

Lake Fork

2017 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

Prepared by:

Kevin Storey, District Management Supervisor
and
Evan Cartabiano, Assistant District Management Supervisor

Inland Fisheries Division
Tyler North District, Tyler, Texas

Carter Smith
Executive Director

Craig Bonds
Director, Inland Fisheries

July 2018



Contents

Contents	i
Survey and Management Summary	2
Introduction.....	3
Reservoir Description	3
Angler Access.....	3
Management History	3
Methods.....	6
Results and Discussion.....	6
Fisheries Management Plan for Lake Fork, Texas	9
Objective-Based Sampling Plan and Schedule (2018–2022).....	11
Literature Cited.....	13
Tables and Figures	14
Water Level	14
Reservoir Characteristics	14
Boat Ramp Characteristics.....	15
Harvest Regulations	15
Stocking History.....	16
Objective-Based Sampling Plan for 2017-2018	17
Vegetation Survey	18
Percent Directed Angler Effort by Species	19
Total Fishing Effort and Fishing Expenditures.....	19
Gizzard Shad.....	20
Bluegill	21
Channel Catfish	22
White Bass.....	25
Largemouth Bass	27
Crappie	31
Proposed Sampling Schedule	33
APPENDIX A – Catch rates for all species from all gear types	34
APPENDIX B – Map of sampling locations.....	35
APPENDIX C – ZIP code distribution	36
APPENDIX D – Objective-based sampling plan 2018 – 2022.....	37

Survey and Management Summary

Fish populations in Lake Fork were surveyed in 2016, 2017 and 2018 using electrofishing, and in 2018 using gill netting. Anglers were surveyed with an access point creel survey from June 2016 to May 2017. Historical data are presented with the 2016-2018 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. Reservoir elevation remained within 3 feet of conservation pool elevation (CPE) for the past two years. The reservoir was hypereutrophic and structural habitat features consisted of featureless bank, standing timber, boat docks, eroded bank and concrete.

Management History: Important sport fishes include Largemouth Bass, crappies (White and Black), and Channel Catfish. The management plan from the 2016 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 access creel surveys. Florida Largemouth Bass were introduced in small reservoirs in the lake basin prior to impoundment and stockings of fingerlings have taken place annually since 1995. Recent efforts to mitigate the loss of fish habitat due to reservoir ageing have included planting buttonbush and several native aquatic species along the lake shoreline. Management of the aquatic invasive species giant salvinia and water hyacinth continues to be a priority.

Fish Community

- **Prey species:** Threadfin Shad were abundant in the reservoir. Electrofishing catch of Gizzard Shad was adequate but their availability as prey to sport fish was low. The majority of Bluegill collected in electrofishing were less than 5-inches in length.
- **Catfishes:** Directed effort and harvest in the most recent creel survey were lower than previous surveys, however Channel Catfish continued to provide a quality fishery and angler catch rates were comparable to previous surveys. Blue Catfish were observed in the gill net survey for the first time in almost 20 years and have been occasionally encountered in creel surveys. Anecdotal evidence indicates a quality Flathead Catfish fishery is present in the reservoir.
- **Temperate basses:** White Bass and Yellow Bass were present in the reservoir though angler interest in this group is low accounting for less than 2% of total directed effort. White Bass gill net catch rates were variable; likely the result of inconsistent reproduction and recruitment. This species has managed to establish a reproducing population following illegal angler stockings. Naturally produced White Bass x Yellow Bass hybrids are also periodically caught by anglers.
- **Largemouth Bass:** Directed fishing effort for Largemouth Bass continued to be high. Despite the 16 – 24-inch slot-length limit, tournament effort has gradually increased in recent creel surveys and these anglers account for over 40% of total directed effort for Largemouth Bass. Few Largemouth Bass were harvested by anglers and most fish retained by anglers were in live-release tournaments. Spring electrofishing catch rates have been consistent although the size distribution has shifted upwards towards the lower end of the slot as more fish from the abundant cohort of small fish seen in the 2016 sample has recruited into the fishery.
- **White Crappie:** Crappie had the second highest directed effort at Lake Fork. Although both Black and White Crappie are present in the reservoir, the fishery is dominated by Black Crappie.

Management Strategies: Continue annual stocking of FLMB at 1,000/km. Conduct fall (2019 and 2021) and spring (2020 and 2022) electrofishing surveys to monitor the Largemouth Bass population and an access point creel survey (beginning June 2018) to monitor angler effort, catch, and harvest rates. Annual vegetation surveys will be conducted to monitor distribution and abundance of giant salvinia and water hyacinth.

Introduction

This document is a summary of fisheries data collected from Lake Fork June 2016 through May 2018. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other 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 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. In addition, contracts exist with the cities of Henderson, Kilgore, Longview and Texas Eastman for municipal withdrawal downstream in the Sabine River. The reservoir was eutrophic with a Carlson's Trophic State Index (TSI) chl-a of 55.4 µg/L (Texas Commission on Environmental Quality 2011). Structural habitat features consisted of featureless bank, standing timber, boat docks, eroded bank and concrete (Storey and Jubar 2008). Native aquatic species are limited, representing 2.5% of reservoir surface area. Aquatic invasive species such as alligatorweed, giant cane, giant salvinia, hydrilla, water hyacinth are present in the reservoir. Reservoir water elevation returned to CPE in May 2015 and has remained within 3 feet of that level in the past two years (Figure 1). Aquatic habitat has improved with higher lake elevations and native aquatic species and emergent woody species have increased in abundance. Other descriptive characteristics for Lake Fork are shown in Table 1.

Angler Access

Lake Fork has five public boat ramps and numerous privately-owned boat ramps with launch fees. Bank fishing access is limited to areas near public boat ramps, the SRA day-use park and at numerous 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 2016) included:

1. Monitoring and management of the Largemouth Bass fishery.

Actions: Electrofishing surveys were completed in fall 2017 and spring 2017 and 2018 to monitor relative abundance, size structure, and condition of the Largemouth Bass fishery. An access-point creel survey was conducted from June 2016 through May 2017 to monitor the fishery and collect data on catch, harvest, and fishing effort. Florida Largemouth Bass fingerlings (317,345) were stocked with assistance from volunteers of the Lake Fork Sportsman's Association (LFSA) who provided the use of their Live Release Boat. Additionally, LFSA members helped to put fingerlings in small minnow bags and divided them up and boat-stocked from their personal boats at sites throughout the lake. Since June 2016, LFSA members have collected 107 fin clips of fish >24 inches at fishing tournaments that were released using their Live Release Boat.

2. Management of aquatic invasive species (AIS).

Actions: Substantial effort was expended managing aquatic invasive species since the last report. These efforts are detailed in the Vegetation/ habitat management history section below. All reports of suspicious aquatic plants were investigated promptly. Aquatic vegetation treatment proposals submitted by Lake Fork homeowners for control of problematic aquatic vegetation were reviewed and approved with appropriate

modifications. An update on the status of AIS in Lake Fork was provided at the Steering Committee meeting of the Texas Clean Rivers Program in April 2017 and 2018.

3. Habitat enhancement projects.

Actions: District staff continued to support the cooperative project between LFSA and Yantis High School in raising potted woody plants. Assistance was provided through site selection and planting of approximately 800 buttonbushes in November 2016, and 350 buttonbushes and 67 bald cypress in November 2017. LFSA started a new initiative to raise giant bulrush, water lily, and waterwillow in the greenhouse at Yantis High School using material procured by TPWD in December 2017. LFSA received a donation from Pond King Inc. of 21 Honey Hole artificial habitat structures which District staff assisted with assembly and deployment at two sites close to the Highway 17 public boat ramp.

4. Improve angler awareness.

Actions: District staff continued 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. News releases were distributed to media outlets and posts were made on social media concerning district fisheries resources and topics of concern. Ongoing efforts were made to provide information on identification and impacts of aquatic invasive species through contact with anglers, homeowners, marina owners and the SRA through presentations and media of all types.

Harvest regulation history: From 1980 to 1985, Largemouth Bass were managed with a 14-inch minimum length limit. Since that time a series of slot-length limits have been introduced to improve population size structure.

- 1985 – 14- to 18-inch slot-length limit, 5-fish bag limit
- 1990 – 14- to 21-inch slot-length limit, 3-fish bag limit
- 1992 – 14- to 21-inch slot-length limit, 3-fish bag limit, 1 fish \geq 21-inches
- 1995 – 14- to 21-inch slot-length limit, 5-fish bag limit, 1 fish \geq 21-inches
- 1998 – 16- to 22-inch slot-length limit, 5-fish bag limit, 1 fish \geq 22-inches
- 1999 – 16- to 23-inch slot-length limit, 5-fish bag limit, 1 fish \geq 23-inches
- 2000 – 16- to 24-inch slot-length limit, 5-fish bag limit, 1 fish \geq 24-inches

In 1991 the 10-inch minimum length limit on Crappies was removed from December through February because of angler concerns of mortality of fish caught at depth. Anglers were required to retain the first 25 fish to reduce waste of the resource. Current regulations are found in Table 3.

Stocking history: Lake Fork has an extensive history of stocking Florida Largemouth Bass that was initiated prior to impoundment in small reservoirs in the lake basin. These reservoirs were inundated after impoundment. Since 1995, fingerlings have been stocked annually. Limited numbers of ShareLunker Largemouth Bass fingerlings have been stocked since 2006. Other species (e.g., Spotted Bass, Channel Catfish, Blue Catfish, Flathead Catfish, Coppernose Bluegill, and Redear Sunfish) were stocked prior to 1985. The complete stocking history is in Table 4.

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 giant salvinia, water hyacinth, alligatorweed, hydrilla, and Eurasian watermilfoil. Water hyacinth was first documented in Glade Creek in 1993 but agency efforts to control the infestation were hampered by a moratorium on spraying in 1998. By the time treatment was resumed in 2001, plants had spread throughout the reservoir (Storey 2016). TPWD AHE staff have provided periodic chemical control of water hyacinth using materials provided by the SRA. Independent spray contractors were hired to treat water

hyacinth in summer 2010 (Storey 2012), summer and fall 2016 and summer 2017 when infestations increased above the levels that AHE could treat. Water hyacinth infestations fluctuate over time in response to lake elevation and during prolonged drought events when its incidence is reduced, and spread is prevented. Giant salvinia was first documented in November in 2015 in Chaney Branch. The infestation was managed through the installation of floating booms, physical removal of plants and herbicide applications by AHE staff. In September 2017 the containment booms were removed when no further plants were observed. One month later, a new infestation was found in White Oak Bay followed by installation of a floating boom and herbicide treatments by AHE staff. Alligatorweed is the most common aquatic species targeted by homeowners through the aquatic vegetation treatment proposal process. District stockings of alligatorweed fleabeetles in 2009 and 2010 had no appreciable impact on alligatorweed so future efforts were discontinued.

LFSA has worked in cooperation with TPWD staff to plant buttonbush along the shoreline since 2011 to enhance littoral habitat. Since 2013 LFSA volunteers in conjunction with students at Yantis High School have grown out plants in a greenhouse at the school using Kills and Spills Restitution funds. District staff planted waterwillow harvested from Lake Holbrook in 2012 and 2014 to encourage establishment of native emergent species. LFSA also assisted with construction and deployment of 60 Georgia-style PVC attractors at 12 sites in Lake Fork in 2015.

Water transfer: No inter-basin transfers are known to exist.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Lake Fork Reservoir (TPWD unpublished). Primary components of the OBS plan are listed in Table 5. All survey sites were randomly-selected, and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Electrofishing – Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (2 hours at 24, 5-min stations in spring 2016 and fall 2017, and 1.83 hours at 22, 5-minute stations in spring 2018). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing.

Gill netting – Common Carp, Smallmouth Buffalo, Blue Catfish, Channel Catfish and White Bass were collected by gill netting (15 net nights at 15 stations). CPUE for gill netting was recorded as the number of fish caught per net night (fish/nn).

Statistics – Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of Vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE and creel statistics.

Creel survey – An annual access-point creel survey was conducted from June 2016 through May 2017. 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 2015).

Habitat – A vegetation survey was conducted in September 2017 to assess all aquatic vegetation and to monitor distribution and abundance of giant salvinia and waterhyacinth. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Water level – Source for water level data was the Texas Water Development Board (TWDB 2018).

Results and Discussion

Habitat: Structural habitat is primarily featureless or with standing timber with boat docks, eroded bank, and concrete in combination with a variety of other habitat types, adding to the diversity of shoreline habitat (Jubar and Storey 2007). Since the previous management report (Storey 2016), reservoir elevation has generally remained within 3 feet of CPE. In summer 2017 although vegetative cover was diverse coverage was limited (3.8% of reservoir surface area) and appreciably lower than in previous surveys where levels of 8-14% were observed (Table 6). Combined native emergent species occupied 495 acres, representing 1.8% of reservoir surface area. The two most abundant species were American lotus (383 acres) and black willow (70 acres). Native submersed species such as American pondweed, coontail and muskgrass accounted for 202 acres, adding a further 0.7% of reservoir surface area. Four invasive aquatic species were observed during the survey; alligatorweed (55 acres), giant cane (0.1 acres), hydrilla (12 acres), and water hyacinth (274 acres), however, giant salvinia was subsequently found in White Oak Bay. Hydrilla in Lake Fork has historically been considered a beneficial component of aquatic habitat and is favored by bass anglers and its presence seldom creates conflicts for resource users. Hydrilla coverage fluctuates unpredictably and the estimate in 2017 was orders of magnitude lower than levels observed in the past (Table 6). Water hyacinth has increased in coverage since lake elevations increased following recovery from drought and this change necessitated chemical treatment in 2016 and 2017.

Creel: Directed fishing effort for Largemouth Bass continued to dominate the fishery representing greater than 76% of total effort in 2016/2017 (Table 7). Crappies were the second most sought species on Lake Fork (13.0%) followed by catfish (5.9%) (Table 7). Although total fishing effort in 2016-2017 (617,698 h) declined from the previous two surveys, it remains high (Table 8). There was an associated decline in the estimate of total directed expenditures, although at \$7.6 million (Table 8) Lake Fork is still an important driver of economic activity in the local community. Anglers interviewed in creel surveys from June 2016 - May 2017 (N=759) were overwhelmingly from Texas (86%) with the majority residing in communities between the Dallas/ Ft. Worth Metroplex and East Texas (Appendix C).

Prey species: Lake Fork contains a diverse prey fish community, and the most abundant species collected in fall electrofishing were Gizzard Shad, Threadfin Shad, and Bluegill. The favorable relative weights of Largemouth Bass (Figures 8 and 9) are reflective of the abundant prey populations. Although the catch rate of Gizzard Shad in 2017 (152.5/h) and 2015 (163.0/h) was similar, the Index of vulnerability (IOV) showed few Gizzard Shad (29%) were available as prey in 2017 (Figure 2). Fortunately, this population was enhanced by the presence of abundant Threadfin Shad (486.5/h) (Appendix A). Catch rate of Bluegill (171.0/h) was lower than the two previous surveys (Figure 3) but most fish collected in surveys were 4 inches or less in length which is a suitable prey size for adult Largemouth Bass. Directed effort for sunfishes remained low (0.1%) (Table 7).

Common Carp and Smallmouth Buffalo: The Texas 44 Carp and Buffalo Challenges held at Lake Fork from 2012 – 2014 showcased the trophy fisheries for both species (Storey and Bennett 2014). During that time, new lake records were established for Common Carp (40.4 lb) and Smallmouth Buffalo (66.0). Both species were collected in gill netting in 2018, but CPUEs for Common Carp (0.2/nn) and Smallmouth Buffalo (0.4/nn) (Appendix A) were low and the absence of historical data made any assessments of their populations impractical.

Catfishes: Size distribution and relative abundance of Channel Catfish in the 2018 gill net survey was consistent with the previous two surveys (Figure 4). Size structure continued to be dominated by legal-length fish. Body condition of fish was excellent with an increasing trend with fish length. Three Blue Catfish were caught in the 2018 gill net survey (Appendix A). Blue Catfish had not been observed in gill nets since 1997 (Poarch 1998). Blue Catfish collected in gill nets on Lake Fork are typically >25 inches but one 13-inch fish was collected in 2018. Low numbers of Blue Catfish were also harvested but this population shows little evidence of expansion. Anecdotal evidence suggests the Flathead Catfish fishery is popular with trotline anglers and hand fishermen but they are seldom encountered in gill nets or creel surveys. The catfish fishery on Lake Fork accounted for less than 10% of total directed effort in the past two creel surveys and catfish were the third most sought species (Table 7). Directed effort (Table 9) and harvest (Figure 5) for combined catfishes declined in the past three surveys but angler catch rate remained similar (Table 9). Anglers released 17% of legal-sized catfish caught during the 2016-2017 creel survey.

Temperate basses: Lake Fork contains a variety of temperate basses including White Bass, Yellow Bass, and White x Yellow bass hybrids. Directed angler effort on temperate basses is consistently low (Table 7). Yellow Bass are the only species native to the reservoir, and White Bass were apparently introduced from Lake Tawakoni by anglers. The White x Yellow Bass hybrids are naturally crossed within the lake. White Bass were first detected in 2004 (Storey and Myers 2004) and have established a self-sustaining population. Although gill net CPUE for White Bass in 2018 (0.6/nn) was reduced as compared with previous surveys (Figure 6), angler harvest (12,189) increased as did the size distribution of harvested fish. Fluctuations in abundance and harvest of White Bass on Lake Fork have been documented in the past and have been attributed to inconsistent recruitment patterns (Storey and Bennett 2014)

Largemouth Bass: Total CPUE of Largemouth Bass (83.5/h) in 2017 fall electrofishing was reduced from catches in 2015 (179.5/h), and 2013 (100.0/h) (Figure 9). The 2015 survey was dominated by abundant numbers of small fish produced during improved aquatic habitat created as the reservoir recovered from a

protracted drought (Storey 2016). Relative weights (W_r) for most inch classes of Largemouth Bass were good, ranging from 90 to 100, indicating adequate prey populations (Figure 9).

Total CPUE of Largemouth Bass in 2018 spring electrofishing (89.5/h) was consistent with results from surveys in 2017 (81.5/h) and 2016 (91.0/h). (Figure 9). Stock structure, as measured by PSD and PSD-16, increased from 2016 to 2018 as larger fish became relatively more abundant in the samples. In the 2016 survey a fish over 24 inches was collected for the first time in a spring sample since 2010 and only the sixth over-slot fish collected in spring electrofishing since 1990 (Storey 2016). In the 2017 survey an additional over-slot fish was collected followed by two more in 2018 (Figure 9).

Angler catch rate of Largemouth Bass in 2016-2017 (0.38/h) was similar to rates observed since 2012-2013 (0.38-0.42/h) (Table 10). Directed angler effort for Largemouth Bass in 2016-2017 (472,814 h) decreased after increased efforts in 2014-2015 (500,645 h) and 2015-2016 (768,940 h). During the creel survey in 2016-2017, the number of released fish (418,335) was similar to the previous year (417,809) although the fish were smaller (Table 10). Released fish less than 4 lbs in weight represented 90-92% of all released fish since 2015. In surveys conducted between 2011 and 2015 this size group represented from 69 – 77% of released fish.

Fishing tournaments have gradually increased in importance at Lake Fork. Tournaments in 2016-2017 (245,115 h) represented 52% of total angling effort, a similar contribution as seen in 2015-2016 (55%) and 2012-2013 (51%), though higher than in 2014-2015 (42%) and 2011-2012 (16%) (Table 10). Retention of Largemouth Bass by anglers in live-release tournaments accounts for most of the estimated harvest. In the past five years between 82-98% of retained fish were from live-release tournament participants (Table 10). Catch and release angling is prevalent for non-tournament anglers as evidenced by a release rate of legal fish of between 96-98% (Table 10).

Crappies: Directed effort for crappies represented between 8 - 18% of total fishing effort observed in the past five creel surveys (Table 7). In the most recent creel survey (2016-2017), directed effort was estimated at 80,243 h, similar to the previous year (73,807 h) (Table 11). Directed effort in the past five creel surveys has remained in the range of 72,000 – 106,000 hr (Table 11). Crappie harvest in 2017, 70,910, declined over the past three creel surveys and the contribution of fish retained during the winter quarter, when the minimum length limit is waived, varied considerably (Figure 11).

Fisheries Management Plan for Lake Fork, Texas

Prepared – July 2018

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 45% of all entries into the ShareLunker program since its inception in 1986. To date, 7 of the top 10, 13 of the top 20, and 24 of the 40 heaviest documented largemouth bass in Texas were caught in Lake Fork. Total annual trip expenditures at Lake Fork were estimated at over \$18.8 million and total economic value of the reservoir for fishing was valued at \$38.4 million (Hunt and Parker 2016). 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. TPWD has stocked more than 13 million FLMB into the lake. The goal of TPWD is to maximize trophy fish abundance to support this world-class trophy fishery.

MANAGEMENT STRATEGIES

1. Stock FLMB (1,000/km) annually to influence genetics and maintain trophy Largemouth Bass catch potential.

ISSUE 2: The decline in aquatic habitat as Lake Fork ages has been identified as an issue. District staff will seek opportunities to foster habitat enhancement initiatives involving establishment of native aquatic plants and deployment of artificial structures.

MANAGEMENT STRATEGY

1. Support cooperative project between LFSA and Yantis High School in growing out buttonbush plants. Assist with site selection and planting activities in Lake Fork.
2. Support the efforts of LFSA to culture select emergent species, including but not limited to giant bulrush, waterlily, waterwillow, in the greenhouse at Yantis High School to enhance native aquatic plant communities in the reservoir.
3. Assist LFSA in applying for grant proposals from sources such as TPWD's Conservation License Plate fund and the Reservoir Fisheries Habitat Partnership to fund habitat improvement projects
4. Monitor TPWD's "Wetland cell" project on SRA property at the SRA Lake Fork office and document establishment of any propagules of water celery and/or water stargrass in the reservoir.

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels 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

Giant salvinia and water hyacinth currently pose the most serious threat of any invasive aquatic plants present 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. Recommend treatments of giant salvinia and water hyacinth, when appropriate, using appropriate foliar applications of herbicides as recommended by AHE staff.
2. Deploy and maintain floating booms across to isolate giant salvinia until infestations are eradicated.
3. Conduct post-treatment vegetation surveys to evaluate effectiveness of herbicide applications.
4. Investigate reports of unusual or unknown aquatic plants in Lake Fork by anglers and homeowners at the earliest possible opportunity.
5. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
6. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc. so they can communicate these messages to their customers.
7. Educate the public about invasive species using media and the Internet.
8. Discuss invasive species when presenting to constituent and user groups.
9. Continue to support zebra mussel sampling being conducted by contractors and aid with dissemination of test results.
10. Provide information on identification of zebra mussels, and encourage reporting of any suspicious cases.
11. Document existing and future inter-basin water transfers to facilitate potential invasive species responses.
12. Work cooperatively with TPWD Austin and AHE staff, the SRA, and the LFSA to develop management plans and to explore opportunities to underwrite recommended courses of action.
13. Continue to review aquatic vegetation treatment proposals submitted by Lake Fork homeowners for control of problematic aquatic vegetation.

ISSUE 4: Angler awareness of the fisheries resources at Lake Fork other than Largemouth Bass and crappies 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.

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 as well as social media.
3. Co-sponsor additional "State of the lake" meetings with local interested parties as needs arise.
4. Continue efforts to educate the public on identification of invasive aquatic plants and consequences of their introductions into public water.

Objective-Based Sampling Plan and Schedule (2018–2022)

Sport fish, forage fish, and other important fishes

Sport fishes in Lake Fork include Largemouth Bass, Channel Catfish, crappies, sunfishes, White Bass, Common Carp, and Smallmouth Buffalo. Gizzard and Threadfin Shad and sunfishes are the primary prey species.

Low-density fisheries

White Bass: White Bass abundance in Lake Fork fluctuates and directed fishing effort is less than 2% of total effort. CPUEs from gill netting surveys is variable and analysis of these data predicts an impractical level of effort would be required to satisfy sampling criteria. The fishery will be sampled using the effort expended to sample Channel Catfish in spring 2020 and 2022. Sampling of the White Bass fishery will be to monitor general trends in relative abundance, size structure, body condition, and growth. No OBS plan objectives have been set for this species.

Common Carp and Smallmouth Buffalo: The Common Carp and Smallmouth Buffalo fisheries in Lake Fork are both nationally and internationally recognized as a destination for trophy size fish of both species. Tournaments on the lake have drawn participants from around the globe and anglers travel to Lake Fork from across the country to catch these species. CPUE from gill netting in 2018 was 0.6/nn for both species combined. Issues with gear selectivity of gill nets make this gear ineffective at sampling these populations so future sampling will be discontinued.

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Lake Fork supports a high-quality Largemouth Bass fishery population managed with a protective 16-24-inch slot-length limit. Electrofishing surveys will be used to monitor Largemouth Bass population relative abundance, size structure, and condition with electrofishing surveys and access-point creel surveys will be conducted to monitor angler catch, harvest, and fishing effort. If any concerning changes are identified they will be investigated further. The Lake Fork Largemouth Bass population will be monitored. Analysis of historical data from spring electrofishing in 2015-2018 predicts a sample of 100 stock-sized Largemouth Bass can be obtained at the 80th percentile by sampling between 16 and 20 stations. Sampling between 14 and 20 stations would be required to yield an $RSE \leq 15$ at the 80th percentile. Analysis of data from fall electrofishing in 2013-2015 and 2017 predicts a sample of 50 stock-sized Largemouth Bass can be obtained at the 80th percentile by sampling between 10 and 20 stations. Further, to yield an $RSE \leq 25$ at the 80th percentile would require sampling between 12 and 24 stations. Sampling will be conducted at 24 randomly-selected nighttime electrofishing stations in fall 2019 and 2021 and in spring 2020 and 2022. Access-point creel surveys will be conducted from June 2018 through May 2020 to monitor the fishery and collect data on catch, harvest, and fishing effort. Data on numbers of released bass in the following size ranges; 4-6.9 lbs, 7-9.9 lbs and >10 lbs will continue to be collected

during creel surveys. In addition, data from the Toyota ShareLunker Program will also be used to document the catch of trophy fish.

Crappie: White and Black Crappie are both present in Lake Fork and the fishery has supported total annual directed fishing effort in the range of 65,000 to 148,000 h in the last nine annual access point creel surveys. Trap net sampling was discontinued after 2007 because catches were insufficient to assess the population. Crappies rank second in importance of directed effort behind Largemouth Bass. Data from access creel surveys conducted from June 2018 through May 2020 will be used to monitor trends in directed effort, and angler catch and harvest.

Channel Catfish: The size distribution of the Channel Catfish population in Lake Fork is consistent and the fishery is of high quality. Catfish anglers have accounted for between 3 and 13% of directed fishing effort in the past nine annual creel surveys. Fishing effort on catfish has ranged from 23,000 to 90,000 h during this time. Analysis of historical data (2012, 2014, 2016, 2018) predicts it would take a sampling effort of between 7 and 12 nn to collect a sample of 50 stock-sized Channel Catfish at the 80th percentile. Achieving an $RSE \leq 25$ at the 80th percentile would require sampling between 5 and 14 stations. A sampling effort of 15 gill nets set at randomly-selected sites will be conducted in spring 2020 and 2022 to monitor general trends in relative abundance, size structure, and body condition of Channel Catfish. The catfish fishery, will be sampled using an access creel from June 2018 through May 2020 to evaluate angler catch, harvest, and effort. Any large-scale changes identified in the population or fishery requiring further study would be investigated.

Sunfish and other prey species: Bluegill, Redear Sunfish, Gizzard Shad and Threadfin Shad are the primary prey species in Lake Fork. Long-term monitoring trend data is desired for these populations to evaluate their relative abundance (CPUE) and size structure (PSD). Relative weights of the Largemouth Bass population, along with size structure of the sunfish and the IOV of Gizzard Shad, will be used to gauge prey fish availability for sport fishes from electrofishing sampling conducted in fall 2019 and 2021. No sampling objectives will be set for prey species and no additional sampling will be conducted above the effort expended for Largemouth Bass.

Habitat: A comprehensive assessment of native and invasive aquatic vegetation species will be conducted every four years using the digital shapefile method to quantify total vegetative coverage. The next assessment is scheduled for summer 2021. Lake Fork's aquatic invasive plants necessitate more frequent monitoring. Water hyacinth and giant salvinia pose the greatest threats to angler and boater access as well their ability to outcompete beneficial native species. Annual aquatic vegetation monitoring, at a minimum, is required to assess threat levels and to implement any necessary rapid response and control efforts. Each summer locations of invasive species of concern will be geo-referenced and measured. Assistance will be provided in the evaluation of treatment efforts through post-treatment surveys. Results and recommendations will be coordinated with AHE staff.

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.
- Guy, C. S., R. M. Neumann, D. W. Willis, and R. O. Anderson. 2007. Proportional size distribution (PSD): a further refinement of population size structure index terminology. *Fisheries* 32(7): 348.
- Hunt, K. M., and C.R. Parker. 2016. A social and economic study of the Lake Fork Reservoir recreational fishery. Report of Mississippi State University, Human Dimensions & Conservation Law Enforcement Laboratory to Texas Parks and Wildlife Department, Austin, Texas.
- Poarch, S.M. 1998. 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, Job A, 31 pages.
- Storey, K.W. 2016. Statewide freshwater fisheries monitoring and management program, Lake Fork Reservoir, Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Performance Report, Project F-221-M-6, Job A, 38 pages.
- Storey, K. W and D. L. Bennett 2014. Statewide freshwater fisheries monitoring and management program, Lake Fork Reservoir, Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Performance Report, Project F-221-M-4, Job A, 42 pages.
- 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 R.A. Myers. 2004. 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-29, Job A, 48 pages.
- Texas Commission on Environmental Quality. 2011. Trophic classification of Texas reservoirs. 2010 Texas Water Quality Inventory and 303 (d) List, Austin. 18 pp.
- Texas Water Development Board (TWDB). 2018. Water data for Texas: Web interface. Available: <https://waterdatafortexas.org/reservoirs/individual/fork> (July 2018).

Tables and Figures

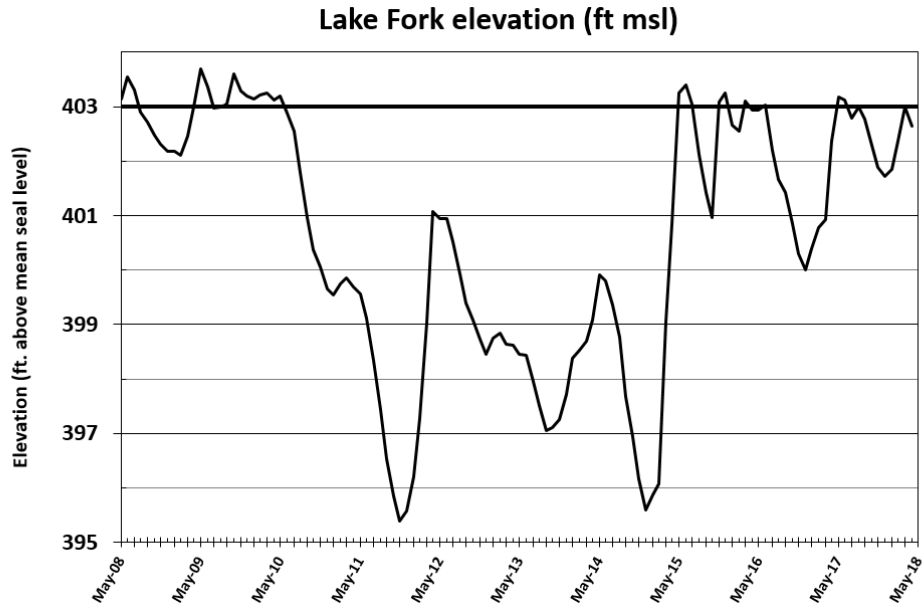


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Lake Fork, Texas, May 2008 through May 2018. Bold horizontal line indicates conservation pool elevation; 403 ft. msl.

Table 1. Characteristics of Lake Fork Reservoir, Texas.

Characteristic	Description
Year constructed	1980
Controlling authority	SRA
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 μ mho / cm
Secchi disc range	4 – 6 ft.
Watershed area	490 mi ²

Table 2. Boat ramp characteristics for Lake Fork Reservoir, Texas, July 2015. Reservoir elevation at time of survey was 397.6 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Rainswood	32.9037 -95.6587	Y	30	393.85	Excellent, no access issues
Highway 17	32.8787 -95.6329	Y	60	392.35	Excellent, no access issues
Highway 154	32.8527 -95.5289	Y	50	393.25	Excellent, no access issues
Highway 515 East	32.8951 -95.5356	Y	50	391.35	Excellent, although sand occasionally accumulates on ramp limiting access
Boardtree Creek	32.8976 -95.6739	Y	15	385.20	Excellent, no access issues

Table 3. Harvest regulations for Lake Fork Reservoir, 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

¹The 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 Reservoir, Texas. Size categories are: FRY =<1 inch; FGL = 1-3 inches; AFGL = 8 inches, and ADL = adults.

Year	Number	Size	Year	Number	Size
Blue Catfish			Florida Largemouth Bass		
1980	268,423	FGL	1995	692,281	FGL
1984	29,676	FGL	1996	697,731	FGL
1985	253,464	FGL	1997	697,337	FGL
	<u>551,563</u>		1998	693,311	FGL
Channel Catfish			1999	710,661	FGL
1977	37,787	FGL	2000	510,558	FGL
1978	80,130	FGL	2001	218,096	FGL
1980	137,545	FGL	2002	692,158	FGL
1984	102,103	FGL	2003	731,714	FGL
	<u>357,565</u>		2004	514,961	FGL
Flathead Catfish			2005	683,876	FGL
1979	4,800	FGL & ADL	2006	501,263	FGL
	<u>4,800</u>		2007	501,174	FGL
Redear Sunfish			2008	501,070	FGL
1981	36,000	FGL	2009	682,622	FGL
	<u>36,000</u>		2010	512,634	FGL
Coppernose Bluegill			2011	684,949	FGL
1981	633,911	FGL	2012	683,484	FGL
	<u>633,911</u>		2013	518,940	FGL
Spotted Bass			2014	502,304	FGL
1979	41	ADL	2015	317,854	FGL
	<u>41</u>		2016	317,315	FGL
Florida Largemouth Bass			2017	320,261	FGL
1978	103	ADL	2018	311,910	FGL
1979	740,815	FGL		<u>14,271,342</u>	
1979	561	ADL	ShareLunker Largemouth Bass		
1980	330,800	FRY	2006	4,800	FGL
1980	300	ADL	2008	2,897	FGL
1982	49	ADL	2009	3,000	FGL
1987	250	AFGL	2010	2,220	FGL
			2011	39,872	FGL
			2012	10,205	FGL
			2013	4,559	FGL
			2014	15,709	FGL
			2018	35,998	FGL
				<u>119,260</u>	

Table 5. Objective-based sampling plan components for Lake Fork Reservoir, Texas 2017–2018.

Gear/ target species	Survey objective <i>Monitor trend in:</i>	Metrics	Sampling objective
<i>Electrofishing: Fall 2017, Effort = 24 stations</i>			
Largemouth Bass	Abundance	CPUE – stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Condition	W_r	10 fish/inch group (max)
Bluegill ^a	Abundance	CPUE – Total	
	Size structure	PSD, length frequency	
Redear Sunfish ^a	Abundance	CPUE – Total	
	Size structure	PSD, length frequency	
Gizzard Shad ^a	Size structure	PSD, length frequency	
	Prey availability	IOV	
<i>Electrofishing: Spring 2018, Effort = 24 stations</i>			
Largemouth Bass	Abundance	CPUE – stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
<i>Gill netting: March – April 2018, Effort = 15 net nights</i>			
Channel Catfish	Abundance	CPUE– stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Condition	W_r	10 fish/inch group (max)
White Bass	Abundance	CPUE– stock	
	Size structure	PSD, length frequency	
	Age-and-growth	Category 2	Estimate mean age of 10-inch fish
Common Carp and Smallmouth Buffalo	Abundance	CPUE– stock	
	Size structure	PSD, length frequency	
<i>Creel survey: June 2016 – May 2017</i>			
Largemouth Bass	Characterize fishery and document trophy potential	Directed effort, angler CPUE, harvest, and release of fish by weight categories	
Catfish, Crappies & White Bass	Characterize fishery	Directed effort, angler CPUE, harvest	

^a No sampling objectives have been set for prey species so no additional sampling effort beyond that designated for Largemouth Bass will be conducted. Largemouth Bass body condition can also be used to make inferences on forage availability.

Table 6. Survey of aquatic vegetation, Lake Fork, Texas, 2004, 2006, 2007, 2009, 2013, and 2017. Surface area (acres) is listed with percent of total reservoir surface area in parentheses. Individual native species observed during surveys are listed in footnotes. Total acreage includes native and non-native species combined.

Vegetation	2004	2006	2007	2009	2013	2017
Native emergent	145 (0.5) ¹	371 (1.4)	450 (1.4)		130 (0.5) ³	495 (1.8) ⁵
Native submersed	1,278 (4.7) ²	543 (2.0)	571 (2.1)		1,069 (3.9) ⁴	202 (0.7) ⁶
Sub-total Native sp.	1,424 (5.2)	914 (3.4)	1,021 (3.7)		1,119 (4.4)	696 (2.5)
Non-native						
<i>Alligatorweed (Tier III)*</i>			42 (0.2)		3 (<0.1)	55 (0.2)
<i>Eurasian watermilfoil (Tier III)*</i>	58 (0.2)	184 (0.7)	418 (1.5)			
<i>Giant cane (Tier III)*</i>						0.1 (<0.1)
<i>Hydrilla (Tier III)*</i>	2,156 (7.9)	1,047 (3.8)	417 (1.5)		1,372 (5.0)	12 (<0.1)
<i>Water hyacinth (Tier II)*</i>	49 (0.2)	10(<0.1)	12 (<0.1)	400.0 (1.5)	4 (<0.1)	274 (1.0)
<i>Giant salvinia (Tier 1)</i>						
Total	3,686 (13.5)	2,155 (7.9)	2,359 (8.9)		2,578 (9.5)	1,037 (3.8)

*Tier I is immediate Response, Tier II Maintenance, and 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*

⁵ *American lotus, buttonbush, black willow, cattail, giant cutgrass, giant bulrush, maidencane, smartweed, soft rush, squarestem spikerush, water lily, waterwillow*

⁶ *American pondweed, coontail, muskgrasst*

Table 7. Percent directed angler effort by species for Lake Fork, Texas, from 2011 through 2013 and 2014 through 2017. Survey periods were from June 1 through May 31.

Species	Year				
	2011-2012	2012-2013	2014-2015	2015-2016	2016-2017
Catfishes	5.2	4.3	12.6	8.3	5.9
Temperate Bass	0.4	0.1	-	1.6	0.9
Sunfish	-	0.1	-	0.2	0.1
Largemouth Bass	73.2	82.5	70.2	81.5	76.5
Crappies	17.7	11.9	14.5	7.8	13.0
Anything	3.6	1.2	2.6	0.6	3.6

Table 8. Total fishing effort (h) for all species and total directed expenditures (and associated RSEs in parentheses) at Lake Fork, Texas, from 2011 through 2013 and 2014 through 2017. Survey periods were from June 1 through May 31.

Creel metric	Year				
	2011-2012	2012-2013	2014-2015	2015-2016	2016-2017
Total fishing effort	602,127 (15)	601,912 (20)	712,724 (13)	943,149 (20)	617,698 (15)
Total directed expenditures	\$7,250,375 (27)	\$10,206,736 (27)	\$9,556,450 (22)	\$10,978,715 (25)	\$7,649,981 (27)

Gizzard Shad

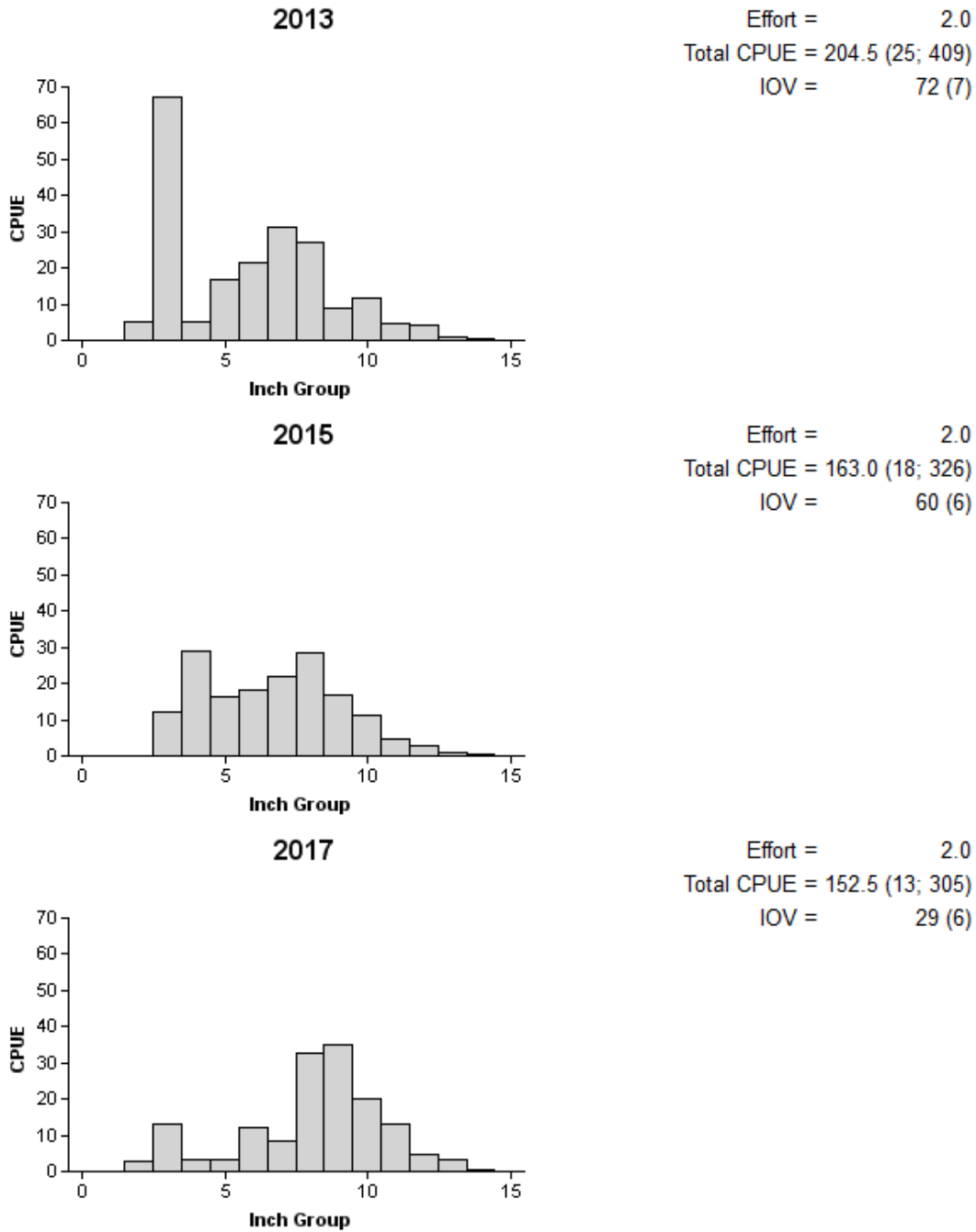


Figure 2. Number of Gizzard Shad caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for structural index and IOV are in parentheses) for fall electrofishing surveys, Lake Fork, Texas, 2013, 2015, and 2017.

Bluegill

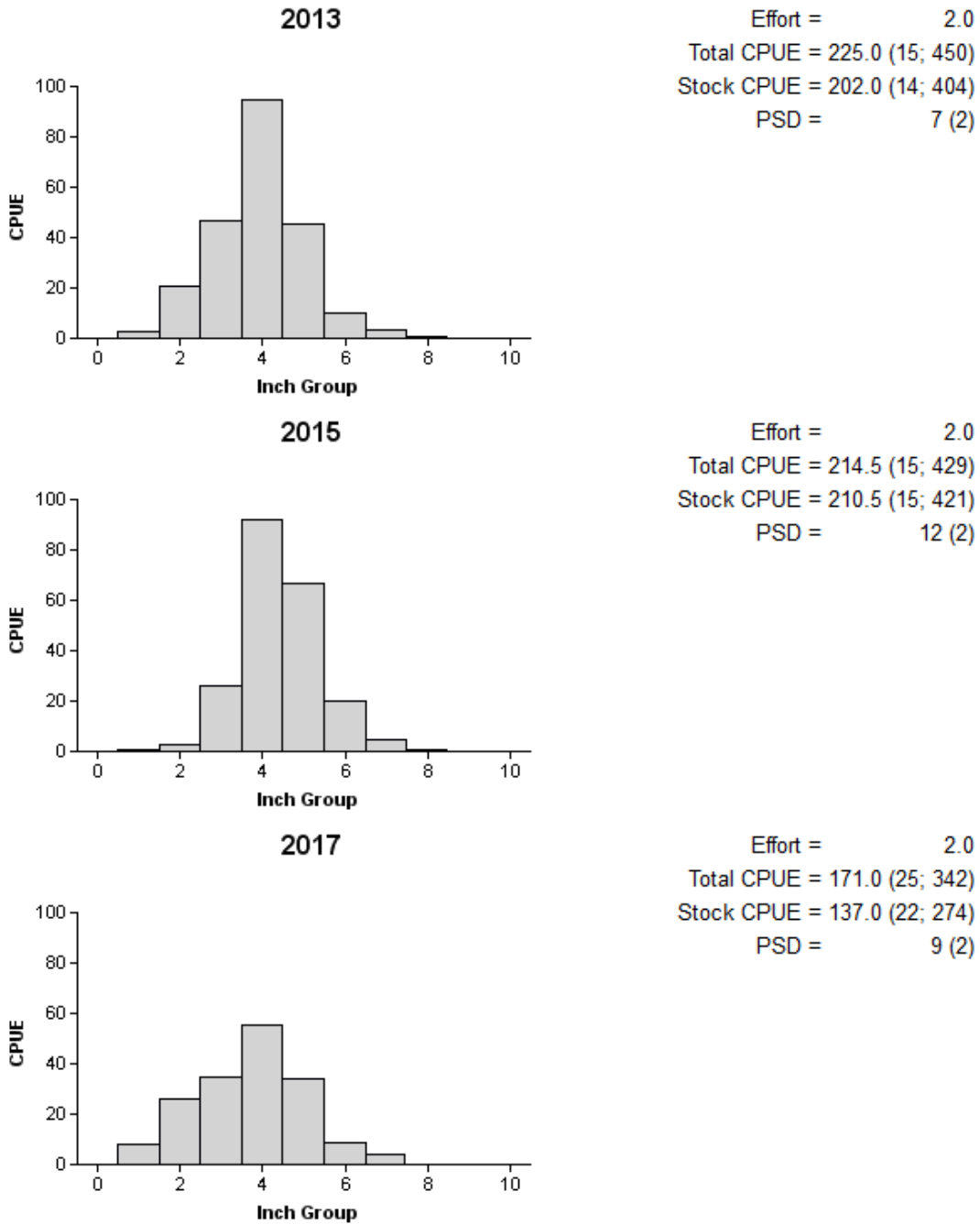


Figure 3. Number of Bluegill caught per hour (CPUE, bars), and population indices (RSE and N for CPUE and SE for structural indices are in parentheses) for fall electrofishing surveys, Lake Fork, Texas, 2013, 2015, and 2017.

Channel Catfish

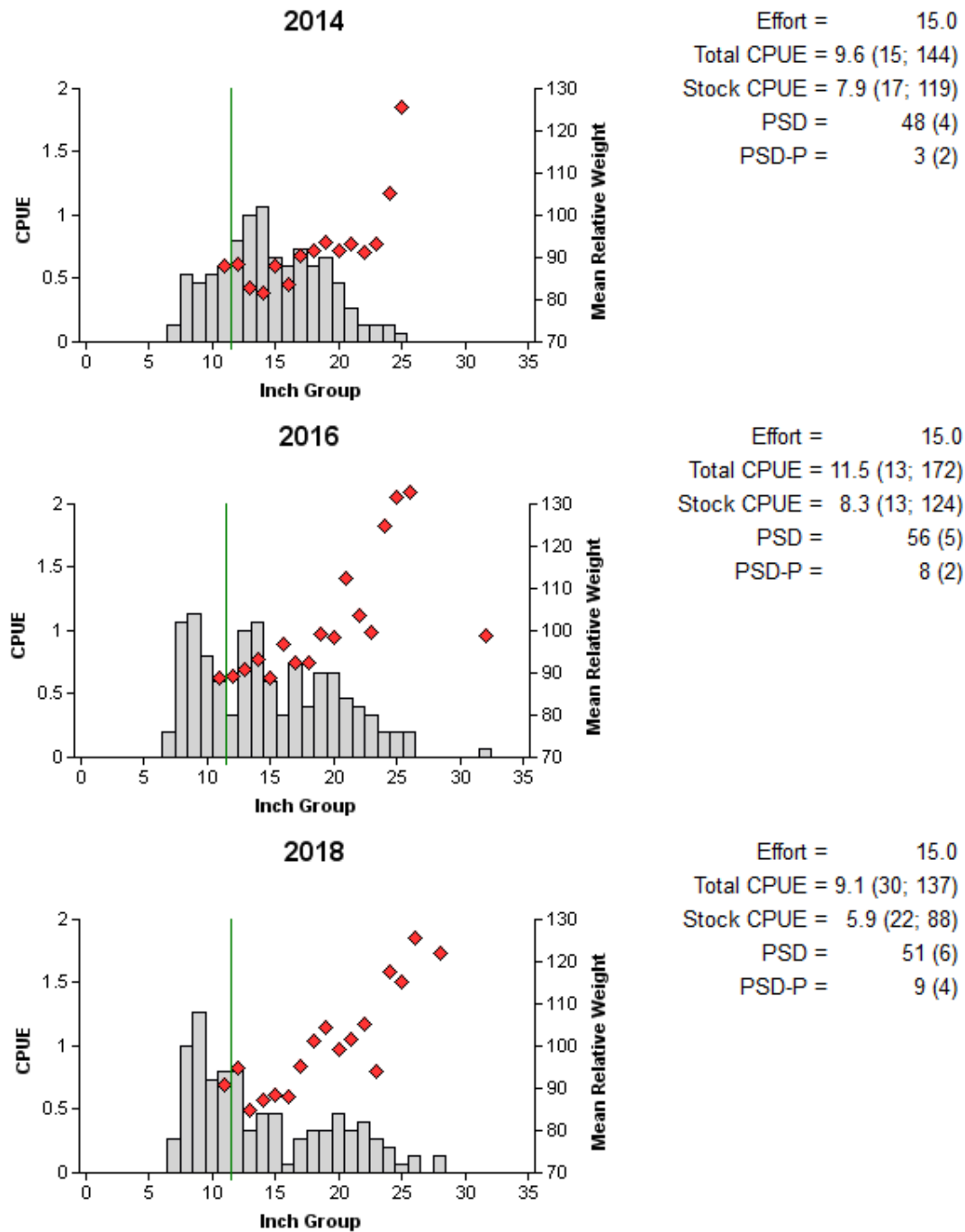


Figure 4. Number of Channel Catfish caught per net night (CPUE), mean relative weights (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Fork, Texas, 2014, 2016, and 2018. Vertical lines indicate minimum length limit at time of survey.

Table 9. Creel survey statistics for catfish (Channel, Blue, and Flathead Catfish combined) at Lake Fork from 2011 through 2013 and 2014 through 2017. Survey periods were from June 1 through May 31. 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				
	2011-2012	2012-2013	2014-2015	2015-2016	2016-2017
Surface area (acres)	23,007	23,741	23,792	24,001	25,033
Directed effort (h)	31,262 (30)	25,733 (32)	89,679 (19)	78,168 (23)	36,175 (25)
Directed effort/acre	1.36 (30)	1.08 (32)	3.77 (19)	3.26 (23)	1.45 (25)
Total catch per hour	1.98 (46)	1.91 (38)	2.06 (25)	1.24 (34)	1.90 (32)
Total harvest	62,873 (50)	57,565 (47)	195,990 (34)	80,225 (50)	43,714 (45)
Harvest/acre	2.73 (50)	2.42 (47)	8.24 (34)	3.34 (50)	1.75 (45)
Percent legal released	3	17	13	29	17

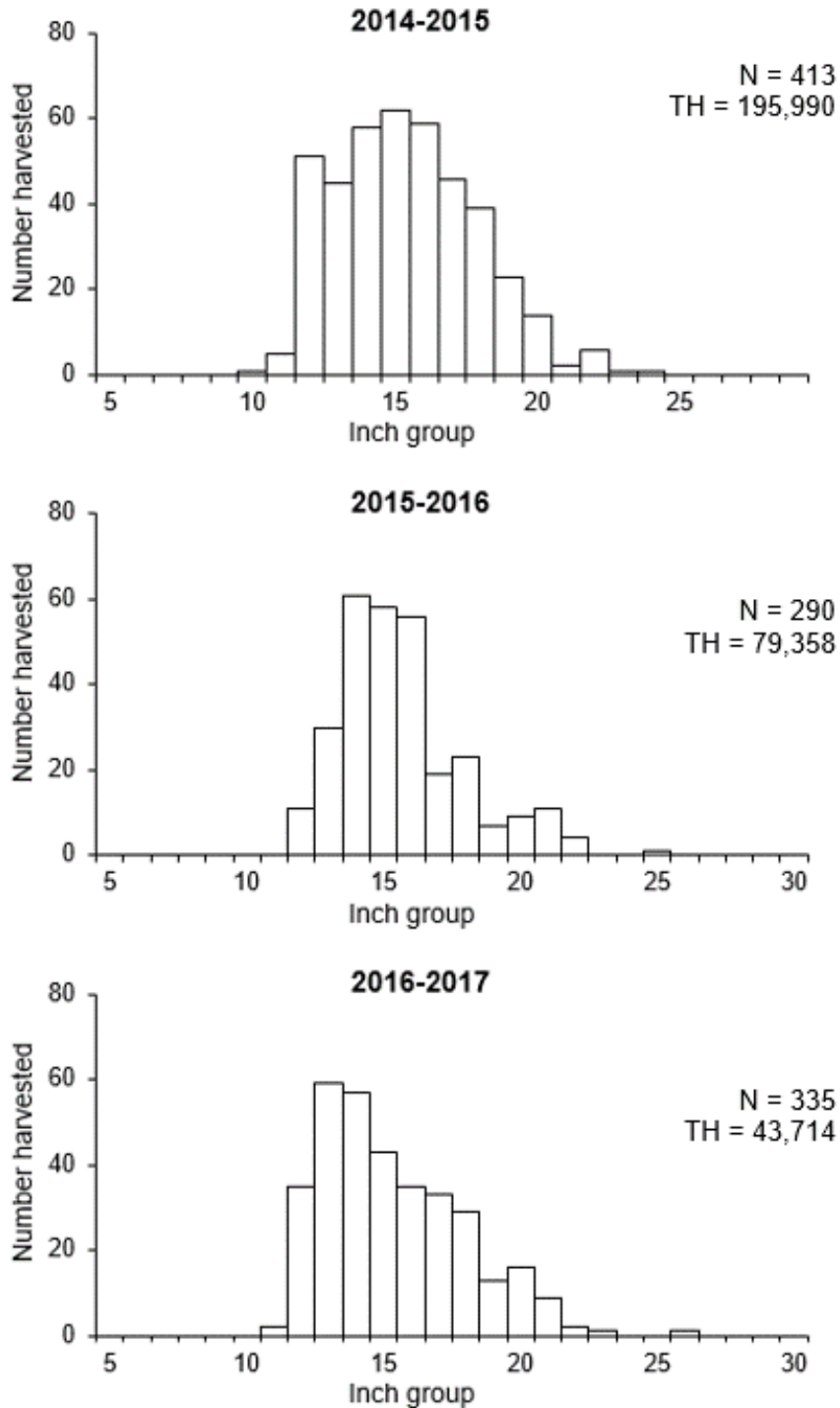


Figure 5. Length frequency of harvested Channel Catfish observed during creel surveys at Lake Fork, Texas, June 2014 to May 2015, June 2015 to May 2016, and June 2016 to May 2017, all anglers combined. N is the number of harvested Channel Catfish (few Blue or Flathead Catfish were observed during creel surveys), and TH is the total estimated harvest for the creel period.

White Bass

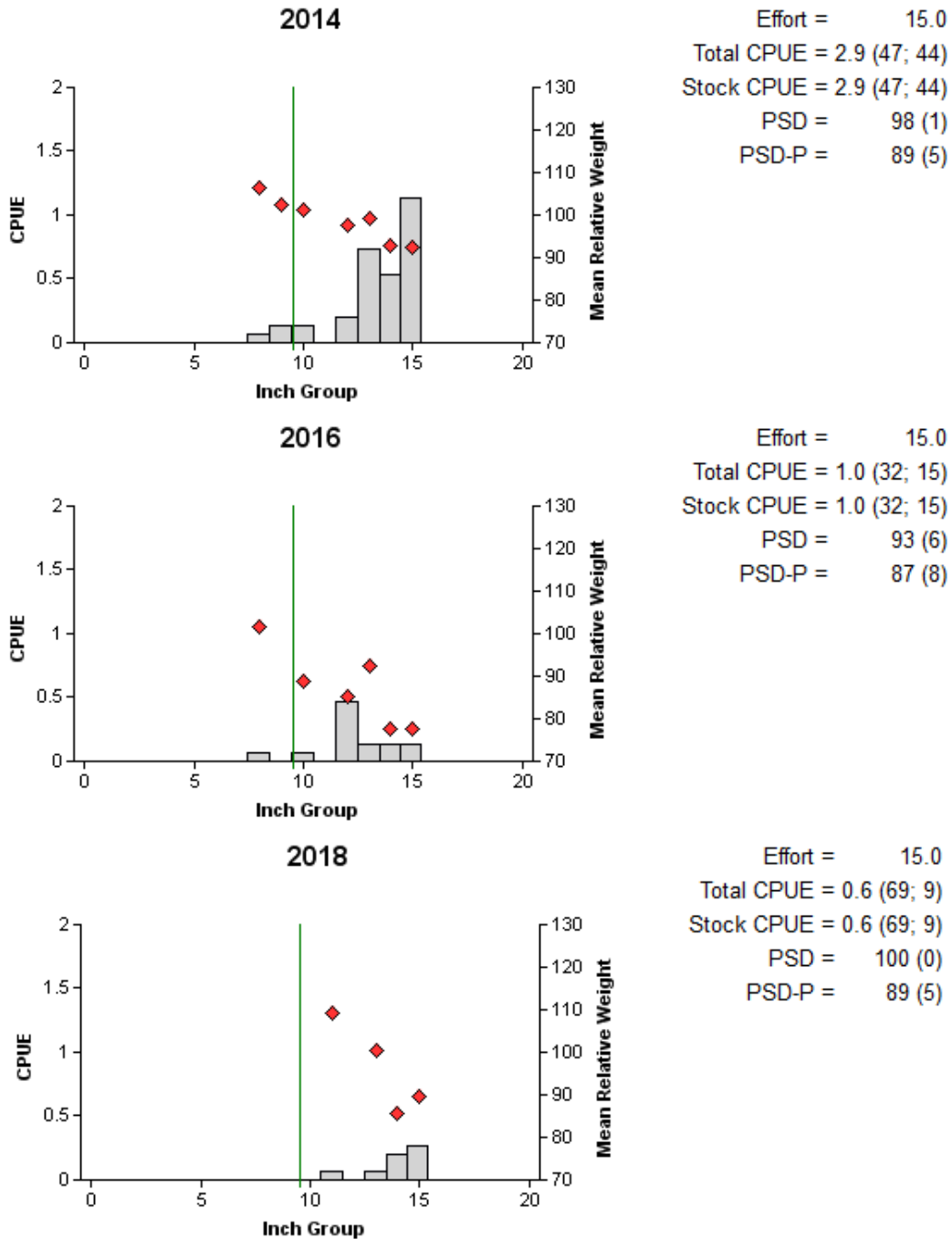


Figure 6. Number of White Bass caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Fork, Texas, 2014, 2016 and 2018. Vertical lines indicate minimum length limit.

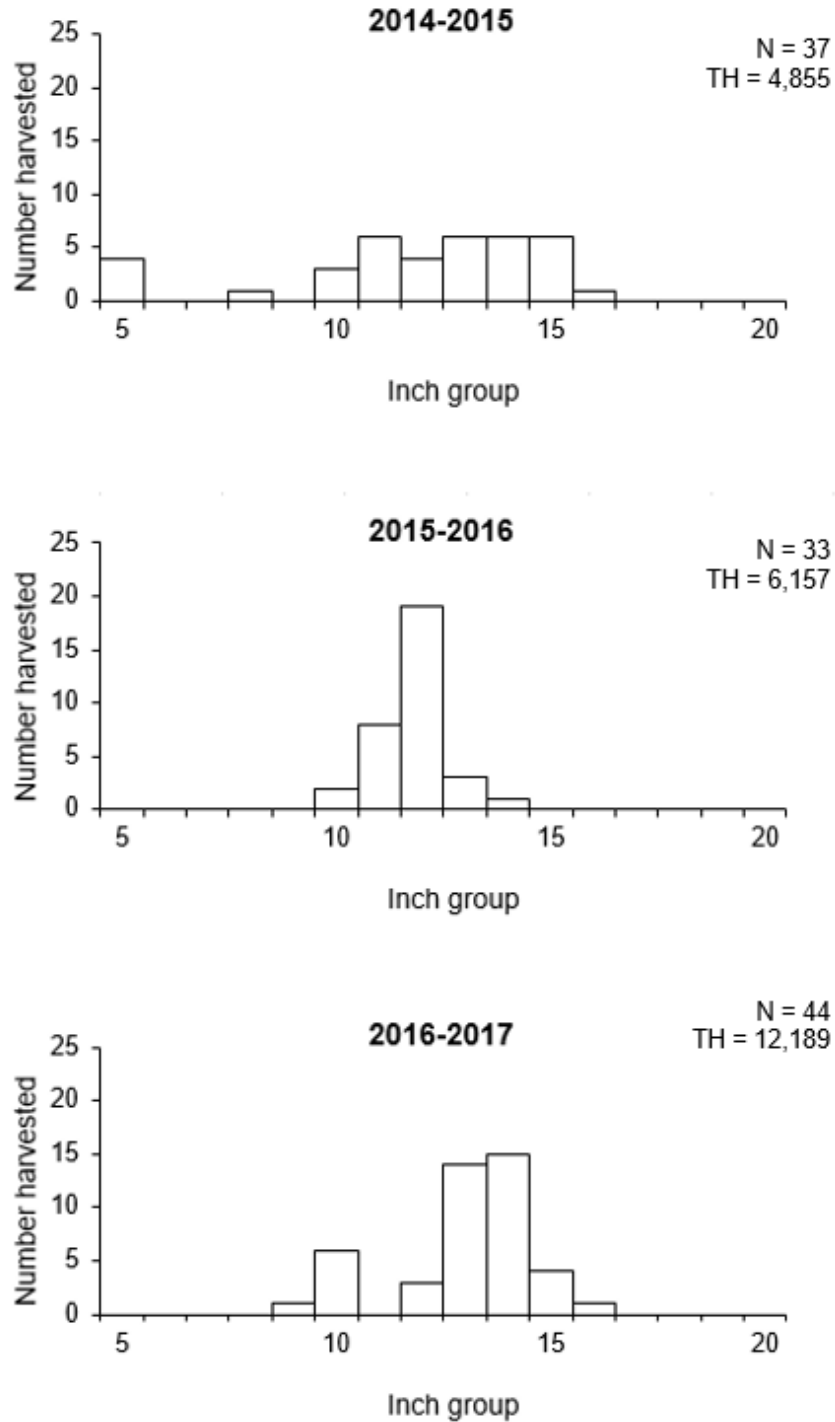


Figure 7. Length frequency of harvested White Bass observed during creel surveys at Lake Fork, Texas, June 2014 to May 2015, June 2015 to May 2016, and June 2016 to May 2017, all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

Largemouth Bass

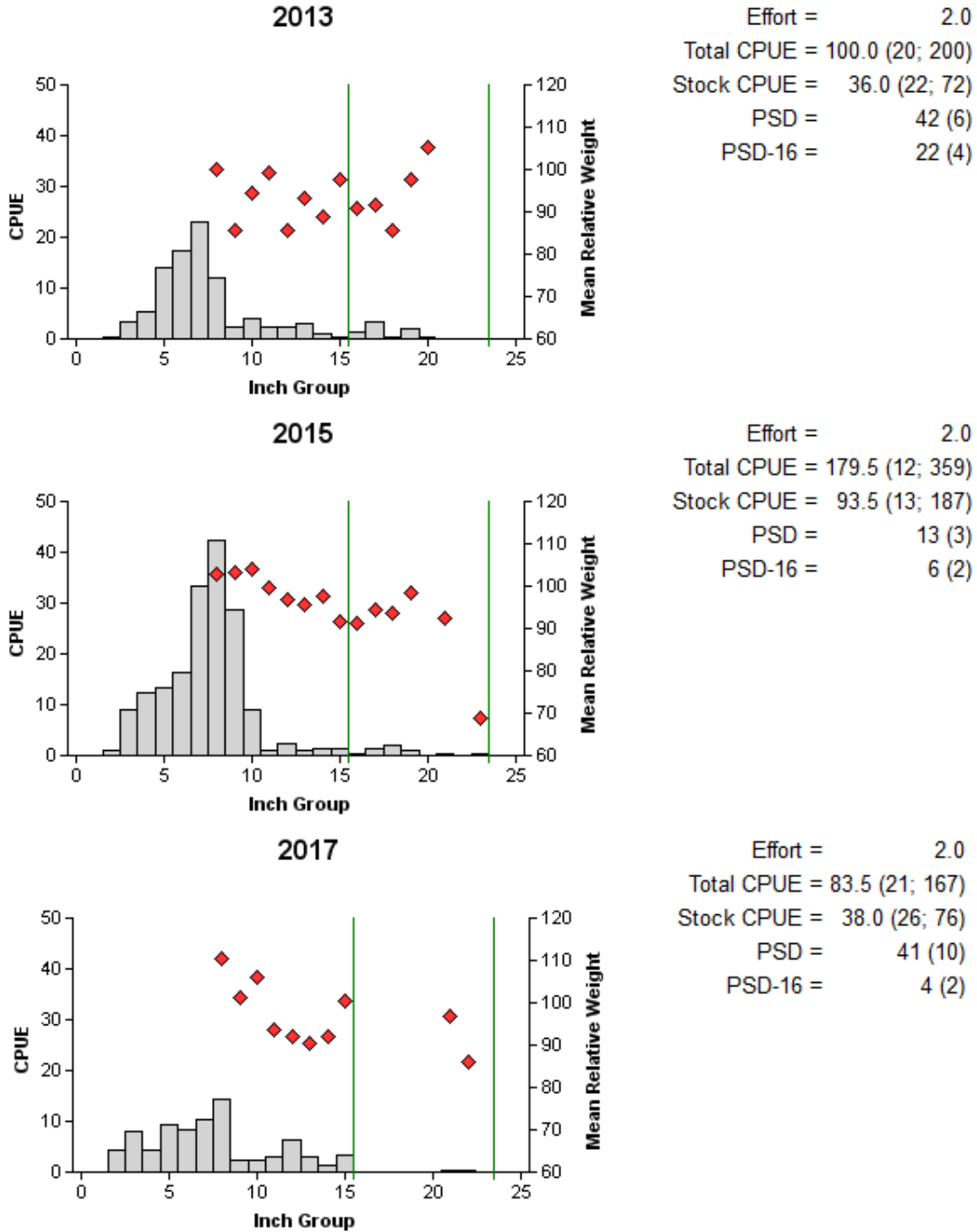


Figure 8. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for structural indices are in parentheses) for fall electrofishing surveys, Lake Fork, Texas, 2013, 2015 and 2017. Vertical lines indicate the lower and upper bounds of the protected slot length limit at time of survey.

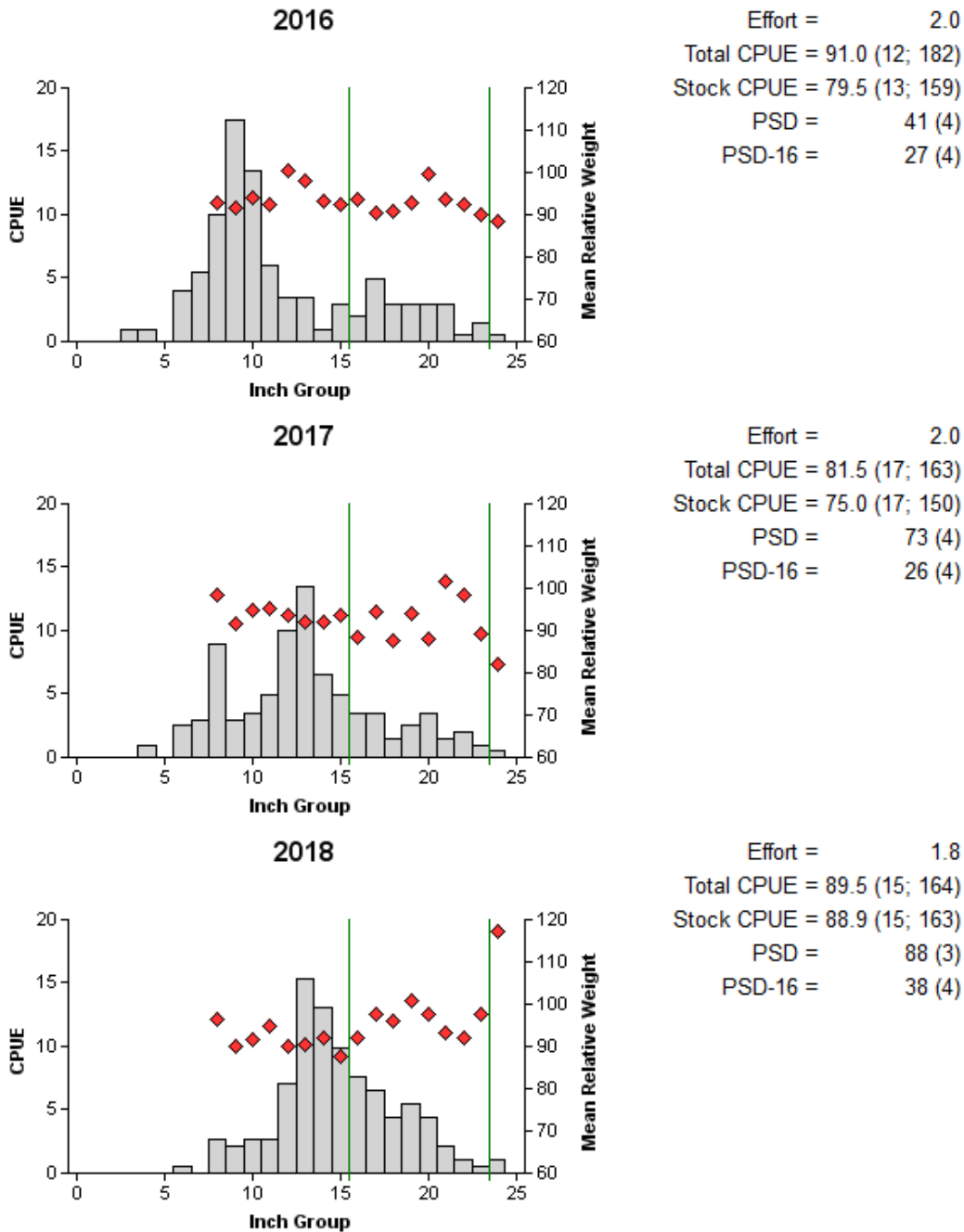


Figure 9. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for structural indices are in parentheses) for spring electrofishing surveys, Lake Fork, Texas, 2016 through 2018. Vertical lines indicate the lower and upper bounds of the protected slot length limit at time of survey.

Table 10. Creel survey statistics for Largemouth Bass at Lake Fork from 2011 through 2013 and 2014 through 2017. Survey periods were from June 1 through May 31. 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				
	2011-2012	2012-2013	2014-2015	2015-2016	2016-2017
Surface area (acres)	23,007	23,741	23,792	24,001	25,033
Directed angling effort (h)					
Tournament	68,508 (22)	253,346 (26)	211,616 (17)	422,529 (26)	245,115 (17)
Non-tournament	372,044 (16)	243,284 (20)	289,029 (14)	346,411 (25)	227,699 (17)
All bass anglers combined	440,552 (15)	496,630 (21)	500,645 (16)	768,940 (21)	472,814 (16)
Angling effort/acre	19.15 (17)	20.92 (21)	21.04 (14)	32.04 (25)	18.89 (16)
Catch rate (number/h)	0.59 (12)	0.42 (12)	0.31 (11)	0.38 (13)	0.38 (13)
Harvest					
Non-tournament harvest	4,570 (60)	789 (105)	647 (226)	1,702 (107)	3,286 (61)
Tournament weigh-in and release	21,186 (64)	32,064 (45)	17,121 (50)	55,624 (59)	18,929 (45)
Harvest*/acre	1.12 (52)	1.38 (43)	0.75 (42)	2.39 (57)	0.89 (47)
Release by weight					
<4.0 lbs	201,487 (35)	194,171 (44)	74,985 (34)	375,969 (42)	386,578 (36)
4.0-6.9 lbs	56,343 (42)	62,275 (48)	30,148 (34)	36,899 (56)	29,262 (45)
7.0-9.9 lbs	4,660 (89)	5,778 (74)	3,824 (48)	4,568 (94)	2,495 (117)
≥10.0 lbs	210 (234)	1,090 (135)	295 (93)	373 (114)	0
Percent legal released (non-tournament)	96	98	97	98	97

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

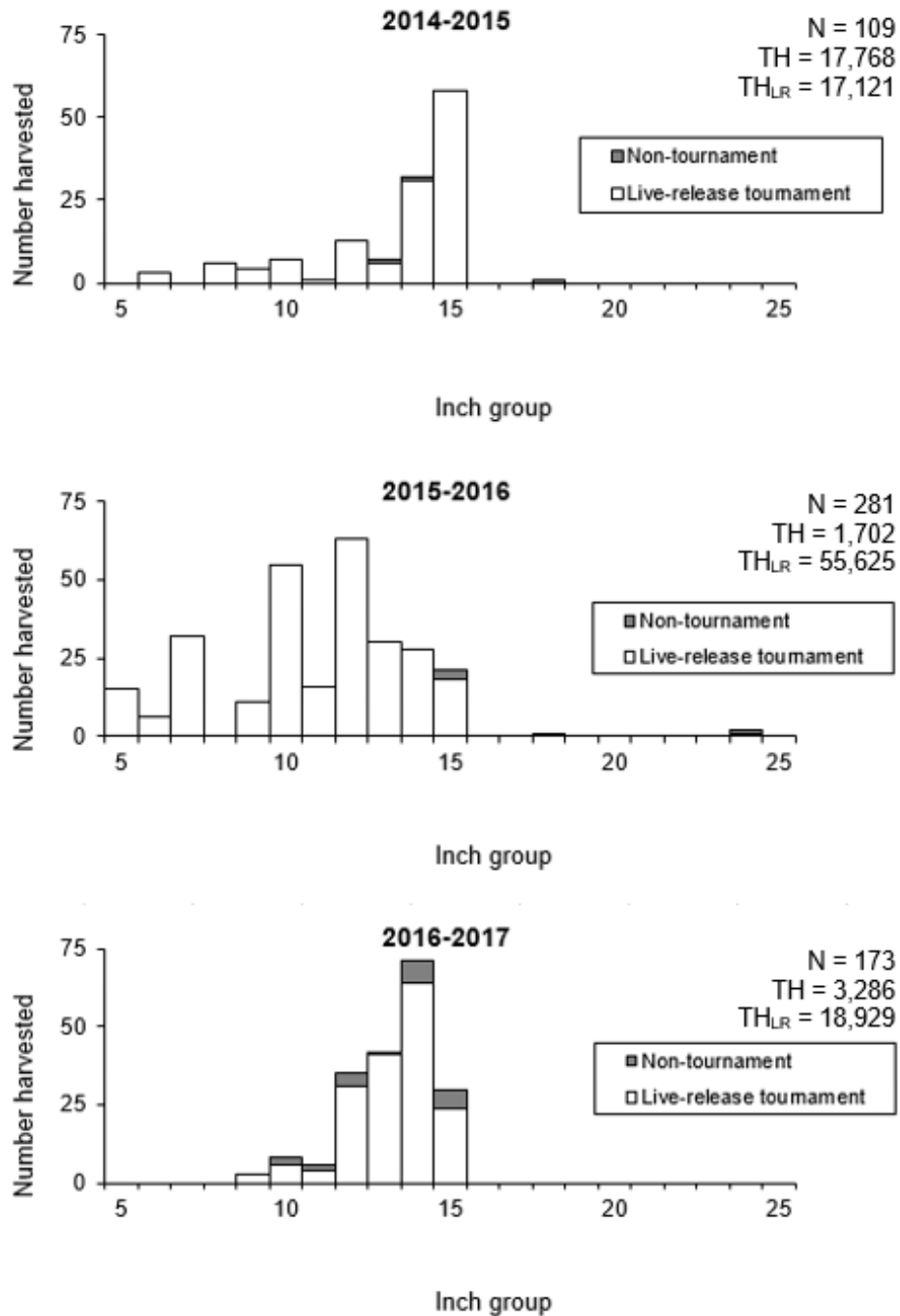


Figure 10. Length frequency of harvested Largemouth Bass observed during creel surveys at Lake Fork, Texas, June 2014 to May 2015, June 2015 to May 2016, and June 2016 to May 2017, separated by angler type. N is the number of harvested Largemouth Bass observed during creel surveys which includes fish 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.

Crappie

Table 11. Creel survey statistics for crappies (White and Black combined) at Lake Fork from 2011 through 2013 and 2014 through 2017. Survey periods were from June 1 through May 31. Total catch per hour is for anglers targeting crappies and total harvest 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				
	2011-2012	2012-2013	2014-2015	2015-2016	2016-2017
Surface area (acres)	23,007	23,741	23,792	24,001	25,033
Directed effort (h)	106,330 (20)	71,876 (22)	103,618 (20)	73,807 (24)	80,243 (22)
Directed effort/acre	4.62 (20)	3.03 (22)	4.36 (20)	2.51 (24)	3.21 (22)
Total catch per hour	2.36 (34)	0.91 (32)	1.29 (20)	1.63 (34)	1.18 (29)
Total harvest	104,809 (49)	100,882 (56)	127,055 (40)	96,994 (53)	70,910 (24)
Harvest/acre	4.56 (49)	4.25 (56)	5.34 (40)	4.04 (53)	2.83 (53)
Percent legal released	5	3	5	5	12

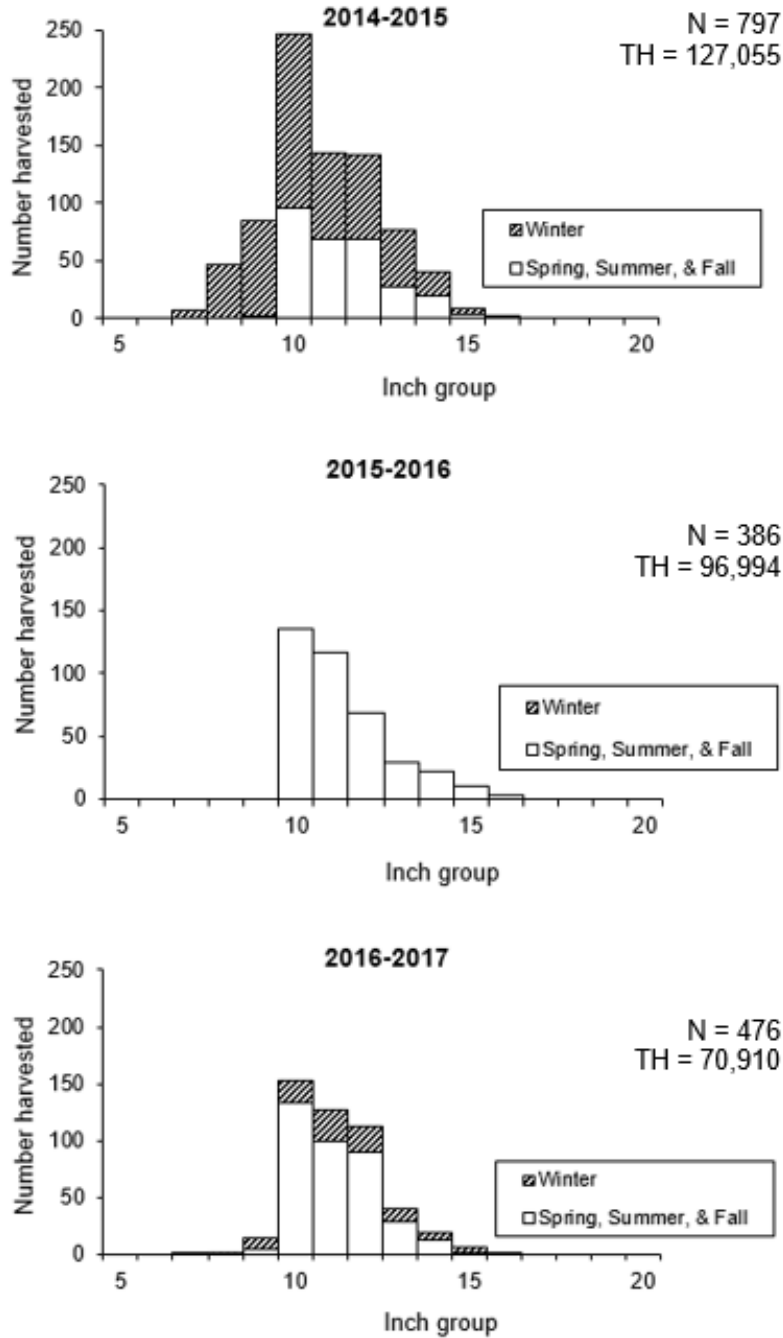


Figure 11. Length frequency of harvested crappie (White and Black Crappie combined) observed during creel surveys at Lake Fork, Texas, June 2014 to May 2015, June 2015 to May 2016, and June 2016 to May 2017, all anglers combined separated by seasonal regulation. From December 1 through the end of February there is no minimum length limit, otherwise the statewide 10-inch minimum length limit applies. N is the number of harvested crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Proposed Sampling Schedule

Table 12. Proposed sampling schedule for Lake Fork, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard surveys denoted by S and additional surveys denoted by A.

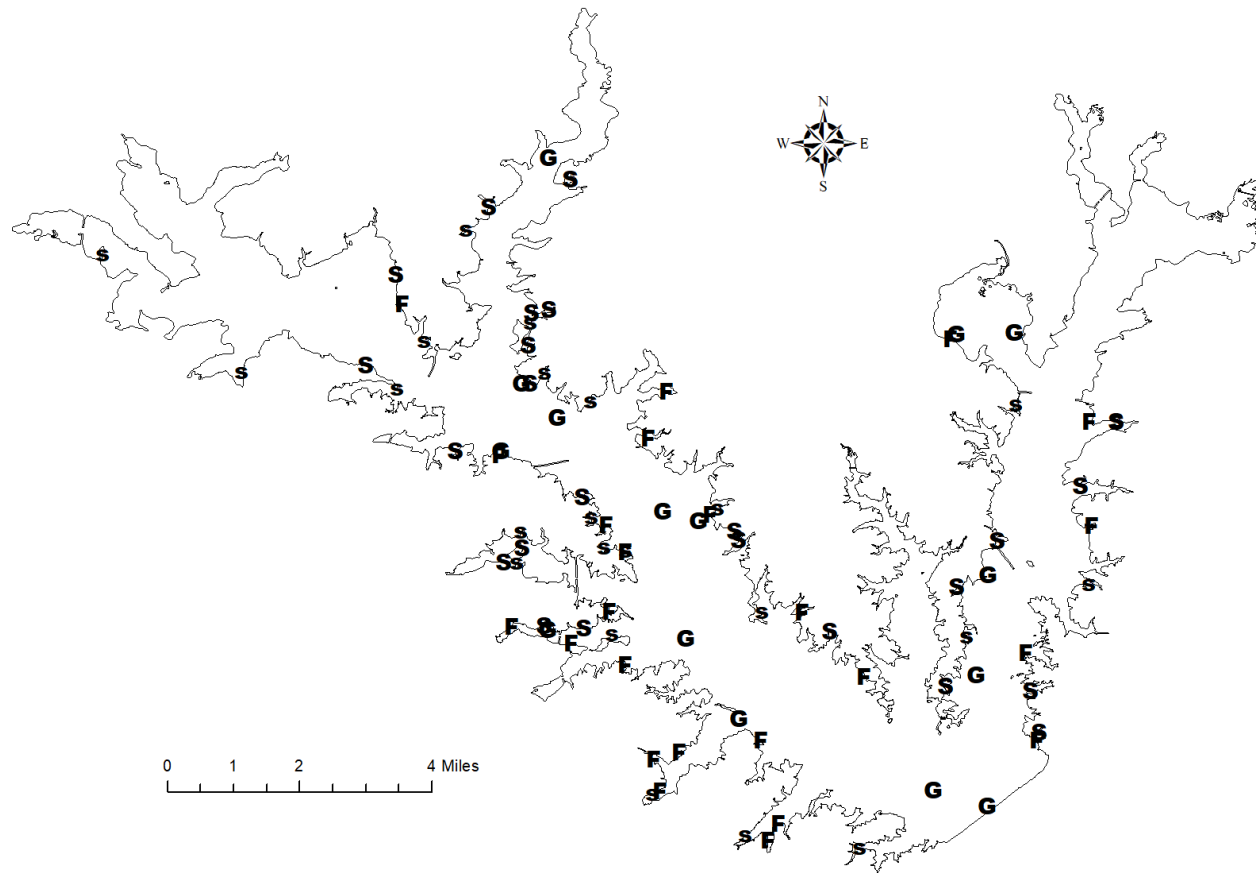
	Survey year			
	2018-2019	2019-2020	2020-2021	2021-2022
Angler Access				S
Vegetation	A	A	A	S
Electrofishing – Fall		A		S
Electrofishing – Spring		A		A
Gill netting		A		S
Creel survey	S	S		
Report		A		S

APPENDIX A – Catch rates for all species from all gear types

Number (N) and catch rate (CPUE) (RSE in parentheses) of all target species collected from all gear types from Lake Fork, Texas, 2017-2018. Sampling effort was 15 net nights for gill netting, 2 hours for spring and fall electrofishing in 2017 and 1.83 hours for spring electrofishing in 2018.

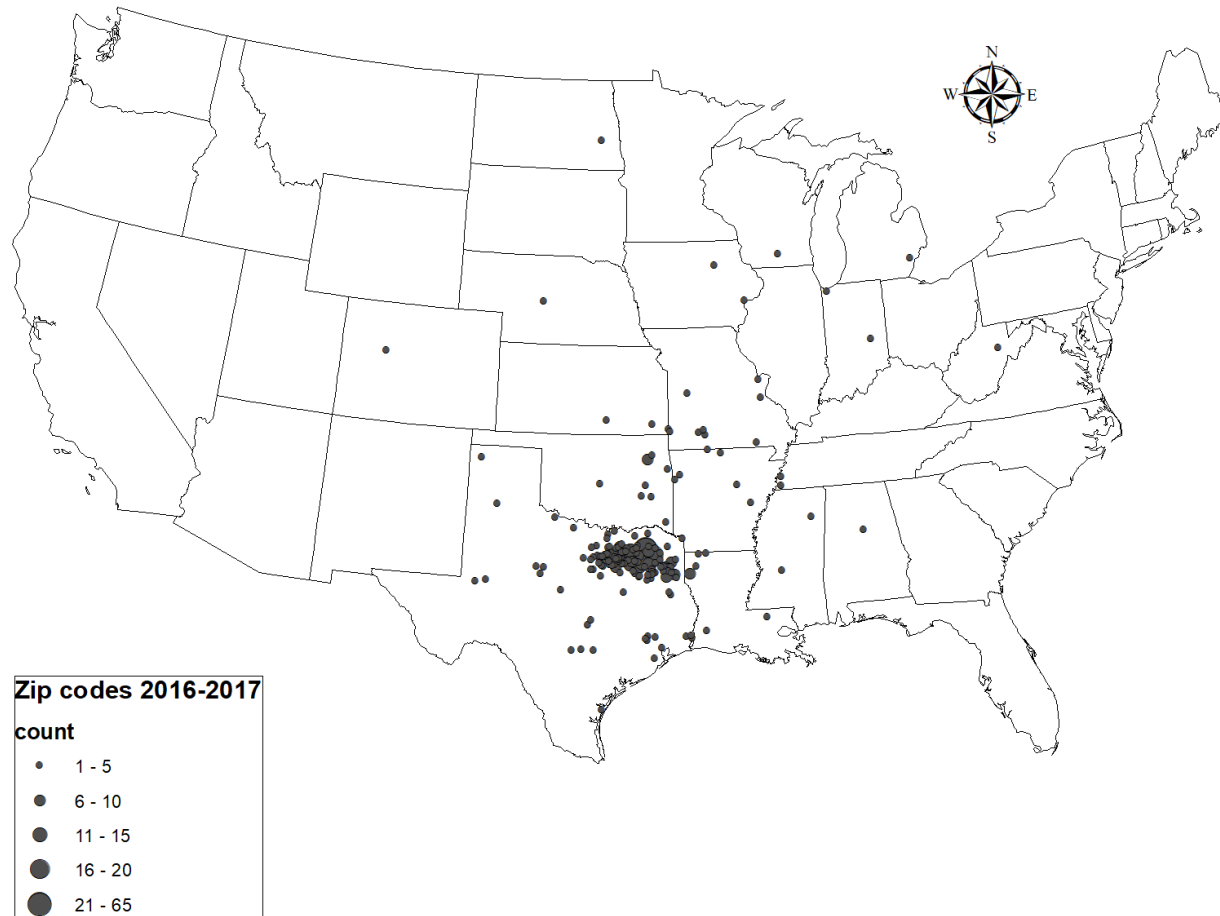
Species	Gill Netting		Electrofishing – Spring 2017		Electrofishing – Fall 2017		Electrofishing – Spring 2018	
	N	CPUE	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					305	152.5 (13)		
Threadfin Shad					973	486.5 (36)		
Common Carp	3	0.2 (53)						
Smallmouth Buffalo	6	0.4 (72)						
Blue Catfish	3	0.2 (53)						
Channel Catfish	137	9.1 (30)						
White Bass	9	0.6 (69)						
Warmouth					4	2.0 (59)		
Bluegill					342	171.0 (25)		
Longear Sunfish					30	15.0 (30)		
Redear Sunfish					75	37.5 (16)		
Largemouth Bass			163	81.5 (17)	167	83.5 (21)	164	89.5 (15)

APPENDIX B – Map of sampling locations



Location of sampling sites in fall electrofishing 2017 (F) spring electrofishing 2017 (S) and 2018 (s), and spring gill netting 2018 (G), Lake Fork, Texas, 2017-2018. Water level was near full pool at time of sampling.

APPENDIX C – ZIP code distribution



Location, by ZIP code, and frequency of anglers that were interviewed at Lake Fork, Texas, during the June 2016-May 2017 (N=759) creel surveys.

APPENDIX D – Objective-based sampling plan 2018 – 2022

Gear/ target species	Survey objective <i>Monitor trend in:</i>	Metrics	Sampling objective
<i>Electrofishing: Fall 2019 and 202, Effort = 24 stations</i>			
Largemouth Bass	Abundance	CPUE – stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Condition	W_r	10 fish/inch group (max)
	Genetics	% FLMB	N = 30, any age
Bluegill ^a	Abundance	CPUE – Total	
	Size structure	PSD, length frequency	
Redear Sunfish ^a	Abundance	CPUE – Total	
	Size structure	PSD, length frequency	
Gizzard Shad ^a	Size structure	PSD, length frequency	
	Prey availability	IOV	
<i>Electrofishing: Spring 2020 and 2022, Effort = 24 stations</i>			
Largemouth Bass	Abundance	CPUE – stock	RSE-Stock ≤ 15
	Size structure	PSD, length frequency	N ≥ 100 stock
<i>Gill netting: March – April 2020 and 2022, Effort = 15 stations</i>			
Channel Catfish	Abundance	CPUE– stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Condition	W_r	10 fish/inch group (max)
White Bass	Abundance	CPUE– stock	
	Size structure	PSD, length frequency	
	Age-and-growth	Category 2	Estimate mean age of 10-inch fish
<i>Creel survey: June 2018 – May 2020</i>			
Largemouth Bass	Characterize fishery and document trophy potential	Directed effort, angler CPUE, harvest, and release of fish by weight categories	
Catfish, Crappies & White Bass	Characterize fishery	Directed effort, angler CPUE, harvest	
<i>Vegetation survey - 2021</i>			
Native and invasive species	Abundance	Area estimates	
<i>Vegetation survey - annual</i>			
Giant salvinia and water hyacinth	Abundance	Area estimates	
	Extent	Distribution map	

^a No sampling objectives have been set for prey species so no additional sampling effort beyond that designated for Largemouth Bass will be conducted. Largemouth Bass body condition can also be used to make inferences on forage availability



Life's better outside.®

In accordance with Texas State Depository Law, this publication is available at the Texas State Publications Clearinghouse and/or Texas Depository Libraries.

© Texas Parks and Wildlife, PWD RP T3200-1293 (08/18)

TPWD receives funds from the USFWS. TPWD prohibits discrimination on the basis of race, color, religion, national origin, disability, age, and gender, pursuant to state and federal law. To request an accommodation or obtain information in an alternative format, please contact TPWD on a Text Telephone (TDD) at (512) 389-8915 or by Relay Texas at 7-1-1 or (800) 735-2989. If you believe you have been discriminated against by TPWD, please contact TPWD or the U.S. Fish and Wildlife Service, Office for Diversity and Workforce Management, 5275 Leesburg Pike, Falls Church, VA 22041.