
- Vegetation surveys were conducted to map the distribution and acreage of water hyacinth in 2012 and 2013.
- TPWD Aquatic Habitat Enhancement staff treated 32 acres of water hyacinth using foliar applications of 2,4-D-based herbicides in August 2012.
- Reviewed aquatic vegetation treatment proposals submitted by Lake Fork homeowners for control of noxious aquatic vegetation. Seven proposals were reviewed in 2012, and two in 2012. To date two have been received in 2014.

3. Habitat enhancement

Actions:

- Worked cooperatively with the Lake Fork Sportsmen Association (LFSA) to develop a habitat action plan recruited group to become a Friends of Reservoir Chapter under the Reservoir Fisheries Habitat Partnership (RFHP).
- Assisted with promotion of fish attractor structures to the LFSA. Delays in distribution of funding from the RFHP have stalled the project.
- Initiated pilot project to establish waterwillow colonies at select sites in Lake Fork using material harvested from a neighboring District reservoir in summer 2012. Expansion of initial sites the following year was impractical because of reduced reservoir elevation and dense growth of hydrilla at all sites.
- Supported LFSA as they planned and developed a small-scale nursery to grow-out buttonbush plants from bare root plants in cooperation with the Yantis High School horticulture program. Currently in excess of 1,000 plants are being grown in the school greenhouse.

4. Lake Fork Trophy Bass Survey

Actions:

- The Lake Fork Trophy Bass Survey continued to be promoted through May 2013 when a decision was made to discontinue the survey because of declining interest. Data from a total of 12,883 trophy Largemouth Bass 7 pounds and/or 24 inches and longer were entered into the database.
- A scientific manuscript is being drafted on the benefits and limitations of volunteer angler data collected through the Lake Fork Trophy Bass Survey.

5. Increase angler awareness of the fisheries resources at Lake Fork

Actions:

- Continued to provide posters detailing fisheries regulations in effect at Lake Fork to local fishing-related businesses that serve the area, for display in stores and at boat ramps.
- Continued to produce news releases promoting the fisheries resources of Lake Fork for distribution to local newspapers and other media outlets.
- Cooperated with interested parties on hosting and promoting the “Lake Fork Carp & Buffalo Challenge” tournaments for common carp and smallmouth buffalo in 2013 and 2014.
- Assisted with promotion and staffing of the Toyota Texas Bass Classic.
- Continue efforts to educate the public on identification of invasive aquatic plants and consequences of their introductions into public water.
- Provided information on identification of zebra mussels, and encouraged reporting of any suspicious cases. Gave presentation on “Zebra Mussel update” to SRA Clean Rivers Program in April 2014.

Harvest regulation history: Sport fishes in Lake Fork are managed with statewide regulations with the exception of Largemouth Bass and crappies (Table 2). A detailed harvest regulation history was provided in a previous report (Storey and Jubar 2008).

Stocking history: Lake Fork 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 Table 3.

Vegetation/habitat management history: Lake Fork has traditionally supported a diverse mix of aquatic vegetation species, consisting of native submersed and emergent types, and invasive species such as hydrilla, Eurasian watermilfoil, water hyacinth, and alligatorweed. In an attempt to improve aquatic habitat, the Lake Fork Sportsman's Association (LFSA) in cooperation with TPWD staff planted bare-root buttonbush plants and 2-year-old plants 2011 along exposed shorelines (Storey 2012). TPWD staff also planted waterwillow at three sites in July 2012. Declining water levels and the appearance of dense hydrilla at the planting sites has hampered expansion of these projects. To date, hydrilla and Eurasian watermilfoil have not created access issues in the reservoir. A total area of 318.5 acres of water hyacinth and alligatorweed was treated using 2,4-D herbicide in summer 2010 (Storey 2012) and a further 55 acres was treated in summer 2012. This chemical treatment, a series of cold winters, prolonged droughts, and unseasonably hot weather have combined to limit the spread of water hyacinth.

Water transfer: Lake Fork is a municipal water supply and the following entities withdraw water directly from the reservoir; Dallas Water Utilities, City of Quitman, and Bright Star Salem Supply Corporation. Water that is withdrawn from Lake Fork is pumped directly to the respective treatment plants and there are no inter-basin transfers. In addition, contracts exist with the cities of Henderson, Kilgore, Longview and Texas Eastman for municipal withdrawal downstream in the Sabine River.

METHODS

Fishes were collected by electrofishing (2 hours at 24, 5-min stations) in fall 2012 and 2013, and spring 2013 and 2014, and gill netting (15 net nights at 15 stations) in spring 2014. 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 2011). An aquatic vegetation survey was performed according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011) utilizing a Lowrance HDS 8 with StructureScan HD. Shoreline distances and areas of vegetation were estimated using ArcView GIS software. Angler access surveys were conducted in conjunction with the vegetation survey and elevations at the end of boat ramps were measured using sonar equipment.

An annual access-point creel survey was conducted from 2012 through 2013. The creel period was June through May. Angler interviews were conducted on 5 weekend days and 4 weekdays per quarter to assess angler use and fish catch/harvest statistics in accordance with the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), as defined by Guy et al. (2007)], and 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 and creel statistics.

Ages were determined for largemouth bass (N=12), channel catfish (N=14) and white bass (N=44) using otoliths.

Micro-satellite DNA genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011) on a sample of 30 fish of multiple ages.

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

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

RESULTS AND DISCUSSION

Habitat: Since the previous management report (Storey 2012), reservoir elevation has fluctuated by a maximum range of 4 feet (Figure 1) between April 2012 (401.1 ft msl) and October 2013 (397.1 ft msl) resulting in variable aquatic habitat. Water hyacinth distribution and coverage decreased as a result of herbicide application in August 2012, unseasonably cold weather in 2013 to 2014 and decreased water levels from drought. Water level fluctuations have functioned to limit the spread of small infestations which were estimated at 4.0 acres in August 2013 (Table 5). Coverage of aquatic plant species estimated in August 2013 accounted for 9.5% of reservoir surface area (2,578 acres), consisting primarily of hydrilla (5.0%) and native submersed species (3.9%).

Creel: Directed fishing effort for Largemouth Bass continued to be highest (82.5%), crappies remained second in importance (11.9%), and catfishes (4.3%) were the third most sought at Lake Fork (Table 6). There was also limited directed effort for White Bass (0.1%). Total fishing effort for all species in 2012-2013 (601,912 h) was similar to 2011-2012 (602,127 h) (Table 7) although total directed expenditures increased to $10.2 million up from a range of $7.1 million to $7.6 million in the previous three years. Anglers interviewed in creel surveys (N=638) from June 2012 through May 2013 originated from 13 states with Texas (82.8%), Louisiana (4.4%) and Oklahoma (4.2%) being the most common states of residence. (Appendix G)

Prey species: Lake Fork contains a diversity of prey fishes. The most abundant species are Gizzard and Threadfin Shad, Bluegill, and Redear Sunfish. Favorable relative weights of Largemouth Bass (Figure 9 and

Figure 10) are confirmation that prey populations in Lake Fork are adequate. CPUE of Gizzard Shad in fall electrofishing in 2013 (204.5/h) was higher than in 2012 (103.5/h) but similar to 2011 (224.5/h). The Index of vulnerability (IOV) showed the majority of Gizzard Shad (72%) were available to most existing predators (Figure 2) and this population was augmented by the presence of Threadfin Shad (97.5/h). Catch rates of Bluegill (225.0/h) and Redear Sunfish (135.0/h) in 2013 were highest of the fall electrofishing surveys in the review because of improved habitat in the form of increased abundance of hydrilla at the time of sampling. The majority of Bluegill collected in surveys was 4 inches or less in length, a suitable prey size for adult Largemouth Bass (Figure 3). The modal size class of the Redear Sunfish population in 2013 (Figure 4) was the 5-inch group and fish were observed to 9 inches. Redear Sunfish likely support a limited fishery for sunfish (Table 6) in Lake Fork.

Common Carp and Smallmouth Buffalo: Lake Fork has been the venue of the Lake Fork Carp and Buffalo Challenge for the past three years. Teams of two bank anglers fish continuously for 70 hours and prizes are awarded for the four biggest Common Carp (2014: 82.6 lbs), the four biggest Smallmouth Buffalo (2014; 207.1 lbs), and the biggest Common Carp and Smallmouth Buffalo from one team (2014: 20.1 and 68.7 lbs respectively). From February 27 to March 2, 2014, 38 two-man teams participated for a combined team effort of 2,660 hours and caught 48 Common Carp (0.018/h) and 38 Smallmouth Buffalo (0.007/h) (Appendix F).

Catfishes: Although Channel, Blue, and Flathead Catfishes are encountered in Lake Fork, Channel Catfish were the only species observed in creel surveys and population sampling. The Channel Catfish population is third in the magnitude of directed angler effort in Lake Fork (Table 6). In the most recent creel survey conducted from June 2012 to May 2013, catfish anglers contributed 4.3% of total angling effort, within the range of 3.0 to 5.9% observed in the past seven annual surveys. Gill netting CPUE in 2014 (9.6/nn) was similar to 2012 (9.4/nn) but higher than in 2008 (6.8/nn) and gill net samples were dominated by fish of legally-harvestable size (Figure 5). Total angler catch rate was similar for the past three years (1.91/h - 1.98/h; Table 8). An estimated 57,565 Channel Catfish were harvested in 2012-2013 and they ranged in length from 12 to 23 inches (Figure 6). Anglers released 17% of legal-sized catfish. The growth rate of Channel Catfish in Lake Fork was moderately fast; average age of 12-inch fish (mean = 11.8 inches; range = 11.1 – 12.7 inches) was 3.0 years (N = 14; range = 2 – 4 years), comparable to the growth observed in spring 2012 (2.8 years, mean length=12.4 inches; Storey 2011).

Temperate basses: White Bass, Yellow Bass, White x Yellow bass hybrids, and Palmetto Bass were present in the reservoir. The presence of Palmetto Bass is an anomaly since these fish have never been stocked by TPWD and this record was presumably the result of an illegal angler stocking. White Bass have continued to increase in abundance since the establishment of a lake record in 2001 and their subsequent detection in population sampling beginning in 2004 (Storey and Myers 2004). This introduction was allegedly accomplished illegally by anglers. Gill net CPUE has increased by a factor of 10 between 2008 (0.2/nn) and 2012 (0.3/nn) and 2014 (2.9/nn) (Figure 7). The majority (95%) of fish collected in 2014 were large enough to be legally retained and body condition was good. The harvest of White Bass has increased in creel surveys in the three year period from June 2010 through May 2013 (Figure 8) and limited directed fishing effort (0.1 – 0.4%) has been observed since June 2011 (Table 6). An age sample of White Bass (N=44) from spring 2014 consisted of fish ranging in length from 8.7 – 16.0 inches and representing five age classes (1-5) (Figure 9). The White Bass population appears to exhibit inconsistent recruitment based on the presence of two abundant year classes (hatched in 2010 and 2012) of the five collected.

Largemouth Bass: Total CPUE of Largemouth Bass in fall electrofishing was higher in 2012 (94.5/h) and 2013 (100.0/h) as compared with 2011 (66.5/h) (Figure 10). Lake Fork reached its historic low-water elevation, 7.6 feet below CPE, one month after the 2011 sample was collected (Figure 1) and the lack of available aquatic habitat may have negatively affected fish vulnerability to electrofishing along shoreline sample sites. Catch rate of stock-sized Largemouth Bass ($\geq$ 8 inches) has remained consistent across the three surveys in this review (range 35.0 – 37.0/h). Higher abundances of sub-stock-sized fish since 2011 in fall samples have led to increased total CPUE as increasing reservoir water elevations have improved aquatic habitat, likely resulting in improved survival and recruitment. Body condition of Largemouth Bass was good, a clear indicator of an adequate supply of prey, as relative weights in most fish inch classes ranged 90 to 100. (Figure 10).

In spring electrofishing, total CPUE of Largemouth Bass has also varied in response to water elevation and associated changes in available aquatic habitat. CPUE in 2012 (68.5/h) was highest at a time when water elevation was 2 feet below CPE (Figure 11). Total CPUE in spring 2013 was at its lowest level (28.5/h) during a period of elevation decline which reached the lowest level observed during this review, 397.1 ft msl, in October 2013. As water elevation increased steadily to 400.0 ft msl by the end of May 2014, CPUE in 2014 also increased (40.5/h). Despite these changes, PSD in spring samples remained stable.

Angler catch rate of Largemouth Bass in 2012-2013 (0.42/h) was similar to rates observed during the time period of June 2006 - May 2009 (0.40-0.41/h) (Table 9). From June 2009 through May 2012 catch rates ranged from 0.59/h to 0.91/h. Although directed angler effort for Largemouth Bass at Lake Fork from 2012-2013 (496,630 h) was higher than in 2010-2011 (478,111 h) or 2011-2012 (440,551 h) it was lower than in the previous four years (range; 521,650 – 983,325 h). Numbers of Largemouth Bass released by weight groups for the last two creel surveys, showed similar total numbers of fish (262,700 vs. 263,314) (Table 9). Fish smaller than 4 pounds accounted for between 74-77% of all released fish and fish over 7 pounds represented 1.9 - 2.6% of all releases.

Live-release tournament effort accounted for 51% of the directed effort for Largemouth Bass in the 2012-2013 creel survey, the second highest annual estimate observed since June 2006 (Table 9). An estimated 32,064 Largemouth Bass were retained by live-release tournament participants in the most recent survey and these fish represented 98% of the total number of retained (harvested) fish (Figure 11). Actual harvest (fish kept for consumption) of Largemouth Bass in Lake Fork has traditionally been low (2-18% of all retained). Between 93-99% of legal-sized fish caught are released by non-tournament anglers (Table 9).

The growth rate of Largemouth Bass in Lake Fork has been variable but has shown evidence of decline in recent years. In fall 2013, the average age of 16-inch fish (mean = 16.1 inches; range = 15.0 – 16.8 inches) was 4.9 years (N = 12; range = 3 – 8 years) as compared with 3.8 years (mean length = 16.6 inches) in fall 2008 (Storey and Jubar 2009) and 3.2 years (mean length=16.6 inches) in 2010 (Storey 2011). Genetic analysis of Largemouth Bass of various sizes collected during fall electrofishing in 2013 yielded an FLMB allele frequency of 57%. The sample contained 6.7% pure FLMB, 6.7% first generation intergrades (F1) between FLMB and NLMB, and the remainder (86.6%) were second or higher generation intergrades (Fx). Intergrades have historically represented the most abundant genotype in genetics samples and pure FLMB were last detected in samples in 2005. These Intergrades still have good trophy potential. Over the past 10 years, of the 39 ShareLunkers ($\geq$ 13 lbs) donated from Lake Fork, only 38.5% of these fish were pure FLMB.

The Lake Fork Trophy Bass Survey has provided an alternative method of collecting data on Largemouth Bass equal to or greater than 7 pounds and/or 24 inches, as standard fisheries sampling methods do not effectively sample fish of this size. Survey data have provided documentary evidence of the slot-length limit's effectiveness in providing anglers the opportunity to catch large numbers of trophy-sized fish. Annual entries in the survey declined over time (Appendix E), resulting in the suspension of the survey. Despite declining entries, the annual percentages of fish >24 inches and > 10 pounds increased and remained relatively consistent, respectively. Responses suggest decreases in entries resulted from decreased angler participation and not a decrease in fishing quality.

A total of 12,883 Largemouth Bass were reported in the survey over 10+ years (March 2003 through May 2013) by anglers from 47 states and the District of Columbia. Anglers measured 61% of their entries, and 35% of these were >24 inches. Fish in the 22- and 23-inch classes were most abundant of the measured entries, representing 27% and 32% of the total, respectively. Anglers weighed 84% of their entries, and of these fish, 16% were >10 pounds. The majority were 7- (40.2%) and 8-pound fish (29.6%). Texas anglers contributed the majority of entries (63.1%), followed by participants from Oklahoma (6.9%), Missouri (5.8%), Louisiana (4.9%), and Arkansas (3.8%). For the first 10 complete years of the Lake Fork Trophy Bass Survey (March 2003 through February 2012), the month of March was the most popular for reporting (30.3%), followed by April (17.4%) and May (11.5%).

Crappies: Crappies were the second most popular sport fish group at Lake Fork, representing 11.9% of total angler effort in 2012-2013 (Table 6). Directed effort for crappie in 2012-2013 (71,876 h) was similar to 2010-2011 (65,152 h) but lower than in 2011-2012 (106,330 h) (Table 11). Total angler catch rate (0.91/h) was at the lowest level of the past seven years, but total harvest (100,882) was similar to previous years.

Black Crappie are usually the dominant species harvested in creel surveys, but they only accounted for 43% of all observed fish in 2012-2013. In the two previous surveys, this species accounted for 81% and 79%, respectively (Storey 2012). The fall quarter (September – November) was responsible for 34% of crappie harvest, followed by winter (December – February) (30%) and spring (March – May) (29%). By comparison, winter quarters in 2009-2010 and 2011-2012 were responsible for 55% and 50%, respectively, of annual harvest (Storey and Jubar 2010). The 10-inch class was the most frequently-harvested size (Black and White crappie combined), accounting for 29% of observed fish as compared with higher proportions seen in 2010-2011 (40%) and 2011-2012 (34%) creel surveys (Storey 2012).

Angler compliance with the 10-inch minimum length limit in effect from March through November was high; Illegal fish accounted for only 1.4% of harvest during that time. During the winter quarter (December through February) when no minimum length limit is in effect, crappies smaller than 10 inches accounted for 8.2% of the total harvest for the year.

Fisheries management plan for Lake Fork, Texas

Prepared – July 2014.

ISSUE 1: Lake Fork has a long and impressive history of producing trophy Largemouth Bass. This lake has held the state record of 18.18 pounds since 1992 and has contributed 46% of all entries into the ShareLunker program since its inception in 1986. Since the last management report was prepared in 2012, 7 entries have been added to the ShareLunker program, 28.6% of which were pure FLMB. To date, 7 of the top 10, 13 of the top 20, and 25 of the 40 heaviest documented largemouth bass in Texas were caught in Lake Fork. Total annual trip expenditures at Lake Fork were estimated in 1996 at over $28 million and total economic value of the reservoir for fishing was valued at $38.9 million. TPWD has managed the Lake Fork largemouth bass fishery under restrictive regulations since it was opened to the public in 1980 and as part of its commitment to enhancing the quality of the bass population the agency's hatcheries have stocked in excess of 13 million FLMB into the lake. The Lake Fork largemouth bass fishery will continue to be monitored intensively.

MANAGEMENT STRATEGIES

1. Stock FLMB (25/acre) annually to influence genetics and maintain trophy Largemouth Bass catch potential.
2. Monitor genetic composition of Largemouth Bass population by assessing allele frequency from samples collected during fall electrofishing in 2015.
3. Continue to monitor the Largemouth Bass population relative abundance, size structure, and condition with spring and fall electrofishing surveys each year.
4. Since growth estimates of 16-inch fish have exhibited a declining trend, collect augmented age sample in order to estimate mean length-at-age and age structure of fish ages 1-3 (Category 3). Use fall electrofishing in 2015 to collect 200 fish subsampled at 5 per 10-mm strata in the length range 150-500 mm.
5. Initiate annual access-point creel survey in June 2014 to monitor the fishery and collect data on catch, harvest, and fishing effort. Continue to collect data on numbers of released bass in the following size ranges; 4-6.9 lbs, 7-9.9 lbs and $\geq$10 lbs.

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 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 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

Water hyacinth currently poses the major threat of any invasive aquatic plant currently in Lake Fork. Lake Fork contains three additional invasive aquatic plants: hydrilla, 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 beneficial habitat. Eurasian watermilfoil is not considered problematic but it does appear to be displacing hydrilla from certain areas. Alligatorweed has expanded as water levels increased following drought. Landowners submit aquatic vegetation treatment proposals more frequently for alligatorweed than for any other species.

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 they can communicate these messages to 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. Continue to support zebra mussel sampling being conducted by contractors and provide assistance with dissemination of test results.
6. Provide information on identification of zebra mussels, and encourage reporting of any suspicious cases.
7. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.
8. Conduct vegetation surveys in order to map distribution and acreage of water hyacinth in Lake Fork as appropriate.
9. Work cooperatively with TPWD Austin and Aquatic Habitat Enhancement staff, the Sabine River Authority, and the LFSA to develop management plans and to explore opportunities to underwrite recommended courses of action.
10. Update "Nuisance aquatic vegetation management plan for Lake Fork" as necessary.
11. Treat water hyacinth using foliar applications of 2,4-D-based herbicides by contract herbicide applicator.
12. Conduct post-treatment vegetation surveys to evaluate effectiveness of herbicide application.
13. Investigate reports of unusual or unknown aquatic plants in Lake Fork by anglers and homeowners at the earliest possible opportunity.
14. Continue to review aquatic vegetation treatment proposals submitted by Lake Fork homeowners for control of noxious aquatic vegetation.

ISSUE 3: During the protracted drought of mid-2010 through 2011, reservoir water elevations decreased to record low levels exposing shorelines that were devoid of any fish habitat structure. LFSA partnered with TPWD staff on two projects to improve aquatic habitat by planting 1,000 bare-root buttonbush plants in March 2011 and 400, 2-year-old plants in November 2011 along exposed shorelines. LFSA has demonstrated a continued interest in making improvements to the aquatic habitat at Lake Fork by becoming a Chapter member of the Friends of Reservoirs (www.waterhabitatlife.org) of the Reservoir Fisheries Habitat Partnership (RFHP). Lake Fork is included in an RFHP grant to fund construction of 6'x6'x3' PVC fish attractors and the LFSA has committed to support the project with a cash donation and to supply volunteer labor. Delays in payment of the grant have stalled the project.

MANAGEMENT STRATEGIES

1. Work cooperatively with LFSA to develop a habitat action plan.
2. Assist with promotion of fish attractor project and construction and deployment of structures.
3. Support cooperative project between LFSA and Yantis High School in raising potted buttonbush plants. Assist with site selection and planting activities in Lake Fork.
4. Expand pilot project to establish waterwillow colonies at select sites in Lake Fork using material harvested from a neighboring District reservoir. Eventually increase the number of sites using plants harvested from the original colonies or from external sources.

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, White Bass, Common Carp and Smallmouth Buffalo. Fisheries regulations need to be prominently displayed and clearly communicated to anglers. District staff will continue efforts to educate resource users about identification of invasive aquatic species and the consequences of introductions of new species such as giant salvinia and zebra mussels

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 produce news releases promoting the fisheries resources of Lake Fork for distribution to local lake papers and other media outlets.
3. Cooperate with interested parties on hosting and promoting tournaments for Common Carp and

Smallmouth Buffalo.
4. Continue to address angler concerns regarding the establishment of a self-sustaining White Bass population.
5. Co-sponsor additional “State of the lake” meetings with local interested parties as needs arise.
6. Continue to provide information packets on Lake Fork facilities to interested anglers by mail and e-mail.
7. Continue efforts to educate the public on identification of invasive aquatic plants and consequences of their introductions into public water.

ISSUE 5: The recreational fisheries resources in Lake Fork have been responsible for the development of many fisheries-related businesses in Wood County and surrounding communities. An economic study in 1994-1995 found that anglers spent almost $27.5 million on trip-related expenditures; $15.8 million of which was spent in three local counties, and over $10.6 million was spent elsewhere in Texas as anglers traveled to the reservoir. Staff from Mississippi State University have been contracted by TPWD to undertake an updated social and economic analysis of the Lake Fork recreational fishery beginning in June 2014.

MANAGEMENT STRATEGIES
1. District staff will collect contact information from anglers during routine creel surveys and supplemental surveys to compile database for Lake Fork Economic Survey from June 2014 through May 2015.
2. Provide feedback on economic study design and planning and review scientific manuscripts resulting from research

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes annual electrofishing sampling in spring and fall to monitor the Largemouth Bass population (Table 12), spring gill netting surveys to monitor catfish species and temperate basses will be conducted every two years beginning in 2016, and an annual access creel survey to monitor the lake’s fisheries will resume in June 2014. Water hyacinth distribution and abundance will continue to be monitored through an annual vegetation survey. An access survey will be conducted every four years.

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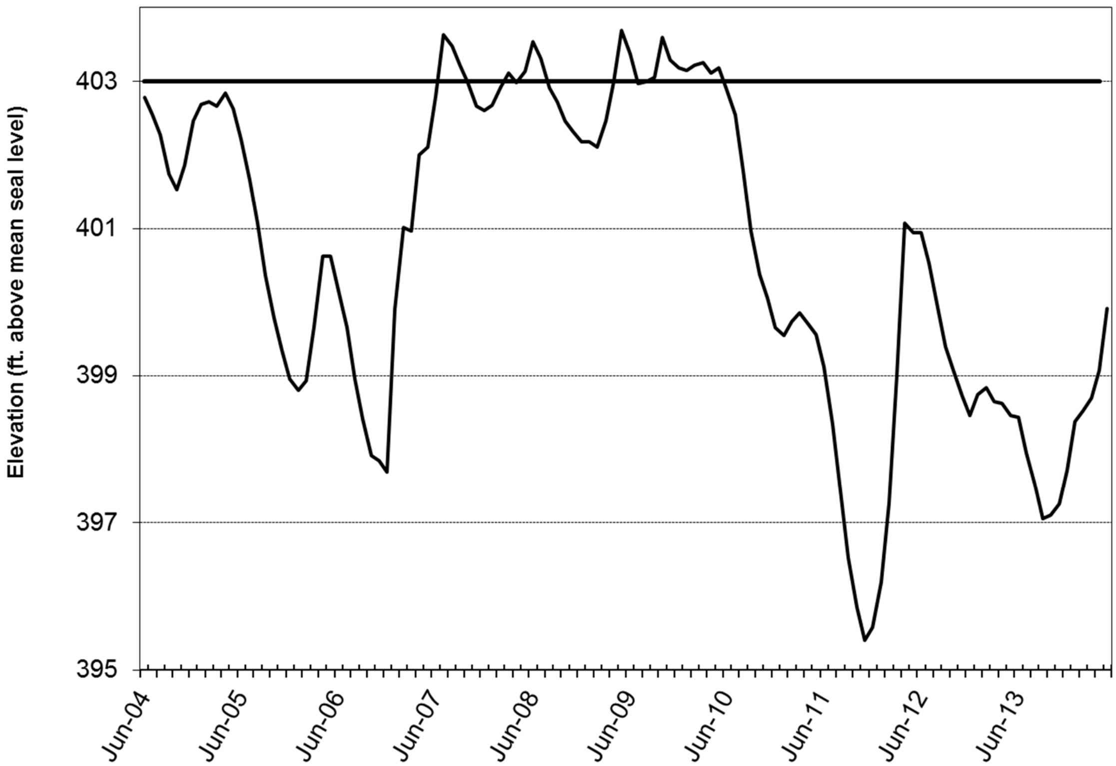


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Lake Fork, Texas, June 2004 through May 2014. Bold horizontal line indicates conservation pool elevation; 403 ft. msl.

Table 1. Characteristics of Lake Fork, 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)	12.18
Conductivity	135 µmho / cm
Secchi disc range	4 – 6 ft.
Watershed area	490 mi^2

Table 2. Characteristics of public boat ramp for Lake Fork, Texas, August, 2013. Reservoir elevation at time of survey was estimated at 5.4 feet below conservation pool elevation.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Rainswood	32.9037 -95.6587	Y	30	393.6	Excellent, no access issues
Highway 17	32.8787 -95.6329	Y	60	389.9	Excellent, no access issues
Highway 154	32.8527 -95.5289	Y	50	389.4	Excellent, no access issues
Highway 515 East	32.8951 -95.5356	Y	50	*	Excellent, although sand occasionally accumulates on ramp limiting access
Boardtree Creek	32.8976 -95.6739	Y	15	385.2	Excellent, no access issues

*Elevation not measured because of deep sediment on end of ramp

Table 3. Harvest regulations for Lake Fork, Texas.

Species	Bag limit	Length limit
Catfishes, Channel and Blue, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Largemouth	5 (1 fish 24 inches or longer)	16- to 24-inch slot
Crappies, White and Black, their hybrids and subspecies	25 (in any combination)	10-inch minimum [1]

[1]The minimum length limit is waived from December 1 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. Stocking history of Lake Fork, Texas. Size categories are: FRY =<1 inch; FGL = 1-3 inches; AFGL = 8 inches, and ADL = adults.

Year	Number	Size
	Blue Catfish	
1980	268,423	FGL
1984	29,676	FGL
1985	253,464	FGL
	551,563	
	Channel Catfish	
1977	37,787	FGL
1978	80,130	FGL
1980	137,545	FGL
1984	102,103	FGL
	357,565	
	Flathead Catfish	
1979	4,800	FGL & ADL
	4,800	
	Redear Sunfish	
1981	36,000	FGL
	36,000	
	Coppernose Bluegill	
1981	633,911	FGL
	633,911	
	Spotted Bass	
1979	41	ADL
	41	

Year	Number	Size
	Florida Largemouth Bass	
1978	103	ADL
1979	740,815	FGL
1979	561	ADL
1980	330,800	FRY
1980	300	ADL
1982	49	ADL
1987	250	AFGL
1995	692,281	FGL
1996	697,731	FGL
1997	698,037	FGL
1998	694,211	FGL
1999	710,761	FGL
2000	510,737	FGL
2001	218,240	FGL
2002	692,258	FGL
2003	732,049	FGL
2004	515,101	FGL
2005	705,986	FGL
2006	506,113	FGL
2007	501,174	FGL
2008	504,117	FGL
2009	685,702	FGL
2010	515,444	FGL
2011	724,921	FGL
2012	693,736	FGL
2013	523,512	FGL
2014	502,318	FGL
	13,097,307	

Table 5. Survey of aquatic vegetation, Lake Fork, Texas, 2004 and 2013. Surface area (acres) is listed with percent of total reservoir surface area in parentheses. Reservoir was estimated to be 5.4 ft below CPE at time of survey in August 2013. Individual native species observed during surveys are listed in footnotes.

Vegetation	2004	2008	2009	2010	2012	2013
Native emergent	145.4 (0.5)[1]					130.0 (0.5)[3]
Native submersed	1,278.1 (4.7)[2]					1,069.4 (3.9)[4]
Sub-total Native sp.	1,423.5 (5.2)					1,119.4 (4.4)
Non-native						
*Alligatorweed (Tier III)**						3.0 (<0.1)
*Eurasian watermilfoil (Tier III)**	58.0 (0.2)					
*Hydrilla (Tier III)**	2,156.2 (7.9)					1,372.0 (5.0)
*Water hyacinth (Tier II)**	48.6 (0.2)	39.0 (0.1)	400.0 (1.5)	5.0 (<0.1)	35 (0.1)	4.0 (<0.1)
Total	3,686.4 (13.5)					2,578.4 (9.5)

*Tier I is immediate Response, Tier III is Watch Status

[1] *American lotus, cattail, maidencane, spikerush*
[2] *Muskgrass, stonewort*
[3] *American lotus, cattail, waterprimrose*
[4] *American pondweed, coontail, muskgrass, stonewort*

Table 6. Percent directed angler effort by species for Lake Fork, Texas, from June 2006 through May 2007, to June 2012 through May 2013.

Species	Year						
	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Catfishes	5.90	3.91	3.03	4.95	3.95	5.19	4.28
White Bass	-	-	-	-	-	0.38	0.05
Yellow Bass	0.09	-	-	-	-	-	-
Sunfish	1.08	-	-	-	1.19	-	0.05
Largemouth Bass	80.32	84.37	87.15	73.53	81.22	73.17	82.51
Crappies	12.61	11.15	8.75	20.85	11.07	17.66	11.94
Anything	-	0.56	1.06	0.67	2.58	3.60	1.17

Table 7. Total fishing effort (h) for all species and total directed expenditures (and associated RSEs in parentheses) at Lake Fork, Texas, from June 2006 through May 2007, to June 2012 through May 2013.

Species	Year						
	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Total fishing effort	807,892 (12)	874,230 (14)	1,128,269 (16)	709,457 (17)	588,692 (17)	602,127 (15)	601,912 (20)
Total directed expenditures	$7,858,137 (17)	$10,909,542 (22)	$15,338,593 (24)	$7,569,111 (28)	$7,139,132 (28)	$7,250,375 (27)	$10,206,736 (27)

Gizzard Shad

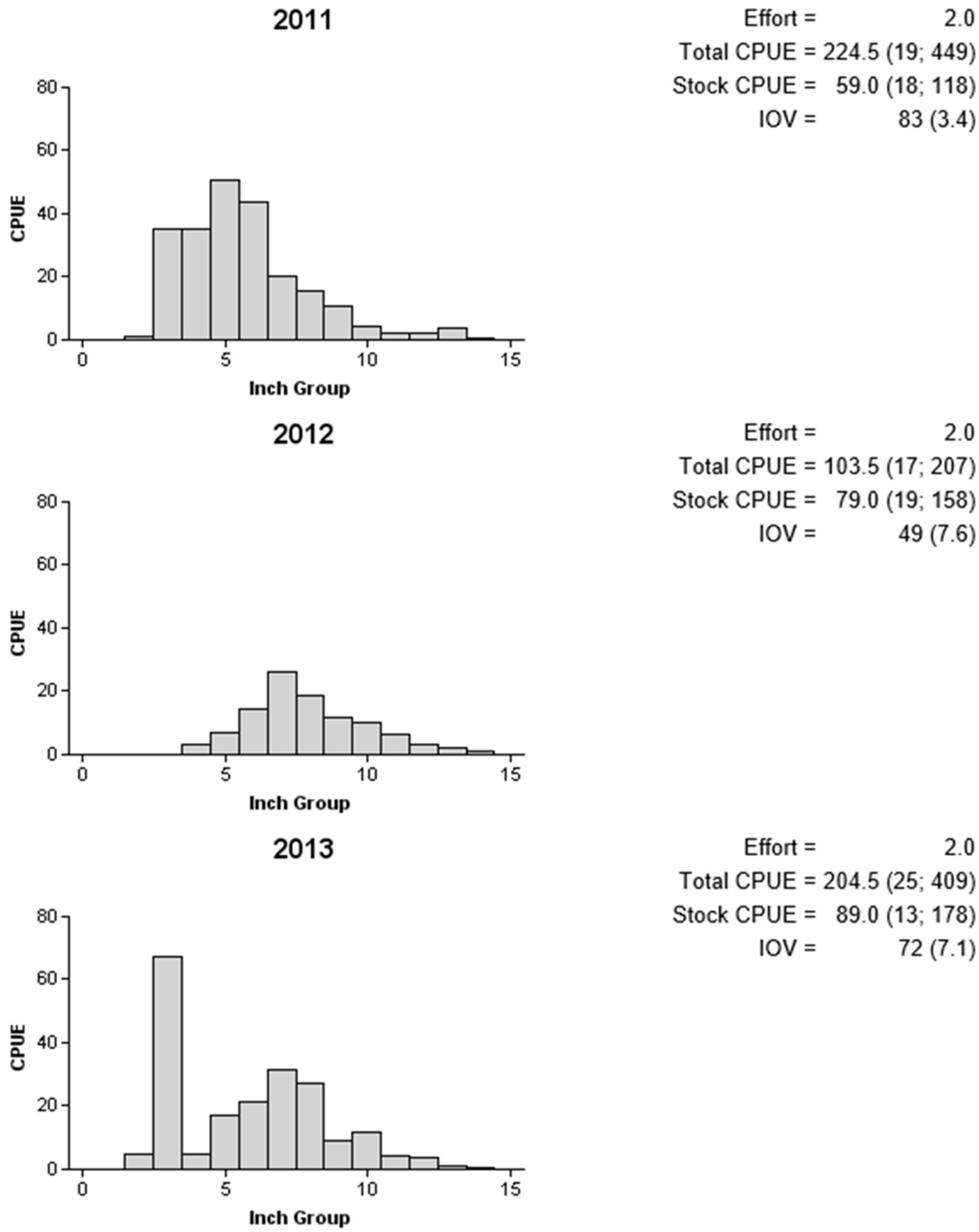
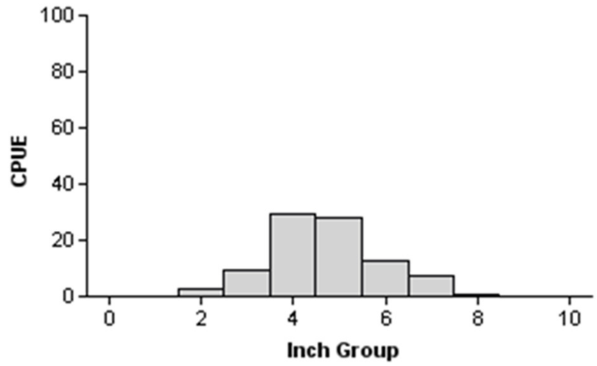


Figure 2. Number of Gizzard Shad caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for structural index and IOV are in parentheses) for fall electrofishing surveys, Lake Fork, Texas, 2011 through 2013.

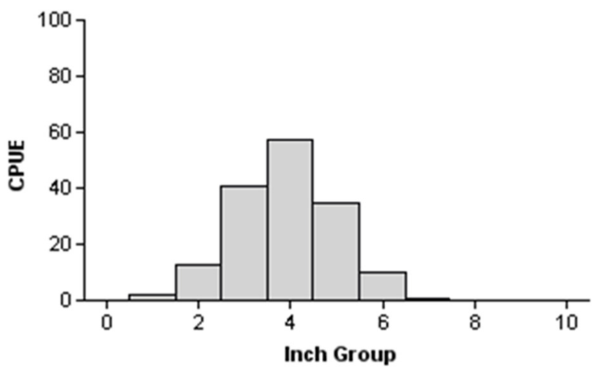
Bluegill

2011



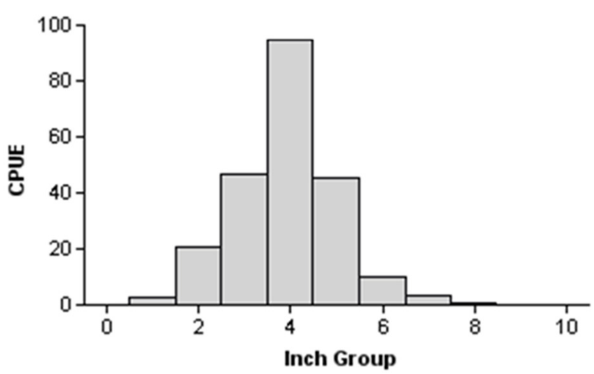
Effort = 2.0
Total CPUE = 90.0 (20; 180)
Stock CPUE = 87.5 (20; 175)
PSD = 23 (5.9)

2012



Effort = 2.0
Total CPUE = 159.0 (19; 318)
Stock CPUE = 144.0 (19; 288)
PSD = 8 (1.3)

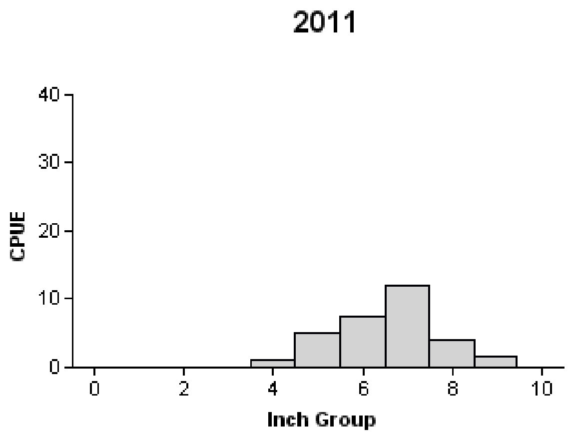
2013



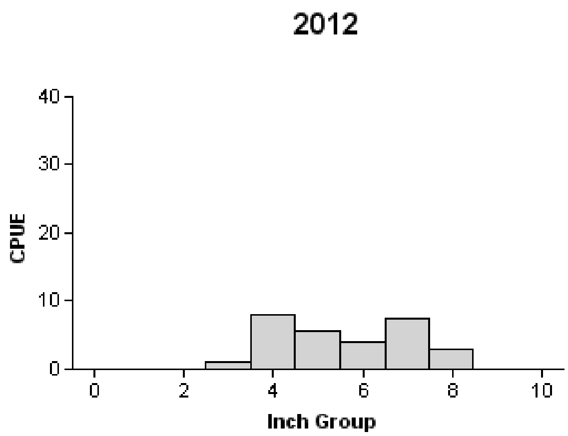
Effort = 2.0
Total CPUE = 225.0 (15; 450)
Stock CPUE = 202.0 (14; 404)
PSD = 7 (2.2)

Figure 3. Number of Bluegill caught per hour (CPUE, bars), and population indices (RSE and N for CPUE and SE for structural indices are in parentheses) for fall electrofishing surveys, Lake Fork, Texas, 2011 through 2013.

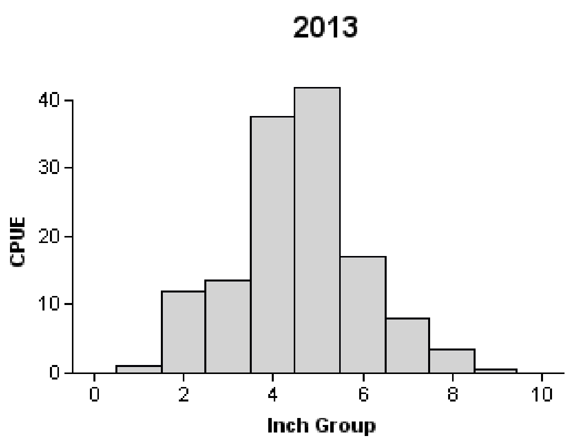
Redear Sunfish



Effort = 2.0
Total CPUE = 31.0 (24; 62)
Stock CPUE = 31.0 (24; 62)
PSD = 56 (8.2)



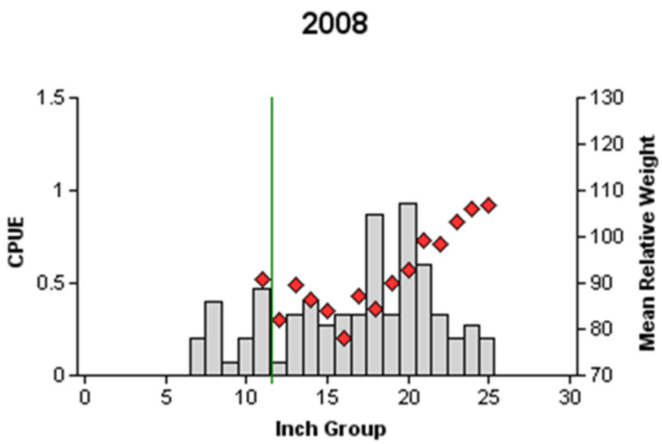
Effort = 2.0
Total CPUE = 29.0 (24; 58)
Stock CPUE = 28.0 (24; 56)
PSD = 38 (8)



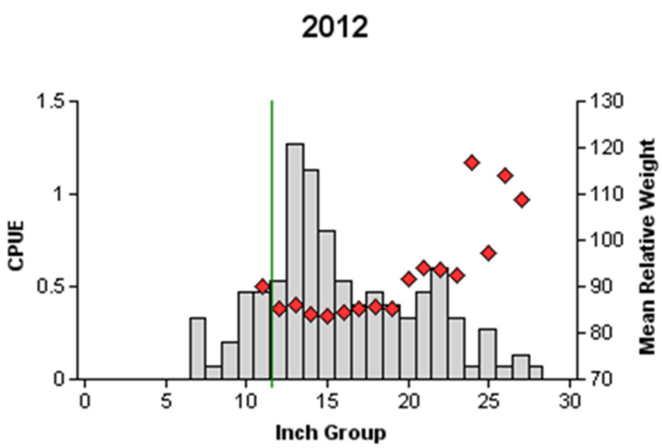
Effort = 2.0
Total CPUE = 135.0 (16; 270)
Stock CPUE = 108.5 (13; 217)
PSD = 11 (1.8)

Figure 4. Number of Redear Sunfish caught per hour (CPUE, bars), and population indices (RSE and N for CPUE and SE for structural indices are in parentheses) for fall electrofishing surveys, Lake Fork, Texas, 2011 through 2013.

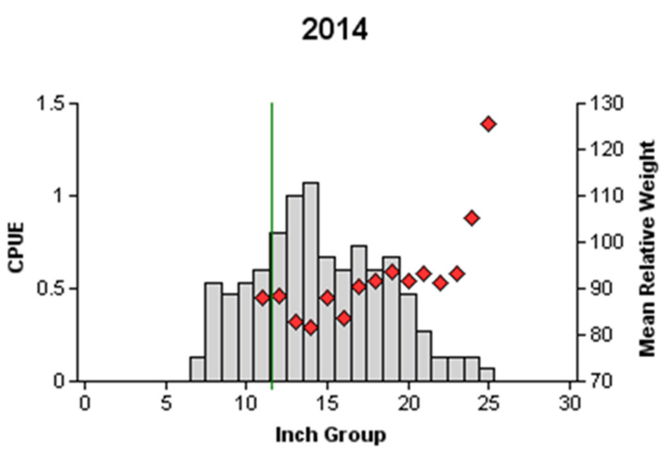
Channel Catfish



Effort = 15.0
Total CPUE = 6.8 (24; 102)
Stock CPUE = 5.9 (26; 89)
PSD = 74 (5.5)
PSD-12 = 92 (2.5)



Effort = 15.0
Total CPUE = 9.4 (11; 141)
Stock CPUE = 8.3 (11; 125)
PSD = 50 (7.8)
PSD-12 = 94 (2.3)



Effort = 15.0
Total CPUE = 9.6 (15; 144)
Stock CPUE = 7.9 (17; 119)
PSD = 48 (4.1)
PSD-12 = 92 (4.1)

Figure 5. Number of Channel Catfish caught per net night (CPUE), mean relative weights (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Fork, Texas, 2008, 2012 and 2014. Vertical lines indicate minimum length limit at time of survey.

Table 8. Creel survey statistics for Catfish (Channel, Blue, and Flathead catfish combined) at Lake Fork from June 2006 through May 2007, to June 2012 through May 2013. Total catch per hour is for anglers targeting Catfish and total harvest is the estimated number of Catfish harvested by all anglers. [RSE for directed effort and total harvest is the same as directed effort/acre and total harvest/acre, respectively]

Creel Survey Statistic	Year						
	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Directed effort (h)	47,663 (18)	34,213 (26)	34,221 (32)	35,112 (31)	23,225 (35)	31,262 (30)	25,733 (32)
Directed effort/acre	1.75 (18)	1.25 (26)	1.26 (32)	1.29 (31)	0.85 (35)	1.15 (30)	0.94 (32)
Total catch per hour	1.34 (24)	1.02 (24)	1.86 (36)	1.73 (55)	1.91 (70)	1.98 (46)	1.91 (44)
Total harvest	59,404 (27)	72,585 (39)	243,991 (67)	68,724 (84)	52,678 (48)	62,873 (50)	57,565 (50)
Harvest/acre	2.18 (27)	2.66 (23)	8.95 (67)	2.52 (84)	1.93 (48)	2.31 (50)	2.11 (47)
Percent legal released	9	20	7	25	6	3	17

Channel Catfish

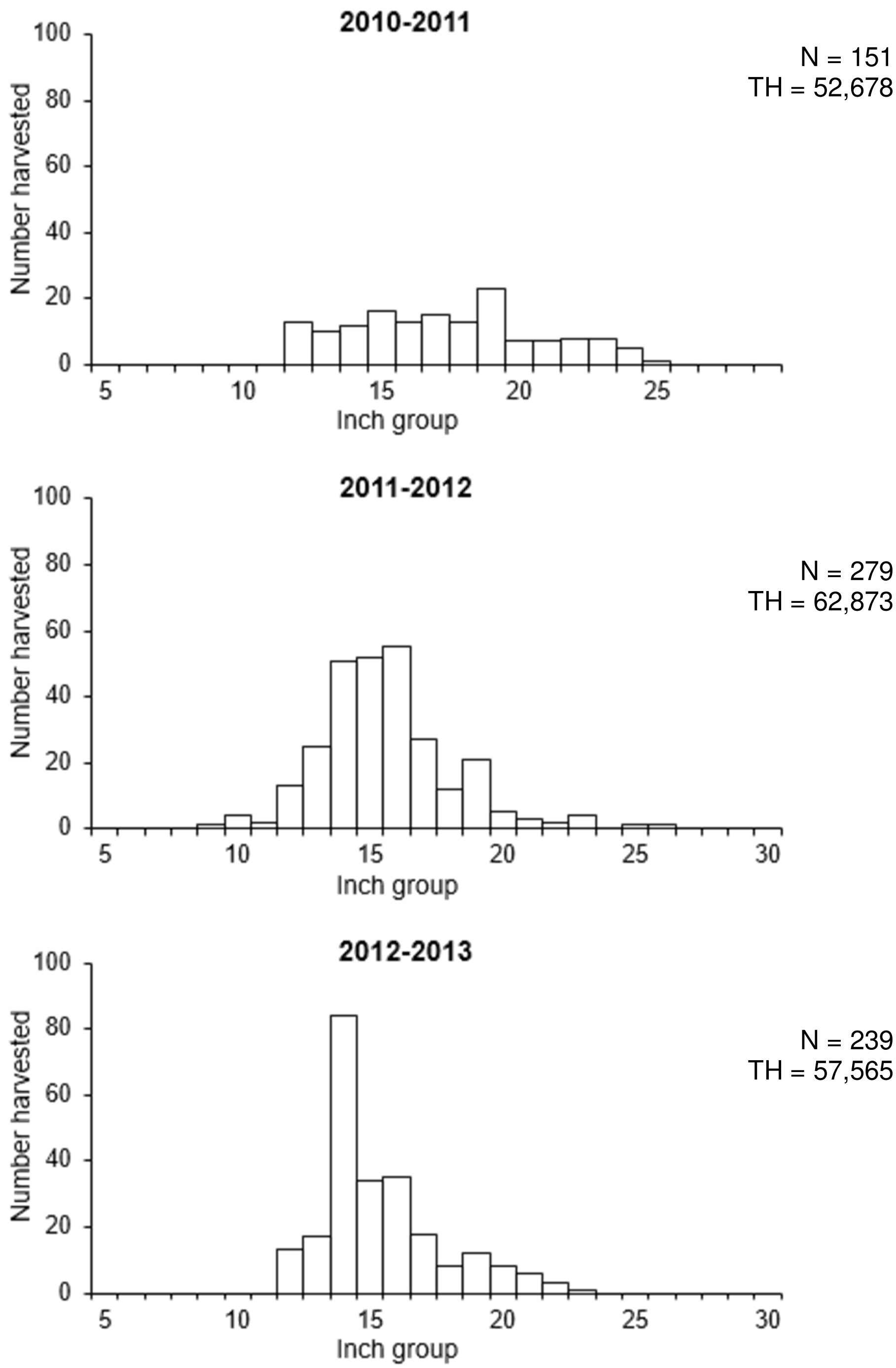
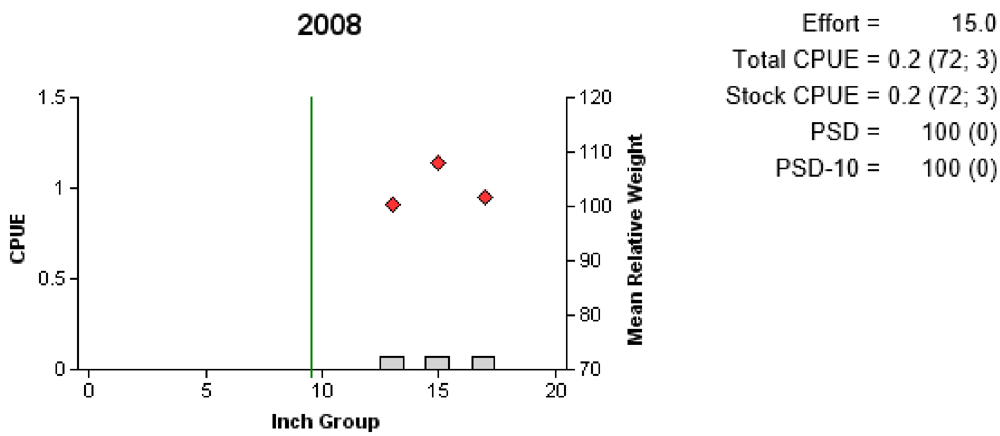
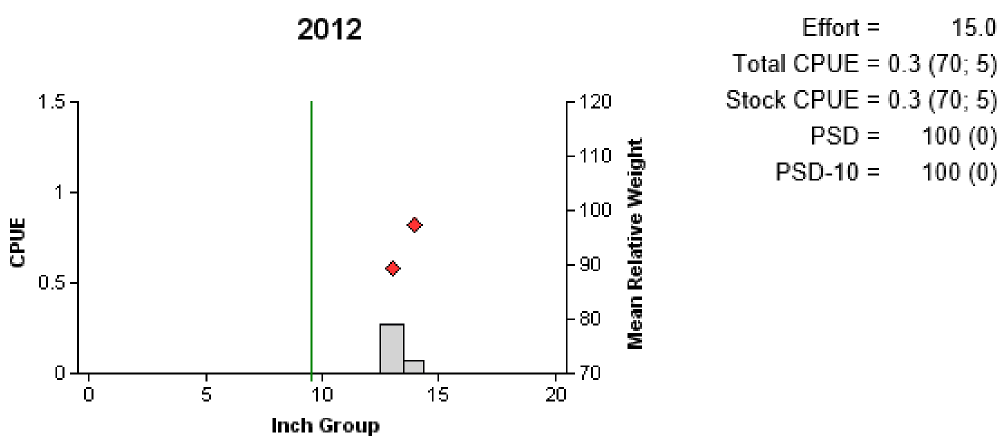


Figure 6. Length frequency of harvested Channel Catfish observed during creel surveys at Lake Fork, Texas, June 2010 through May 2011 to June 2012 through May 2013, all anglers combined. N is the number of harvested Channel Catfish (no Blue or Flathead Catfish were observed) observed during creel surveys, and TH is the total estimated harvest for the creel period.

White Bass





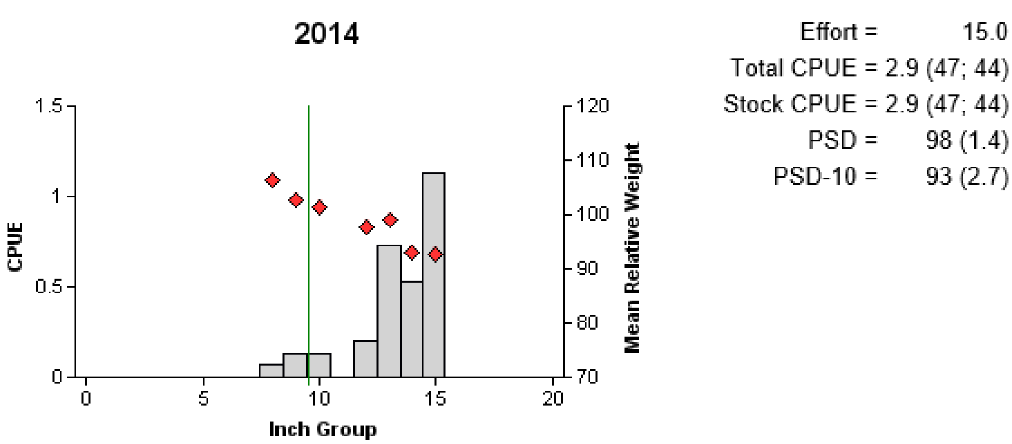


Figure 7. Number of White Bass caught per net night (CPUE), mean relative weights (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Fork, Texas, 2008, 2012 and 2014. Vertical lines indicate minimum length limit at time of survey.

White Bass

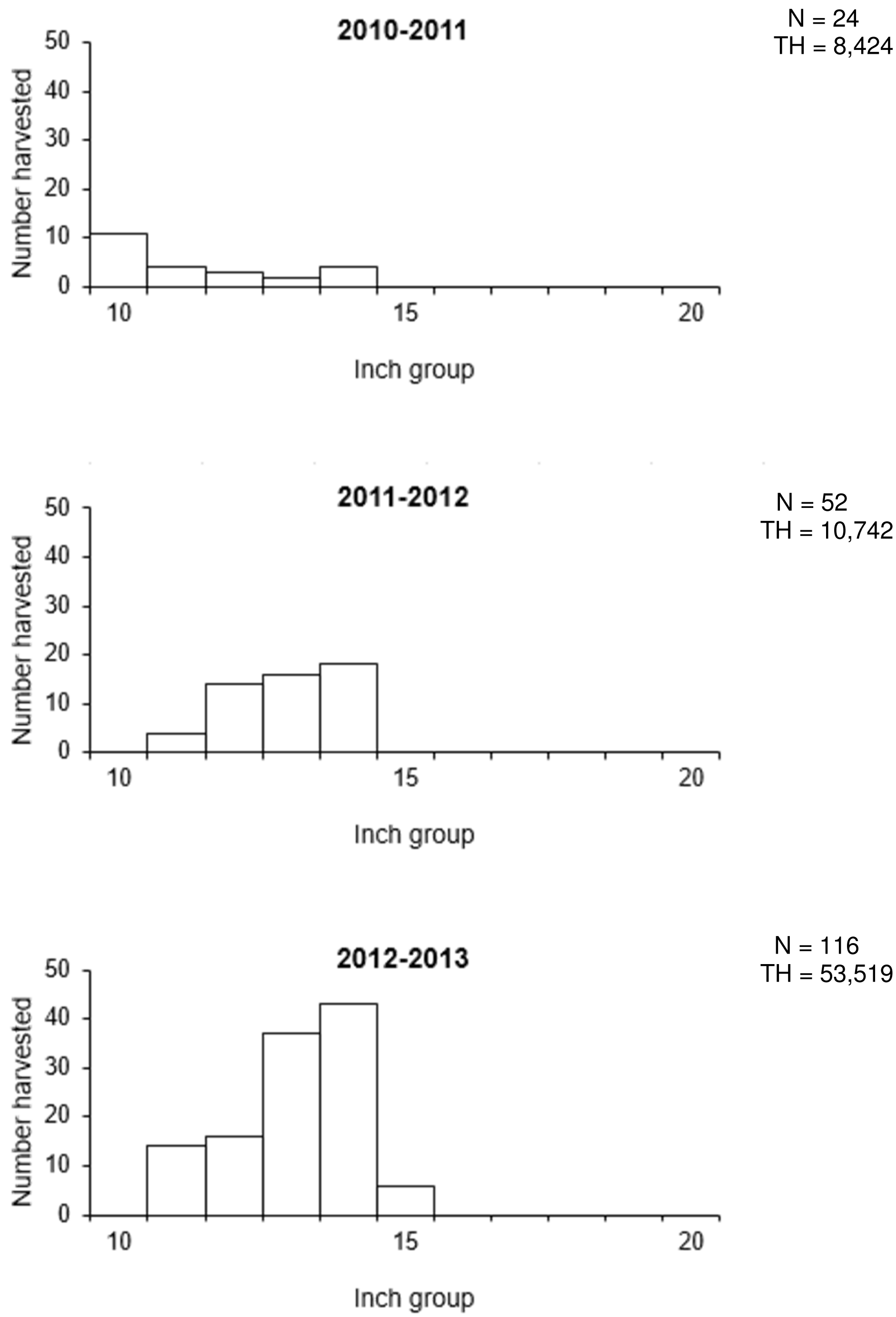


Figure 8. Length frequency of harvested White Bass observed during creel surveys at Lake Fork, Texas, June 2010 through May 2011 to June 2012 through May 2013, all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

White Bass

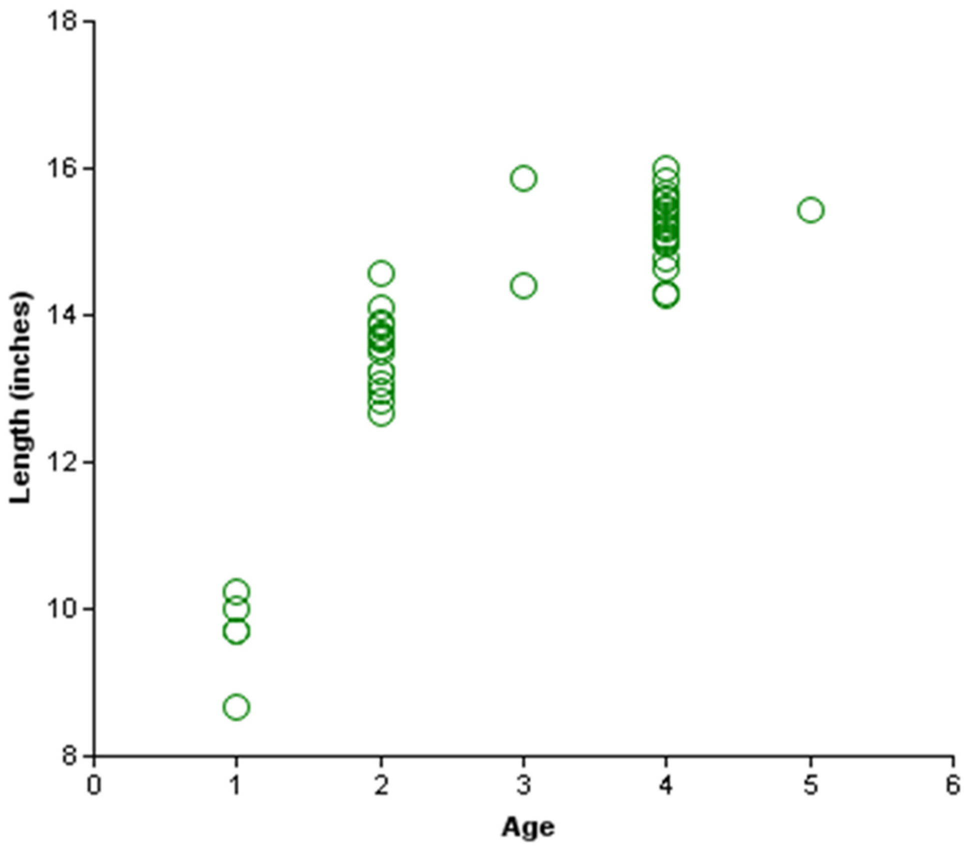
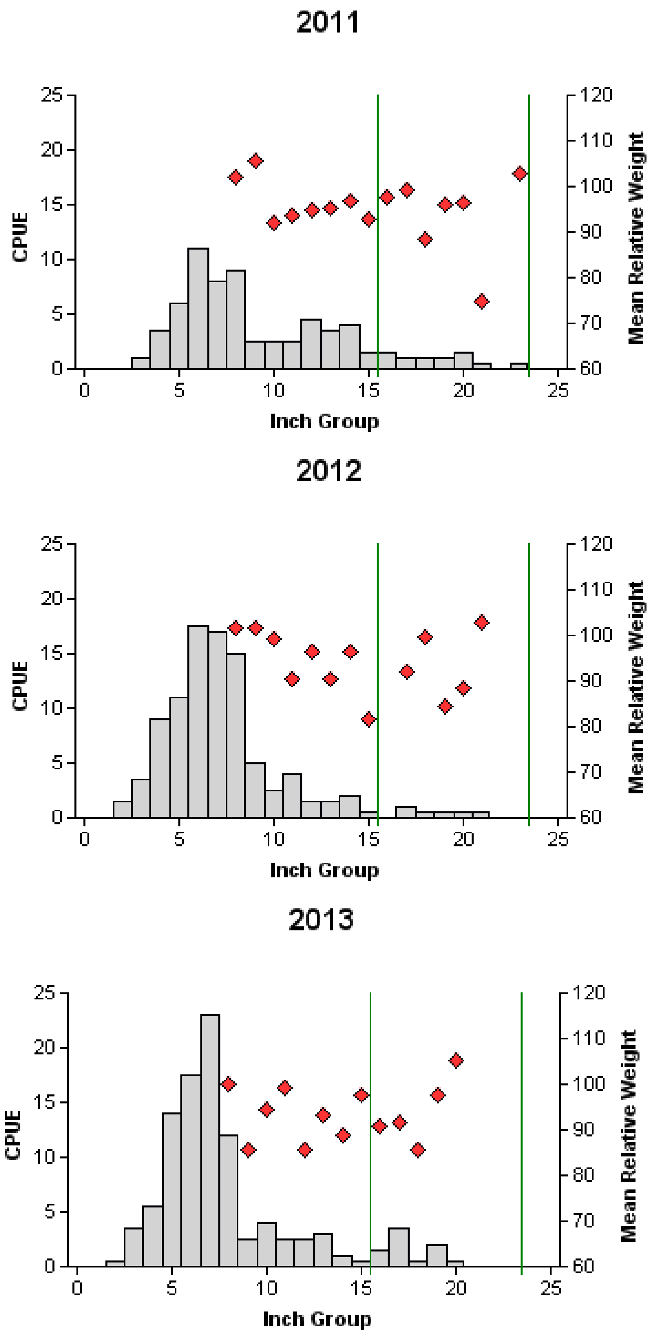


Figure 9. Length-at-age for White Bass (sexes combined; N=44) collected from gill nets at Lake Fork, Texas, March 2014.

Largemouth Bass - fall



2011

Effort = 2.0
Total CPUE = 66.5 (16; 133)
Stock CPUE = 37.0 (16; 74)
PSD = 55 (6)
PSD-16 = 19 (6.2)

2012

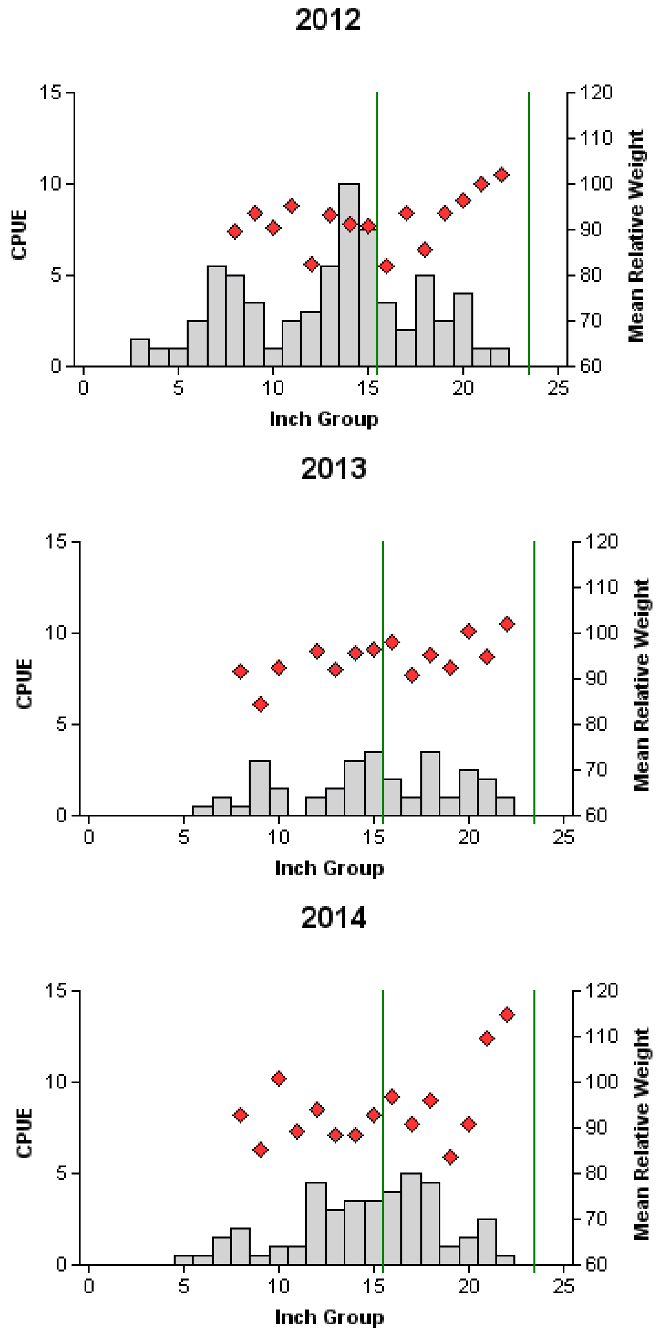
Effort = 2.0
Total CPUE = 94.5 (18; 189)
Stock CPUE = 35.0 (20; 70)
PSD = 24 (4.7)
PSD-16 = 9 (2.7)

2013

Effort = 2.0
Total CPUE = 100.0 (20; 200)
Stock CPUE = 36.0 (22; 72)
PSD = 42 (6)
PSD-16 = 22 (4.1)

Figure 10. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for structural indices are in parentheses) for fall electrofishing surveys, Lake Fork, Texas, 2011 through 2013. Vertical lines indicate the lower and upper bounds of the protected slot length limit at time of survey.

Largemouth Bass - spring



2012

Effort = 2.0
Total CPUE = 68.5 (14; 137)
Stock CPUE = 57.0 (14; 114)
PSD = 79 (4.8)
PSD-16 = 33 (4.4)

2013

Effort = 2.0
Total CPUE = 28.5 (23; 57)
Stock CPUE = 27.0 (24; 54)
PSD = 81 (7)
PSD-16 = 48 (6.8)

2014

Effort = 2.0
Total CPUE = 40.5 (16; 81)
Stock CPUE = 38.0 (16; 76)
PSD = 88 (5.4)
PSD-16 = 50 (8.3)

Figure 11. 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, Texas, 2012 through 2014. Vertical lines indicate the lower and upper bounds of the protected slot length limit at time of survey.

Table 9. Creel survey statistics for Largemouth Bass at Lake Fork from June 2006 through May 2007, to June 2012 through May 2013, 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. *Harvest includes traditional harvest and fish temporarily retained during live-release fishing tournaments

Creel Survey Statistic	Year						
	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Directed angling effort (h)							
Live-release tournament effort	160,434 (14)	181,813 (17)	329,684 (22)	95,388 (35)	164,084 (24)	68,508 (22)	253,346 (26)
Non tournament	528,154 (14)	604,657 (16)	653,641 (16)	426,262 (16)	314,027 (17)	372,043 (16)	243,284 (20)
All bass anglers combined	688,588 (13)	786,470 (15)	983,325 (15)	521,650 (18)	478,111 (17)	440,551 (15)	496,630 (21)
Angling effort/acre	23.80 (13)	27.05 (15)	30.07 (17)	19.13 (18)	17.54 (17)	16.16 (15)	18.22 (21)
Catch rate (number/h)	0.40 (8)	0.41 (8)	0.41 (8)	0.64 (13)	0.91 (15)	0.59 (12)	0.42 (12)
Harvest							
Non-tournament harvest	4,300 (46)	2,253 53)	12,685 (61)	1,760 (89)	2,291 (28)	4,570 (60)	789 (105)
Harvest*/acre	0.94 (29)	0.75 (31)	3.64 (29)	1.38 (49)	2.89 (37)	0.94 (52)	1.21 (47)
Tournament weigh-in and release	22,925 (37)	19,933 (36)	87,927 (50)	35,818 (53)	76,496 (39)	21,186 (64)	32,064 (45)
Release by weight							
<4.0 lbs						201,487(35)	194,171 (44)
4.0-6.9 lbs						56,343 (42)	62,275 (48)
7.0-9.9 lbs						4,660 (89)	5,778 (74)
≥10.0 lbs						210 (234)	1,090 (135)
Percent legal released (non-tournament)	97	99	93	98	98	96	98

Largemouth Bass

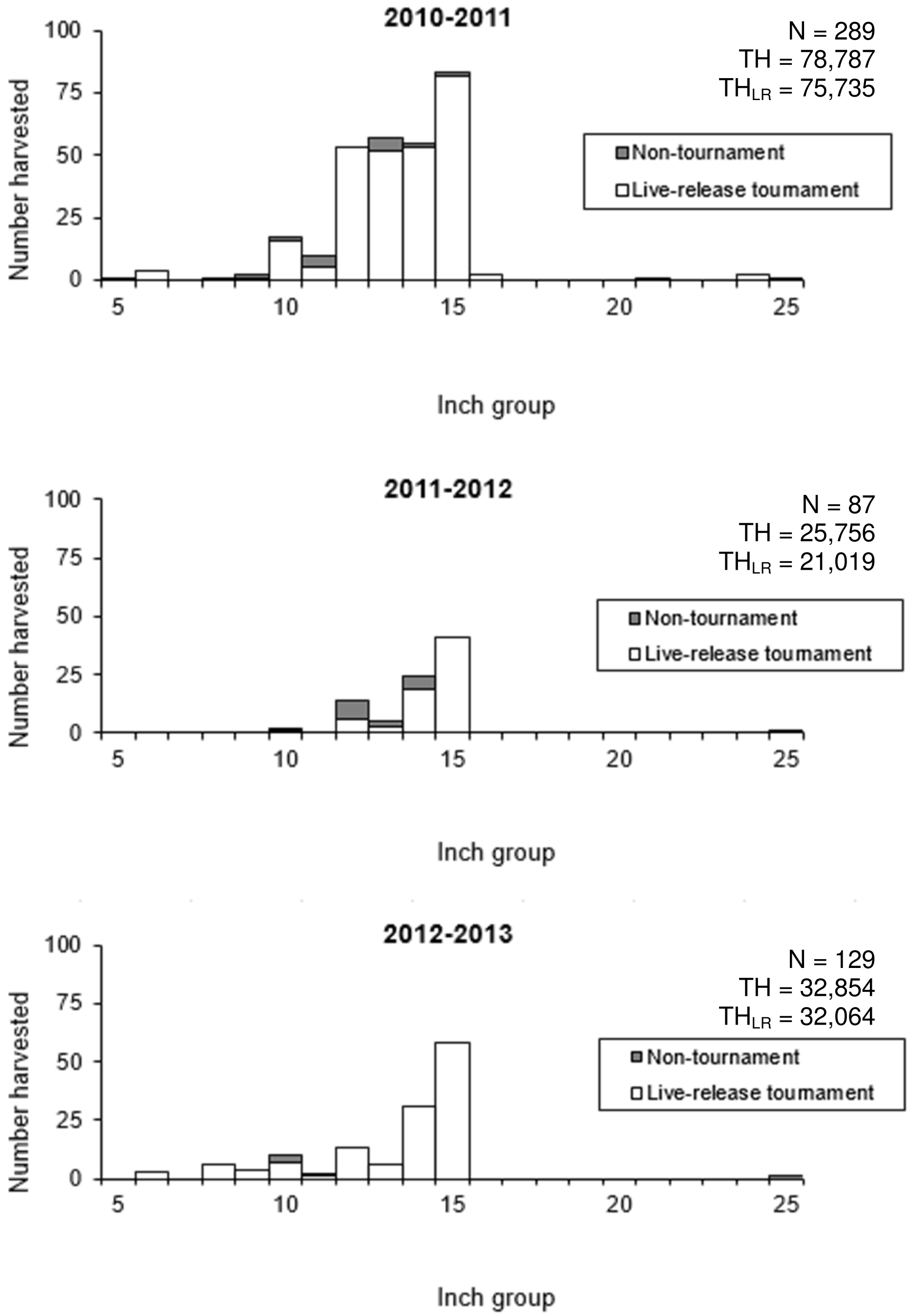


Figure 12. Length frequency of harvested Largemouth Bass observed during creel surveys at Lake Fork, Texas, June 2010 through May 2011 to June 2012 through May 2013, separated by angler type. N is the number of harvested Largemouth Bass observed during creel surveys which includes fish transported to 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.

Largemouth Bass

Table 10. Results of micro-satellite DNA genetic analysis of Largemouth Bass collected by fall electrofishing, Lake Fork, Texas, 2006 through 2009, 2011 and 2013. 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. Samples collected prior to 2011 were composed exclusively of Age-0 fish.

		Genotype						
Year	Sample size	FLMB	F1	Fx	Combined intergrades	NLMB	% FLMB alleles	% pure FLMB
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
2009	30	0	0	30	30	0	48.0	0.0
2011	30	0	0	30	30	0	53.0	0.0
2013	30	2	2	26	28	0	57.0	6.7

[a]Analysis did not separate F1 from Fx hybrids

Table 11. Creel survey statistics for crappies (White and Black combined) at Lake Fork from June 2006 through May 2007, to June 2012 through May 2013. Total catch per hour is for anglers targeting crappies and total harvest is the estimated number of crappies harvested by all anglers. Relative standard errors (RSE) are in parentheses. [RSE for directed effort and total harvest is the same as directed effort/acre and total harvest/acre, respectively]

Creel Survey Statistic	Year						
	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Directed effort (h)	101,904 (13)	97,518 (16)	98,751 (20)	147,925 (19)	65,152 (22)	106,330 (20)	71,876 (22)
Directed effort/acre	3.74 (13)	3.58 (16)	3.62 (20)	5.43 (19)	2.39 (22)	3.90 (20)	2.64 (22)
Total catch per hour	1.69 (24)	1.86 (27)	1.93 (30)	1.49 (26)	1.71 (46)	2.36 (34)	0.91 (32)
Total harvest	172,981 (40)	130,368 (32)	242,961 (48)	126,472 (44)	89,851 (53)	104,809 (49)	100,882 (56)
Harvest/acre	6.34 (40)	4.78 (32)	8.91 (48)	4.64 (44)	3.30 (53)	3.84 (49)	3.70 (56)
Percent legal released	4	9	4	5	2	5	3

Crappies

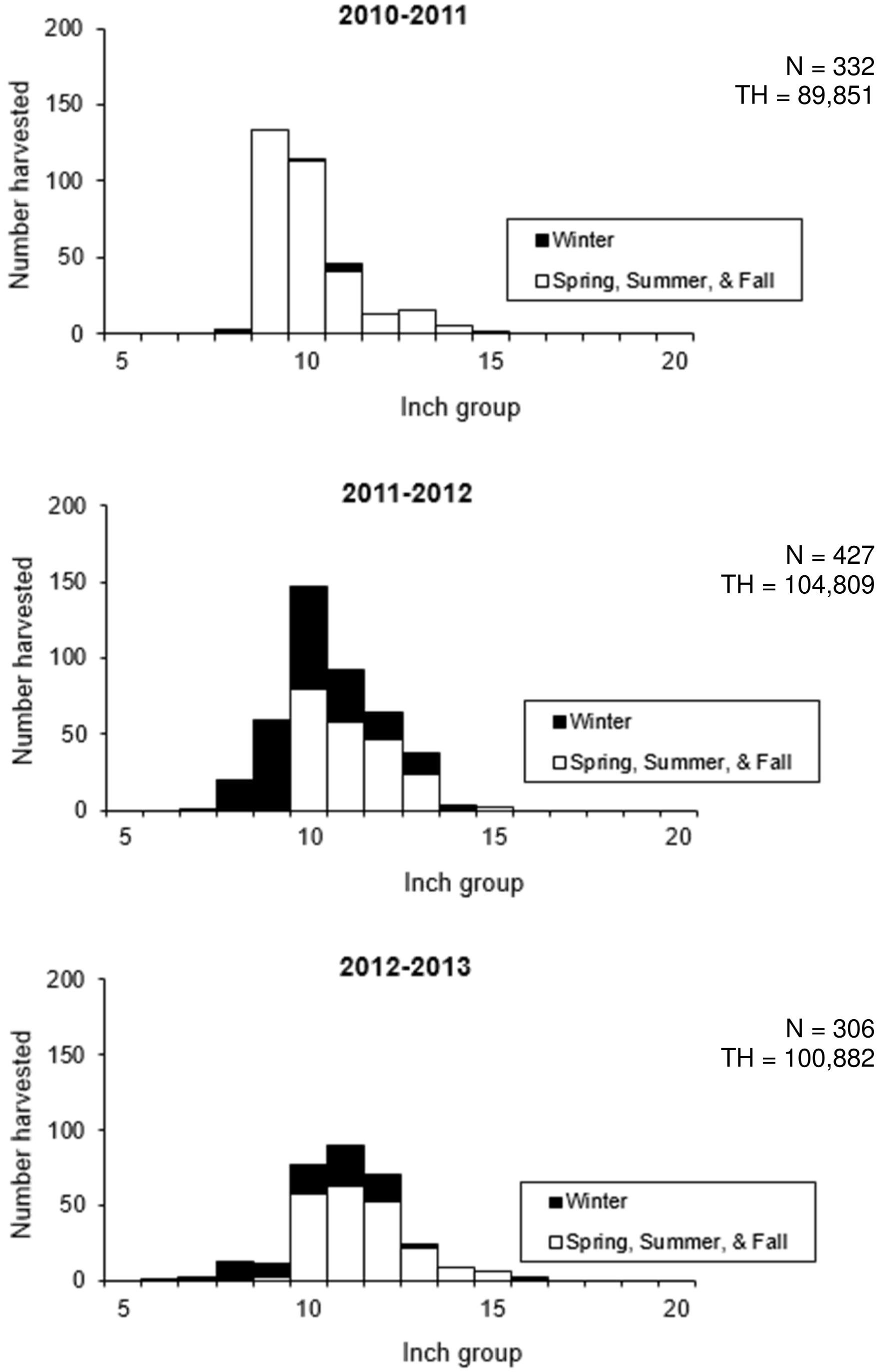


Figure 13. Length frequency of harvested Crappie (White and Black combined) observed during creel surveys at Lake Fork, Texas, June 2010 through May 2011 to June 2012 through May 2013, all anglers combined separated by creel quarter. N is the number of harvested Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 12. Proposed sampling schedule for Lake Fork, 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.

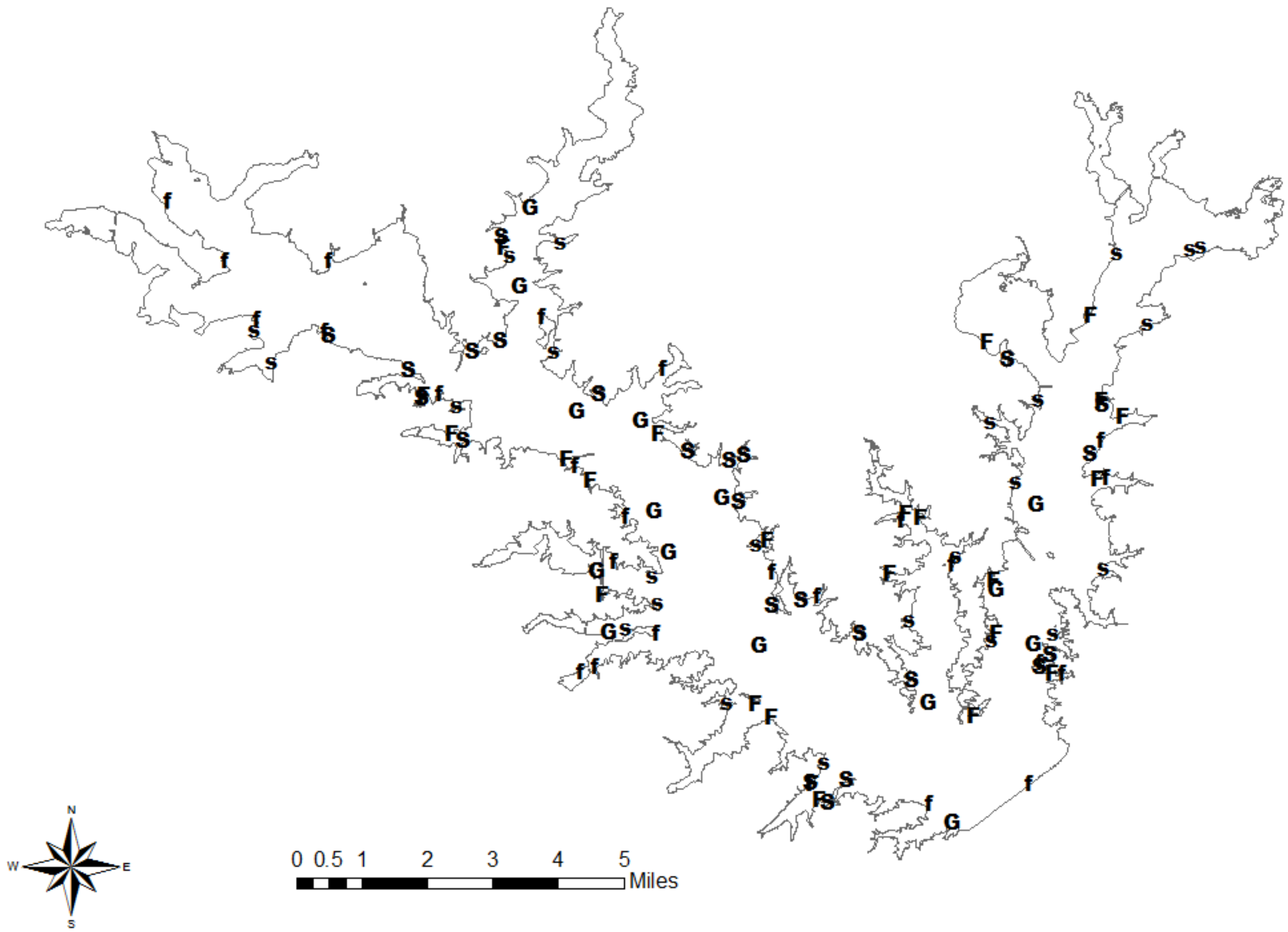
Survey Year	Electrofishing Spring/ Fall	Access survey	Gill netting	Creel survey	Vegetation survey	Report
Summer 2014-Spring 2015	A/A			A	A	
Summer 2015-Spring 2016	A/A		A	A	A	A
Summer 2016-Spring 2017	A/A			A	A	
Summer 2017-Spring 2018	A/S	S	S	A	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from gill netting and electrofishing, Lake Fork, Texas, 2013-2014. Sampling effort was 10 net nights for gill netting, and 2 hour for electrofishing for each sample.

Species	Gill Netting		Electrofishing – Fall		Electrofishing - Spring	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad			409	204.50		
Threadfin Shad			195	97.50		
Common Carp	4	0.27				
Smallmouth Buffalo	1	0.07				
Channel Catfish	144	9.60				
White Bass	44	2.93				
Warmouth			6	3.00		
Bluegill			450	225.00		
Longear Sunfish			88	44.00		
Redear Sunfish			270	135.00		
Largemouth Bass			200	100.00	81	40.50

APPENDIX B



Location of sampling sites in fall electrofishing 2012 (f) and 2013 (F), spring electrofishing 2013 (s) and 2014 (S), and spring gill netting 2014 (G), Lake Fork, Texas, 2012-2014.

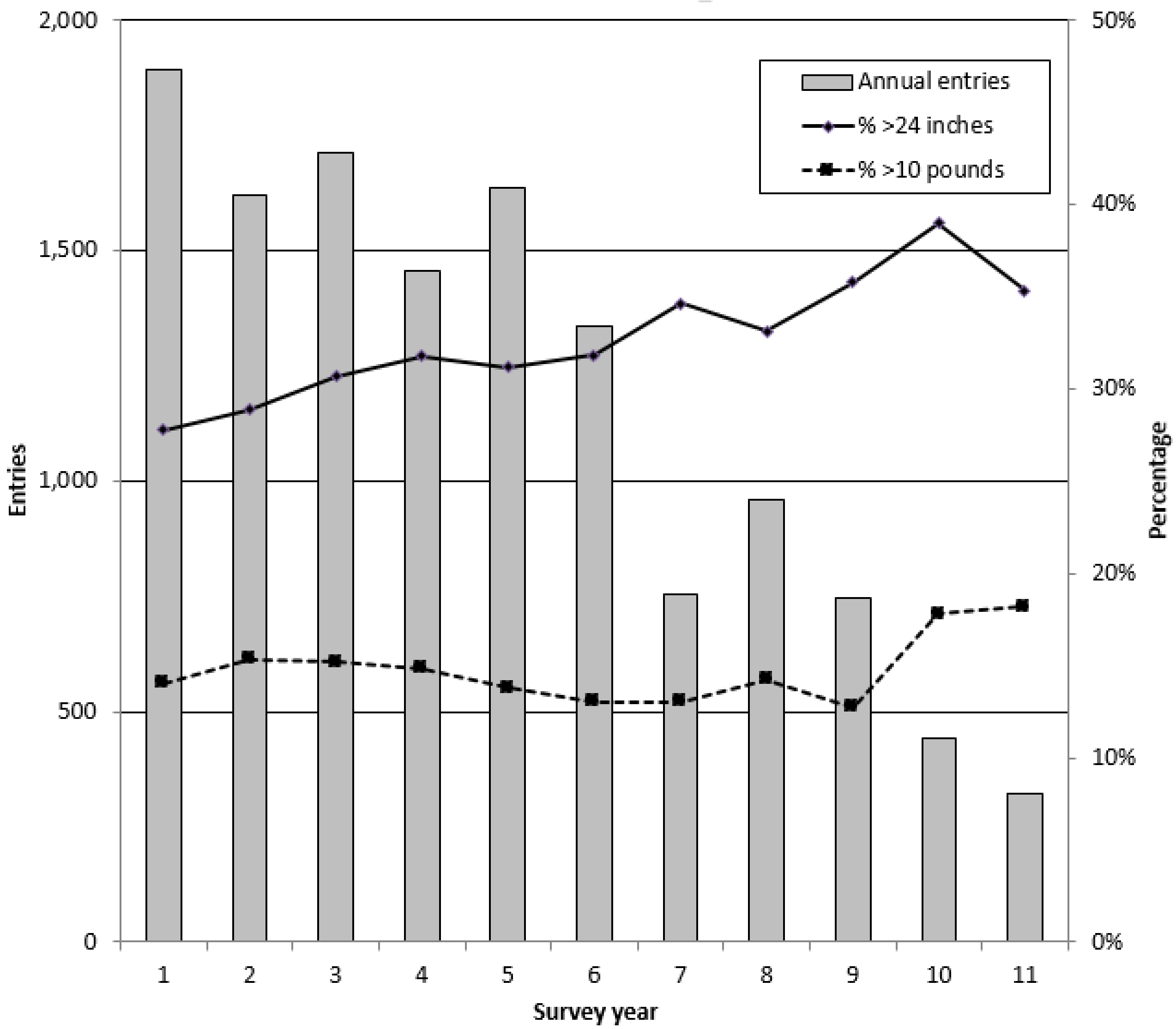
Appendix C

Water body records, All-Ages records, All-Tackle category, for Lake Fork as of 5/30/2014

Species	Weight (lbs)	Length (inches)	Date certified	Gear
Bass, Hybrid Yellow	4.75	19.00	3/12/2005	Rod & reel
Bass, Largemouth[a]	18.18	25.50	1/24/1992	Rod & reel
Bass, Palmetto	7.96	24.25	5/26/2009	Rod & reel
Bass, Spotted	3.32	17.25	12/1/2010	Rod & reel
Bass, White	3.97	18.25	2/8/2006	Rod & reel
Bass, Yellow	3.37	17.00	12/7/2012	Rod & reel
Bluegill	1.61	11.50	7/9/1995	Rod & reel
Bowfin	17.65	36.50	2/21/1993	Rod & reel
Buffalo, Bigmouth	36.00	33.50	10/19/1997	Rod & reel
Buffalo, Smallmouth	68.38	47.00	8/3/2012	Bow & arrow
Bullhead, Black	2.48	16.25	2/1/1995	Cane Pole
Bullhead, Yellow	3.20	16.25	3/22/1997	Rod & reel
Carp, Common	40.40	41.00	3/5/2013	Rod & reel
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	3.92	18.50	4/27/2003	Rod & reel
Crappie, White	3.19	17.00	2/5/1993	Rod & reel
Drum, Freshwater	22.50	33.00	4/23/2010	Rod & reel
Gar, Longnose	24.38	50.00	5/4/2009	Bow & arrow
Gar, Spotted	12.50	41.50	3/20/2014	Bow & arrow
Goldfish	4.48	18.88	3/30/2014	Bow & arrow
Shad, Gizzard	1.44	16.25	6/16/2009	Bow & arrow
Sunfish, Hybrid	0.23	6.65	9/14/1999	Fly rod
Sunfish, Longear	0.48	7.50	6/1/1998	Rod & reel
Sunfish, Orangespotted	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

[a] State record

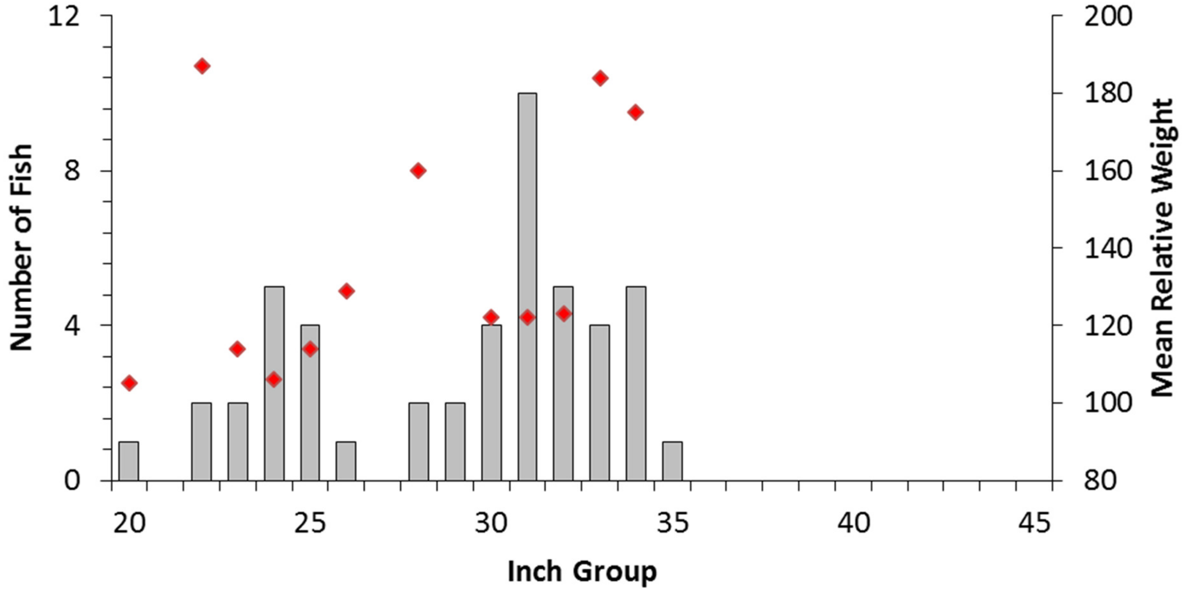
Appendix D



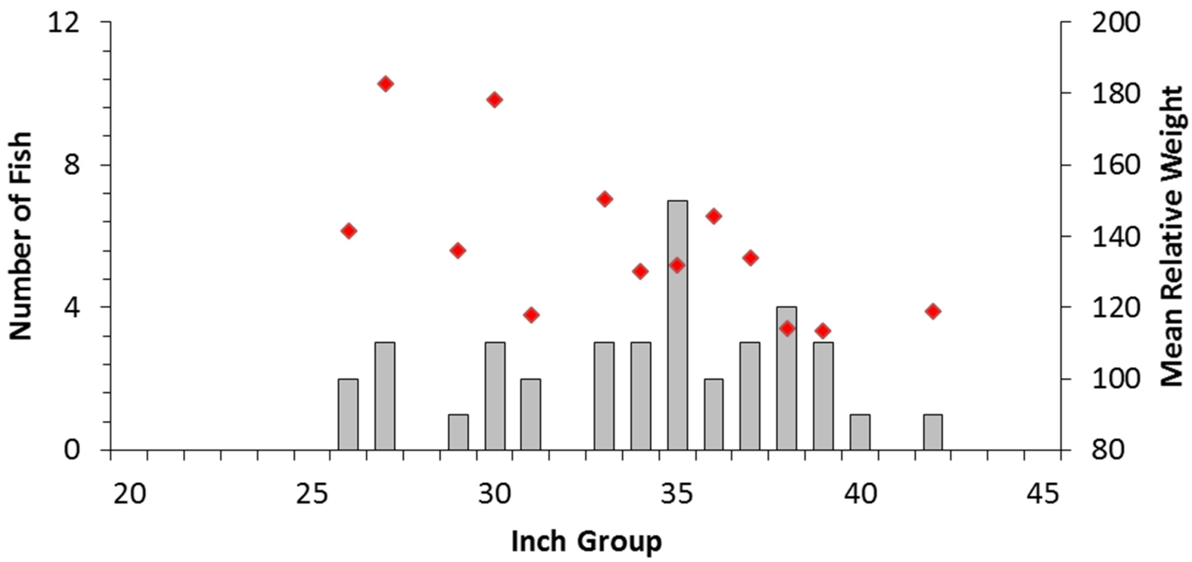
Total numbers of largemouth bass entries by survey year (March-February) reported (solid bars) in the Lake Fork Trophy Bass Survey, March 2003 – May 2013, the percentage of entries ≥24 inches (solid line) and the percentage of entries ≥ 10 pounds (dashed line).

Appendix E

Common Carp

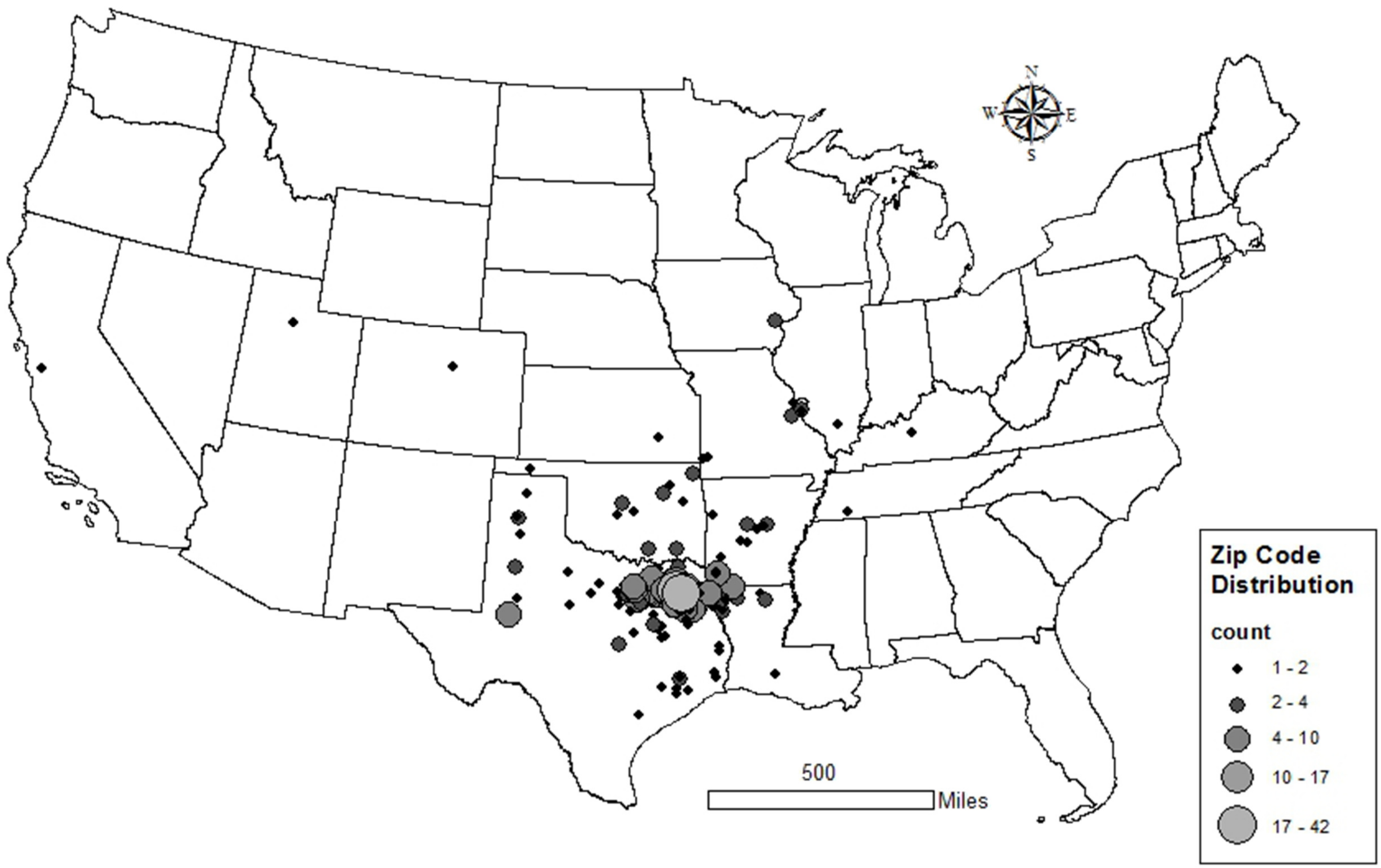


Smallmouth Buffalo



Number of Common Carp (N=48) and Smallmouth Buffalo (N=38) caught (bars) and mean relative weight (diamonds) from the Lake Fork Carp and Buffalo Challenge tournament, Lake Fork, Texas, February 27 to March 2, 2014. Mean relative weights were calculated only for fish with a recorded weight.

Appendix F



Location, by ZIP code, and frequency of anglers that were interviewed at Lake Fork, Texas, during the June 2012 through May 2013 creel survey.