Richland-Chambers Reservoir

2018 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

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Survey and Management Summary

Fish populations in Richland-Chambers Reservoir were surveyed in 2018 using electrofishing, and in 2019 using gill netting. Anglers were surveyed from June 2018 through May 2019 with a creel survey. Historical data are presented with the 2018-2019 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: Richland-Chambers Reservoir is a 41,356-acre reservoir (at full pool) on the Richland and Chambers Creek tributaries of the Trinity River. Boat access is adequate, but bank angler access is limited. At full pool, boats can be launched from nine boat ramps surrounding the lake, of which five are available without a fee. There are no handicap-specific facilities, but most are accessible. Aquatic vegetation was locally abundant in the lower reservoir, but scarce elsewhere.

Management History: Important sport fish include White Bass and Palmetto Bass, Largemouth Bass, Blue Catfish and Channel Catfish, and White Crappie and Black Crappie. Supplemental stocking of Largemouth Bass (genetics unknown) was conducted in 2013 and 2016. Requests for stocking of Palmetto Bass have been submitted annually and, in most years, stockings were conducted. An experimental 30- to 45-inch slot-size limit for Blue Catfish was established in 2009.

Fish Community

- **Prey species:** Threadfin Shad and Gizzard Shad continue to be the primary prey species and most Gizzard Shad were available as prey for sport fishes. Bluegill and other sunfish species provide additional prey, and most are less than 5 inches in length.
- **Catfishes:** Channel Catfish are present in the reservoir, but abundance is low compared to Blue Catfish. Blue catfish continued to support a popular fishery. Size distribution comprised a wide size range and was like previous surveys.
- **Temperate basses:** Angling effort for temperate basses has continued to decline and this group is now less sought than Largemouth Bass. Although angler harvest of White Bass has continued to decline, harvest of Palmetto Bass was the highest recorded over the past three surveys. However, without reliable stocking this species is not sustainable.
- **Largemouth Bass:** Angling effort (particularly tournament effort) for Largemouth Bass has increased and they are now the most sought-after species. Improvement in water level stability and habitat have contributed to improved reproduction and recruitment. Growth and body condition of Largemouth Bass was good; age at 14 inches was 2.1 years and most relative weights exceeded 90.
- **Crappie:** Both Black and White Crappie were present and support a popular fishery with good angler catch rate. Inclement weather in fall 2018 and spring 2019 likely influenced angler effort which was lower than previous surveys.

Management Strategies: Continue annual requests for Palmetto Bass fingerlings at 10 fish/acre. Request annual stocking of Florida Largemouth Bass fingerlings at 1,000/km of shoreline and promote stocking on social media. Investigate change in catfish harvest regulations. Continue cooperation with the controlling authority in invasive species monitoring and management.

Introduction

This document is a summary of fisheries data collected from Richland-Chambers Reservoir in 2018-2019. 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. Historical data are presented with the 2018-2019 data for comparison.

Reservoir Description

Richland-Chambers Reservoir is a 41,356-acre reservoir (at full pool) on the Richland and Chambers Creek tributaries of the Trinity River. The reservoir was completed in 1987 to provide water for municipal and industrial purposes. Aquatic vegetation has traditionally been scarce (occupying <0.5% of the reservoir area). Although both Hydrilla *Hydrilla verticillata* and Alligatorweed *Alternanthera philoxeroides* were identified in earlier surveys, only native aquatic vegetation was present in the littoral area of the reservoir in 2018. Richland-Chambers Reservoir is in the mid-range of eutrophic reservoirs in Texas with a mean TSI chl-a of 56.48 (Texas Commission on Environmental Quality 2016). The littoral zone consists of a variety of physical habitat types (Bennett and Ott 2011). Most of the shoreline is featureless (70%), while combinations consisting of bulkhead, eroded shoreline, and riprap make up the remainder. A substantial drought occurred in the watershed from 2012-2015 resulting in lower than normal water level (Figure 1). However, reservoir fluctuation has been minimal since.

Angler Access

At full pool, boat access is adequate, but bank angler access is limited. Boats can be launched from nine boat ramps surrounding the lake, of which five require no fee (Table 2). There are no ADA compliant facilities, but most are accessible. Other descriptive characteristics for Richland-Chambers Reservoir are found in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Ott and Norman 2015) included:

1. Continue to request annual stockings of Palmetto or Sunshine Bass (based on availability) at 10/acre. Conduct additional gill netting in spring of 2017 and 2019 and a creel survey during spring 2019.

   Action: Palmetto Bass *Morone chrysops x M. saxatillis* or Sunshine Bass *M. saxatillis x M. chrysops* fingerlings were requested at 10/acre annually from 2016-2019. Unfortunately, TPWD Hatcheries were not able to reliably produce enough fish to meet requests and actual stocking rate ranged from 5.3-7.6/acre; no fish were available for stocking in 2019.

2. Request annual stocking of Florida strain Largemouth Bass *Micropterus salmoides floridanus* fingerlings to maintain trophy potential. Examine Largemouth Bass growth and allele frequency every four years.

   Action: Stocking has been requested and conducted annually. Average age at legal-length was assessed for 13 specimens collected by electrofishing in Fall 2018. Because genetic data was no longer needed for stocking justification, genetic analysis was not conducted.

3. Continue to monitor the presence and coverage of exotic plant species in the reservoir through cursory inspections and a vegetation survey in 2018. Review treatment plans as submitted by property owners or the controlling authority and provide technical assistance.

   Action: A vegetation survey was conducted in 2018. No treatment plans have been submitted.

4. Continue promoting Richland-Chambers Reservoir in news releases and continue presentations to angling clubs promoting angling opportunities in the area.

   Action: Outdoor writers around the reservoir and state were provided with news releases and information about the fishery and additional stocking; lake-specific regulation posters were distributed to vendors of angling-oriented businesses in the Richland-Chambers Reservoir area.

5. Continue monitoring catfish *Ictalurus spp.* populations through biennial gill netting in 2017 and 2019, jug-line survey in winter 2015-2016 and harvest monitoring through a creel survey in 2018-2019.

   Action: Gill net sampling was conducted in spring 2017 and 2019. Experimental jug-line sampling as part of the slot-length limit evaluation was conducted in winter 2015-2106. A creel survey was conducted from June-November 2018 and March-May 2019.

6. Cooperate with the controlling authority and Richland-Chambers Wildlife Management Area staff regarding monitoring of zebra mussel *Dreissena polymorpha* samplers placed in wetland cells. Conduct outreach to educate the public about invasive species. Monitor changes to inter-basin water transfers.

   Action: Controlling authority and TPWD Wildlife Management Area staff have been provided with information regarding the potential for zebra mussel infestation. Water temperature data loggers were installed in the wetland cells to evaluate the probability that summer water temperatures would permit veliger survival. Following identification of adult zebra mussels in October 2017, TPWD and the controlling authority cooperated to develop a zebra mussel management plan. The location where zebra mussels were discovered was treated with a molluscicide. Clean-Drain-Dry posters have been distributed to major outdoor equipment retailers in the area and CLEAN DRAIN DRY stencils have been installed at access points.

Harvest regulation history: With the exception of Blue Catfish *I. furcatus*, sport fishes in Richland-Chambers Reservoir have been managed with statewide harvest regulations (Table 3). An experimental slot-length limit to protect trophy Blue Catfish went into effect in September 2009. Any size fish below 30 inches may be retained, all fish 30-45 inches in length must be released only one fish over 45 inches is allowed as part of the 25-fish daily bag limit in combination with Channel Catfish *I. punctatus*.

Stocking history: Fingerling Palmetto Bass have been requested annually for Richland-Chambers Reservoir every year since 1996; due to limited availability no stocking occurred in 2000, 2001, 2007, 2012, or 2019. Palmetto Bass fingerling stocking was supplemented with approximately 2.1 million fry in 2010. Florida Largemouth Bass were first stocked in 1988 and have been periodically stocked to maintain the trophy potential of the reservoir. Management stockings of adult Largemouth Bass (genetics unknown) was conducted in 2013 and 2016 (564 and 1,324 respectively). The complete stocking history is found in Table 4.

Vegetation/habitat management history: Richland-Chambers Reservoir has typically contained little aquatic vegetation. This is likely the result of wind action, turbidity, and high annual water level fluctuation. During the last four survey periods, substantial aquatic vegetation was only present in 2018 (Table 5) and no control action has been necessary. A structural habitat survey was completed in 2010 (Bennett and Ott 2011). No habitat enhancement projects have been conducted.

Water transfer: Richland-Chambers Reservoir was built by the Tarrant Regional Water District (TRWD) for municipal water supply. TRWD is currently a water wholesaler to more than ten counties in Texas in the Dallas and Fort Worth (DFW) metropolitan complex. The City of Corsicana has a pipeline from the reservoir to Lake Halbert to supplement the city water system. Raw water is also transferred from the

reservoir through the current East Texas Pipeline and converges with water from Cedar Creek Reservoir near Waxahachie, Texas. Water from the pipeline is available along a grid system to multiple water treatment plants in the Dallas/Fort Worth area, including Waxahachie, Midlothian, and Fort Worth.

Raw water from Richland-Chambers Reservoir has the potential to be introduced directly or indirectly into reservoirs Bardwell, Benbrook, Halbert, Joe Pool, Mountain Creek, Arlington, Eagle Mountain, and Lake Worth; all with subsequent return into the Trinity River. The TRWD also maintains a pumping station on the Trinity River to filter raw river water through wetland cells before transmission through an additional pumping station into Richland-Chambers. However, pumping was temporarily discontinued after flooding in spring 2015 damaged the intake pumps but was re-established in 2018. The TRWD and the City of Dallas Water Utilities have partnered to construct an Integrated Pipeline (IPL) Project, which will create further connections between municipalities and reservoirs including Lake Palestine. This system came online in spring 2018 following installation of a chloramine injection facility at the Richland-Chambers intake.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Richland-Chambers 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 2017).

Electrofishing – Largemouth Bass, sunfishes *Lepomis spp.*, Gizzard Shad *Dorosoma cepedianum*, and Threadfin Shad *D. petenense* were collected by day time electrofishing (2 hour at 24, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fishes caught per hour (fish/h) of actual electrofishing. Ages for Largemouth Bass were determined using otoliths from 13 randomly-selected fish (range 13.0 to 14.6 inches).

Gill netting – Channel Catfish, White Bass, and Palmetto Bass were collected by gill netting (10 net nights at 10 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). Palmetto Bass PSD was calculated according to Dumont and Neely (2011). 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 access-point creel survey was conducted from June through November 2018 and March through May 2019. Angler interviews were conducted on five weekend days and four 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 2017).

Habitat – A structural habitat survey was conducted in 2010 (Bennett and Ott 2011). A vegetation survey was conducted in August 2018 to monitor changes in coverage and species distribution. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised).

Water level – Source for water level data was the United States Geological Survey (USGS 2019).

Results and Discussion

Habitat: A vegetation survey of the littoral zone was conducted in 2018. A prolonged drought occurred from 2012 through early 2015. However, since that time water level has stabilized near conservation pool (Figure 1). Limited exposure of littoral zone to desiccation had allowed native submersed species

including Water stargrass *Heteranthera dubia* and pondweed *Potamogeton spp*. to become locally abundant in the 309 flats area (Table 6). American lotus *Nelumbo lutea*, has become locally abundant in the Cedar Creek arm. However, overall coverage of aquatic vegetation was only approximately 0.5% of the reservoir area. Alligatorweed and Hydrilla, identified in previous surveys, were not detected in 2018. Terrestrial vegetation such as Black willow *Salix nigra* and Winged elm *Ulnus alata* that had grown in the littoral zone during the drought were inundated following water level recovery and have continued to provide excellent littoral habitat.

Creel: Total fishing effort (54,503 hours) and total directed expenditures ($582,367) declined substantially from the previous survey in 2014-2015 (Table 8). Unusually high storm activity during fall 2018 and spring 2019 likely accounted for some of the observed declines in total effort and expenditures (9 out of 27 creel days resulted in zero to low numbers of angler interview interceptions).

Prey species: Primary prey species included Threadfin and Gizzard Shad, and Bluegill *L. macrochirus*. Combined catch rates of Threadfin and Gizzard Shad were high (2,856/h) (Appendix A) and most Gizzard Shad were available as prey (IOV=79; Figure 2). However, combined sunfish catch rate was only 59.0/hour (Appendix A). Species collected included Bluegill, Longear Sunfish *L. megalotis, and* Redear Sunfish *L. microlophus*. Although Bluegill up to 7 inches in length were collected by electrofishing (Figure 3), little directed angling effort (2%) toward sunfish was observed during the 2018-2019 creel period (Table 7).

Catfishes: The percentage of total angler effort for catfishes (7%) was roughly half of the 16% and 13% documented in the previous two surveys (Table 7). Anglers harvested an estimated 8,768 catfishes (Blue and Channel Catfish combined) during the 2018-2019 survey (Table 9) and Blue Catfish continued to be the dominant species harvested. Angler catch rate of catfishes (1.4/hour) was similar to 1.8/hour in 2014-2015 and was over double the 0.6 per hour in 2010-2011. As in previous surveys most of the Blue Catfish harvested were 14-17 inches in length (Figure 6). Few Blue Catfish larger than 20 inches in length were harvested and none $\geq$ 45 inches were observed in the creel survey. Channel Catfish made up approximately 25% of the total catfish harvest and some illegal harvest of sub 12-inch Channel Catfish was observed during the creel survey (Figure 7). It is likely that species misidentification accounted for some of the illegal harvest as Blue Catfish <30 inches in length may be legally retained.

Gill net catch rate of Blue Catfish in 2019 (19.0/nn) was lower than previous surveys (25.2/nn in 2015 and 28.5/nn in 2017) (Figure 4). Although PSD-30 has continued to climb incrementally under protection from the slot-length limit, no specimens $\geq$ 45 inch have been collected. Relative weight (Wr) was at or above 90 for all size classes and suggest adequate prey availability. Despite good body condition, prior surveys have documented Blue Catfish take a decade to reach quality size (>20 inches), and fifteen or more years to grow into the protected slot-size (Bennett and Ott 2011). Channel Catfish (although present) continued to represent a low-density fishery and were substantially less abundant than Blue Catfish, with gill net CPUE ranging from 1.3/nn in the current survey to 1.2/nn in the 2017 sample (Figure 5).

Temperate basses: Temperate basses *Morone spp*. were the second most sought-after species group at Richland-Chambers Reservoir; accounting for 27% of the total directed angling effort (Table 7). Directed angling-effort was roughly half of the previous survey but angler catch rate was similar (Table 10). Harvest of White Bass has declined substantially compared to previous surveys, but harvest of Palmetto Bass was the highest recorded in recent history; most were in the 18-21 inch groups (Figure 11). Fifteen percent of the legal-length temperate basses were released.

Although White Bass were present in the current survey, low precision of CPUE estimates (Figure 8) limits reliability of conclusions regarding relative abundance. Overall size distribution has been bi-modal in all three of the recent samples suggesting multiple year classes and reliable annual recruitment. However, mean relative weight was at or above 90 for all inch classes and is indicative of adequate prey abundance.

Gill net catch rate of Palmetto Bass (4.1/nn) was also relatively low and poor precision of CPUE estimates limit reliability of comparing relative abundance to earlier surveys. However, the multi-modal size

distribution suggests survival of fingerlings stocked in 2018, 2017, and possibly 2016 (Figure 9). Full rate of 10 fingerlings per acre has not been achieved since 2015 (Table 4) but even the reduced rate stockings in 2016, 2017, and 2018 have at least maintained a population. It is worth noting that inclement weather during the last three years, restricted stocking activity to distribution at the boat ramp rather than from boat and this may have influenced survival. Relative weight ranged from 80-93 and was sub-optimal considering the availability of prey.

Largemouth Bass: Largemouth Bass moved from the second most sought-after species to first accounting for approximately 52% of total directed effort (Table 7). Although directed effort for non-tournament anglers was like previous surveys, tournament activity nearly doubled and accounted for 72% of the effort directed toward Largemouth Bass (Table 11). Three major tournament events were captured during the current creel survey and likely accounted for the shift in directed effort. Angling catch rate for tournament and non-tournament anglers combined was like previous years at 0.5/h. Estimated harvest was minimal; all tournament caught fish were assumed to be caught and released and 95% of the legal-length Largemouth Bass caught by non-tournament anglers were released. Anglers reported most (96%) of the caught-and-released fish were < 4 lbs., 4% were 4.0-6.9 lbs.; there was no reported catch of fish > 7.0 lbs.

Richland-Chambers Reservoir has historically exhibited low nighttime electrofishing catch rates (Bennett and Ott 2011); due to this result the past two surveys have been conducted during daylight hours. Electrofishing catch rate in fall 2018 (50.0/h) was substantially above the 7.5/nn reported in 2014. However, any perceived increase in relative abundance must be measured against differences in sampling efficiency due to water level which was nine feet below conservation pool in 2014 compared to near full pool in 2018 (Figure 1). Size distribution in the current survey was very good (PSD=64; PSD-14=42 with evidence of a strong 2018 year-class; Figure 12). Strong recruitment is likely due to stabilization of water level and improvement in littoral habitat relative to past surveys. Relative weight was above 90 for most inch classes (the exception being one 15-inch specimen) and is indicative of excellent prey availability (Appendix A). Average age of Largemouth Bass at 14 inches (13.0-14.6) was 2.1 years (N=13, range 1-3 years).

Crappie: The percentage of effort for crappie *Pomoxis spp.* relative to other species has declined compared to previous surveys and was only 9% of the directed effort in 2018-2019 (Table 7). The magnitude of effort directed toward crappie was roughly 1/3 of that in previous surveys (Table 12) yet angling success (1.4/h; species combined) was similar (Table 12). As discussed earlier inclement weather in fall 2018 and spring 2019 likely contributed to the decline in angler effort. Angler harvest of White Crappie *P. annularis* was slightly higher than Black Crappie *P. nigromaculatus* but size distribution of the two species was similar (Figures 12 and 13).

Fisheries Management Plan for Richland-Chambers Reservoir, Texas

Prepared – July 2019

ISSUE 1: Stockings of Palmetto Bass (combined with natural recruitment of White Bass) have developed an excellent fishery that is utilized by many anglers and represents the second most popular fishery of the reservoir. Due to consumptive nature of the fishery, annual stockings of Palmetto Bass are required.

MANAGEMENT STRATEGIES

1. Continue to request annual stockings of Palmetto or Sunshine Bass (based on availability) at 10/acre.
2. Promote stocking through social media to maintain angler enthusiasm.

ISSUE 2: Stabilization of water level and habitat improvements improve the probability of survival for Florida Largemouth Bass fingerlings. Increase in directed effort by anglers (particularly tournament anglers) is likely related. Anglers have submitted four Legacy Class ShareLunkers from Richland-Chambers Reservoir; the most recent in 2008. Under these conditions stocking with Florida strain Largemouth Bass may be used to increase the trophy potential of the reservoir and to promote the fishery.

MANAGEMENT STRATEGIES

1. If current littoral habitat persists or improves further, continue to request annual stocking of FLMB fingerlings at 1,000/km of shoreline to maintain trophy potential.
2. Promote stocking through social media to maintain angler enthusiasm.

ISSUE 3: Stabilization of water level has contributed to improved littoral habitat and aquatic vegetation coverage.

MANAGEMENT STRATEGIES

1. Continue to monitor the presence and coverage of native and exotic plant species through cursory inspections during sampling in 2021 and conduct a comprehensive survey in 2023.
2. If exotic species do become problematic, review treatment plans as submitted by property owners or the controlling authority and provide technical assistance.

ISSUE 4: Catfishes have been an important component of the overall fishery. As a result, an experimental 30- to 45-inch slot-length limit for Blue Catfish was implemented in September 2009 to improve trophy potential. Although fish in the protected size range have increased in gill net samples over the 10 years since implementation, there is little evidence that fish are growing through the protected size range.

MANAGEMENT STRATEGIES

1. Recommend removal of current size limit and replace with an appropriate regulation once the suite of new regulations are finalized by the Catfish Management Regulation Committee.

ISSUE 6: 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 S*alvinia molesta* Hydrilla and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and

swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Maintain communication with Richland-Chambers Wildlife Management Area staff regarding monitoring of zebra mussel samplers placed in wetland cells.
3. Continue to monitor the presence and coverage of native and exotic plant species through reconnaissance inspections conducted during sampling in 2021 and a comprehensive survey in 2023.
4. If exotic species do become problematic, review treatment plans as submitted by property owners or the controlling authority and provide technical assistance.
5. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc… so that they can in turn educate their customers.
6. Educate the public about invasive species using media and the internet.
7. Make a speaking point about invasive species when presenting to constituent and user groups.
8. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

Objective-Based Sampling Plan and Schedule (2019–2023)

Sport fishes in Richland-Chambers Reservoir include Blue and Channel Catfish, White and Palmetto Bass, Largemouth Bass; and Black and White Crappie. Important forage species include Gizzard and Threadfin Shad, and Bluegill.

Low-density or underutilized fisheries
All sport fish species at Richland-Chambers Reservoir contribute to the overall fishery and justify sampling effort.

Survey objectives, fisheries metrics, and sampling objectives

Crappie: During the 2018-2019 creel survey crappie represented 9% of the directed angler effort and was the fourth most popular fishery. Although both White and Black crappies were harvested, White Crappie were the most abundant in angler creels. Historically, crappie have been sampled every four years with 15 single-cod, shoreline set trap nets in late fall, with stock-size catch rates ranging from 1.1 – 2.5/nn (Ott and Norman 2015). This level of sampling did not reliably provide acceptable precision (RSE < 25, N $\geq$ 50). Although it would be possible to set enough extra nets to reach this goal at least 80% of the time the effort necessary does not justify the results. As a substitute the crappie fishery will be monitored by a creel survey in 2022-2023. Creel survey will be an access-based design consisting of four weekdays and five weekend days selected at random during the summer (June-August), fall (September-November) and spring (March-May) quarters.

Palmetto Bass: Directed angling effort for temperate basses was 27% of the total in 2018-2019 creel survey. Gill net sampling has been conducted on a biennial basis and catch rates of stock-sized Palmetto Bass have ranged from 0.5/nn to 3.1/nn with 10 or 15 net nights of effort. However, bootstrap analysis of data from the previous two surveys (2015, 2017) suggest a large amount of effort (50 - 60 randomly-selected gill net nights) would be required to obtain reliable PSD and CPUE estimates providing RSE < 25; N stock < 50. Therefore, ten randomly-selected gill net sites will be sampled in the spring 2021 and 2023 to detect presence/absence of Palmetto Bass and document stocking success using the same

sampling intensity as that of Blue Catfish. Fishery results will be recorded based on an access-based creel design in 2022-2023 consisting of 4 weekdays and 5 weekend days selected at random during the summer (June-August), fall (September-November) and spring (March-May) quarters.

White Bass: Directed angling effort for temperate basses was 27% of the total in 2018-2019 creel survey. White Bass have been historically sampled at the same intensity as Palmetto Bass. Catch rates for stock-sized specimens in three most recent surveys were 1.2, 1.6, and 2.5/nn and the effort required to achieve RSE < 25; N stock < 50 is excessive. Therefore, in accordance with the Blue Catfish sampling efforts 10 gill net sites will be sampled in spring 2021 and 2023 with results reported as presence/absence only. Fishery results will be reported based on an access-based design in 2022-2023 consisting of four weekdays and five weekend days selected at random during the summer (June-August), fall (September-November) and spring (March-May) quarters.

Blue Catfish: Blue and Channel Catfish combined accounted for 7% of directed angler effort during the 2018-2019 creel survey. Blue Catfish have been historically collected in biennial gill net surveys at 10 to 15 net nights of effort. Over the past three surveys CPUE stock has ranged from 11.2 to 19.2/net night and bootstrap analysis suggests that effort needed to describe PSD and CPUE at the desired level (N> 50, RSE <25) could be achieved with 5-12 nets. Ten gill net nights of effort achieved the target precision in spring 2019. Therefore, the relative abundance and stock distribution of Blue Catfish will continue to be monitored in the spring of 2021 and 2023 with 10 net nights of effort each year. All specimens stock-length and greater will be individually measured and weighed. Length data will be used to describe PSD; weight data will be used to estimate relative weight by inch-group. The fishery will be monitored with an access-based creel in 2022-2023 consisting of four weekdays and five weekend days selected at random during the summer (June-August), fall (September-November) and spring (March-May) quarters.

Channel Catfish: Blue and Channel Catfish combined accounted for 7% of directed angler effort during the 2018-2019 creel survey. Channel Catfish gill net catch rate of stock size specimens have ranged from 1.2-1.3/nn in the past three past surveys and RSEs have ranged from 40-70 despite 10 or 15 net nights of effort. Channel Catfish are a minor part of the fishery; the level of effort necessary to collect reliable population metrics is excessive. Therefore, Channel Catfish will be monitored in spring 2021 and 2023 at the same sampling intensity as described for Blue Catfish, results reported as presence/absence only, while the fishery will be described in creel results.

Largemouth Bass: Largemouth Bass were the most sought species in the 2018-2019 creel survey accounting for 52% of the directed effort. The majority (72%) of the effort was tournament-related. Unfortunately, Largemouth Bass abundance is limited by turbidity combined with water level fluctuation which limits littoral habitat. Nighttime surveys consisting of 24 (randomly selected), 5-minute electrofishing stations conducted in 2010 and 2014 produced stock-size CPUE's ranging from 13.1 to 14.6 fish/h (with RSE's from 25 to 27). Daytime surveys with the same level of effort conducted in 2014 and 2018 exhibited similar low stock size CPUE's (3.5 and 14.5, respectively) but still with acceptable RSE's (26 and 29). This suggests that 24 randomly selected stations is adequately estimating relative abundance and size distribution. Therefore, Largemouth Bass population trend data will be monitored in the fall of 2022 with 24, 5-minute daytime stations for relative abundance, size structure, and condition. Additional biologist-selected stations will be added if necessary to collect a sample of 13 specimens 13-14.9 inches in length for age-and-growth; additional stations will not be included in CPUE estimates. All specimens stock length and greater will be individually measured and weighed. Length data will be used to describe PSD; weight data will be used to estimate *Wr* by inch-group. The resulting fishery will be monitored with an access-based creel in 2022-2023 consisting of 4 weekdays and 5 weekend days selected at random during the summer (June-August), fall (September-November) and spring (March-May) quarters.

Forage species: Threadfin and Gizzard Shad, and to a lesser extent Bluegill are the primary forage species at Richland-Chambers Reservoir. Relative abundance, size distribution, PSD, and IOV have been collected every four years since 1988. Gizzard Shad CPUE has been relatively consistent, ranging from 163 to 198 with IOV > 79 in the past four surveys (both daytime and nighttime sampling). Bluegill CPUE has been more variable (ranging from 15 to 120/h) during the same period but unrelated to day or

night sampling and with higher RSEs than Gizzard Shad. Gizzard Shad and Bluegill will be sampled during the day in fall 2022 at the same intensity as is proposed for Largemouth Bass to provide documentation of presence/absence Length data will be used to describe PSD and IOV. Relative weight estimates for Largemouth Bass will be used for supplemental qualitative assessment of prey suitability.

Habitat: Alligatorweed *Alternanthera philoxeroides* and Hydrilla have been identified in the past and individual subdivisions have submitted Aquatic Vegetation Treatment Plans for limited control of Hydrilla. Giant Reed was the only non-native species detected and was similar in coverage to previous surveys. American Lotus and Water Stargrass have been locally abundant and provide valuable habitat. However, reservoir wide coverage of any aquatic plant species has historically been low. Cursory inspection of aquatic vegetation will be conducted during fish community sampling in 2021 and a complete-reservoir comprehensive vegetation survey will be conducted in 2022,

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Tables and Figures

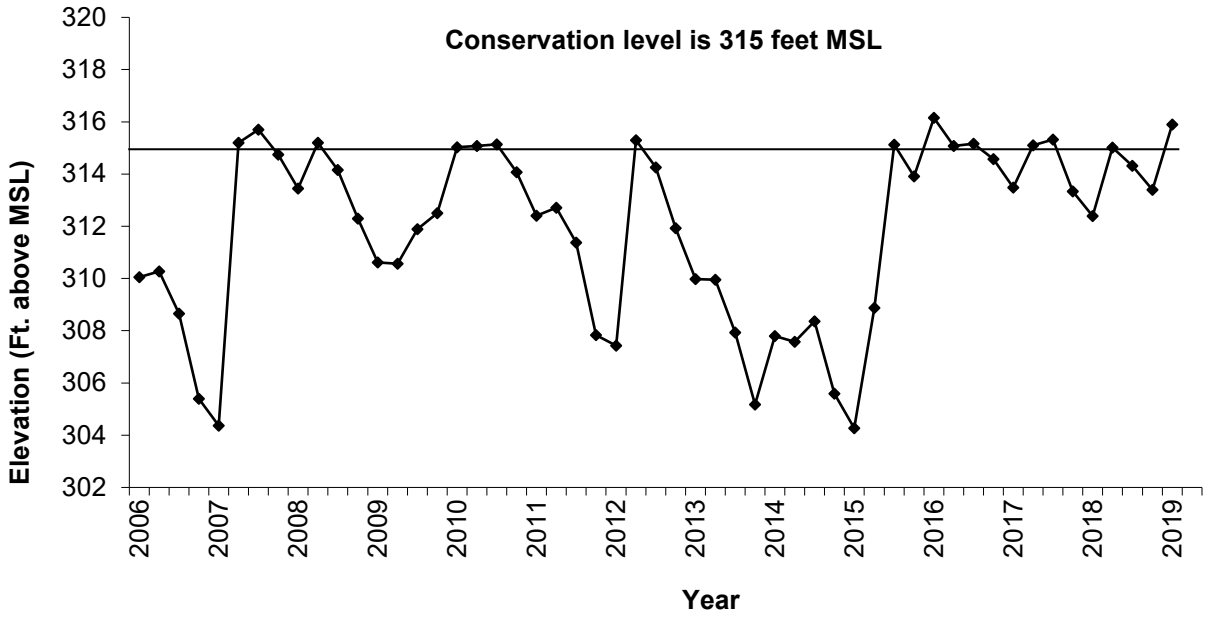


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Richland-Chambers Reservoir, Texas

Table 1. Characteristics of Richland-Chambers Reservoir, Texas.

Characteristic	Description
Year constructed	1987
Controlling authority	Tarrant Regional Water District
Counties	Freestone (dam), Navarro
Reservoir type	Tributary
Shoreline Development Index (SDI)	11.2
Conductivity	300 umhos/cm

Table 2. Boat ramp characteristics for Richland-Chambers Reservoir, Texas, August 2018. Reservoir elevation at time of survey was 315 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft.)	Condition
Cedar Creek	32.03087 -96.27554	Y	30	NA	Good access
Sunset Cove Marina	32.04856 -96.26393	Y/fee	10	NA	Good access
FM 2859	32.06318 -96.23896	Y	20	NA	Good access
Cheneyboro	31.94983 -96.34936	Y	10	NA	Good access
Crab Creek	31.96771 -96.31576	Y	10	NA	Good access
Oak Cove Marina	32.00437 -96.21558	Y/fee	200	304.5	Good access
Harbor Inn Marina	31.99040 -96.21402	Y/fee	20	NA	Good access
Highway 309 Park	31.99105 -96.13688	Y	20	NA	Good access
Fisherman's Point	31.93896 -96.12474	Y/fee	40	303.0	Good access
Reservoir Office	31.93766 96.11737	N	20	306.0	Restricted access

Table 3. Harvest regulations for Richland-Chambers Reservoir, Texas.

Species	Bag Limit	Length limit
Catfish, Blue	25[a] (1 fish 45 inches or longer)	30 – 45-inch Slot-Length Limit[b]
Catfish, Channel	25[a]	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Palmetto	5	18-inch minimum
Bass, Largemouth	5	14-inch minimum
Crappie, White and Black	25 (in any combination)	10-inch minimum

[a] The daily bag limit for Channel and Blue Catfish is 25 in any combination.

[b] No fish can be retained between 30 and 45 inches.

Table 4. Stocking history of Richland-Chambers Reservoir, Texas. FGL = fingerling; ADL=adult

Species	Year	Number Stocked	Size
Catfish, Blue	1988	42,750	FGL
	1988	4,222	ADL
	Total	46,972	
Catfish, Channel	1988	193,202	FRY
Bass, Palmetto (White x Striped)	1996	100,861	FGL
	1997	117,576	FGL
	1998	227,618	FGL
	1999	225,598	FGL
	2002	112,070	FGL
	2003	103,300	FGL
	2004	205,895	FGL
	2005	413,686	FGL
	2006	150,753	FGL
	2008	415,646	FGL
	2009	249,657	FGL
	2010	64,036	FGL
	2010	2,072,137	FRY
	2011	100,602	FGL
	2013	304,917	FGL
	2014	387,327	FGL
	2015	422,287	FGL
	2016	244,543	FGL
	2017	221,095	FGL
	2018	313,260	FGL
	2019	0	
	Total	6,452,864	
Bluegill, Coppernose	1988	659,598	FGL
	1989	1,042,071	FGL
	Total	1,701,669	

Continued next page…..

Table 4. continued

Species	Year	Number Stocked	Size
Bass, Florida Largemouth	1988	547,329	FGL
	1989	1,114,186	FRY
	1991	160,317	FRY
	1991	339,000	FGL
	1999	644	FGL
	2001	485,519	FGL
	2002	423,715	FGL
	2006	420,129	FGL
	2007	501,630	FGL
	2010	377,318	FGL
	2011	500,538	FGL
	2015	236,700	FGL
	2016	300,122	FGL
	2018	313,260	FGL
	2019	0	
	Total	5,720,407	
Bass, ShareLunker	2008	9,739	FGL
Bass, Largemouth	2013	564	ADL
	2016	1,324	ADL
	Total	1,888	

Table 5. Objective-based sampling components for Richland-Chambers Reservoir, Texas 2018–2019.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Abundance	CPUE–Stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Age-and-growth	Age at 14 inches	N = 13, 13.0 – 14.9 inches
	Condition	Wr	10 fish/inch group (max)
Bluegill [a]	Abundance	CPUE–Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
Gizzard Shad [a]	Abundance	CPUE–Total	RSE ≤ 25
	Prey availability	IOV	N ≥ 50
Gill netting			
Blue Catfish	Abundance	CPUE–stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
Channel Catfish	Presence-absence		
Temperate basses	Presence-absence		

[a] No additional effort will be expended to achieve an RSE ≤ 25 for CPUE of Bluegill and Gizzard Shad if not reached from designated Largemouth Bass sampling effort. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density.

Table 6. Surveys of aquatic vegetation, Richland-Chambers, Texas, 2006–2018. Surface area (acres) is listed with percent of total reservoir surface area in parentheses. Tr indicates trace amount.

Vegetation	2006	2010	2014	2018
Native submersed	1 (0.01)	36 (0.10)		129 (0.30)
Coontail		<1 (0.01)	Tr	
Muskgrass		1 (0.01)	Tr	
Pondweed		34 (0.08)	Tr	31 (0.07)
Water stargrass		2 (0.01)	Tr	98 (0.23)
Native emergent			0 (0.00)[1]	79 (0.19)
American lotus				79 (0.19)
Non-native	1 (0.01)	44 (0.11)		
Alligatorweed (Tier III)*		4 (0.01)	Tr	
Hydrilla (Tier II)*	1 (0.01)	40 (0.10)	Tr	

*Tier II is Maintenance Status, Tier III is Watch Status

1 Emergent species were identified but not quantified because they were growing above water level.

Table 7. Percent directed angler effort by species for Richland-Chambers Reservoir, Texas, 2010–2019. Survey periods were from 1 June through 30 November and 1 March through 31 May*.

Species	2010/2011*	2014/2015	2018/2019
Catfishes	16	13	7
Temperate Basses	39	36	27
Largemouth Bass	19	25	52
Crappies	16	19	9
Sunfishes	0	0	2
Anything	10	7	3

*Winter quarter included in 2010-2011 creel survey.

Table 8. Total fishing effort (h) for all species and total directed expenditures at Richland-Chambers Reservoir, Texas, 2010-2019. Survey periods were from 1 June through 30 November and 1 March-31 May. Relative standard error is in parentheses.

Creel statistic	2010/2011*	2014/2015	2018/2019
Total fishing effort	87,679 (19)	76,999 (20)	54,503 (24)
Total directed expenditures	$1,021,728 (31)	$754,674 (35)	$582,367 (39)

*Winter quarter included in 2010-2011 creel survey.

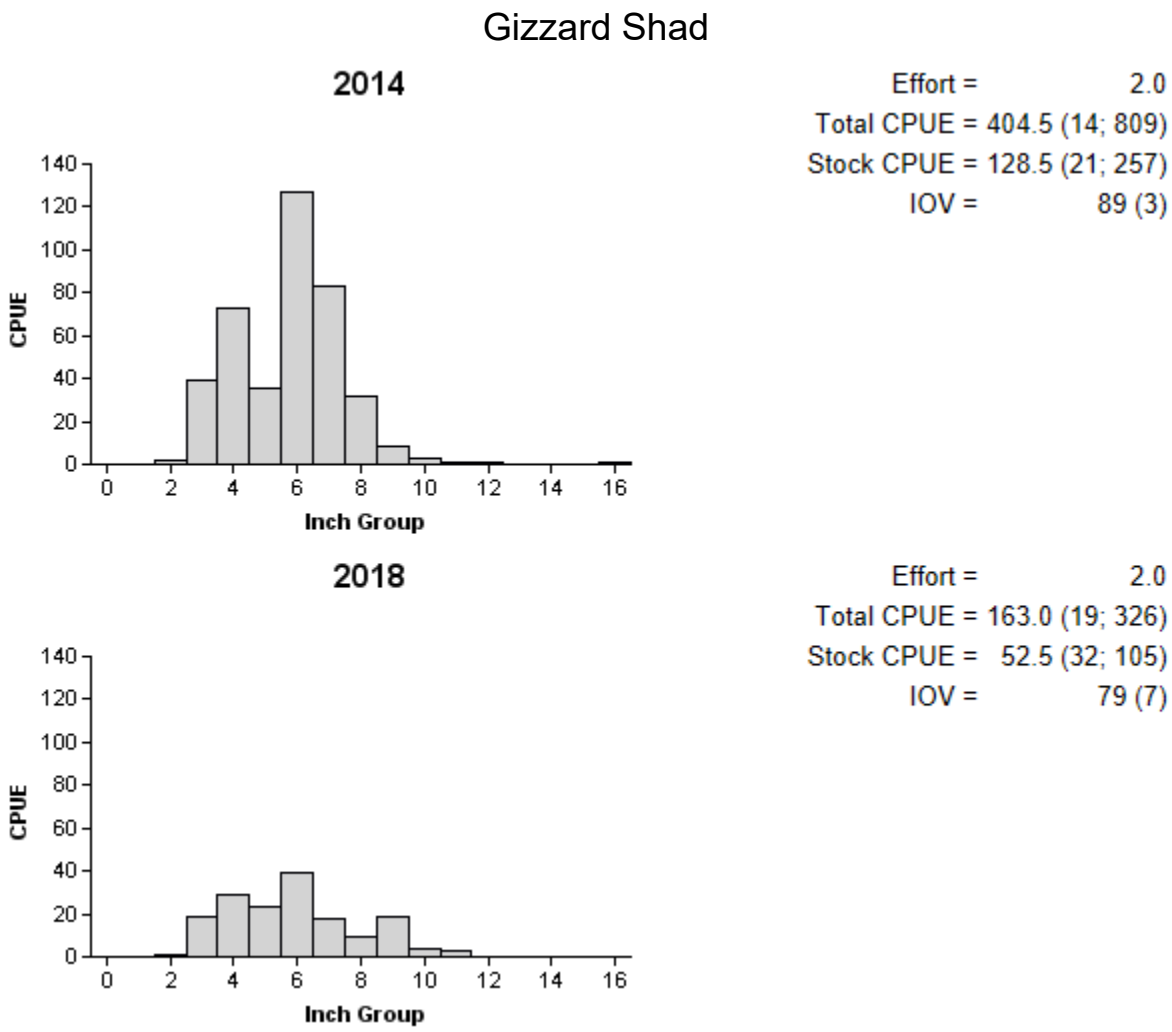


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall daytime electrofishing surveys, Richland-Chambers Reservoir, Texas, 2014, and 2018.

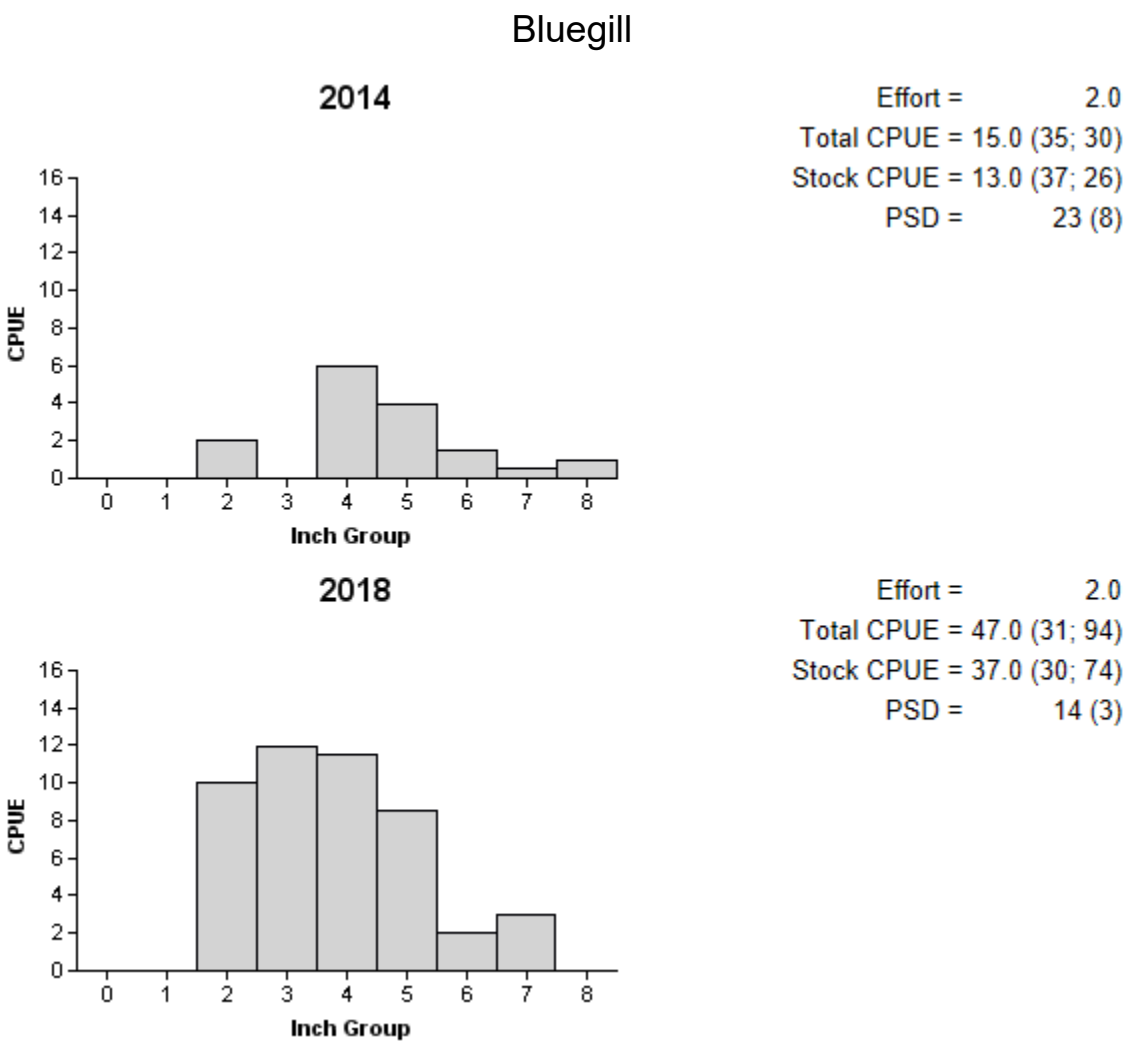


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall daytime electrofishing surveys, Richland-Chambers Reservoir, Texas, 2014 and 2018.

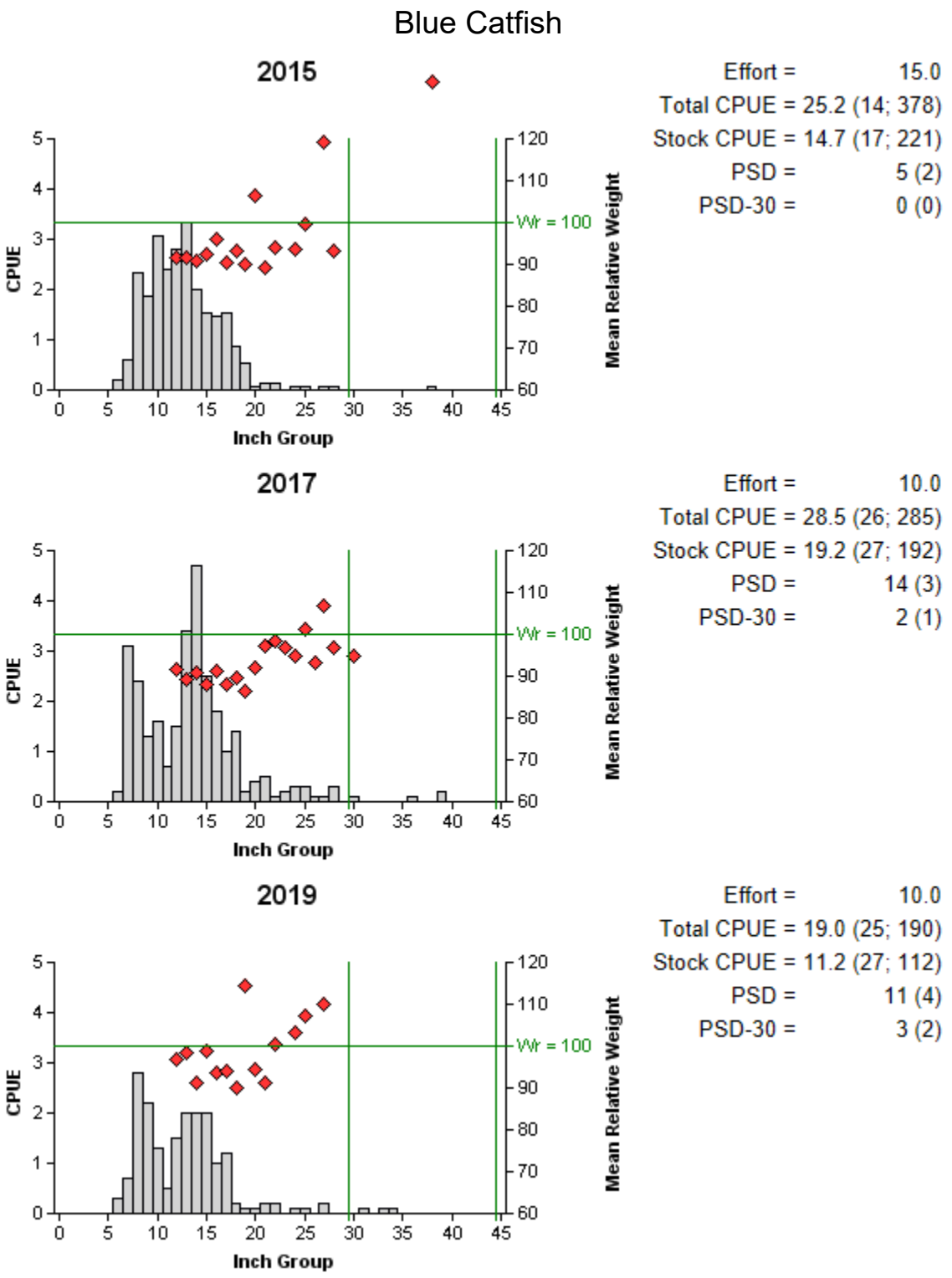


Figure 4. Number of Blue Catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Richland-Chambers Reservoir, Texas, 2015, 2017, and 2019. Vertical lines represent upper and lower limits for slot-size.

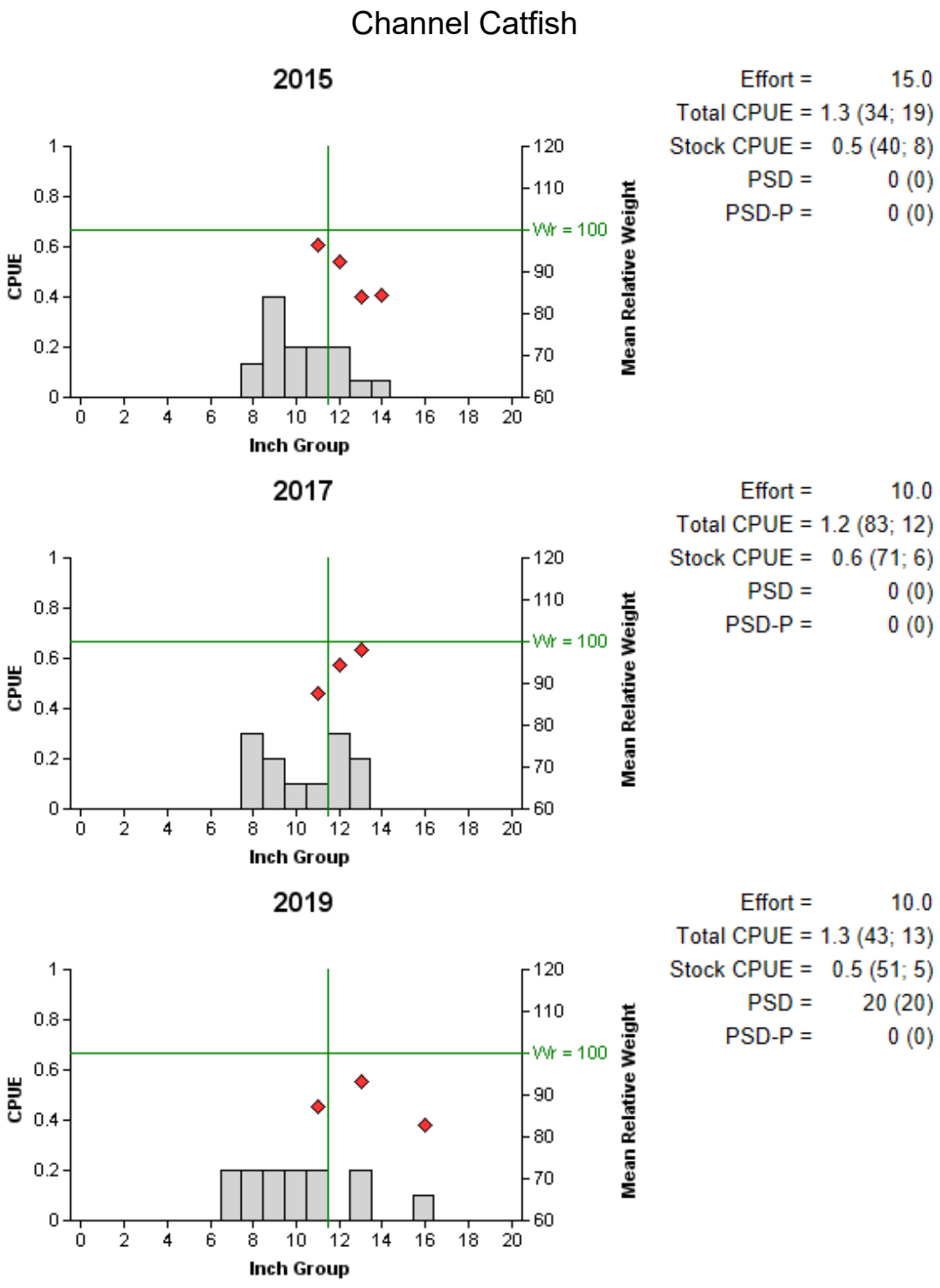


Figure 5. Number of Channel Catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Richland-Chambers Reservoir, Texas, 2015, 2017, and 2019. Vertical line represents minimum length limit.

Table 9. Creel survey statistics for Catfish at Richland-Chambers Reservoir, Texas, from June 2010 through May 2011, June through November 2014 and March through May 2015, and June through November 2018 and March through May 2019. Total catch per hour is for anglers targeting catfishes and total harvest is the estimated number of catfishes harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2010/2011	2014/2015	2018/2019
Surface area (acres)	41,356	36,495	41,356
Directed effort (h)	7,038 (49)	10,215 (33)	3,834 (39)
Directed effort/acre	0.2 (49)	0.3 (33)	0.1 (39)
Total catch per hour	0.6 (19)	1.8 (22)	1.4 (56)
Total harvest	7,626 (91)	22,718 (62)	8,768 (61)
Blue Catfish	6,859 (61)	21,513 (56)	6,356 (56)
Channel Catfish	767 (359)	1,205 (169)	2,412 (74)
Harvest/acre	0.2 (91)	0.6 (62)	0.2 (61)
Blue Catfish	0.2 (61)	0.6 (62)	0.2 (56)
Channel Catfish	0.02 (359)	<0.1 (169)	0.1 (74)
Percent legal released	< 1	8	2

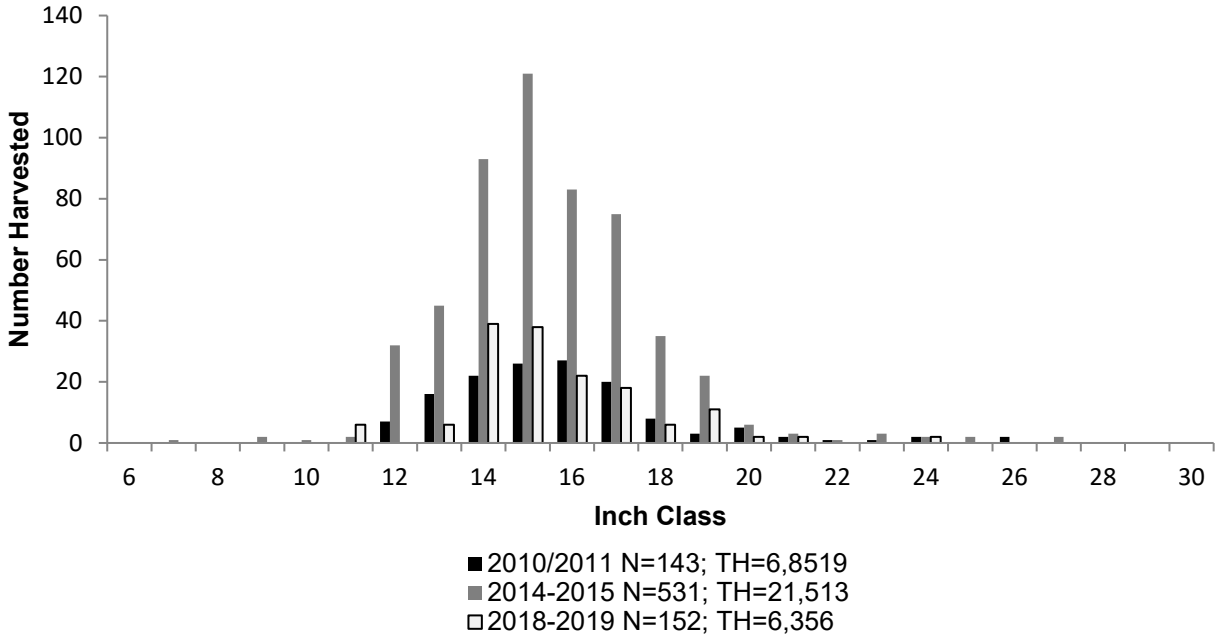


Figure 6. Length frequency of harvested Blue Catfish observed during creel surveys at Richland-Chambers Reservoir, Texas, from June 2010 through May 2011, June through November 2014 and March through May 2015, and June through November 2018 and March through May 2019, all anglers combined. N is the number of harvested Blue Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

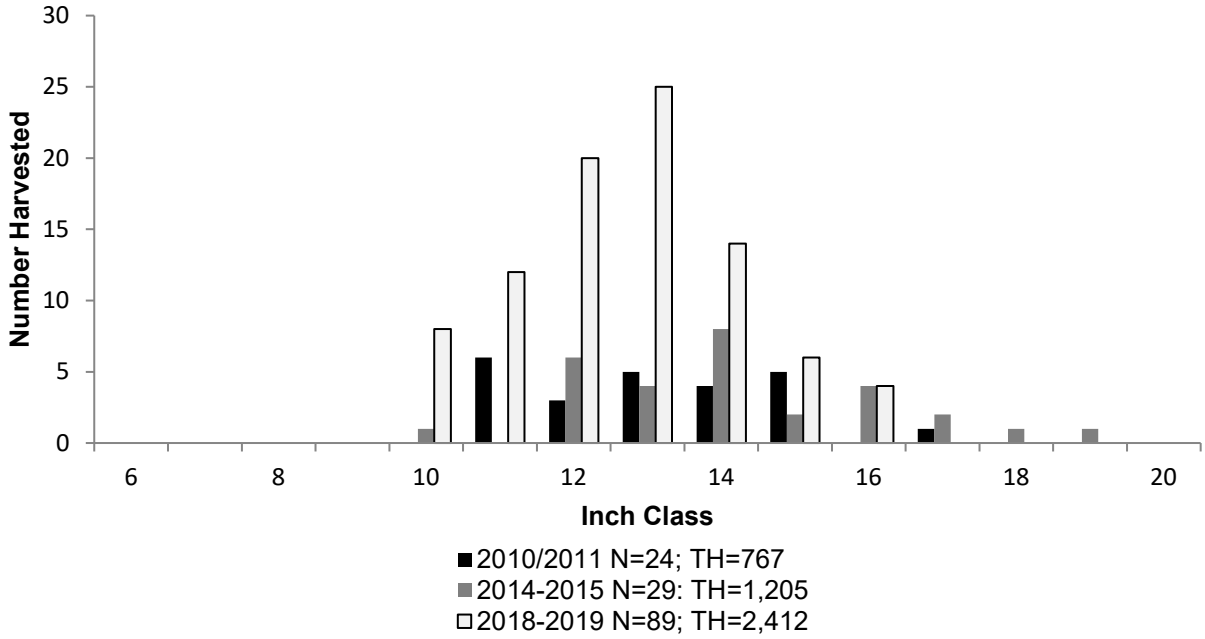


Figure 7. Length frequency of harvested Channel Catfish observed during creel surveys at Richland-Chambers Reservoir, Texas, from June 2010 through May 2011, June through November 2014 and March through May 2015, and June through November 2018 and March through May 2019, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

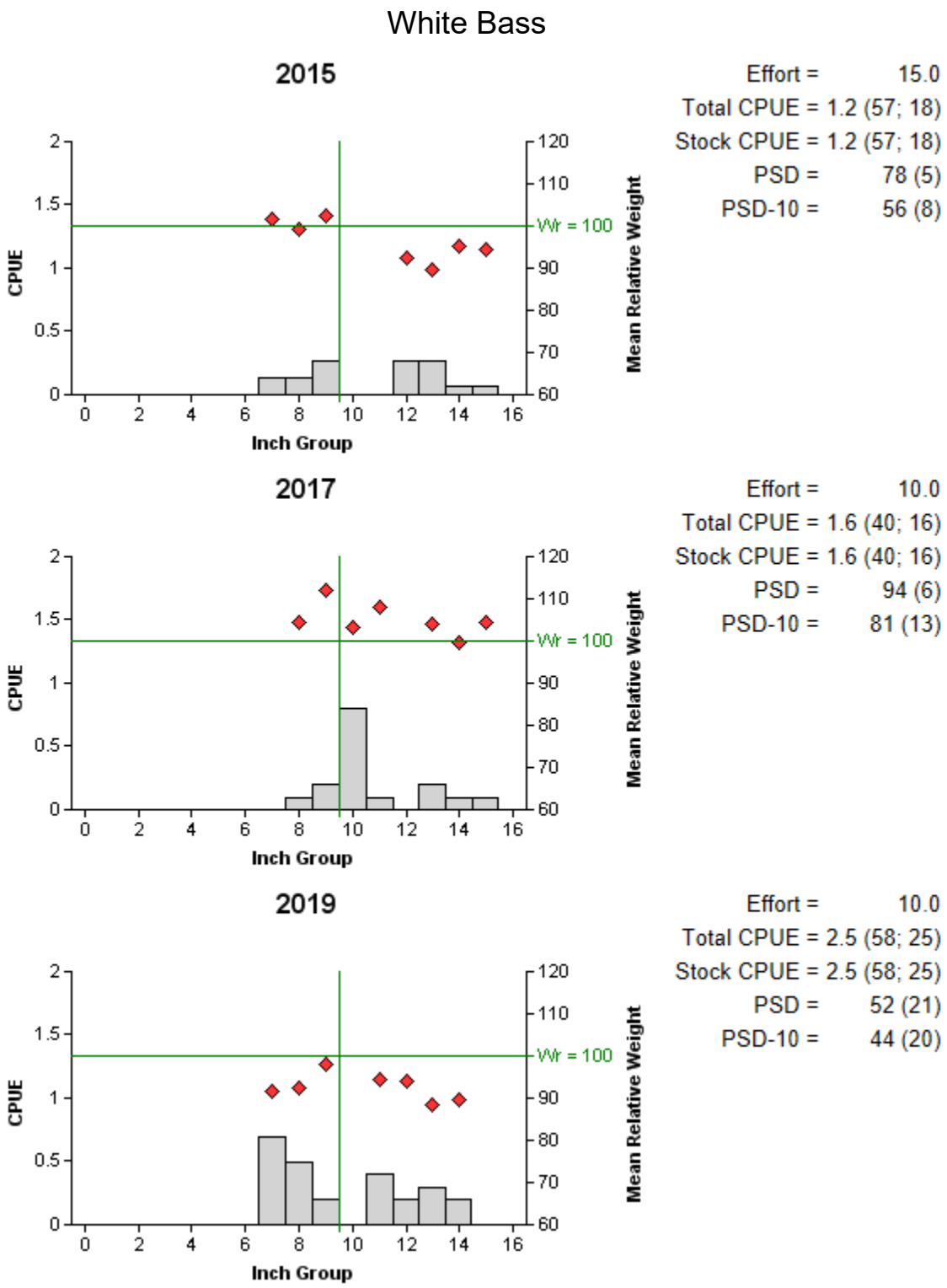


Figure 8. Number of White Bass caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Richland-Chambers Reservoir, Texas, 2015, 2017, and 2019. Vertical line represents minimum-length limit.

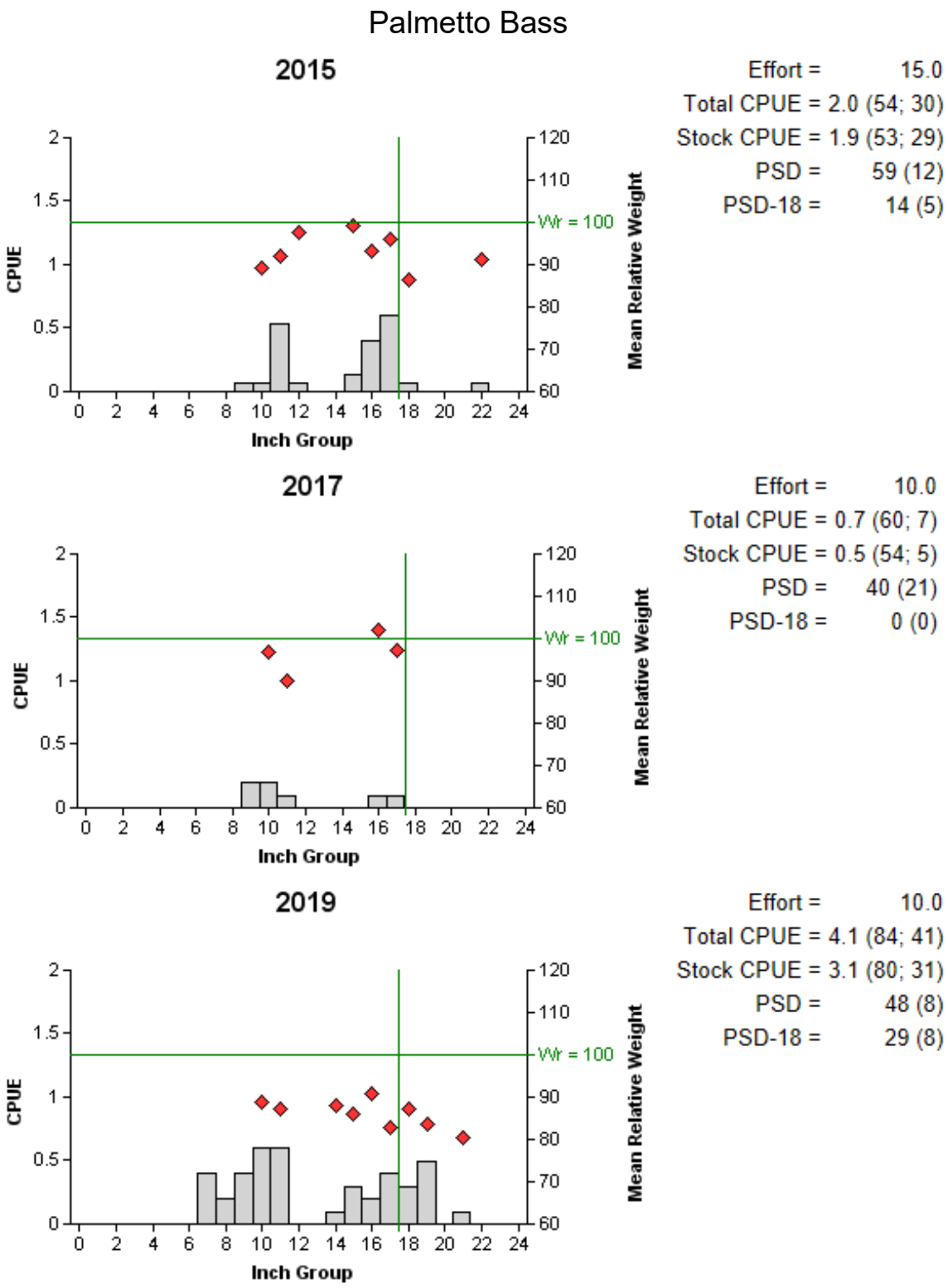


Figure 9. Number of Palmetto Bass caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Richland-Chambers Reservoir, Texas, 2015, 2017, and 2019. Vertical line represents minimum-length limit.

Table 10. Creel survey statistics for Temperate Basses at Richland-Chambers Reservoir, Texas, from June 2010 through May 2011, June through November 2014 and March through May 2015, and June through November 2018 and March through May 2019. Total catch per hour is for anglers targeting Temperate Basses and total harvest is the estimated number of Temperate Basses harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2010/2011	2014/2015	2018/2019
Surface area (acres)	41,356	36,495	41,356
Directed effort (h)	33,944 (22)	27,451 (25)	14,718 (37)
Directed effort/acre	0.8 (22)	0.8 (25)	0.4 (37)
Total catch per hour	3.8 (21)	2.6	2.8 (15)
Total harvest	77,380 (28)	38,562 (36)	27,473 (55)
White Bass	70,588 (24)	37,497 (32)	18,779 (51)
Palmetto Bass	6,792 (64)	1,085 (187)	8,694 (64)
Harvest/acre	1.9 (28)	1.1 (36)	0.7 (55)
White Bass	1.7 (24)	1.1 (32)	0.4 (51)
Palmetto Bass	0.2 (64)	<0.1 (187)	0.2 (64)
Percent legal released	21	NA	15

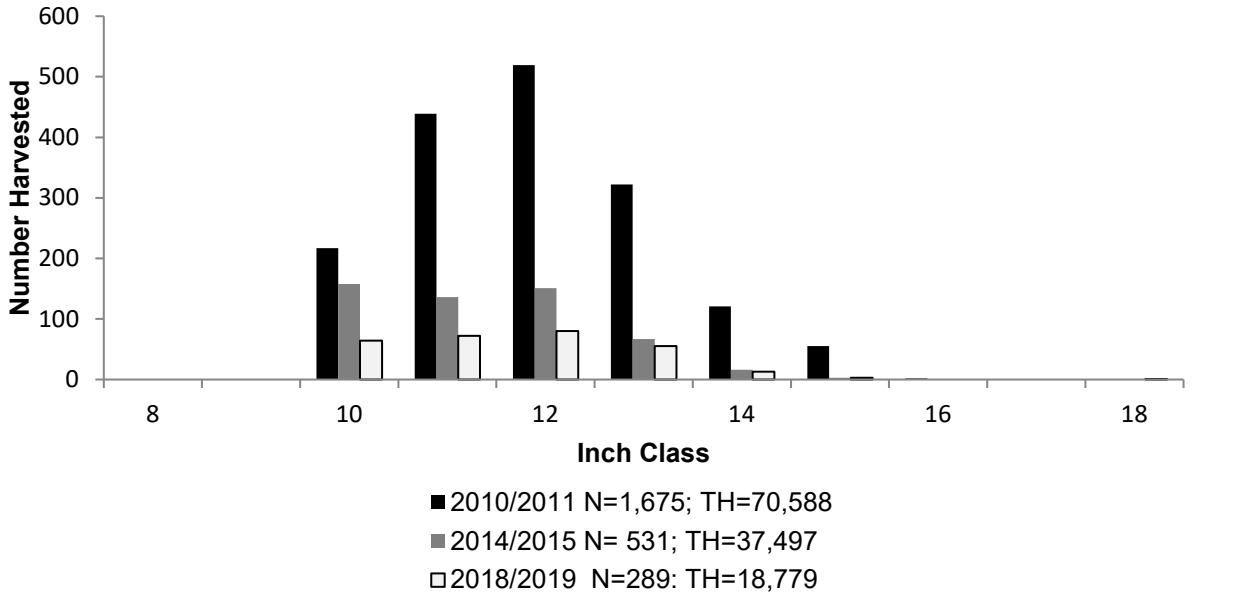


Figure 10. Length frequency of harvested White Bass observed during creel surveys at Richland-Chambers Reservoir, Texas, from June 2010 through May 2011, June through November 2014 and March through May 2015, and June through November 2018 and March through May 2019, all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

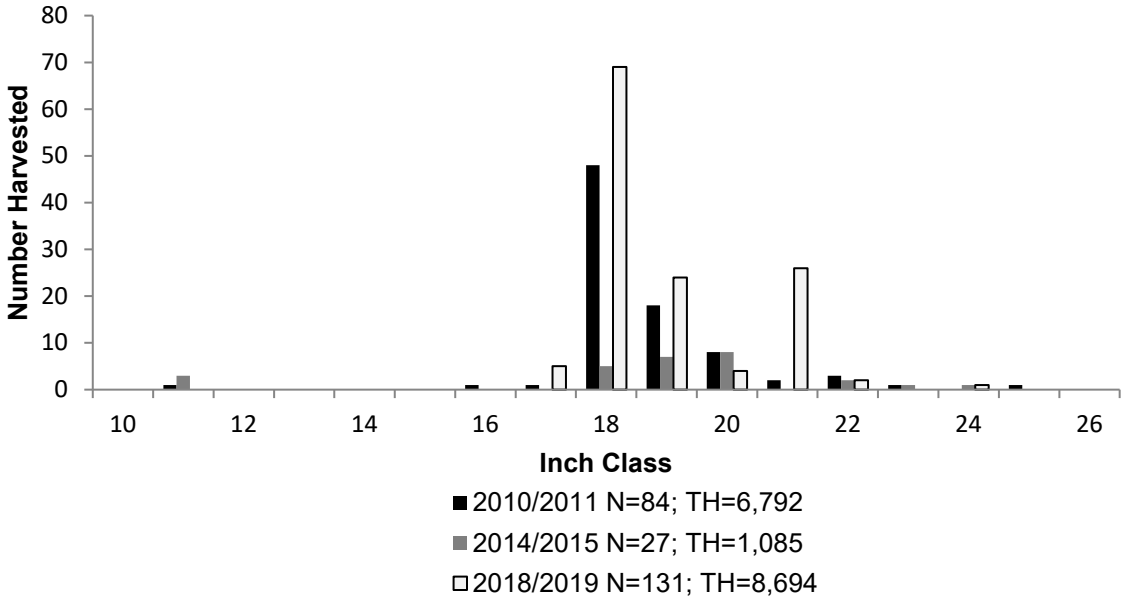


Figure 11. Length frequency of harvested Palmetto Bass observed during creel surveys at Richland-Chambers Reservoir, Texas, from June 2010 through May 2011, June through November 2014 and March through May 2015, and June through November 2018 and March through May 2019, all anglers combined. N is the number of harvested Palmetto Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

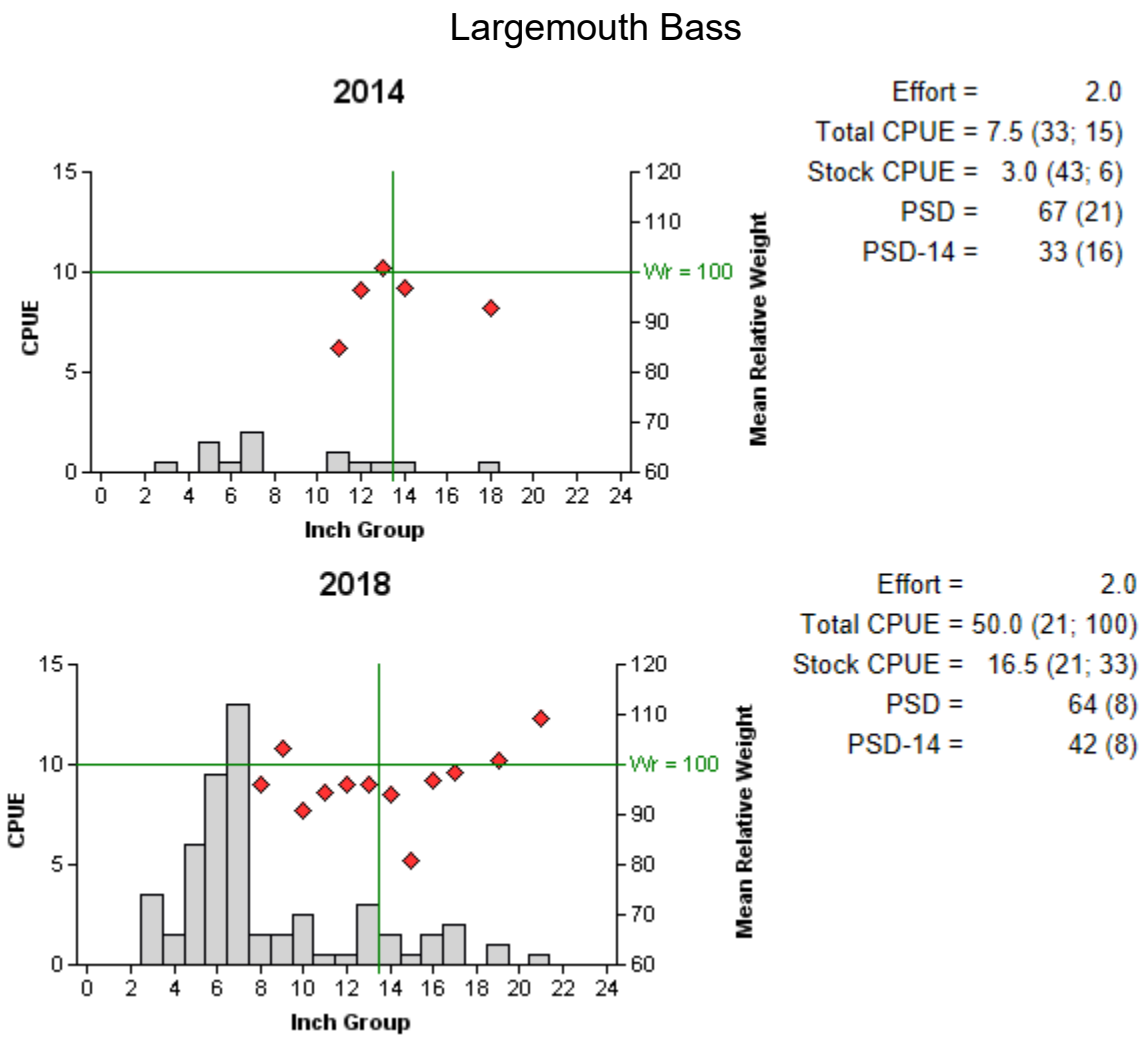


Figure 12. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall daytime electrofishing surveys, Richland-Chambers Reservoir, Texas, 2014 and 2018. Vertical line represents minimum-length limit.

Table 11. Creel survey statistics for Largemouth Bass at Richland-Chambers Reservoir, Texas, from June 2010 through May 2011, June through November 2014 and March through May 2015, and June through November 2018 and March through May 2019. Catch rate is for all anglers targeting Largemouth Bass. Harvest is partitioned by the estimated number of fish harvested by non-tournament anglers and the number of fish retained by tournament anglers for weigh-in and release. The estimated number of fish released by weight category is for anglers targeting Largemouth Bass. Relative standard errors (RSE) are in parentheses.

Statistic	2010/2011	2014/2015	2018/2019
Surface area (acres)	41,356	36,495	41,356
Directed angling effort (h)			
Tournament	7,706 (35)	12,807 (32)	20,322 (29)
Non-tournament	9,261 (30)	6,566 (33)	7,912 (40)
All black bass anglers combined	16,967 (26)	19,373 (32)	28,234 (32)
Angling effort/acre	0.4 (26)	0.5 (32)	0.7 (32)
Catch rate (number/h)	0.5 (25)	0.5 (24)	0.5 (23)
Harvest			
Non-tournament harvest	190 ()	83 (<1)	118 (329)
Harvest/acre	<0.01 ()	0.02 (1)	<0.01) (329)
Tournament weigh-in and release	1,916 ()	889 (71)	1,454 (69)
Release by weight			
<4.0 lbs	na	7,959 (118)	8,889 (74)
4.0-6.9 lbs	na	447 (117)	364 (96)
7.0-9.9 lbs	na	54 (103)	0
≥10.0 lbs	na	0	0
Percent legal released (non-tournament)	21	93	95

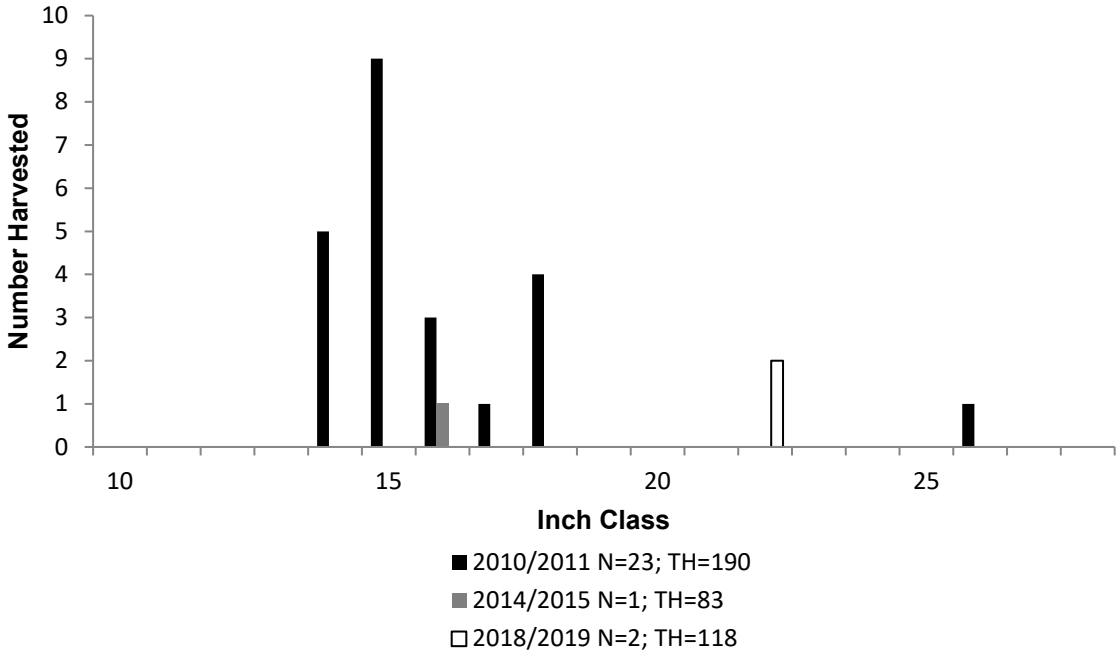


Figure 9. Length frequency of non-tournament harvested Largemouth Bass observed during creel surveys at Richland-Chambers Reservoir, Texas, June 2010 through May 2011, June through November 2014 and March through May 2015, and June through November 2018 and March through May 2019, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the estimated non-tournament harvest for the creel period

Crappie

Table 12. Creel survey statistics for Crappie at Richland-Chambers Reservoir, Texas, from June 2010 through May 2011, June through November 2014 and March through May 2015, and June through November 2018 and March through May 2019. Total catch per hour is for anglers targeting White Crappie and total harvest is the estimated number of Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	2010/2011	2014/2015	2018/2019
Surface area (acres)	41,356	36,495	41,356
Directed effort (h)	14,345 (26)	14,871 (26)	5,061 (42)
Directed effort/acre	0.4 (26)	0.4 (26)	0.1 (42)
Total catch per hour	2.0 (51)	1.5 (35)	1.4 (46)
Total harvest	17,205 (62)	17,933 (48)	7,319 (78)
White Crappie	8,272 (51)	7,537 (54)	4,103 (74)
Black Crappie	8,933 (71)	10,396 (45)	3,216 (83)
Harvest/acre	0.4 (62)	0.5 (48)	0.2 (78)
White Crappie	0.2 (51)	0.2 (54)	0.1 (74)
Black Crappie	0.2 (71)	0.3 (45)	0.1 (83)
Percent legal released	0	2	3

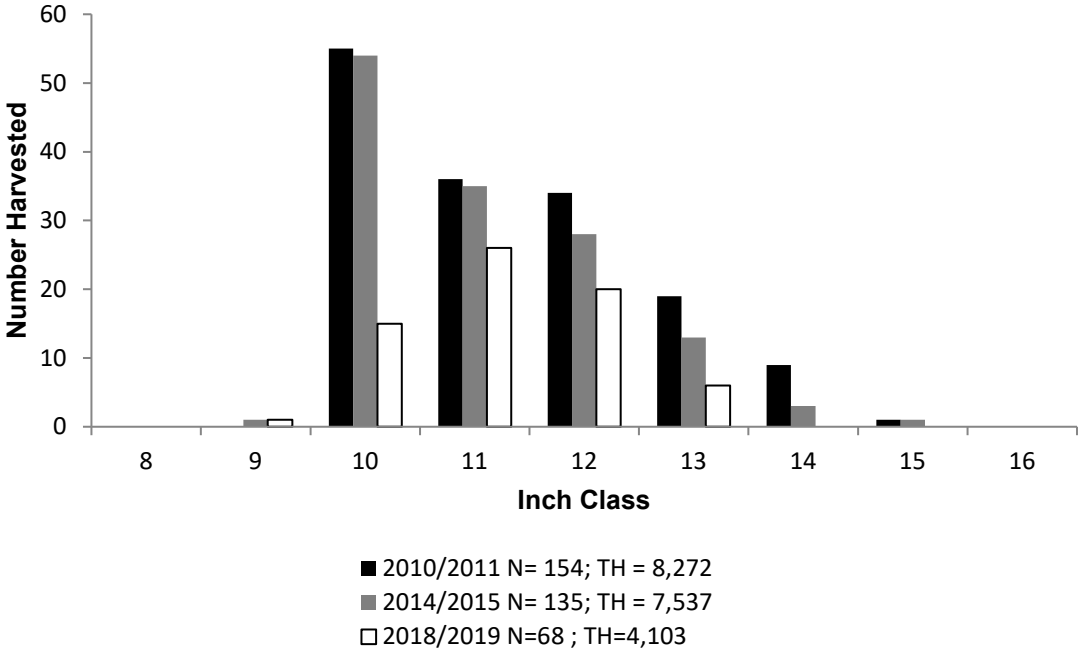


Figure 10. Length frequency of harvested White Crappie observed during creel surveys at Richland-Chambers Reservoir, Texas, from June 2010 through May 2011, June through November 2014 and March through May 2015, and June through November 2018 and March through May 2019, all anglers combined. N is the number of harvested White Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

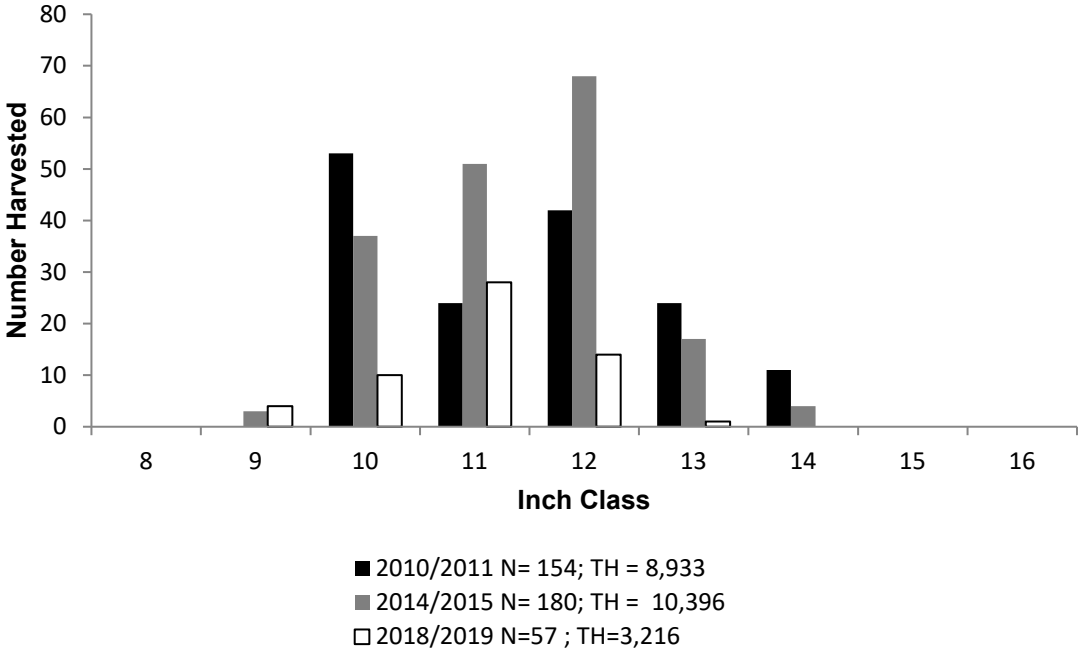


Figure 11. Length frequency of harvested Black Crappie observed during creel surveys at Richland-Chambers Reservoir, Texas, from June 2010 through May 2011, June through November 2014 and March through May 2015, and June through November 2018 and March through May 2019, all anglers combined. N is the number of harvested Black Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Proposed Sampling Schedule

Table 13. Proposed sampling schedule for Richland-Chambers Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

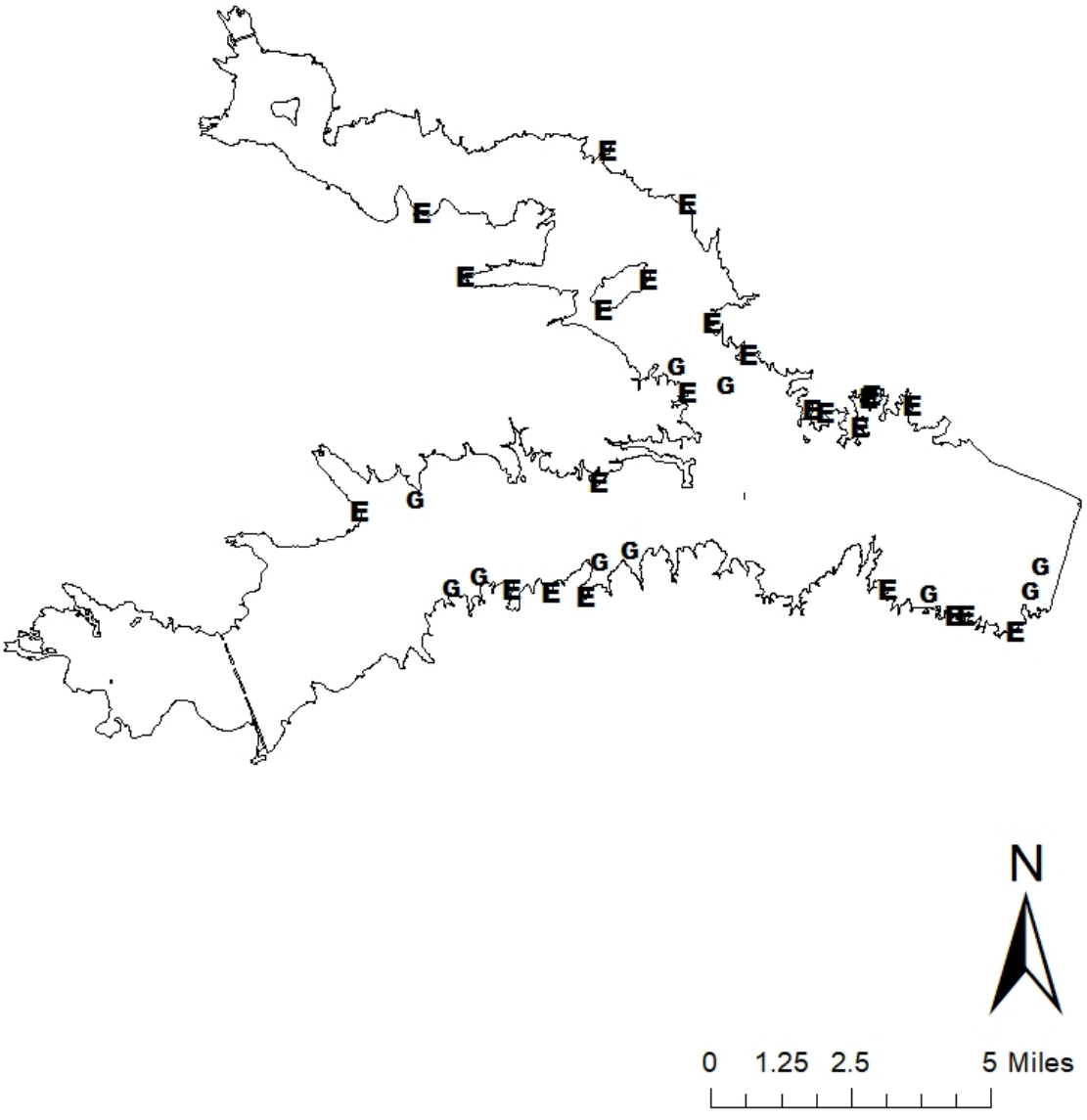
	Survey year			
	2019-2020	2020-2021	2021-2022	2022-2023
Angler Access				S
Vegetation				S
Electrofishing – Fall (daytime)				S
Gill netting		A		S
Creel survey				A
Report				S

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 Richland-Chambers Reservoir, Texas, 2018-2019. Sampling effort was 10 net nights for gill netting and 2 hours for daytime electrofishing.

Species	Gill Netting		Electrofishing	
	N	CPUE	N	CPUE
Gizzard Shad			326	163.0 (19)
Threadfin Shad			5,386	2,693.0 (45)
Blue Catfish	190	19.0 (25)		
Channel Catfish	13	1.3 (43)		
Flathead Catfish				
White Bass	25	2.5 (58)		
Palmetto Bass	41	4.1 (84)		
Bluegill			94	47.0 (31)
Longear Sunfish			3	1.5 (73)
Redear Sunfish			9	4.5 (50)
Largemouth Bass			100	50 (21)

APPENDIX B – Map of sampling locations



Location of sampling sites, Richland-Chambers Reservoir, Texas, 2018-2019. Gill net and electrofishing stations are indicated by G and E, respectively. Water level was near full pool at time of sampling.

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