Coleman Reservoir

2020 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-4

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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Survey and Management Summary

Fish populations in Coleman Reservoir were surveyed in 2020 by using electrofishing and trap netting and in 2019 and 2021 by using gill netting. Historical data are presented with the 2019-2021 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: Coleman Reservoir is an 1,811-acre impoundment constructed in 1966 on Jim Ned Creek in the Colorado River Basin. The reservoir is used for municipal water supply, flood control, and recreation. The reservoir is controlled by the City of Coleman and has a history of water level fluctuation. Coleman was full in 2007 but dropped to a record low water level in April 2015. Water level rose to conservation pool (CP) after substantial rains in April and May 2016. Water level has fluctuated within five feet of full since 2016. Fish habitat primarily consisted of flooded terrestrial vegetation, standing timber, star grass, button bush, cattail, lotus, and water-willow. As of spring 2016 all boat ramps were useable. Bank-fishing access was limited to the boat ramp areas and near Press Morris Park.

Management History: Important sport fish include Largemouth Bass, Hybrid Striped Bass (i.e., Palmetto Bass and Sunshine Bass) and White Crappie. Sport fishes are currently regulated by statewide harvest regulations. Threadfin Shad were introduced in 1984 and 1985. Channel Catfish were first introduced in 1966. In order to maintain a Hybrid Striped Bass fishery, fish have regularly been stocked beginning in 1976. Florida Largemouth Bass were introduced in 1991 and were last stocked in 2019. Largemouth Bass continue to be monitored for size structure, body condition, and Florida Largemouth Bass genetic influence. In an effort to stop the spread of invasive species, aquatic invasive species signage has been posted. Also, outreach efforts provided continued engagement with partners and the general public about the negative impact of aquatic invasive species though the use of print media, social media, and public engagements.

Fish Community

- **Prey species:** Gizzard Shad, Threadfin Shad, and sunfish were present and available for sport fish. Relative abundance of prey species was fair. Few of the Gizzard Shad were of sizes that were available to sport fish. Bluegill was the most common prey species. Prey abundance should not limit sportfish growth.
- **Catfishes:** Few catfish were sampled. However, Channel Catfish was the predominant catfish species in the reservoir. Flathead Catfish were present in the reservoir.
- **Hybrid Striped Bass:** Hybrid Striped Bass were present in the reservoir in low relative abundance. All fish sampled were of harvestable size.
- **Largemouth Bass:** Catch rates of Largemouth Bass were good with some legal length fish available to anglers. The Largemouth Bass population was dominated by smaller fish with most of the fish sampled < 8 inches. Mean relative weights were below optimal to optimal. On average, it took 3.2 years for Largemouth Bass to reach legal length.
- **White Crappie:** White Crappie were present, but relative abundance was low.

Management Strategies: Largemouth Bass will be surveyed in spring 2024 with bass-only electrofishing and Largemouth bass and prey will be surveyed in fall 2024 with electrofishing. Gill netting will be conducted in spring 2025 to determine if Sunshine Bass stockings were successful as well as to maintain long-term trend data on Channel Catfish, sample for White Crappie, and presence or absence of Flathead Catfish. Access and habitat surveys will be conducted in summer 2024. Inform the public of the threat and negative impact of invasive species.

Introduction

This document is a summary of fisheries data collected from Coleman Reservoir in 2019-2021. 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 2019-2021 data for comparison.

Reservoir Description

Coleman Reservoir is an 1,811-acre impoundment constructed in 1966 on Jim Ned Creek in the Colorado River Basin. The reservoir is used for municipal water supply, flood control, and recreation. The reservoir is controlled by the City of Coleman and has a history of extreme water level fluctuation and drought. The reservoir has a Carlson's Trophic State Index Chl *a* of 51.7 and is considered eutrophic (Texas Commission on Environmental Quality 2020). Coleman Reservoir was full in 2007 but dropped to a record low water level (19.5 feet below CP; i.e., 1,698.0 feet above mean sea level) by April 2015. The reservoir filled to CP (i.e. 1,717.5 feet above mean sea level) after substantial rains in 2015 and 2016. Water level has fluctuated within five feet of CP since filling (Figure 1). Other descriptive characteristics for Coleman Reservoir are in Table 1.

Angler Access

Coleman Reservoir's boat access consisted of three boat ramps: two public ramps at Press Morris Park and one private ramp at Quail Creek RV Park that was only accessible by those at the RV Park. During the 2017-2021 monitoring period, all ramps were useable. Additional boat ramp characteristics are in Table 2. Bank access was limited to Press Morris Park.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Goldstrohm and Homer 2017) included:

1. Stock Palmetto Bass fingerlings biennially at a rate of 5/acre.

   Action: Sunshine Bass fry were stocked in 2020 at a rate of 47/acre. Fingerling production was limited, thus Sunshine Bass fry were purchased and stocked in Coleman Reservoir. Sunshine Bass fingerlings were stocked in 2021 at a rate of 5.9/acre.

2. Monitor Hybrid Striped Bass by gill netting in 2019 and 2021 to determine trends in catch rates, size structure, body condition, growth, and collect genetic information.

   Action: Hybrid Striped Bass were sampled in 2019 and 2021. Trends in catch rates, size structure, body condition, and growth were calculated. Genetic information was sampled from all Hybrid Striped Bass sampled.

3. Map coverage of salt cedar in Coleman Reservoir and discuss potential control strategies with the City of Coleman and Texas Parks and Wildlife Department invasive species experts.

   Action: A map of salt cedar coverage at Coleman Reservoir has not been made since the last report cycle. However, much of the salt cedar has been inundated since the last report, and the coverage has likely been reduced as a result. Texas Parks and Wildlife Department invasive species experts discussed salt cedar distribution and abundance and possible control strategies with the City of Coleman in 2018. No salt cedar management has occurred at this time. Percent occurrence of salt cedar was recorded during the vegetation survey in 2020.

4. Educate the public about the threats of invasive species.

Action: Aquatic invasive species signage was posted at Coleman reservoir access points during summer of 2013 and have been maintained as needed. Media and internet posts have been made about invasive species. Invasive species was a talking point when presenting to constituents.

Harvest regulation history: From 1985 to 1992, Largemouth Bass were managed with a 14-inch minimum length limit (MLL). A 16-inch MLL was implemented in 1992 to improve the population size structure. In 1999, the regulation was reverted to the statewide 14-inch MLL because the 16-inch MLL failed to produce satisfactory results. All other species have been managed with statewide regulations. Current regulations are found in Table 3.

Stocking history: Threadfin Shad were stocked in 1984 and 1985. Channel Catfish were stocked in the 60's and early 2000's. Hybrid Striped Bass (i.e., Palmetto Bass and Sunshine Bass) have been stocked frequently at Coleman Reservoir. Palmetto Bass were stocked from 1976 to 2009 and Sunshine Bass fry have been stocked from 2014 until 2017 and in 2020. Sunshine Bass fingerlings were stocked in 2021. Florida Largemouth Bass were first stocked in 1991 and were most recently stocked in 2019. ShareLunker Largemouth Bass fingerlings were stocked in 2021. The complete stocking history is displayed in Table 4.

Vegetation/habitat management history: Twenty-two aquatic plant species were planted in Coleman Reservoir in 1998 as part of a statewide habitat initiative. From 1998-2007, qualitative vegetation assessments were conducted annually by staff from the United States Army Corps of Engineers Lewisville Aquatic Ecosystem Research Facility. No introduced aquatic plants, aside from those documented to be naturally occurring, were found in vegetation surveys after the reservoir filled in 2002.

Water transfer: No interbasin 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 Coleman Reservoir (Goldstrohm and Homer 2017). Primary components of the OBS plan are listed in Table 5. All survey sites were randomly selected unless otherwise stated and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Electrofishing – Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1 hour at 12, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. Two additional bass-only electrofishing stations were sampled to collect additional fish for age and growth samples. Ages for Largemouth Bass (range 13.0 to 14.9 inches) were determined by using otoliths from 13 Largemouth Bass in 2020.

Trap netting – Crappie were collected using trap nets (10 net nights at 10 stations). Catch per unit effort for trap netting was recorded as the number of fish caught per net night (fish/nn).

Gill netting – Channel Catfish, Hybrid Striped Bass, White Crappie, and Black Crappie were sampled by gill netting (10 net nights at 10 stations). Catch per unit effort for gill netting was recorded as the number of fish caught per net night (fish/nn). Lengths and weights were measured for each species. Otoliths were collected from all dead Hybrid Striped Bass (N=17) for evaluating age and growth.

Genetics – Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017). Micro-satellite DNA analysis was used to determine genetic composition of individual fish from 2005 through 2020 and by electrophoresis for previous years. Fin clips were collected from each Hybrid Striped Bass during gill netting and were sent to TPWD Inland Fisheries – A.E. Wood Laboratory for genetic analysis for determination of hybrid type. Following DNA isolation, each tissue sample will be evaluated by using the

reaction MPX1- Morone (Msa5-11 and Msa5-71) to verify the hybrid status of each fish (Dijar Lutz-Carrillo, personal communication). Each fish will be evaluated with a single base extension (SBE-Morone) assay using Cytochrome Oxidase Subunit-1 as a substrate to amplify single nucleotide polymorphisms (SNPs) at three sites, which this will allow for the resolution of species-specific SNPs which identified the maternal contributor to the hybrid.

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.

Habitat – In July 2020, structural habitat composition was determined by conducting a survey using the random point method assessing 100 random stations distributed along the shoreline. Four sample sites could not be surveyed. Vegetation data were also collected at these 100 sites. Additionally, a habitat survey was conducted during the same time at 100 random stations distributed throughout the reservoir. Two sample sites could not be sampled. Habitat types and vegetation were identified at or below the waterline and marked as “1” for present or “0” for absent. Percent occurrence (% = [N stations present / total stations sampled] X 100) and associated 95% confidence intervals were calculated for structural habitat and habitat (Ausvet 2021).

Water level – Source for water level data was the United States Geological Survey (USGS 2021).

Results and Discussion

Habitat: Structural habitat features consisted mainly of natural/featureless shoreline (56.3%) and rocky shoreline (42.7%). Docks (5.2%) and rock bluff (1.0%) were also features that were present (Table 6). The reservoir is mainly open water (74.5%) with some flooded terrestrial brush (17.3%), standing timber (7.1%), lotus (3.1%), and star grass (2.0%). Water primrose, black willow, logs, and coontail were each 1.0% of the habitat throughout the reservoir. Habitat in the shoreline survey was primarily flooded terrestrial brush (84.4%), common buttonbush (51.0%), star grass (31.3%), water-willow (22.9%), cattail (19.8%), lotus (14.6%), standing timber (10.4%), pondweed (9.4%), black willow (6.3%), and coontail (5.2%). Spikerush, water primrose, and bulrush were present in less than 5% of the shoreline (Table 7). Water level at the time of survey was 1.0 feet below CP.

Prey species: The prey base primarily consisted of Gizzard Shad, Threadfin Shad, and Bluegill. Catch rate of Gizzard Shad in 2020 (72.0/h) declined from previous surveys in 2016 (184.0/h) and 2014 (239.0/h). Gizzard Shad IOV was 26 in 2020, which was similar to previous surveys in 2016 (28) and was lower compared to the survey in 2014 (75), indicating most fish were not available as prey (Figure 2). Threadfin Shad catch rate has continued to decrease in 2020 (33.0/h; see Appendix A) down from 2016 (118.0/h). Bluegill CPUE in 2020 (220.0/h) increased from 2016 (150.0/h) and was similar to 2014 (241.0/h; Figure 3). Size structure of Bluegill in 2020 was dominated by small sub-stock length fish (PSD=18), which was similar to previous surveys. Most Bluegill were of adequate prey size for sport fish (Figure 3). Prey catch has fluctuated over the years but has recently declined (see Appendix C).

Channel Catfish: Catch rate of Channel Catfish in 2021 (3.0/nn) has remained similar to 2019 (3.0/nn) and 2017 (2.2/nn). All fish sampled in 2021 were of legal length (Figure 4). Body conditions improved with increasing size. Mean relative weight values from 90 to nearly 140 suggested condition was below optimal to better than optimal. Optimal mean relative weight value would be 100.

Flathead Catfish: Flathead Catfish were present in the reservoir and observed during gill netting and electrofishing surveys.

Hybrid Striped Bass: Hybrid Striped Bass catch rates in gill net surveys declined. Catch rate in 2021 (3.7/nn) and 2019 (2.4/nn) remained low compared to 9.7/nn in 2017 (Figure 5). Catch rates for fish ≥ stock length (3.7/nn in 2021, 2.4/nn in 2019, and 9.7/nn in 2017) and CPUE-18 (3.7/nn in 2021, 2.4/nn in 2019, and 9.5/nn in 2017 were similar to total catch rates. All fish sampled in 2021 and 2019 were of legal length. The PSDs in the 2017-2021 surveys were 100. Mean relative weights ranged from 90-100, and mean values for most inch groups tended to decline from 2017-2021. Few (N=4) Sunshine Bass from the fry stockings were sampled during gill netting in either the age and growth sampling or during genetic testing (Table 8). Hybrid Striped Bass sampled in 2021 were either 14 years old (N=14; i.e., Palmetto Bass stocked in 2007), 12 years old (N=1; i.e., Palmetto Bass stocked in 2009), or 4 years old (N=2; i.e., Sunshine Bass fry stocked in 2017; Figure 6). Genetic results indicated that only three Hybrid Striped Bass sampled in 2021 were Sunshine Bass and those ranged from 20.3-21.8 inches. All other Hybrid Striped Bass sampled in 2021 were Palmetto Bass. In 2021, two of the three Sunshine Bass confirmed with genetics were determined to be from the 2017 fry stocking based on age data. No age and growth information were taken on the third confirmed Sunshine Bass to determine stocking year. In 2021, the Category II age sample objective was not met. No fish ranging from 17.0-18.9 inches were sampled, thus additional sampling was not warranted. Hybrid Striped Bass sampled in 2019 were either 12 years old (N=8; i.e., Palmetto Bass stocked in 2007), 10 years old (N=1; i.e., Palmetto Bass stocked in 2009) or 2 years old (N=1; i.e., Sunshine Bass fry stocked in 2017; Figure 7). One Hybrid Striped Bass sampled in 2019 was a Sunshine Bass from fry stockings and all other Hybrids Striped Bass were Palmetto Bass.

Largemouth Bass: Total catch rate for Largemouth Bass was 188.0/h in 2020, which was higher than in 2016 (107.0/h) and 2014 (155.0/h; Figure 8). Catch of stock-length (≥ 8 inches) fish was similar in 2020 (76.0/h), 2016 (80.0/h), and 2014 (77.0/h). Catch of legal-length Largemouth Bass was greater in 2020 (13.0/h) than in 2016 (5.0/h) but was lower than in 2014 (19.0/h). The Largemouth Bass population appeared to have more representation of fish ≥stock length in 2014 (PSD=66), though more sub-stock fish were increasingly present in 2016 (PSD=38) and 2020 (PSD=25; Figure 8). Mean relative weight values ranged from 86 to 100 in 2020, suggesting condition was below optimal to optimal. Historical trends in relative abundance of Largemouth Bass were likely influenced by water level and habitat availability (see Appendix D). Periodic water level increases often resulted in increased CPUE of sub-stock fish. From 2000-2020, average catch rate of sub-legal Largemouth Bass was 124.2/h and most years were greater than 100.0/h (see Appendix E). Despite the catch rate of sub-stock fish, recruitment of legal-length fish has been variable and limited. Growth to legal length has been dynamic and variable for Largemouth Bass at Coleman Reservoir. Historically, it takes an average of 2-4 years for Largemouth Bass to grow to 14 inches in Coleman Reservoir. In 2020, Largemouth Bass achieved legal length at about 3.2 years (N=13, range 2-5 years; Figure 9), an average of 1.0 year in 2016 (N=13, range 1 year), and average of 2.0 years in 2014 (N=22, range 2-3 years) and 2004 (N=22, range 2 years; Goldstrohm and Homer 2017). Some of the Largemouth Bass sampled for age and growth were produced during extreme drought years and likely experienced slower growth until the reservoirs experienced water level influxes and subsequent increases in productivity. The Largemouth Bass sampled in 2020 that were 4-5 years old were spawned during or just after the lowest water level in Coleman Reservoir history, and thus individuals faced reduced growth rates. The percent Florida Largemouth Bass alleles were similar in 2016 (50.8%) and 2014 (48.6%; Table 9). In 2016, one pure Florida Largemouth Bass and one pure Northern Largemouth Bass were represented in the sample, and all other fish collected were intergrades (Goldstrohm and Homer 2017). Historically, there have been few pure Florida Largemouth Bass in Coleman Reservoir. Most fish sampled were intergrades. Coleman Reservoir had a ShareLunker Bass caught in March 2021 weighing 14.83 pounds and was a pure Florida Largemouth Bass.

Crappie: White Crappie catch rate varied and was 0.1/nn in 2020, 6.2/nn in 2016, and 2.0/nn in 2012 (Figure 10). Sampling objectives for abundance, size structure, and condition were not met for White Crappie with trap netting in 2020. Catch rates with gill nets was 2.0/nn in 2021 (Figure 11). Legal-length fish were sampled using gill nets and available to anglers. Of the fish sampled with gill nets, condition was optimal with mean relative weights around 100 (Figure 11). Catch rates of sub-stock White Crappie have been variable since 2000 (see Appendix F). Some of the variability may be influenced by water

level fluctuation along with other environmental and biological factors following increase in water levels and it tends to decline following substantial decreases in water level and prolonged droughts. Years where CPUE were the greatest (i.e., 1994 and 2008) were after stable water levels near or at CP (see Appendix G). Black Crappie were present in the reservoir in low relative abundance.

Fisheries Management Plan for Coleman Reservoir, Texas

Prepared – July 2021

ISSUE 1: Hybrid Striped Bass have provided a fishery at Coleman Reservoir. Periodic stockings are required to maintain the fishery. Sunshine Bass were introduced into Coleman Reservoir in 2014 and were stocked as fry as a part of a research project investigating the integration of Sunshine Bass into reservoirs. Fry stockings were not successful from 2014-2017 resulting in few Sunshine Bass fry from the 2014-2017 stockings being captured during sampling. Sunshine Bass fingerlings were stocked in 2021. The Gizzard Shad population has been dominated by individuals of large sizes that are not optimal prey sizes for sport fish and may not support a Hybrid Striped Bass fishery at this time. In addition, the presence of long-lived Hybrid Striped Bass (i.e., 12-14 years old) is indicative of an underutilized fishery.

MANAGEMENT STRATEGIES

1. Discontinue the Hybrid Striped Bass stocking program at Coleman Reservoir.
2. Monitor remaining Hybrid Striped Bass by gill netting in 2025 to determine trends in catch rates, size structure, body condition, and growth.
3. Collect fin clips of all Hybrid Striped Bass during gill net surveys to assess relative recruitment of Sunshine Bass and growth to legal size.
4. Collect all dead Hybrid Striped Bass during gill netting surveys for age and growth samples.

Issue 2: Largemouth Bass continue to support a fishery at Coleman Reservoir. The first ShareLunker Legacy Largemouth Bass (#602) for Coleman Reservoir was caught in spring 2021. The catch of the ShareLunker has demonstrated that Coleman Reservoir can produce trophy Largemouth Bass. However, the Largemouth Bass population fluctuates in response to changes in water level and habitat coverage, thus continued monitoring is required. Additionally, age at legal length was higher than expected during the 2020 sampling with 5-year-old fish at 14 inches in length.

MANAGEMENT STRATEGIES

1. Continue to monitor Largemouth Bass and prey populations with electrofishing survey in 2024. Determine trends in relative abundance and size structure for prey species and Largemouth Bass and body condition for Largemouth Bass.
2. Continue to monitor Florida Largemouth Bass genetic introgression by collecting genetic samples from Largemouth Bass in 2024 to determine if recent stockings have increased the Florida Largemouth Bass introgression.
3. Conduct an extra spring, bass-only electrofishing sample in 2024 to determine if bass longer than legal length are present in higher abundance than sampled in fall 2020. A category II age and growth sample will be taken.
4. If few legal-length bass are sampled during the spring electrofishing survey, consider collecting >200 Largemouth Bass for a category III age and growth survey to look at mortality of individuals in the population and possible stunting.

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.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc… so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. 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 (2021–2025)

Sport fish, prey fish, and other important fishes: Sport fishes present in Coleman Reservoir are Hybrid Striped Bass, and Largemouth Bass. Proposed sampling is in Table 10.

Low-density fisheries: Channel Catfish, Flathead Catfish, White Crappie and Black Crappie: Channel Catfish have low catch rates in gill net surveys and no Channel Catfish were sampled using baited, tandem hoop nets. General monitoring for Channel Catfish relative abundance (CPUE-Total) will be conducted in conjunction with gill net sampling for Hybrid Striped Bass. Flathead Catfish will be monitored for presence/absence in 2024-2025 in conjunction with other sampling. White Crappie had low catch rates in trap nets (only one fish in 10 trap nets in 2020) at Coleman Reservoir. General monitoring for White Crappie and Black Crappie relative abundance (CPUE-Total) will be conducted in conjunction with gill net sampling for Hybrid Striped Bass. No specific sampling goals will be set for Channel Catfish, Flathead Catfish, White Crappie, or Black Crappie.

Survey objectives, fisheries metrics, and sampling objectives

Prey species: Gizzard Shad, Threadfin Shad, and Bluegill are the primary prey species in Coleman Reservoir. The next electrofishing survey will be conducted in fall 2024 for 1 hour at 12, 5-minute random stations. Catch rate target precision will be RSE ≤ 25% for Gizzard Shad and Bluegill. A sample of 50 Gizzard Shad will be collected for monitoring trends of size structure (length frequency) and index of vulnerability to assess prey availability and prey size suitability for sport fish. Size structure (PSD) will be determined for Bluegill by collecting ≥ 50 stock-sized (≥3 inch) fish. No additional effort will be conducted if objectives for prey species are not met during designated electrofishing sampling. Largemouth Bass body condition can provide information on prey vulnerability to predation and prey catch rates.

Hybrid Striped Bass: A gill net survey will be conducted in spring 2025 to collect data on catch rates and size structure. Gill nets will be deployed at 10 random stations at depths ≤ 30 feet to collect relative abundance data, and target precision will be a RSE ≤ 30% for CPUE-Total and CPUE-18. A target of 50 fish will be collected to assess size structure. Length and weight will be taken on all fish. Fin clips will be taken on all Hybrid Striped Bass to determine if Sunshine Bass stockings were successful. All dead Hybrid Striped Bass collected in gill nets will be sampled for age and growth. No additional effort will be conducted if objectives for Hybrid Striped Bass are not met during designated sampling.

Largemouth Bass: To monitor Largemouth Bass and their prey, a night-time electrofishing survey will be conducted during fall 2024 to monitor trends in relative abundance (CPUE-Total, CPUE-Stock, and CPUE-14), size structure, and body condition. Electrofishing will be conducted for 1 hour at 12, 5-minute stations. A target precision will be RSE ≤ 25% for estimates of CPUE-Total and CPUE-Stock. A target of 50 fish ≥ stock-size will be collected to assess size structure, and ≥ 5 fish per inch group ≥ stock-size will be measured for length and weight to assess body condition. If precision, size structure, or body condition objectives are not achieved, up to one hour of additional sampling (12, 5-minute stations) may be added. Fin clips from 30 random fish of any size will be collected for microsatellite DNA analysis to determine genetic introgression of Florida Largemouth Bass in 2024 after recent stockings. An additional daytime, bass-only electrofishing survey will be conducted in spring 2024 to examine the relative abundance of legal-length Largemouth Bass. A category II age and growth sample will be collected during the spring, daytime bass-only electrofishing survey. If the survey does not result in an increased catch rate of larger bass, then a Category III age and growth sample will be considered for fall 2024 to determine trends over time regarding growth and if there are problems associated with growth past 14 inches.

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Tables and Figures

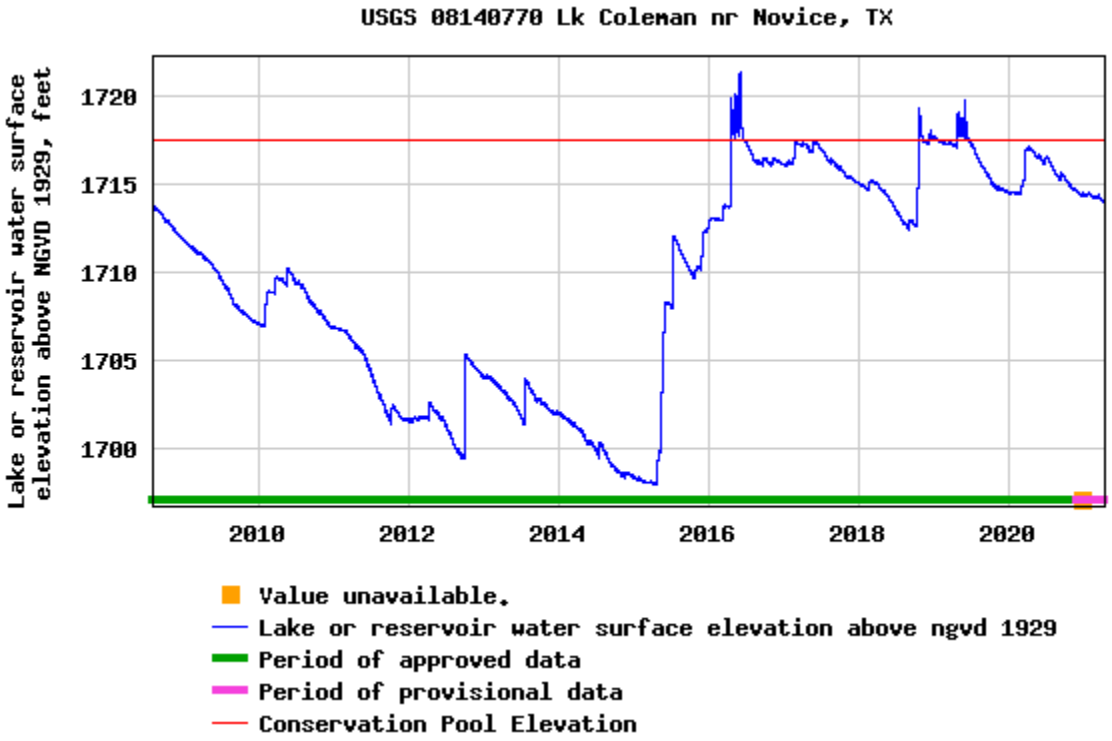


Figure 1. Daily water level data for Coleman Reservoir, Texas, August 2008- May 2021 (USGS 2021). NGVD 1929 refers to the National Geodetic Vertical Datum of 1929.

Table 1. Characteristics of Coleman Reservoir, Texas.

Characteristic	Description
Year constructed	1966
Conservation pool	1,717.5 feet above mean sea level
Maximum depth	1,661.5 feet above mean sea level
Controlling authority	City of Coleman
County	Coleman
Reservoir type	Tributary
River basin	Colorado River Basin
Shoreline Development Index	4.05
Trophic Classification Index (Chl *a*)	51.66
USGS 8-Digit HUC Watershed	12090108 (Jim Ned)
Conductivity	355-508 µS/cm

Table 2. Boat ramp characteristics for Coleman Reservoir, Texas, July, 2020. Reservoir elevation at time of survey was 1,716.5 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Press Morris Park, North	32.03853 -99.46322	Y	15	1,709.5	Good; Accessible
Press Morris Park, South	32.03775 -99.46311	Y	8	1,707.5	Good; Accessible
Quail Creek RV Park	32.03622 -99.47069	N	5	1,705.5	Good; Accessible

Table 3. Harvest regulations for Coleman Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, Hybrid Striped (i.e., Palmetto Bass and Sunshine Bass)	5	18-inch minimum
Bass, Largemouth	5	14-inch minimum
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Coleman Reservoir, Texas. FRY = fry; FGL = fingerling; AFGL = advanced fingerling; ADL = adults; UNK = unknown.

Year	Number	Size
	Threadfin Shad	
1984	1,950	FGL
1985	1,200	FGL
Total	3,150	
	Channel Catfish	
1966	84,000	AFGL
1967	350	UNK
2002	1,081	AFGL
2003	33,584	AFGL
Total	119,015	
	Palmetto Bass	
1976	21,280	1967
1977	16,656	1970
1979	13,950	UNK
1981	10,575	UNK
1983	9,999	UNK
1986	35,180	FRY
1987	40,050	FGL
1988	300,000	FRY
1989	250,000	FRY
1991	32,030	FGL
1992	24,400	FGL
1994	24,786	FGL
1995	14,950	FGL
1996	10,096	FGL
1997	10,235	FGL
1998	10,087	FGL
2004	9,998	FGL
2007	523,122	FRY
2007	10,119	FGL
2009	10,220	FGL
Total	1,377,733	

Year	Number	Size
	Sunshine Bass	
2014	124,952	FRY
2015	118,918	FRY
2016	108,379	FRY
2017	142,500	FRY
2020	85,900	FRY
2021	10,083	FGL
Total	580,649	
	Largemouth Bass	
1966	246,000	
1967	8,000	
1970	100,000	
Total	354,000	
	ShareLunker Largemouth Bass	
2021	10,295	FGL
	Kemp's Largemouth Bass	
1985	102,528	FRY
	Florida Largemouth Bass	
1991	100,465	FGL
2001	201,471	FGL
2012	104,477	FGL
2019	145,802	FGL
Total	552,215	

Table 5. Objective-based sampling plan components for Coleman Reservoir, Texas 2020–2021.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Abundance	CPUE–Total, CPUE–Stock, CPUE-14	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Condition	W_r	5 fish/inch group (max)
	Age-and-growth	Age at 14 inches	N = 13, 13.0 – 14.9 inches
Bluegill [a]	Abundance	CPUE–Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
Gizzard Shad [a]	Abundance	CPUE–Total	RSE ≤ 25
	Size structure	length frequency	N ≥ 50
	Prey availability	IOV	N ≥ 50
Threadfin Shad [a]	Abundance	CPUE–Total	RSE ≤ 25
Trap netting			
Crappie	Abundance	CPUE–Total, CPUE–Stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
	Condition	W_r	5 fish/inch group (max)
Gill netting			
Hybrid Striped Bass	Abundance	CPUE–Total, CPUE–18	RSE-Stock ≤ 30
	Size structure	PSD, length frequency	N ≥ 50
	Condition	W_r	All fish sampled
	Age-and-growth	Age at 18 inches	N = 13, 17.0 – 18.9 inches
	Genetics	Hybrid type	All fish sampled

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

Table 6. Survey of structural habitat types, Coleman Reservoir, Texas, July 2020. Percent occurrence with lower and upper 95% confidence limits (CL) of shoreline structural habitat at 96 random sites. Water level at time of survey was 1.0 feet below conservation pool elevation.

Structural habitat type	Percent occurrence	Lower CL	Upper CL
Natural shoreline	56.3	46.3	65.7
Rocky shoreline	42.7	33.3	52.7
Rock bluff	1.0	0.2	5.7
Docks	5.2	2.2	11.6

Table 7. Survey of aquatic vegetation, Coleman Reservoir, Texas, July 2020. Percent occurrence with lower and upper 95% confidence limits (CL) of vegetation at 98 random sites throughout the reservoir and 96 sites along the shoreline. Water level at time of survey was 1.0 feet below conservation pool elevation.

	Throughout the reservoir			Shoreline		
Vegetation type	Percent occurrence	Lower CL	Upper CL	Percent occurrence	Lower CL	Upper CL
Open water	74.5	65.0	82.1	3.1	1.1	8.8
Flooded terrestrial brush	17.3	11.1	26.0	84.4	75.8	90.3
Standing timber	7.1	3.5	14.0	10.4	5.8	18.1
Lotus	3.1	1.0	8.6	14.6	8.9	23.0
Star grass	2.0	0.6	7.1	31.3	22.9	41.1
Water primrose	1.0	0.2	5.6	1.0	0.2	5.7
Black willow	1.0	0.2	5.6	6.3	2.9	13.0
Logs	1.0	0.2	5.6	0.0	0.0	0.0
Coontail	1.0	0.2	5.6	5.2	2.2	11.6
Common button bush	0.0	0.0	0.0	51.0	41.2	60.8
Water-willow	0.0	0.0	0.0	22.9	15.6	32.3
Cattail	0.0	0.0	0.0	19.8	13.1	28.9
Pondweed	0.0	0.0	0.0	9.4	5.0	16.9
Spikerush	0.0	0.0	0.0	4.2	1.6	10.2
Bullrush	0.0	0.0	0.0	1.0	0.2	5.7

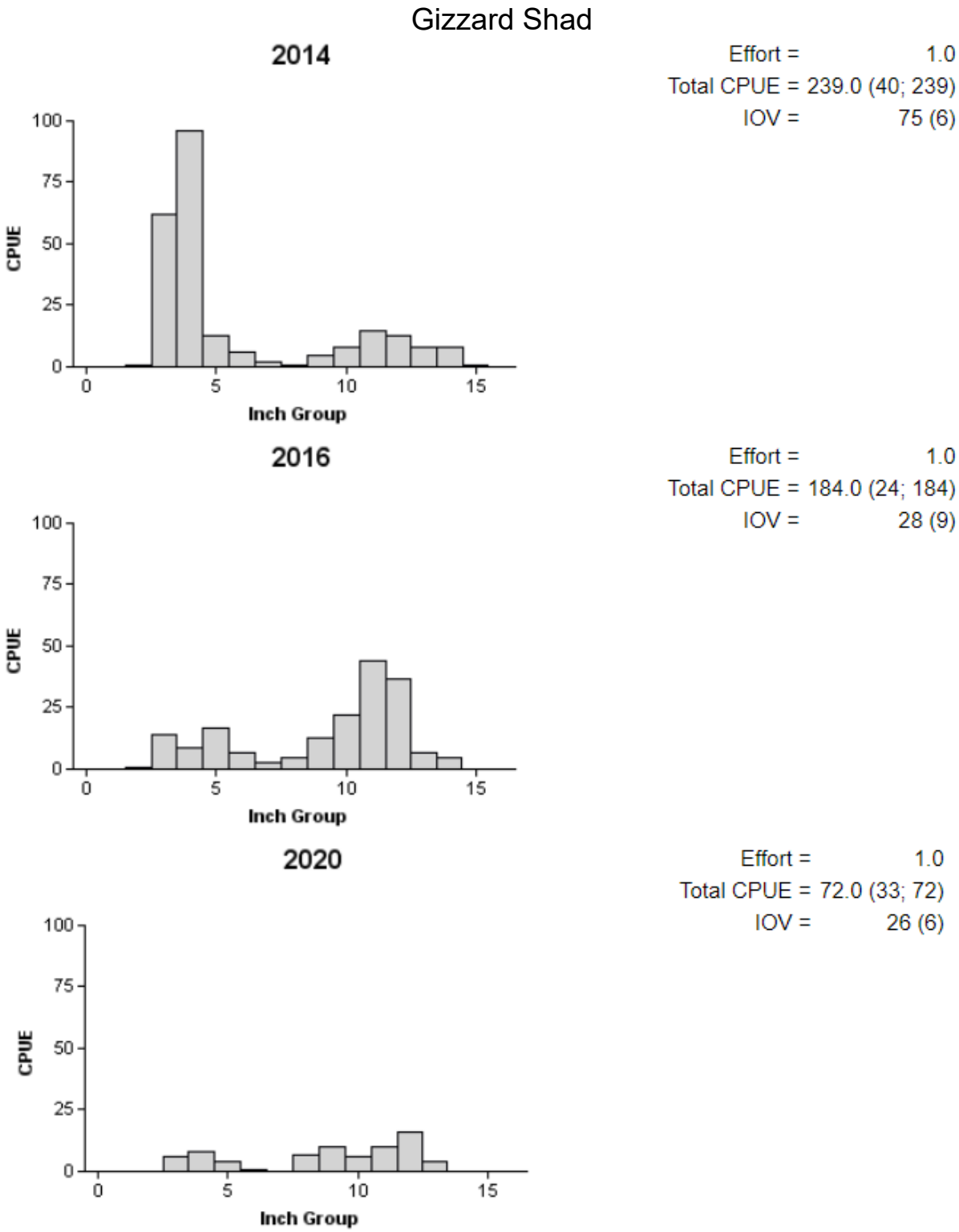


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Coleman Reservoir, Texas, 2014, 2016, and 2020.

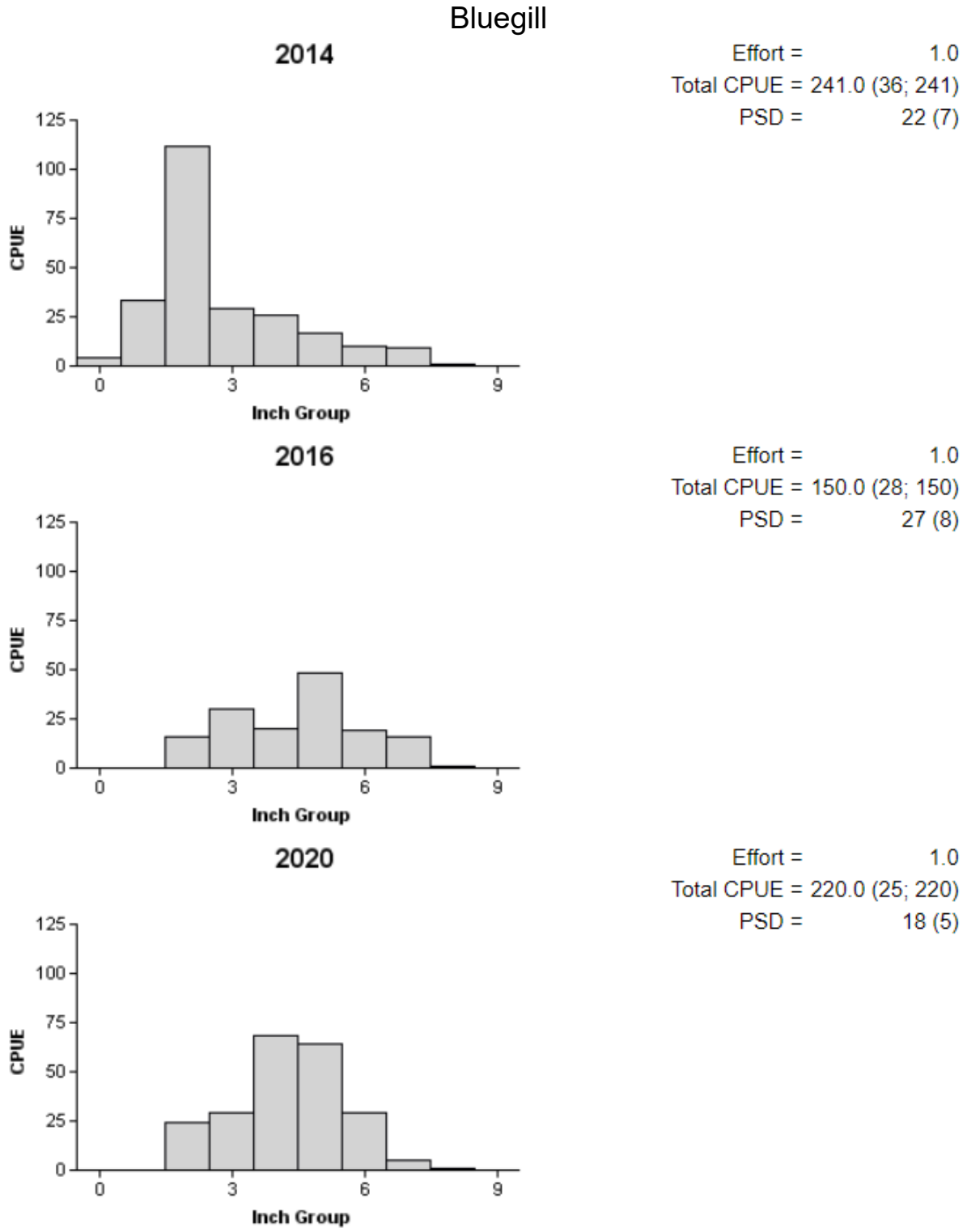


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Coleman Reservoir, Texas, 2014, 2016, and 2020.

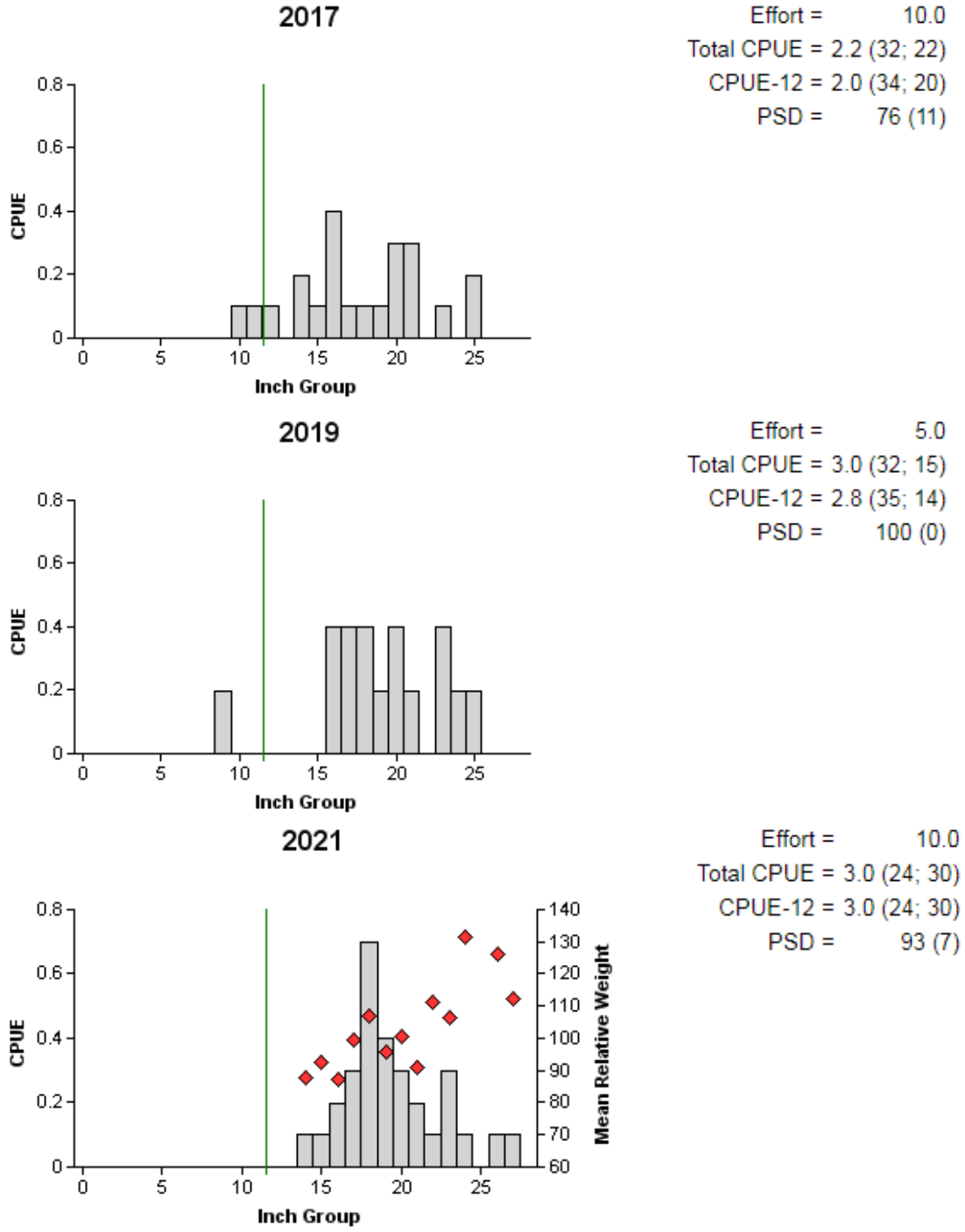


Figure 4. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Coleman Reservoir, Texas 2017, 2019, and 2021. Vertical line indicates minimum length limit.

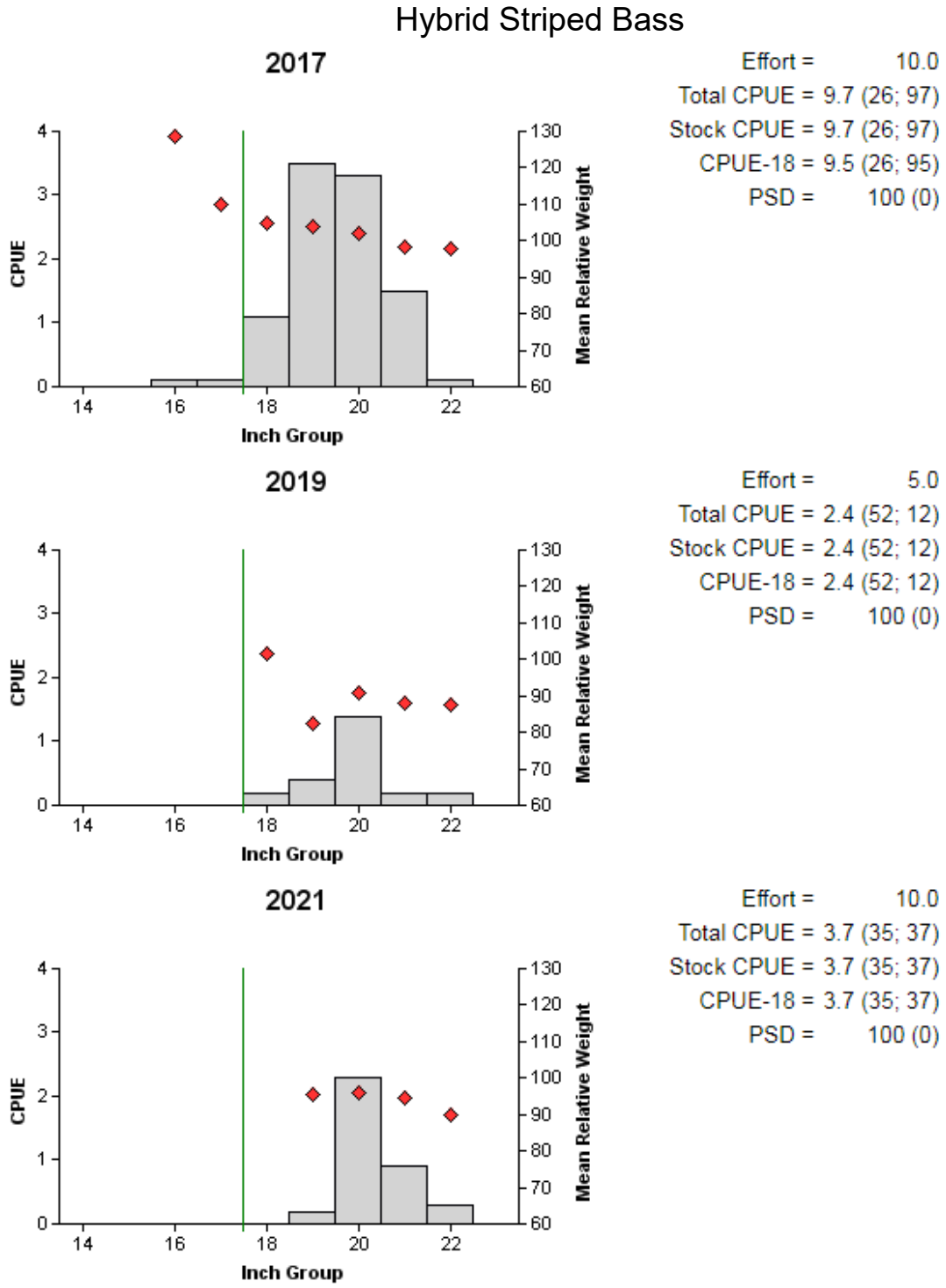


Figure 5. Number of Hybrid Striped Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Coleman Reservoir, Texas, 2017, 2019, and 2021. Vertical line indicates minimum length limit.

Hybrid Striped Bass

Table 8. Data from Sunshine Bass collected from gill net surveys for Coleman Reservoir, Texas 2019–2021. Year class values of NA indicate that year class could not be determined with data collected.

Year sampled	Year class	Length (inch)	Notes
2021	2017	21.6	Genetics confirmed hybrid type; year class determined by age and growth sample
2021	2017	20.9	Genetics confirmed hybrid type; year class determined by age and growth sample
2021	NA	21.8	Genetics confirmed hybrid type; no age data was collected from this fish
2019	2017	20.4	Genetics confirmed hybrid type; year class determined by age and growth sample

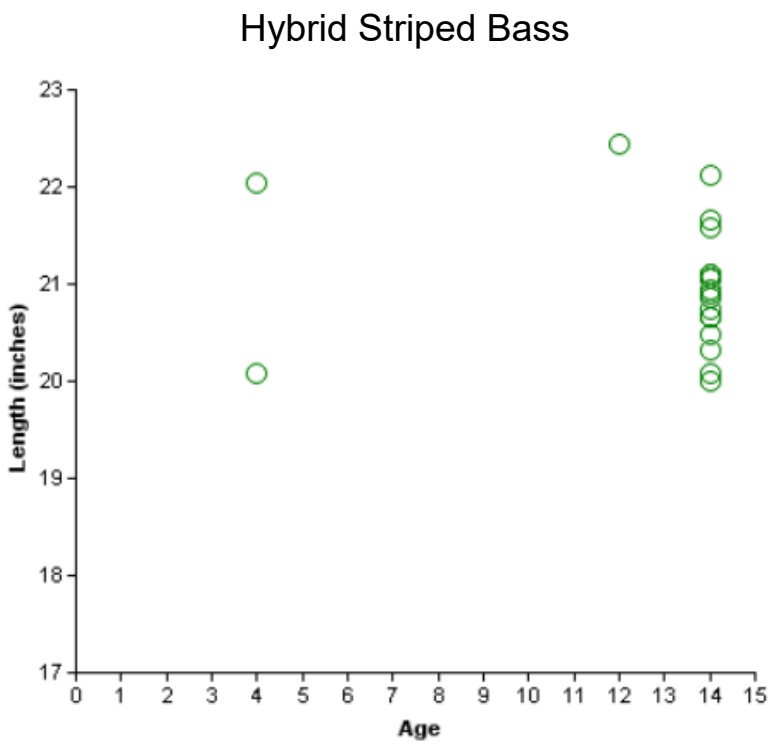


Figure 6. Length at age for Hybrid Striped Bass collected during spring 2021 gill nets, Coleman Reservoir, Texas.

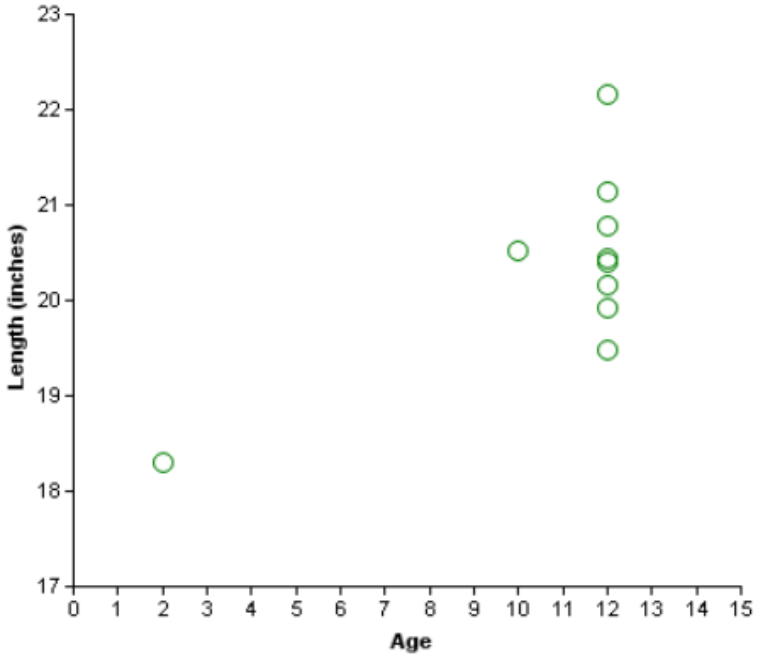


Figure 7. Length at age for Hybrid Striped Bass collected during spring 2019 gill nets, Coleman Reservoir, Texas.

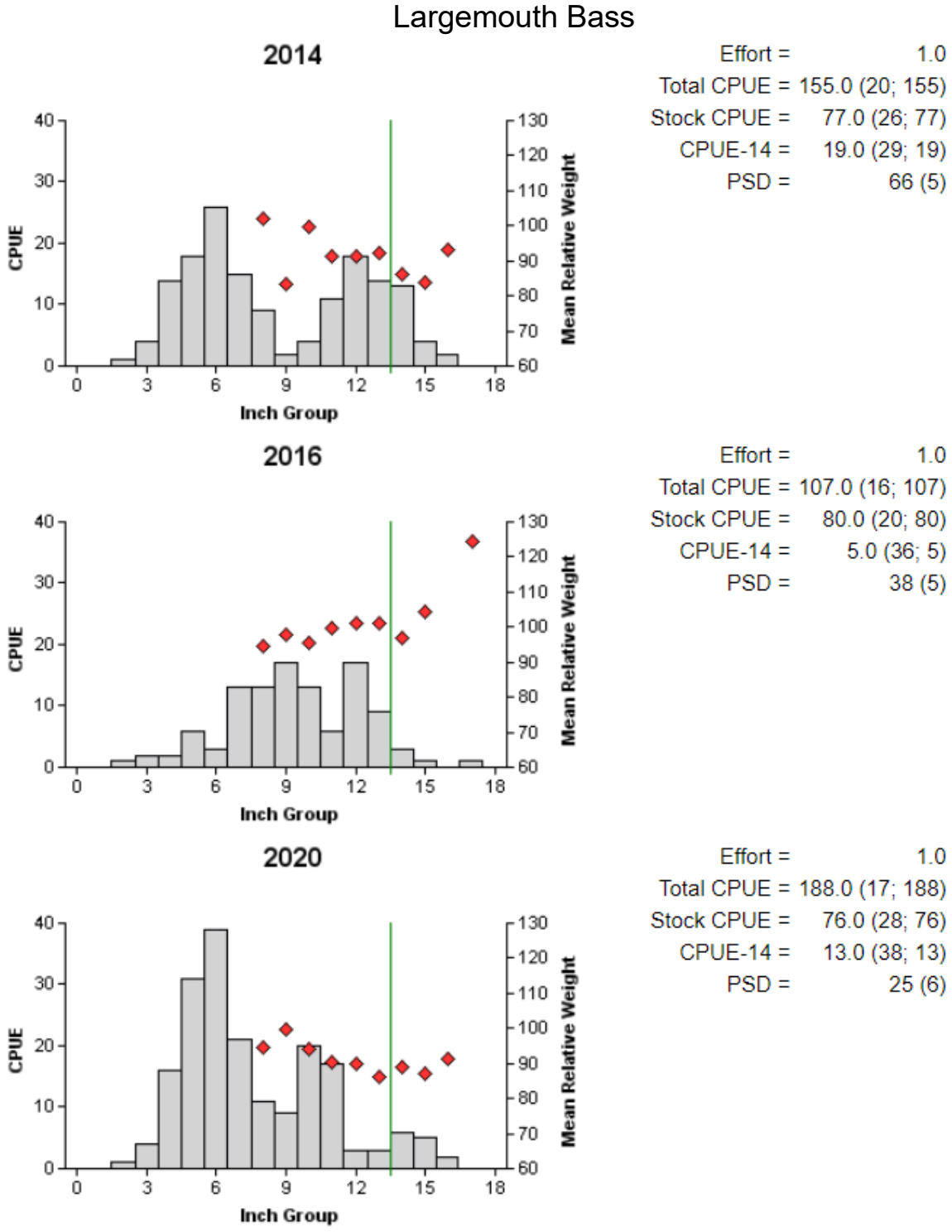


Figure 8. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Coleman Reservoir, Texas, 2014, 2016, and 2020. Vertical line indicates minimum length limit.

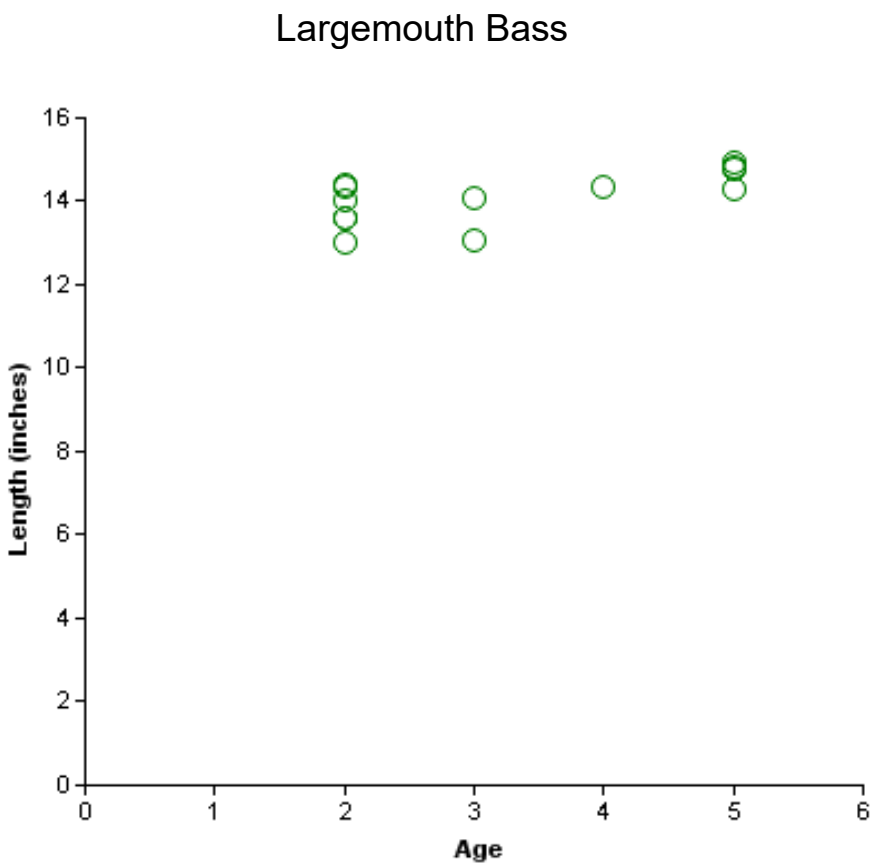


Figure 9. Length at age for Largemouth Bass 13.0-14.9 inches total length collected during fall 2020 electrofishing and bass-only electrofishing, Coleman Reservoir, Texas. Mean age at length took an average of 3.2 years (N=13, range 2-5 years).

Largemouth Bass

Table 9. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Coleman Reservoir, Texas, 1987-2016. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, F1 = first generation hybrid between a FLMB and a NLMB, Fx = second or higher generation hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

Year	Sample size	Number of fish				% FLMB alleles	% FLMB
		FLMB	F1	Fx	NLMB		
1987	41	0	NA	4[a]	37	3.0	0.0
1991	30	0	NA	17[a]	13	17.5	0.0
1994	21	8	NA	12[a]	1	71.5	38.1
1997	30	1	NA	21[a]	8	31.7	3.3
2000	30	2	NA	26[a]	2	48.3	6.7
2002	41	4	NA	31[a]	6	48.7	9.8
2004	24	5	NA	23[a]	6	46.2	14.7
2006	30	0	NA	30[a]	0	48.4	0.0
2012	30	1	1	28	0	59.2	3.3
2014	30	0	1	29	0	48.6	0.0
2016	30	1	26	2	1	50.8	3.3

[a] Determination of hybrid status not conducted

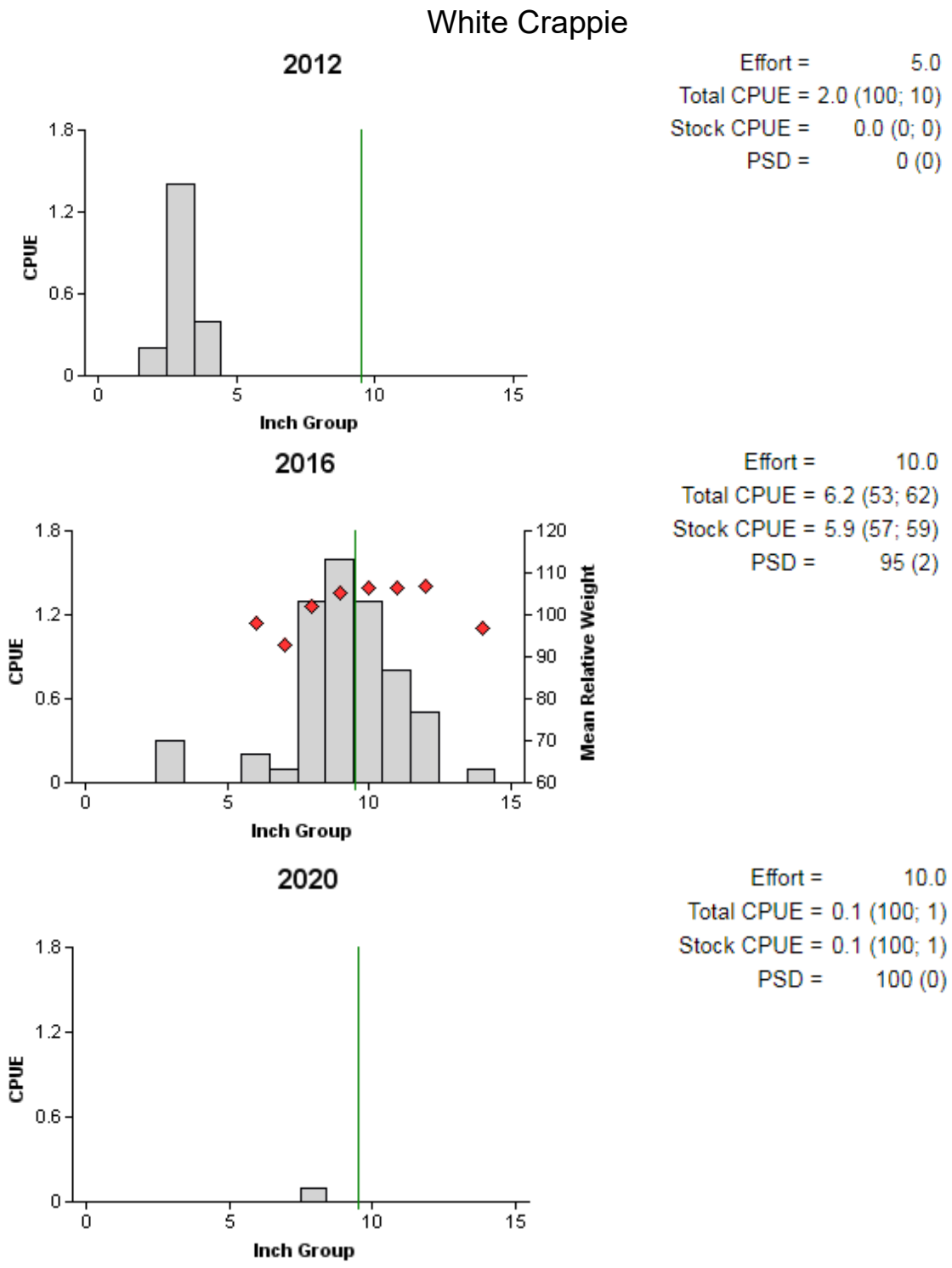


Figure 10. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Coleman Reservoir, Texas, 2012, 2016, and 2020. Vertical line indicates minimum length limit.

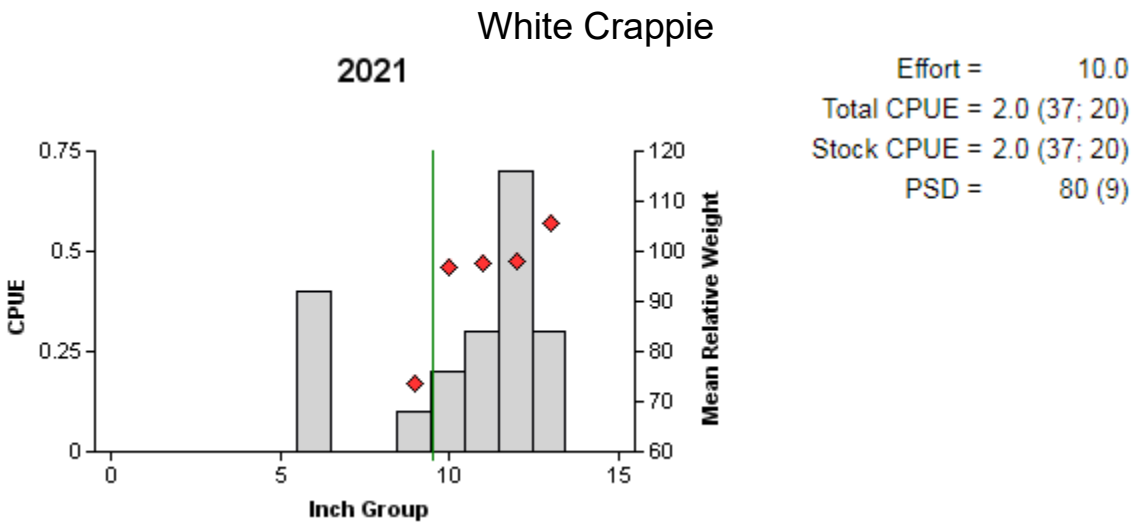


Figure 11. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting survey, Coleman Reservoir, Texas, 2021. Vertical line indicates minimum length limit.

Proposed Sampling Schedule

Table 10. Proposed sampling schedule for Coleman Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing surveys are conducted in the fall.

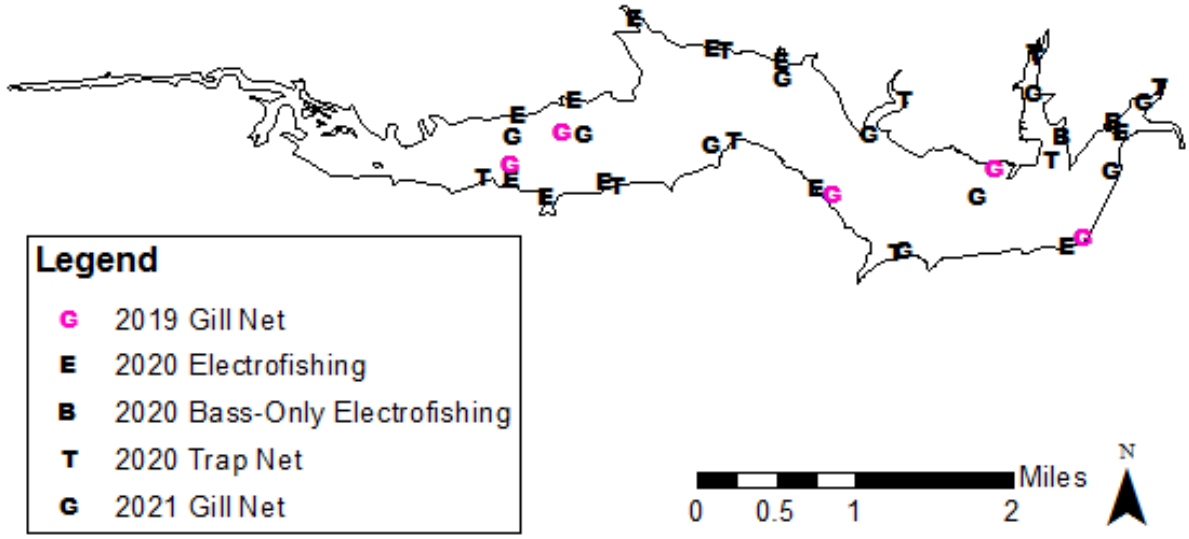
	Survey year			
	2021-2022	2022-2023	2023-2024	2024-2025
Angler access				X
Structural habitat				X
Vegetation				X
Electrofishing – fall				X
Electrofishing – spring			X	
Gill netting				X
Report				X

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 Coleman Reservoir, Texas, 2019-2020. Sampling effort was 1 hour for electrofishing, 10 net nights for trap netting, and 10 net nights for gill netting.

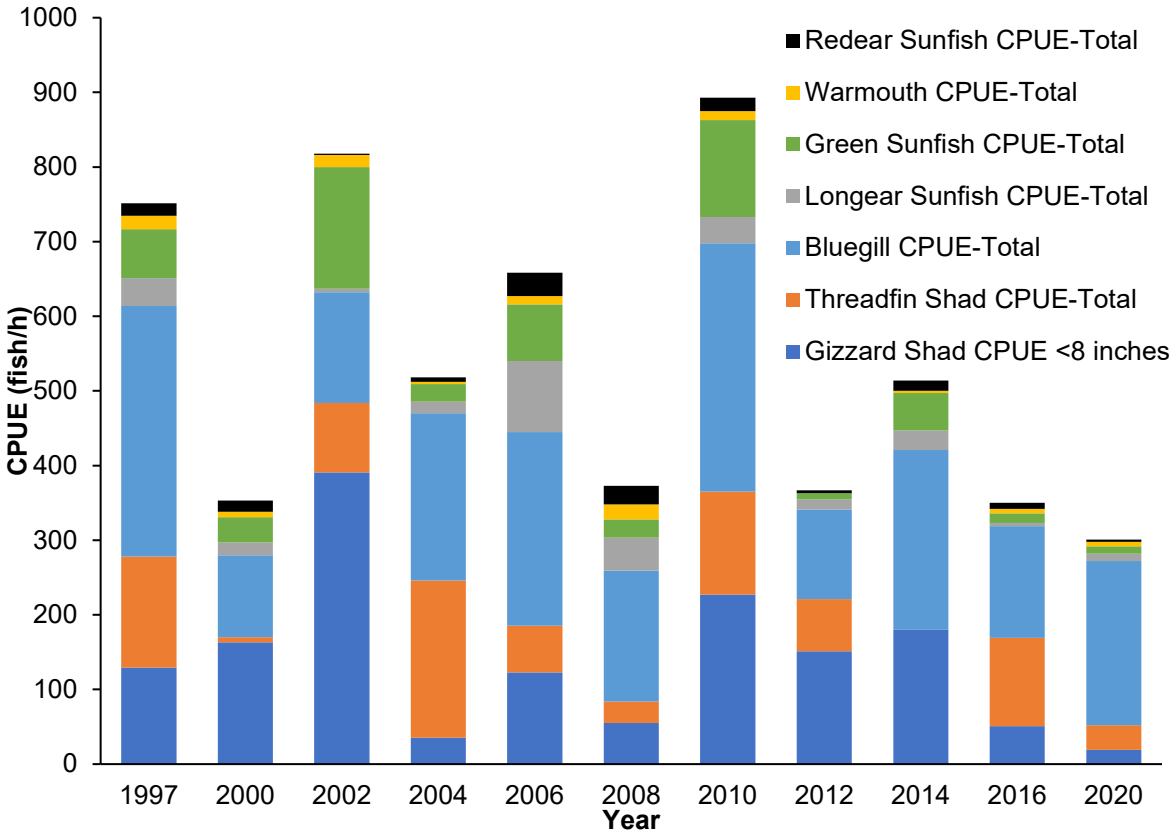
Species	Electrofishing		Trap netting		Gill netting	
	N	CPUE (RSE)	N	CPUE (RSE)	N	CPUE (RSE)
Gizzard Shad	72	72.0 (33)				
Threadfin Shad	33	33.0 (29)				
Golden Shiner	4	4.0 (56)				
Blackspot Shiner	1	1.0 (100)				
Blacktail Shiner	1	1.0 (100)				
Channel Catfish					30	3.0 (24)
Green Sunfish	10	10.0 (61)				
Warmouth	6	6.0 (58)				
Bluegill	220	220.0 (25)				
Longear Sunfish	10	10.0 (32)				
Redear Sunfish	3	3.0 (52)				
Largemouth Bass	188	188.0 (17)				
White Crappie			1	0.1 (100)	20	2.0 (37)
Black Crappie					6	0.6 (83)
Hybrid Striped Bass					37	3.7 (35)

APPENDIX B – Map of sampling locations



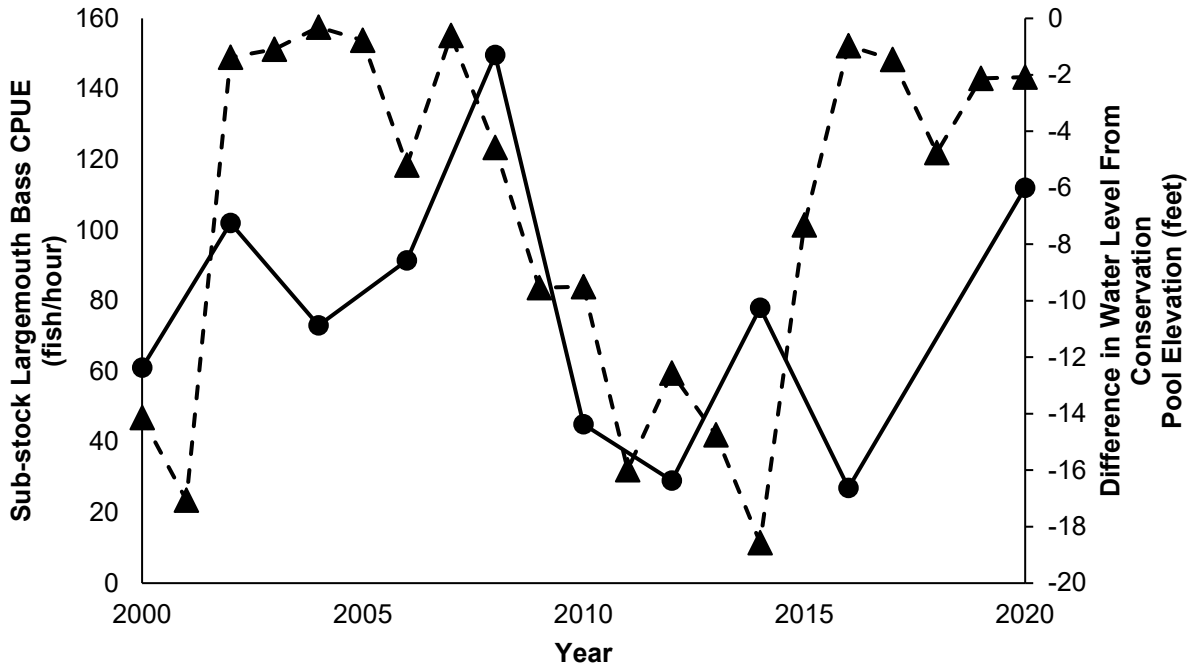
Location of sampling sites, Coleman Reservoir, Texas, 2017-2021. Gill net, electrofishing, bass-only electrofishing, and trap net stations are indicated by G, E, B, and T respectively. Water level was 0.2 feet below conservation pool during 2019 gill netting survey. Water level was 2.0 feet below conservation level during 2020 electrofishing sampling and about 3.0 feet below conservation pool during 2020 trap netting and 2021 gill netting surveys.

APPENDIX C – Trends in catch per unit effort for commonly sampled prey species



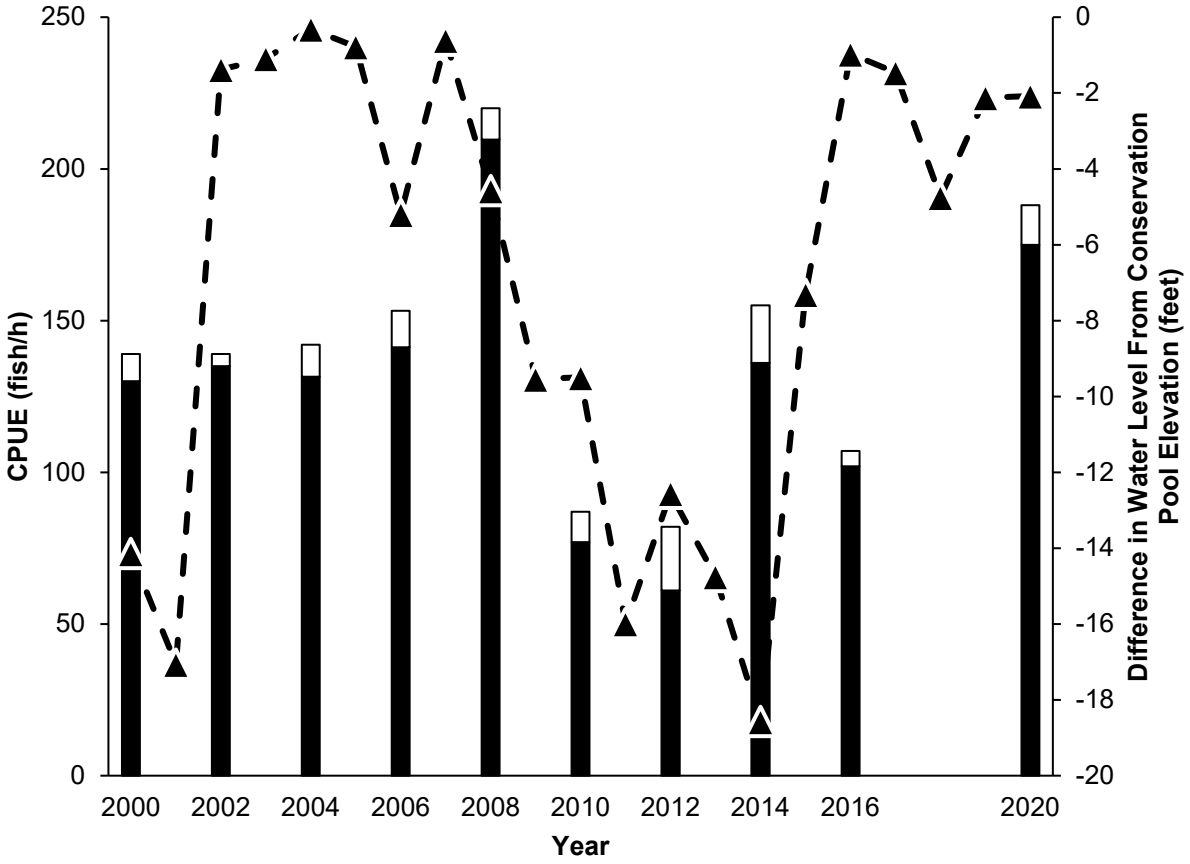
Total catch per unit effort for commonly sampled prey species in Coleman Reservoir, Texas, 1997-2020.

APPENDIX D – Trends in catch per unit effort of sub-stock Largemouth Bass and associated water level



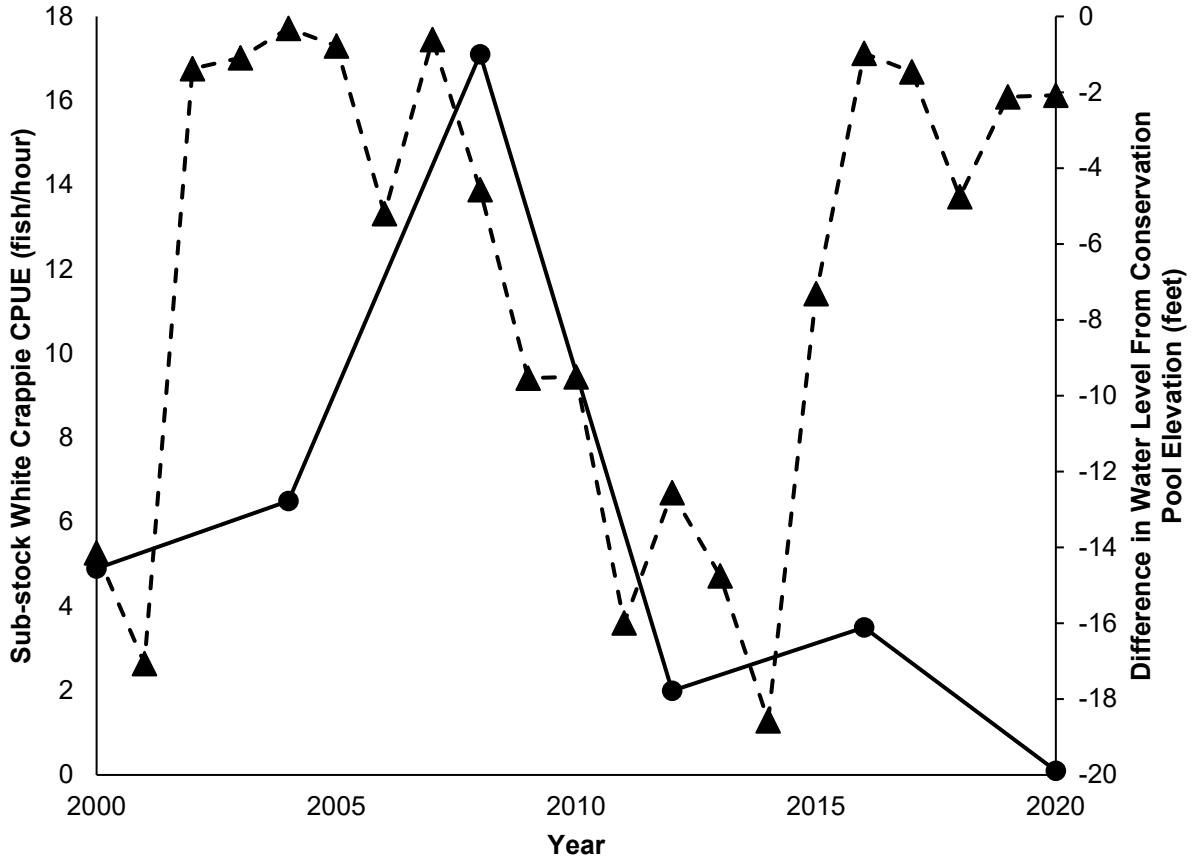
Sub-stock CPUE of Largemouth Bass (fish/h; solid line) caught during fall electrofishing surveys and difference between beginning October Water level elevation and conservation pool (feet; dashed line), Coleman Reservoir 2000-2020.

APPENDIX E – Trends in catch per unit effort of sub-legal and legal-length Largemouth Bass and associated water level



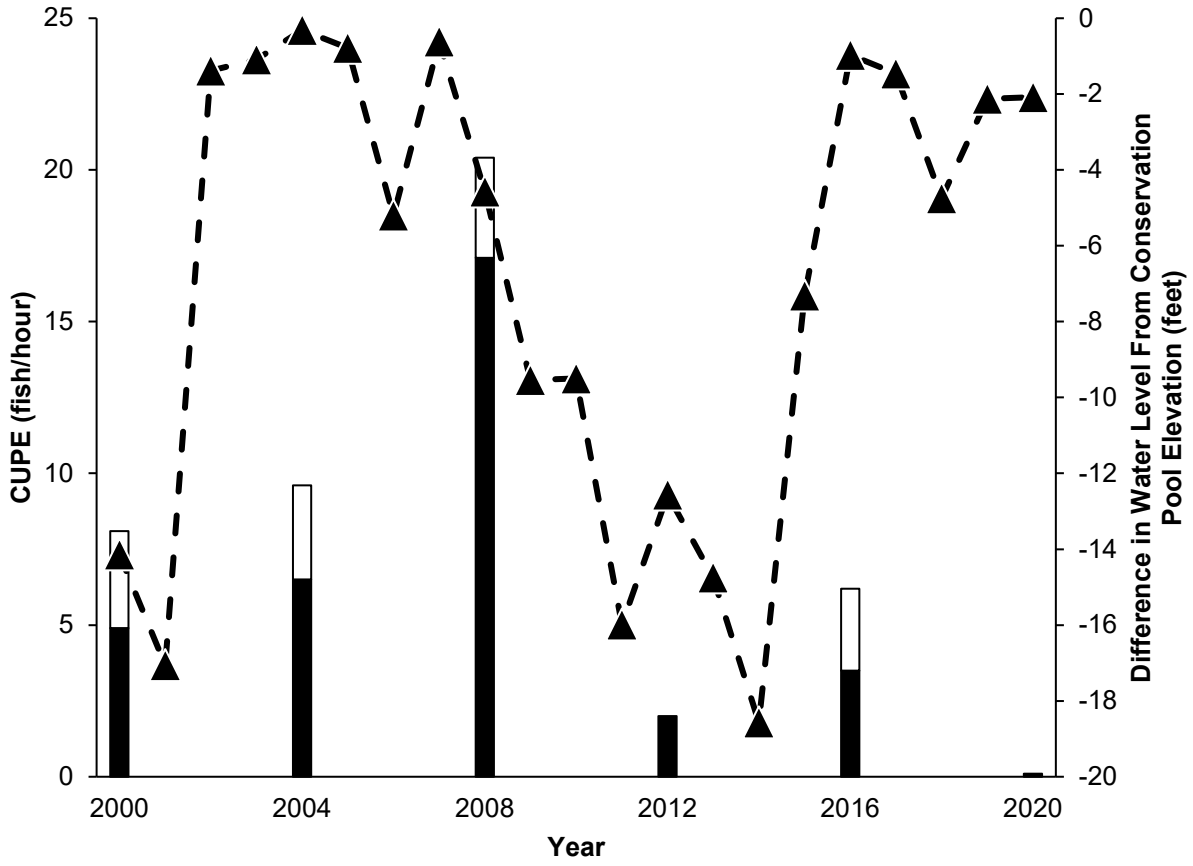
Cumulative catch rates of sub-legal (<14 inches TL; black bars) and legal (≥14 inches TL; white bars) Largemouth Bass caught per hour during fall electrofishing surveys and difference between beginning October water level elevation and conservation pool (feet; dashed line), Coleman Reservoir 2000-2020.

APPENDIX F – Trends in catch per unit effort of sub-stock White Crappie and associated water level



Sub-stock CPUE of White Crappie (fish/h; solid line) caught during fall electrofishing surveys and difference between beginning October water level elevation and conservation pool (feet; dashed line), Coleman Reservoir 2000-2020.

APPENDIX G – Trends in catch per unit effort of sub-legal and legal-length White Crappie and associated water level



Cumulative catch rates of sub-legal (<10 inches TL; black bars) and legal (≥10 inches TL; white bars) White Crappie caught per net night during fall trap netting surveys and difference between beginning October water level elevation and conservation pool (feet; dashed line), Coleman Reservoir 2000-2020.

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