Brownwood Reservoir

2024 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-5

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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Survey and Management Summary

Fish populations in Brownwood Reservoir were surveyed in 2021 and 2024 by electrofishing, 2024 by trap netting, and in 2025 by gill netting. Historical data are presented with the 2021-2025 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: Brownwood Reservoir is a 6,814-acre impoundment constructed on Pecan Bayou and its tributary, Jim Ned Creek, in the Colorado River Basin about 70 miles southeast of City of Abilene and about 6 miles north of the City of Brownwood, Texas. The reservoir was constructed in 1933 and is used for municipal water supply, flood control, and recreation. The reservoir is controlled by the Brown County Water Improvement District. Prior to summer 2024, the reservoir had dropped to about 9 ft below conservation pool elevation. Rainfall during 2024 refilled the reservoir and increased water level to over conservation pool elevation. As of May 2025, the reservoir was about 0.5 ft above conservation pool. During the habitat survey, the areas surveyed in the reservoir were primarily featureless, though observed vegetation was mostly waterwillow, inundated terrestrial vegetation, coontail, and shoreline habitat was typically rocky. Boater access was available at all public ramps during the survey period, and bank angler access was limited to areas near the boat ramps and Lake Brownwood State Park.

Management History: Palmetto Bass were regularly stocked from the 1980's through mid-1990's, but stockings were discontinued because of the lack of directed fishing effort. Largemouth Bass harvest was managed with a 16-inch minimum length limit (MLL) from 1 September 1992 to 31 August 1999. Thereafter, the regulation was changed to a 14-inch MLL. Largemouth Bass were last stocked in 2024. Blue Catfish were stocked in 2022-2024 to improve catfish fishery.

Fish Community

- **Prey Species:** Bluegill, Gizzard Shad, Threadfin Shad, and Longear Sunfish comprised most of the prey species community. Shad and sunfish were available as prey to most sport fish, and Bluegill were the predominant prey in 2024.
- **Catfishes:** Blue, Channel, and Flathead catfishes were present in the reservoir. Relative abundance of Blue Catfish and Channel Catfish remained low in gill netting and low-frequency electrofishing surveys. The low-frequency electrofishing survey was not completed in full because of equipment issues; no fish were caught. Similar to previous gill netting surveys, most Blue Catfish sampled were legal size, and the 2025 catch rate remained low but was lower than the prior survey in 2021. Catfishes were the 2nd-most targeted species by anglers, particularly bank anglers. About 38.4% of legal catfishes were released by anglers.
- **Largemouth Bass:** Largemouth Bass catch rates fluctuated during the survey period but catch indicated adequate reproduction similar to other recent surveys. Catches of legal length fish were similar during the survey period. Two pure Florida Largemouth Bass were found in the genetics sample, and 60% of bass in the sample had Florida-strain alleles. Largemouth Bass was the most popular species targeted by anglers, and most legal fish were released. Largemouth Bass tournament angling accounted for 38.4% of the total effort towards the species.
- **Crappie:** Both White and Black Crappie are found in the reservoir, but White Crappie are more numerous. The White Crappie catch rate slightly increased but it is still substantially lower than reported in 2017. Crappie were the 3rd-most targeted species, and only 3% of legal fish were released.

Management Strategies: Continue developing and maintaining partnerships for improving fish habitat within the reservoir. Continue to monitor zebra mussels and work with controlling authority and stakeholders to identify potential preventative and control measures. Conduct electrofishing and trap netting in fall 2028 and gill netting during spring 2029. Conduct a roving creel survey from summer 2028 – spring 2029.

Introduction

This document is a summary of fisheries data collected from Brownwood Reservoir in 2021-2025. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve existing sport fisheries. While information on other fisheries was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2021-2025 data for comparison.

Reservoir Description

Brownwood Reservoir is a 6,814-acre impoundment constructed on Pecan Bayou and its tributary, Jim Ned Creek, in the Colorado River Basin about 70 miles southeast of Abilene, TX and about 6 miles north of Brownwood, Texas. The reservoir was constructed in 1933 and is used for municipal water supply, flood control, and recreation. The reservoir is controlled by the Brown County Water Improvement District. Land use within the watershed is primarily agricultural, residential, and ranching. The Carlson Trophic State Index for Brownwood Reservoir is 54.9 and is considered eutrophic (Texas Commission on Environmental Quality 2024). Prior to summer 2024, the reservoir reached nearly 9 ft. low over the survey period (Figure 1). Rainfall during summer and fall 2024 refilled the reservoir and increased the water level to over conservation pool elevation. As of May 2025, the reservoir was about 0.5 ft above conservation pool. Additional reservoir characteristics are displayed in (Table 1).

Angler Access

Brownwood Reservoir has four public boat ramp sites (Table 2). During the survey period, all ramps were open. Public shoreline access was limited to the area around the boat ramps within Lake Brownwood State Park.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Homer and Goldstrohm 2021) included:

1. Continue to establish and maintain partnerships to conduct fisheries habitat enhancement projects.

   Action: TPWD partnered with Lake Brownwood State Park to enhance the fishing area around the fishing pier with artificial habitat structures and a pier lighting system for improved access.

2. Conduct a year-long roving creel survey from June 2024-May 2025 to estimate angler effort, fish harvest and catch, and angler expenditures at Brownwood Reservoir.

   Action: A creel survey was conducted from June 1, 2024 – May 31, 2025.

3. Conduct low-frequency electrofishing and gill netting to monitor blue catfish relative abundance, body conditions, and growth.

   Action: Low frequency electrofishing was conducted in late spring 2024, and gill netting was conducted in spring 2025. The low frequency electrofishing survey was not fully completed due to equipment issues.

4. Educate public about invasive species and associated threats to Texas water bodies.

   Action: Various efforts have been made to educate several groups and individuals about invasive species. Examples include social media posts, popular press articles, providing literature, posting signage at boat ramps, and making speaking points while speaking to groups and individuals.

Harvest regulation history: Prior to 1992, all species were managed with statewide fishing regulations. From 1 September 1992 to 31 August 1999, Largemouth Bass were managed with 16-inch MLL. However, the regulation reverted to the statewide 14-inch MLL on 1 September 1999 because no improvement in

growth rates were observed with the prior regulation. Other species have been managed with statewide regulations (Table 3).

Stocking History: Historical stockings included Threadfin Shad, Walleye, Hybrid Green x Redear Sunfish, Palmetto Bass (1980-2022), and Largemouth Bass (1969-1996). Florida Largemouth Bass were initially stocked in 1975 and last stocked in 2024. Blue Catfish were recently stocked in 2022-2024. The complete stocking history for Brownwood Reservoir is displayed in Table 4.

Vegetation/habitat management history: A collaborative artificial fish habitat enhancement project was completed during fall 2015. Additional artificial fish habitat structures and an underwater pier lighting system were installed at Lake Brownwood State Park to enhance the fishing pier in 2017. Additional habitat enhancement projects were conducted in Fall 2024 and Spring 2025 in which habitat structures and brush piles were deployed into seven locations at the reservoir.

Water transfer: No interbasin water transfers are known to exist. The City of Early can draw raw water from Brownwood Reservoir to keep Early Town Center Pond full, which led to an infestation of zebra mussels in that waterbody in 2023.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Brownwood Reservoir (Homer and Goldstrohm 2021). 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 2022).

Low-frequency electrofishing – Low-frequency electrofishing was conducted late spring 2024 at 20, 3-min stations with a Smith-Root APEX pulsator. Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing.

Electrofishing – Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (2 hours at 24, 5-min stations). Prior to 2024, fishes were sampled using a Smith-Root 7.5 GPP pulsator, and the most recent survey was conducted with the Smith-Root APEX pulsator. Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. A Category I age sample of 78 Largemouth Bass was collected to evaluate growth.

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

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

Genetics – Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2024). Micro-satellite DNA analysis was used to determine genetic composition of individual fish since 2005. Electrophoresis analysis was used prior to 2005.

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 (Wr)] were calculated for target fishes according to Anderson and Neumann (1996). Index of Vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV.

Habitat – A vegetation and structural habitat surveys were conducted in summer 2024 by using the random point method (TPWD, Inland Fisheries Division, unpublished manual revised 2022). A total of 425 random points throughout the reservoir, and presence/absence was determined for vegetative and structural habitat types identified at or below the waterline at all stations. Twenty-four (n=24) stations were discarded because they occurred in inaccessible areas of the reservoir or were on dry land. All remaining points (N=401) were sampled for the vegetation survey wherein presence/absence of aquatic vegetation species was recorded.

Structural habitat type was additionally recorded for those points. Percent occurrence (% = [number of stations with habitat present / total stations sampled] X 100) and associated 95% confidence intervals (Lake Tahoe Community College 2023) were calculated for each habitat feature type (TPWD, Inland Fisheries Division, unpublished manual revised 2022).

Creel – A roving creel survey was conducted from June 2024 – May 2025. Angler interviews were conducted on 5 weekend days and 4 weekdays per quarter to assess angler use and fish catch/harvest statistics in accordance with the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2022).

Water level – Source for water level data was the United States Geological Survey (USGS 2025).

Results and Discussion

Habitat: In 2024, shoreline habitat consisted mostly of rocky shoreline (65.1%), boat docks and ramps (23.7%), natural shoreline (17.2%), and gravel (7.7%; Table 6). Several areas of featureless, open water (28.2%) were observed as well as vegetation mostly consisting of common buttonbush (27.4%) and American waterwillow (20.9%; Table 7). Other vegetation and habitat features present included cattail (3.4%), flooded terrestrial vegetation (1.7%), standing (3.9%) and fallen timber (1.7%), smartweed (1.2%), bulrush (0.5%) and American pondweed (0.2%).

Creel: In the 2024-2025, anglers spent an estimated 82,677.7 h of fishing effort at Brownwood Reservoir (Table 8). Approximately 58% of the angler effort reported was from boat anglers, and the remaining 42% was from bank anglers. Anglers reported spending $1,081,538 during the creel survey, which 82% ($890,620) of the expenditures came from boat anglers. The most targeted species by anglers were Largemouth Bass (43,191 h), catfishes (15,289.4 h), White Crappie (11,480.3 h), fishing for anything (10,949.2 h), and White Bass (1,767.7 h; Table 9). Angling effort by species group was different by angler type. Bank anglers allocated more effort targeting catfishes (11,248.2 h), White Crappie (8,963.7 h), and fishing for anything (8,722.2 h), whereas boat anglers spent most of their effort targeting Largemouth Bass (34,258.8 h). Boat anglers reported the only angling effort towards White Bass (1,767.7 h).

Prey species: Bluegill, Gizzard Shad, Threadfin Shad and Longear Sunfish comprised most of the prey observed during the fall 2024 survey. Inland Silversides were also numerous, but they could not be effectively collected with the standardized sampling gear. Other prey species observed included Green Sunfish, Redear Sunfish, Warmouth, Orangespotted Sunfish, common Carp, Bigscale Logperch and a variety of hybrid sunfishes. Gizzard Shad fluctuated from 120.5/h in 2018 to 105.0/h in 2020 up to 122.5/h in 2024 (Figure 2). Index of Vulnerability fluctuated from 89 in 2018 to 69 in 2020 to 79 in 2024. Overall, Gizzard Shad relative abundance appeared adequate and most individuals were optimal prey size. Threadfin Shad were caught at 21.5/h in fall 2025 (see Appendix A), which was substantially lower than the 97.5/h documented in 2020. Bluegill was the predominant species in the survey. Bluegill CPUE was 514.0/h in fall 2024, an increase since surveys in 2018 (378.0/h) and 2020 (465.0/h; Figure 3). Individuals ranged from 1-7 inches total length (TL) among the surveys, and PSD remained consistently low. However, the greater representation of sub-quality-sized Bluegill suggested that most were optimal prey sizes. Longear Sunfish increased from 87.0/h in 2018 to 122.0/h in 2020 to 146.0 in 2024, and individuals have consistently ranged from 1-5 inches TL (Figure 4). Overall, prey relative abundance was ample to support the existing sport fish community in Brownwood Reservoir (see Appendix C).

Catfishes: Channel Catfish, Blue Catfish, and Flathead Catfish were present in surveys, though Channel Catfish and Flathead Catfish traditionally have had low relative abundance in monitoring surveys. The Flathead and Channel catfish were not enumerated in the 2025 gill netting survey but were present. The target sample sizes for Blue and Channel Catfish were not achieved in the scheduled surveys. The 2024 low frequency electrofishing survey was halted due to equipment failure. In the spring 2025, Blue Catfish catch rate in the gill netting survey (2.6/nn) was similar to the surveys in 2013 (2.9/nn) and 2017 (2.2/nn; Figure 5); a similar pattern was observed for fish that were ≥ stock length. The PSDs for Blue Catfish fluctuated from 75 in 2017 to 36 in 2021 to 67 in 2025. The fluctuations in PSDs may be indicative of infrequent reproduction and/or year class failures likely attributed to water level fluctuations and lack of suitable spawning habitat during the periods of drought. The catch rate for fish ≥20 inches was low at

0.8/nn in 2025 and slightly less than the 1.4/nn reported in 2017. Mean relative weights for the represented inch groups were mostly fair (i.e., 90-95) despite the low relative abundance in 2025. Low-frequency electrofishing was attempted but was not completed because of issues involving the sampling equipment. Anglers spent 15,289.4 h targeting catfishes, which 73.6% was from bank anglers (Table 10). During the creel period anglers harvested an estimated 1,063 Blue Catfish, 1,507 Channel Catfish, and 197 Flathead Catfish, which is considered low. Anglers released 38.4% of all legal catfishes caught, which anglers tended to harvest a greater proportion of Channel Catfish than other catfishes. During the creel, 11 Blue Catfish (14-25 in TL), 14 Channel Catfish (12-19 in TL), and 2 Flathead Catfish (22 and 28 in TL) were observed as harvested.

Largemouth Bass: Largemouth Bass catch rates have fluctuated during the survey period from 123.0/h in 2018 to 91.0/h in 2020 to 124.0/h in 2024 (Figure 6). Catch rates for legal fish were similarly low among the surveys from 2018-2024 (8.5-12.0/h), while Stock CPUE decreased from 98.0/h to 41.0/h during the same period. Size structure as represented by PSD observed during the survey period indicated an increase of more quality length fish from 2020 (PSD=41) to 2024 (PSD=49). Historical trends in the relative abundance of Largemouth Bass are likely influenced by water level and suitable habitat availability (see Appendix D). Periodic water level increases following periods of drought at Brownwood Reservoir often resulted in increased production of Largemouth Bass, but these periods of higher reproduction were generally short in duration and seldom resulted in substantial changes in relative abundance of legal fish. Mean relative weights for the represented inch groups in the 2024 sample were poor to good (82 – 107) and were consistent with prior surveys in 2018 and 2020. Two pure Florida Largemouth Bass were identified in the 2024 sample, and the allele frequency for Florida Largemouth Bass was 60.0%, the highest documented since 1997 (Table 11). Stockings appeared to result in greater Florida Largemouth Bass recruitment. No pure Northern Largemouth Bass were surveyed, but 10 fish in the genetics sample had mostly Northern strain alleles. Ages from 78 Largemouth Bass collected during the fall 2024 survey ranged from 0-8 years old, and lengths ranged from about 8 – 22 inches TL (Figure 7; Table 12). Only five bass at 14 inches TL were collected and had a mean age of 3.6 years. Largemouth Bass were the most popular sportfish among anglers. Anglers spent an estimated 43,191 h targeting Largemouth Bass (Table 12), which most effort was spent by boat anglers (37,258.8 h). Tournament anglers reported 16,584.4 h (38.4%) of effort targeting Largemouth Bass during the creel period. During the 2024-2025 creel survey, anglers harvested about 1,234.5 Largemouth Bass, and about 85% of legal fish were released. During the survey, 26 individuals ranging from 14-20 in TL were observed as harvested.

Crappie: Both White and Black Crappie are present in the reservoir, but White Crappie have been the most abundant. Several objectives were achieved with increasing sampling effort in 2025, though desired precision for relative abundance estimates were not achieved. Black Crappie were not caught in the most recent survey. In 2024, White Crappie relative abundance in trap netting surveys improved to 5.2/nn in 2024 from 1.2/nn in 2020 (Figure 8). The PSD for White Crappie was 42 and indicated that the population was balanced between stock individuals and those below stock length. Lengths ranged from 3-10 in TL. The catch rate for legal White Crappie was equal to that reported in 2020 (0.2/nn). Mean relative weights ranged from fair to good, indicating that forage is adequate. Anglers spent an estimated 11,480.3 h targeting White Crappie (Table 13), which most of this effort was from bank anglers (8963.7 h). Anglers harvested about 6,348.5 White Crappie during the 2024-2025 creel survey, and an estimated 3% of legal individuals were released. During the creel survey, 58 White Crappie ranging from 10-13 in TL were observed as harvested.

Fisheries management plan for Brownwood Reservoir

Prepared – July 2025

ISSUE 1: Brownwood Reservoir experienced extreme water level fluctuations attributed to prolonged droughts and flooding. During periods of drought and low water level, vegetation and structural habitat become unavailable to popular sport fish and their prey. TPWD and Brown County Water Improvement District have partnered multiple times during the last survey period to enhance fishing in the reservoir by adding structural habitat. The district desires to continue this partnership with TPWD to improve habitat in areas of the reservoir that are deficient in structure.

MANAGEMENT STRATEGIES

1. Continue to maintain current and identify new partnerships to conduct fisheries habitat enhancement projects at Brownwood Reservoir.
2. Explore various funding opportunities to help support habitat enhancement efforts.
3. Plan and conduct evaluation of habitat enhancement projects.

ISSUE 2: Blue Catfish were initially stocked in 2007 to develop a fishery and have been stocked multiple times since. Channel Catfish are present and support a much greater proportion of the catfish fishery at Brownwood Reservoir than previously expected based upon data from the 2024-2025 roving creel survey. Monitoring for both Blue and Channel Catfish has resulted in low catch rates, and data suggest that the populations may have poor reproduction and recruitment of fish to legal size. Creel data suggest angler catch and harvest for both species are low.

MANAGEMENT STRATEGIES

1. Conduct sampling with a mixed gear approach to include gill nets, jug lines, tandem hoop nets, and possibly low-frequency electrofishing.
2. Stock both Blue and Channel Catfish 2-inch fingerlings at least once during the monitoring period at a rate of 100/acre when the reservoir is >75% capacity.

ISSUE 4: Zebra mussel veligers were identified in plankton samples collected from two locations in the reservoir during fall 2020, and adult mussels were collected in June 2021 at a private marina. 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. Biological impact and financial costs associated with zebra mussels can be 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 Brown County Water Improvement District to maintain appropriate signage at access sites and discuss other prevention measures for zebra mussel threats and spread.
2. Continue to monitor zebra mussel presence with settlement structures and shoreline checks.
3. Contact and educate marina owners about invasive species, and provide them with posters, literature, and other informative materials so that they can in turn educate their customers.
4. Educate the public about invasive species with the media and the internet.
5. Discuss invasive species when presenting and or interacting with constituents.
6. Track future interbasin water transfers to facilitate potential invasive species responses.

Objective-Based Sampling Plan and Schedule (2025–2029)

Sport fish, prey fish, and other important fishes: Important sport fishes present in Brownwood Reservoir include Largemouth Bass, Blue Catfish, Channel Catfish, and White Crappie. Important prey species include Bluegill, Gizzard Shad, Threadfin Shad and Longear Sunfish. Proposed sampling is displayed in Table 14.

Low-density fisheries: White Bass are present in the reservoir, but they have been in low relative abundance in previous monitoring surveys. Anglers reported low directed effort targeting them in the 2024-2025 creel survey. Flathead Catfish represent the least targeted species of catfishes by anglers. Hybrid Striped Bass have not been stocked into Brownwood Reservoir since 2002, but some individuals have moved from Coleman Reservoir downstream through Pecan Bayou into the reservoir during flood events, and their abundance is low. Monitoring of CPUE-Total for Flathead Catfish and White Bass will be conducted during sampling efforts for Blue Catfish and Channel Catfish. The presence and absence of other non-target species will be recorded.

Survey objectives, fisheries metrics, and sampling objectives

Prey Species: Sunfishes (i.e., Bluegill and Longear Sunfish), Gizzard Shad, and Threadfin Shad are the primary prey species at Brownwood Reservoir. Electrofishing surveys for prey have traditionally been conducted biennially while targeting Largemouth Bass. Historical sampling effort of 1.5-2.0 hours has yielded desirable precision (RSE≤25) for relative abundance estimates as well as sample sizes for evaluating the size structure for prey species. To continue monitoring population trends, the next electrofishing survey will be conducted in fall 2028 at 24, 5-minute randomly selected stations for a total of two hours of sampling effort. Trend data for CPUE and size structure will be collected. During sampling, target precision will be RSE≤25% for CPUE-Total. A target of ≥50 fish will be collected to assess length frequency of sunfishes. Index of Vulnerability (IOV) will be calculated for Gizzard Shad to assess the relative proportion of individuals in the population that are of suitable prey sizes for sport fish. A target of 50 Gizzard Shad will be sampled to evaluate IOV. If sample size and estimate precision targets are not achieved for prey species, additional sampling will not be conducted unless objectives for Largemouth Bass require additional sampling.

Catfishes: The Blue Catfish population is likely still developing, and the population does support a fishery. Stockings in 2007, 2010, 2016, and 2022 through 2024 have resulted in limited natural reproduction and recruitment of legal fish. Typical catch rates of Blue Catfish have been 2.0-2.6/nn, though most have been legal fish. Low-frequency electrofishing in 2014 resulted in only five captured Blue Catfish, and the utility of this gear for future surveys is questionable. Another attempt at low-frequency electrofishing was conducted in spring 2024, but equipment issues led to no fish being sampled and ending the survey early. Gill netting will be conducted to monitor Blue and Channel Catfish during spring 2029 at 10 randomly selected stations. Additionally, 50 paired jug lines will be set at 50 random stations to target larger catfishes that may be underrepresented in the gill netting data. Channel Catfish represented a larger part of the overall harvest of catfishes in the 2024-2025 creel survey. Prior to the survey, the species was thought to support a minor part of the catfish fishery, thus prior sampling efforts in the 2021-2025 monitoring cycle were minimal. The recent creel indicated that the species is more popular among anglers than originally thought and warrant more monitoring effort. Channel Catfish will be sampled in late spring/early summer with tandem hoop nets by deploying them for two-night sets at 10 random stations no deeper than 20 ft depth to avoid potentially hypoxic conditions. No target precision will be set for relative abundance estimates given that sampling effort would likely be impractical to achieve RSEs < 25. Should ≥50 stock-length fish be collected, PSD will be determined for both species. An exploratory low-frequency electrofishing survey during spring 2029 will be attempted by sampling Blue Catfish at 20, 3-minute randomly selected stations. Otoliths will also be retained from up to 50 sampled Blue Catfish and Channel Catfish ≥stock length (i.e., Category I) to assess what year classes are present. Otoliths will be collected during the same season and year but possibly among multiple gear types. Flathead Catfish will be monitored for presence/absence.

Largemouth Bass: Largemouth Bass have supported the most popular fishery at the reservoir. Further, the

reservoir is a popular destination for Largemouth Bass fishing tournaments. In fall 2024, Major League Fishing held its Elite Series tournament at the reservoir, and several other bass clubs frequent the reservoir regularly. Traditionally, sampling for Largemouth Bass has been conducted biennially. However, electrofishing every four years may be adequate to monitor substantial changes in the Largemouth Bass fishery. During this period, sampling will only occur during fall 2028. Sampling will be conducted for 2.0 hours at 24, 5-minute stations. The prescribed sampling effort has yielded suitable levels of precision for relative abundance estimates and sample sizes for evaluating size structure, body condition, and age and growth during prior surveys. Target precision will be RSE≤25 for CPUE-Total and Stock CPUE. A target sample of ≥50 stock-length fish will be sampled to determine size structure. Lengths and weights will be measured from a target of five fish per represented inch group > stock length to calculate mean relative weights. A random sample of 30 bass will be evaluated for prevalence of Florida Largemouth Bass and Northern Largemouth Bass alleles. If objectives are not achieved, up to 1 hour of additional electrofishing may be conducted if deemed feasible.

White Crappie: Trap netting has yielded variable results with the traditionally prescribed effort. In 2020, only five trap nets were set and yielded only six fish. Variability in relative abundance is likely affected by water level and habitat availability. An increase in water level occurred in spring – fall 2025 after the reservoir had reached nearly 9.0 ft below conservation pool elevation. Now that the reservoir is nearly full, recruitment of White Crappie should improve samples in trap netting surveys. Ten (n=10) nets appear to be the optimal number of nets to meet sampling objectives. Random sampling has been inconsistent in providing reliable estimates of population parameters for White Crappie. Therefore, trap netting will be conducted in fall 2028 at 10 biologist-selected stations to assess trends in relative abundance, size structure, and body conditions. No target precision will be attempted for CPUE-Total and Stock CPUE. A target of 50 fish ≥stock-size will be collected to evaluate size structure by calculating PSD. Measurements of length and weight for ≥5 fish per inch group will be taken to assess body condition. A sample of 13 White Crappie 9.0-10.9 inches TL will be retained for a Category II age sample to assess growth. If objectives are not achieved, up to 10 additional trap nets may be set if deemed feasible. Crappie relative abundance (CPUE-Total and Stock CPUE) will also be monitored in spring 2029 gill netting, without target levels of precision and practical effort.

Creel Survey:
The last creel survey was conducted from June 2024-May 2025. A roving creel survey will not be conducted this cycle.

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Tables and Figures

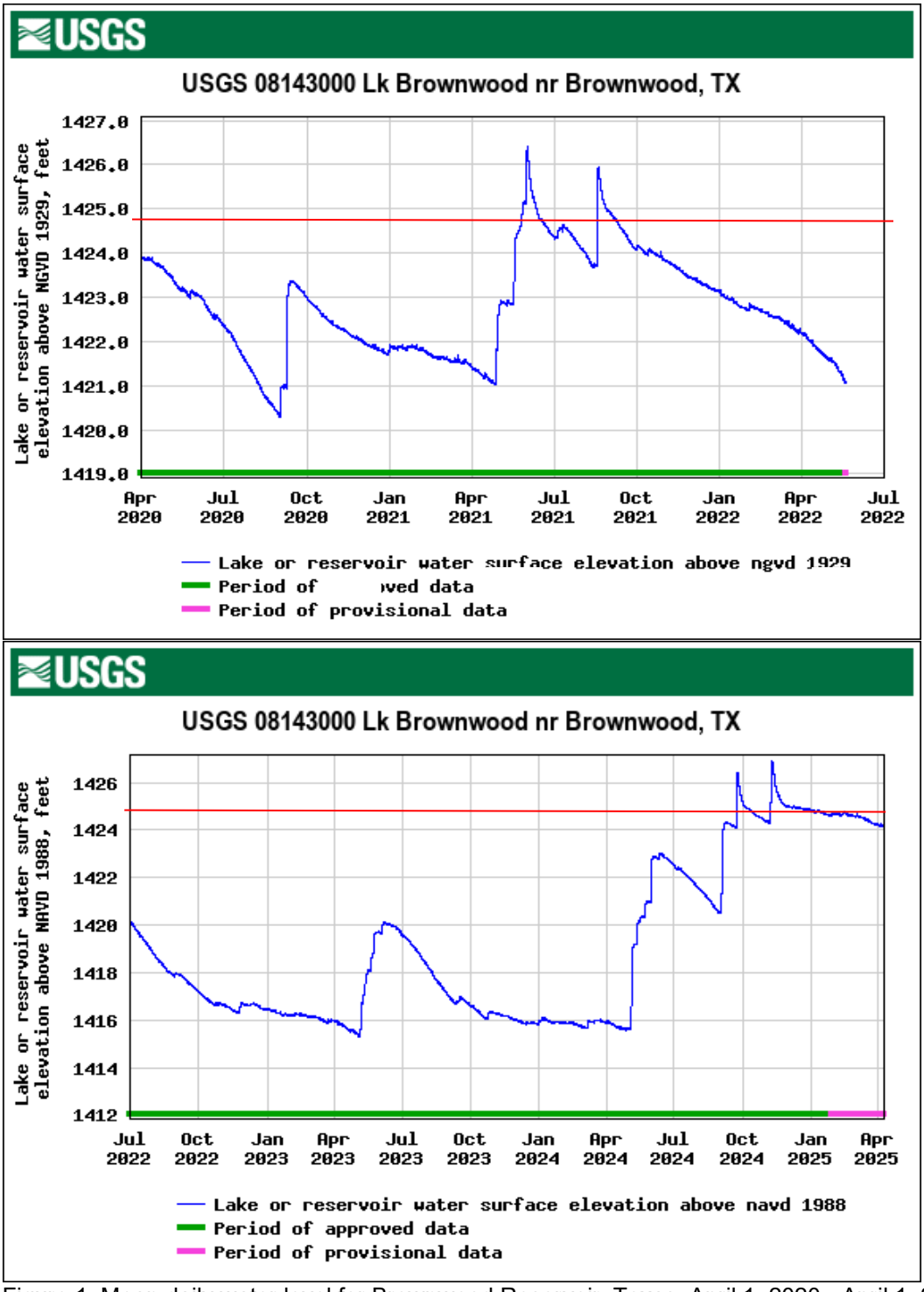


Figure 1. Mean daily water level for Brownwood Reservoir, Texas, April 1, 2020 - April 1, 2025. The red line indicates the reservoir's conservation water level elevation. The top graph represents data collected from April – July 2022 in elevation above NAVD 1929, whereas the bottom graph represents data collected the most recent available data collected in elevation above NAVD 1988.

Table 1. Reservoir characteristics for Brownwood Reservoir, Texas.

Characteristic	Description
Year Constructed	1933
Controlling Authority	Brown County Water Improvement District
County	Brown
Reservoir Type	Tributary
Conservation Pool Elevation (feet above mean sea level)	1,424.6
River Basin	Colorado
USGS 8- Digit Hydrologic Unit Code Watersheds	12090108 (Jim Ned) 12090107 (Pecan Bayou)

Table 2. Boat ramp characteristics for Brownwood Reservoir, Texas, April 2020. Water level at the time of the access survey was approximately 3 feet below conservation pool elevation.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	No. of Lanes	Elevation at end of boat ramp (feet)	Condition
Lake Brownwood State Park Ramp 1	31.86161° -99.01931°	Y	10	1	1,412	Accessible
Lake Brownwood State Park Ramp 2	31.86186° -99.01958°	Y	10	1	1,418	Accessible
Lake Brownwood State Park Ramp 3	31.86161° -99.01993°	Y	10	1	1,421	Accessible
Flat Rock Park	31.82419º -99.05103º	Y	20	1	1,417	Accessible
Dam	31.84161º -99.00350º	Y	35	1	1,410	Accessible

Table 3. Harvest regulations for Brownwood Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue, their hybrids and subspecies	25 (in any combination); no more than 5 ≥ 20 inches	No minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Largemouth	5	14-inch minimum
Crappie: White and Black, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history for Brownwood Reservoir, Texas. FGL=fingerlings; FRY=fry; ADL=adults; UNK = Unknown.

Species	Year	Number	Size
Threadfin Shad	1984	1,000	ADL
Blue Catfish	1988	17	ADL
	2007	326,174	FGL
	2010	325,761	FGL
	2016	324,616	FGL
	2022	169,850	FGL
	2023	219,051	FGL
	2024	222,291	FGL
	Total	1,587,760	
Channel Catfish	1972	72,000	ADL
	1980	150	UNK
	2005	304	ADL
	2006	300	ADL
	2007	556	ADL
	2008	300	ADL
	2009	301	ADL
	2010	300	ADL
	2011	302	ADL
	2012	300	ADL
	2013	301	ADL
	2014	306	ADL
	2015	321	ADL
	2016	305	ADL
	2017	322	ADL
	2018	316	ADL
	2019	311	ADL
	2023	383	ADL
	2024	407	ADL
	Total	77,785	
Green x Redear Hybrid Sunfish	1971	5,000	UNK
	1972	22,500	UNK
	1978	7,000	UNK
	1980	150	UNK
	Total	34,650	
Florida Largemouth Bass	1975	200,956	FGL
	1976	118,000	FRY
	1976	238,000	FGL
	1977	367,545	FGL
	1978	218,975	FGL
	1996	177,163	FGL
	2007	326,520	FGL
	2012	327,352	FGL
	2016	141,355	FGL
	2018	77,017	FGL
	2024	78,479	FGL
	Total	2,271,312	
Largemouth Bass	1969	10,000	UNK

	1970	500,000	FRY
	1994	169	ADL
	1995	86	ADL
	1996	50	ADL
	Total	510,305	
Smallmouth Bass	1980	72,950	UNK
	1982	70,000	UNK
	Total	142,950	
Palmetto Bass	1980	73,850	UNK
	1983	75,600	UNK
	1986	145,601	FGL
	1987	145,101	FGL
	1988	148,325	FGL
	1989	154,470	FGL
	1991	39,600	FGL
	1992	40,500	FGL
	1994	45,006	FGL
	1995	89,970	FGL
	1996	36,869	FGL
	2002	36,680	FGL
	Total	1,031,572	
Walleye	1976	75,000	FRY
	1977	1,500,000	FRY
	1978	1,550,000	FRY
	Total	3,125,000	

Table 5. Objective-based sampling plan (OBS) for Brownwood Reservoir, Texas, 2021-2025.

Gear/target species	Survey Objective	Metrics	Sampling Objective
Electrofishing			
Gizzard Shad [a]	Relative Abundance	CPUE-Total	RSE ≤ 25
	Size Structure	Length frequency	N ≥ 50
	Prey Availability	IOV	N ≥ 50
Bluegill [a]	Relative Abundance	CPUE-Total	RSE ≤ 25
	Size Structure	Length frequency, PSD	N ≥ 50 stock
Longear Sunfish [a]	Relative Abundance	CPUE-Total	RSE ≤ 25
Largemouth Bass	Relative Abundance	CPUE-Total and Stock CPUE	RSE ≤ 25
	Size Structure	Length frequency, PSD	N ≥ 50 stock
	Body Condition	W_r	5 fish / inch group
	Genetics	% FLMB	N = 30
Low-frequency electrofishing			
Blue Catfish	Relative Abundance	CPUE-Total and CPUE-12	Practical effort
	Size Structure	PSD	N ≥ 50 stock
	Age and Growth	Category I	Practical effort
Gill netting			
Blue Catfish	Relative Abundance	CPUE-Total; CPUE-12	Practical effort
	Size Structure	Length frequency, PSD	N ≥ 50 stock
	Age and Growth	Category I	Practical effort
Channel Catfish	Presence/Absence	CPUE-Total	Practical effort
White Bass	Presence/Absence	CPUE-Total	Practical effort
White Crappie	Relative Abundance	CPUE-Total and CPUE-10	Practical effort
Trap netting			
White Crappie	Relative Abundance	CPUE-Total; Stock CPUE, CPUE-10	Practical effort
	Body Condition	W_r	Practical effort
	Size Structure	Length frequency, PSD	Practical effort
	Age and Growth	Category I sample	Practical effort

[a] No additional effort will be expended to achieve an RSE ≤ 25 for CPUE for prey species 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 prey density.

Table 6. Survey of structural habitat types, Brownwood Reservoir, Texas, July 2024. Percent occurrence with lower and upper 95% confidence limits (CL) of structural habitat at 401 random sites. Water level at time of survey was at conservation pool elevation.

Structural Habitat Type	Percent occurrence	Lower CL	Upper CL
Rocky Shoreline	65.1	60.4	69.8
Boat Docks and Ramps	23.7	19.5	27.9
Natural Shoreline	17.2	13.5	20.9
Gravel	7.7	5.1	10.3
Bulkhead	2.7	1.1	4.3
Rock Bluff	2.5	1.0	4.0

Table 7. Percent occurrence with lower and upper 95% confidence limits (CL) of vegetation at 401 random sites throughout Brownwood Reservoir, Texas, July 2024. Water level at time of survey was at conservation pool elevation.

	Throughout the Reservoir		
Structural Habitat	Percent Occurrence	Lower CL	Upper CL
Open Water/Featureless	28.2	23.8	32.6
Common Buttonbush	27.4	23.1	31.8
Waterwillow	20.9	16.9	20.9
Standing Timber	3.9	2.5	6.5
Cattail	3.4	2.1	6.1
Flooded Terrestrial Vegetation	1.7	<1.0	<1.0
Logs/Fallen Timber	1.7	<1.0	<1.0
Smartweed	1.2	<1.0	<1.0
Bulrush	0.5	<1.0	<1.0
American Pondweed	0.2	<1.0	<1.0

Table 8. Directed angling effort (hours) and angler expenditures ($) and associated relative standard errors (in parentheses) by bank versus boat anglers reported during the June 1, 2024 – May 31, 2025 roving creel survey, Brownwood Reservoir, Texas.

Angler Type	Effort (h)	Expenditures ($)
Bank	34,866.3 (15)	190,918 (53)
Boat	47,811.4 (15)	890,620 (138)
Total	82,677.7 (15)	1,081,538 (114)

Table 9. Angler effort (hours; RSE in parentheses) by angler type and species group reported in the June 1, 2024 – May 31, 2025 roving creel survey, Brownwood Reservoir, Texas.

Species Group	Bank Anglers	Boat Anglers	Total Effort (h)
Largemouth Bass	5,932.2 (28)	37,258.8 (15)	43,191.0 (13)
Catfishes	11,248.2 (21)	4,041.2 (28)	15,289.4 (17)
Crappie	8,963.7 (23)	2,516.6 (35)	11,480.3 (19)
Anything	8,722.2 (25)	2,227.0 (39)	10,949.2 (22)
White Bass	0.0	1,767.7 (43)	1,767.7 (43)

Gizzard Shad

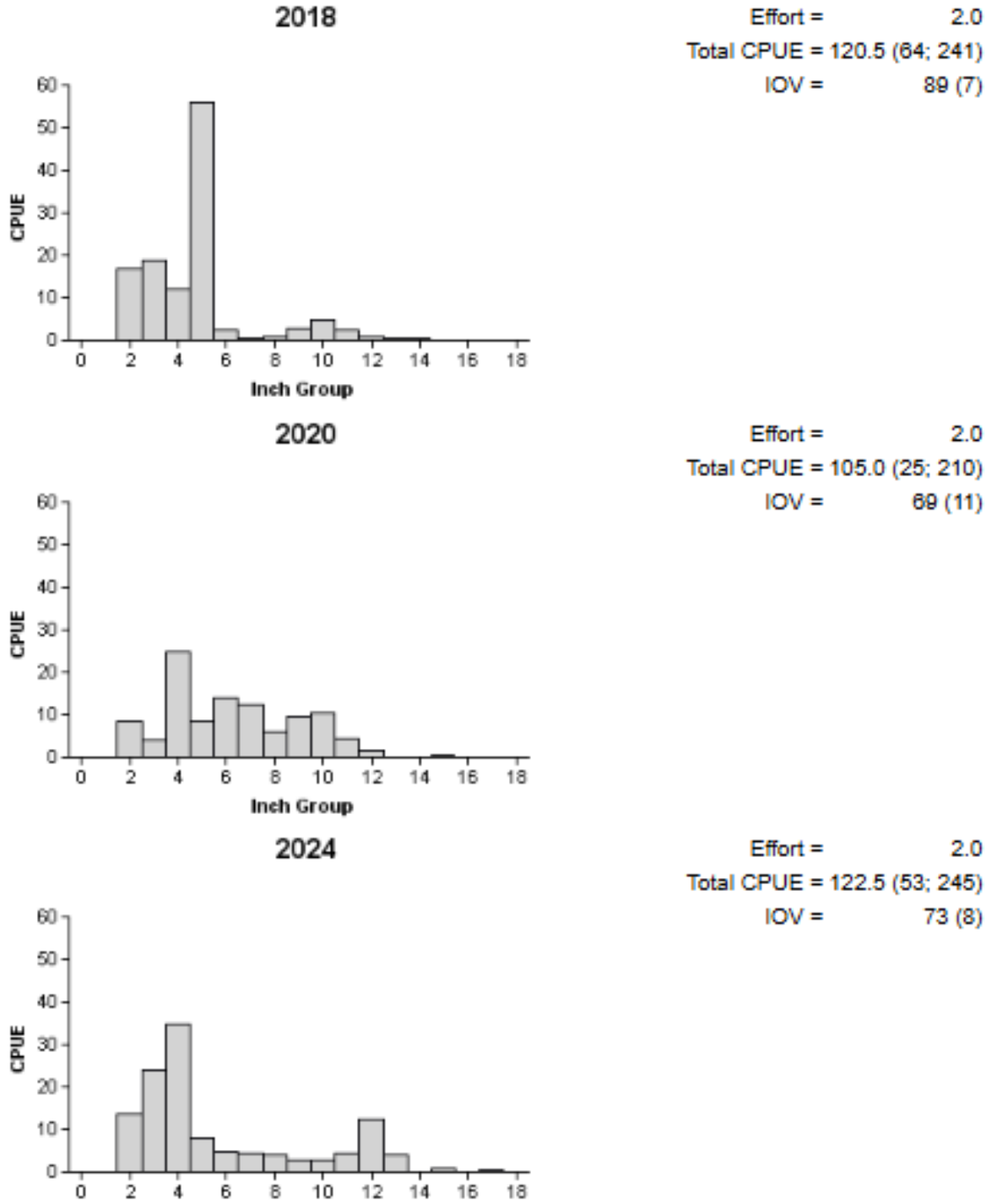


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Brownwood Reservoir, Texas, 2018, 2020, and 2024.

Bluegill

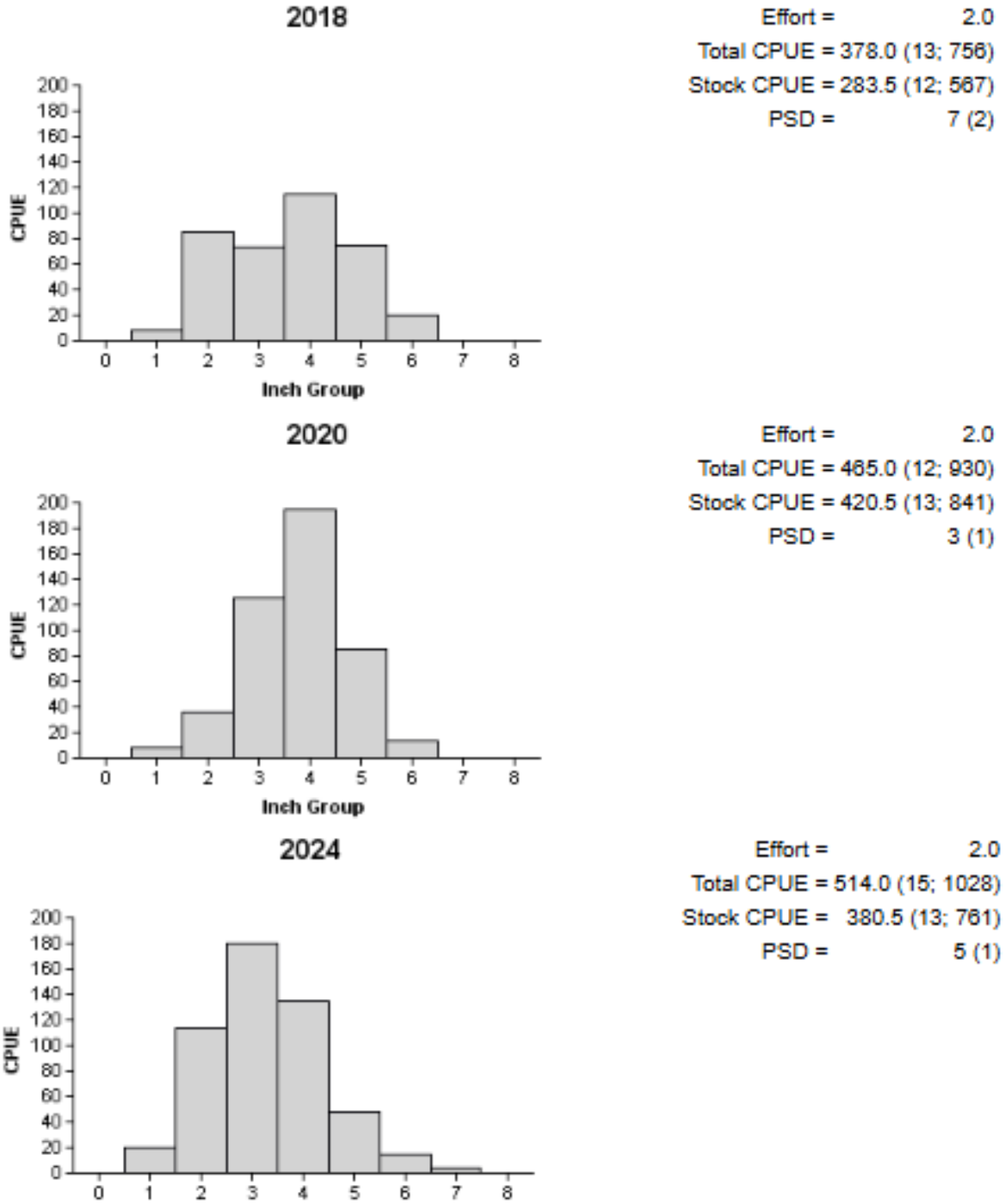


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for PSD are in parentheses) for fall electrofishing surveys, Brownwood Reservoir, Texas, 2018, 2020, and 2024.

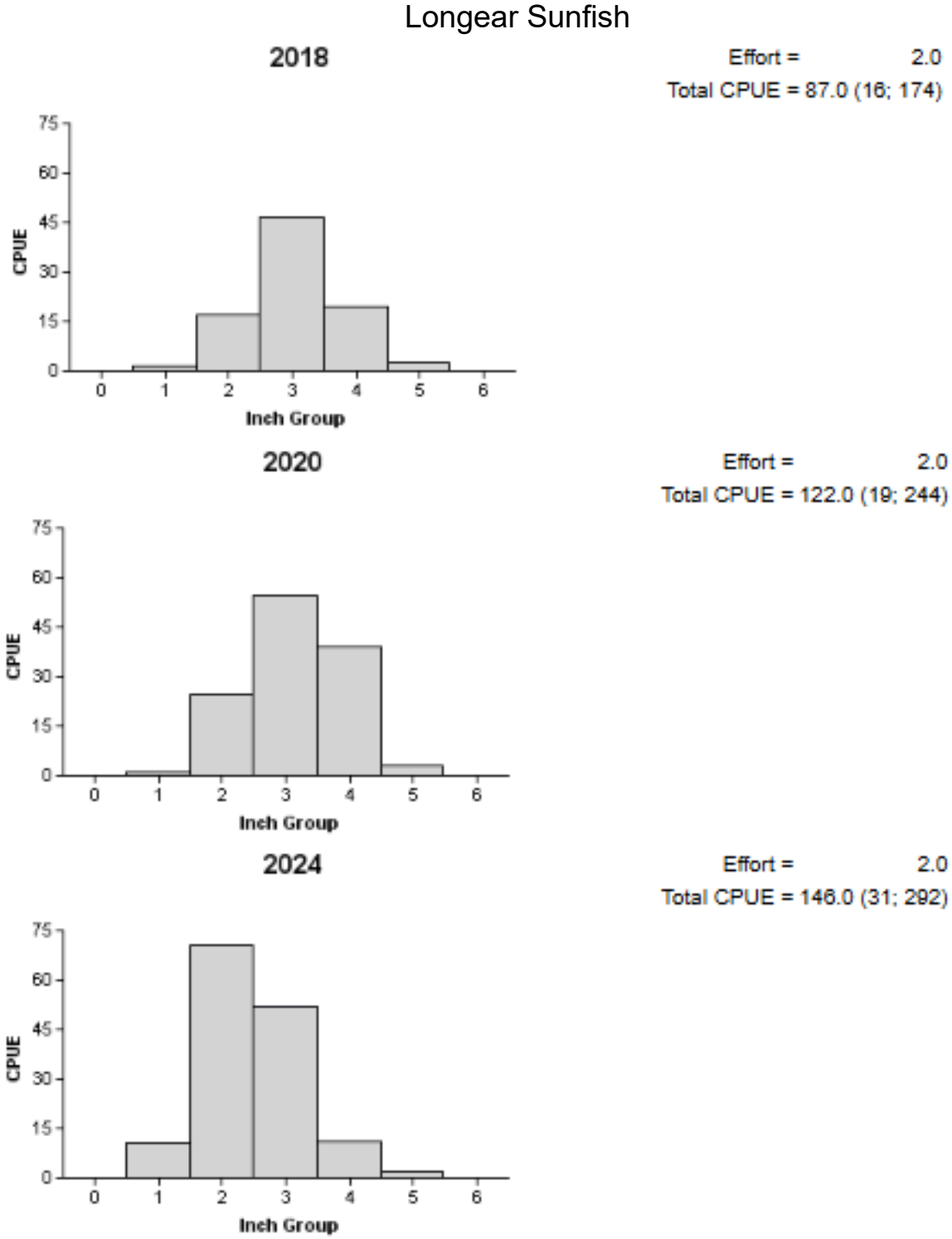


Figure 4. Number of Longear Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE) for fall electrofishing surveys, Brownwood Reservoir, Texas, 2018, 2020, and 2024.

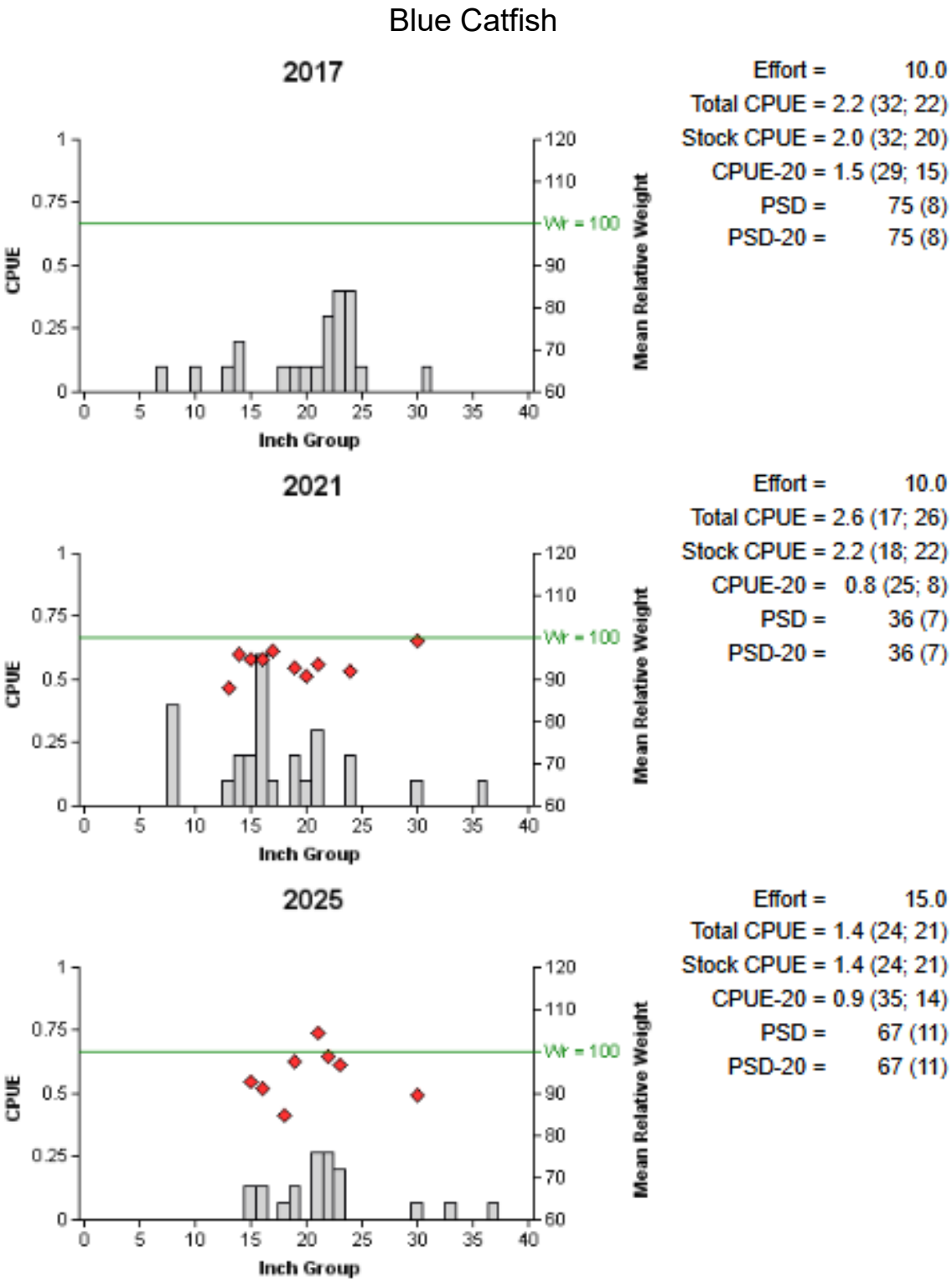


Figure 5. Number of Blue Catfish caught per net night (CPUE), mean relative weights (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Brownwood Reservoir, Texas, 2017, 2021 and 2025. The vertical green line indicates the 12-inch minimum length limit.

Catfishes

Table 10. Creel survey statistics for catfishes at Brownwood Reservoir, Texas, from June 2024 through May 2025. Total catch per hour is for anglers targeting catfishes and total harvest is the estimated number of catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year
	2024/2025
Surface area (acres)	6,814
Directed effort (h)	15,289.4 (17)
Directed effort/acre	2.2 (26)
Total catch per hour	0.3 (125)
Total harvest	2,767.8
Blue Catfish	1,063.4 (64)
Channel Catfish	1,507.3 (59)
Flathead Catfish	197.1 (196)
Harvest/acre	0.14
Blue Catfish	0.16 (64)
Channel Catfish	0.22 (59)
Flathead Catfish	0.03 (196)
Percent legal released	34.8
Blue Catfish	35.4
Channel Catfish	2.8
Flathead Catfish	19.0

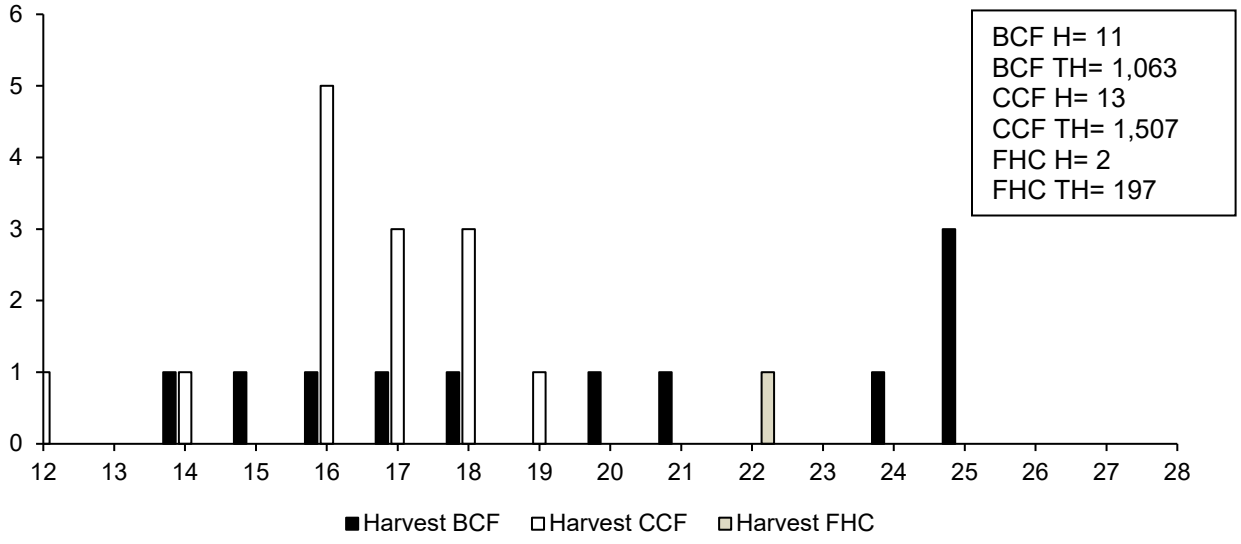


Figure 6. Blue (BCF; black bars), Channel (CCF; white bars), and Flathead Catfish (FHC; gray bars) observed harvested (H) and estimated total harvest (TH) in the 2024-2025 roving creel survey, Brownwood Reservoir, Texas.

Largemouth Bass

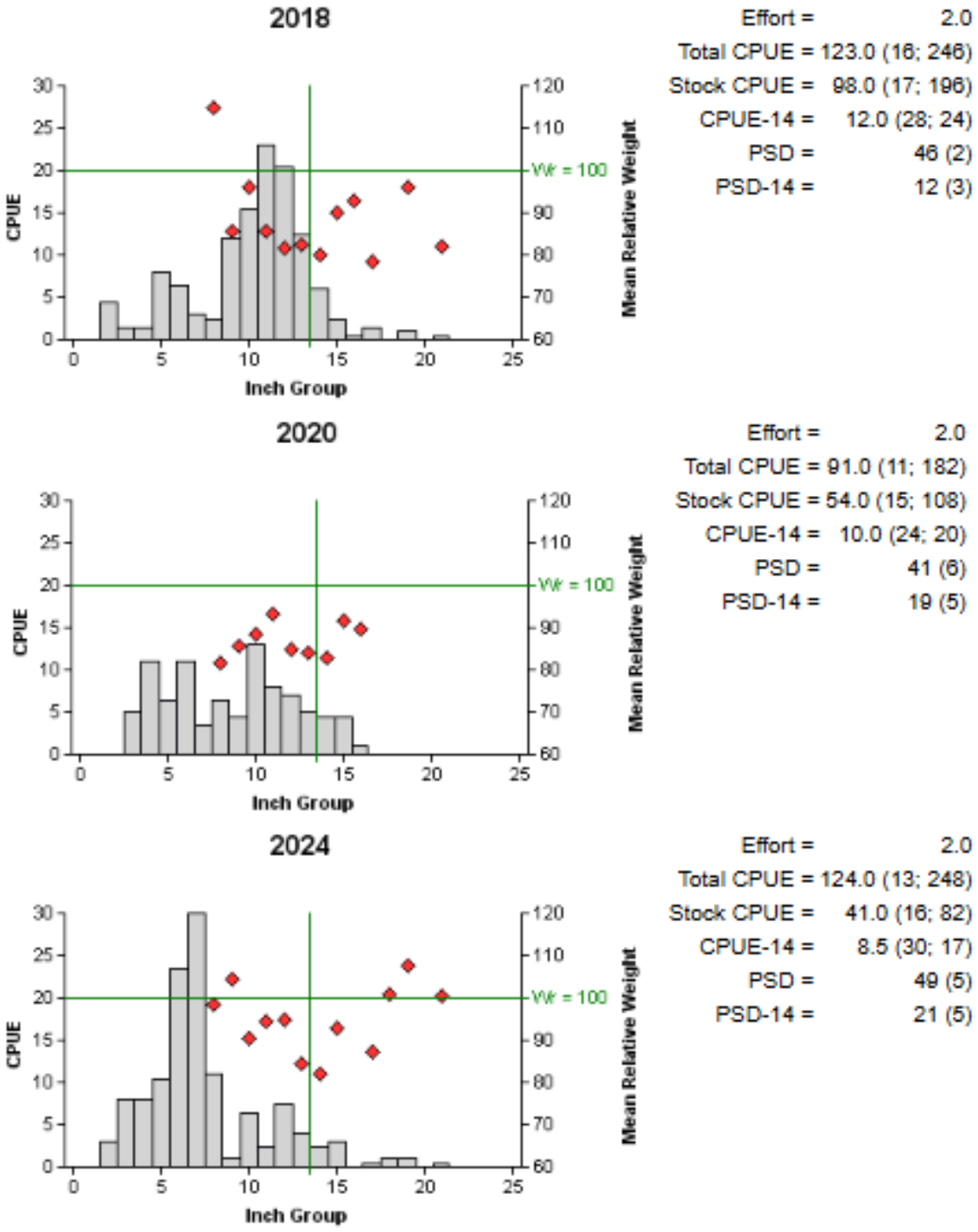


Figure 7. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weights by inch group (red diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Brownwood Reservoir, Texas, 2018, 2020, and 2024. The vertical green line indicates the 14-inch minimum length limit.

Largemouth Bass

Table 11. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Brownwood Reservoir, Texas. 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. NA = F1 hybrids were not determined in samples from 1997-2006. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

Year	Sample size	FLMB	F1	Fx	NLMB	% FLMB alleles	% pure FLMB
1997	24	2	NA	20	2	45.8	8.3
2000	60	8	NA	47	5	47.4	13.3
2002	31	4	NA	20	7	44.4	12.9
2006	30	0	NA	30	0	41.0	0.0
2014	30	2	1	27	0	51.5	6.7
2016	30	1	1	27	1	40.6	3.3
2020	29	0	2	25	2	41.1	0.0
2024	30	2	0	28	0	60.0	6.7

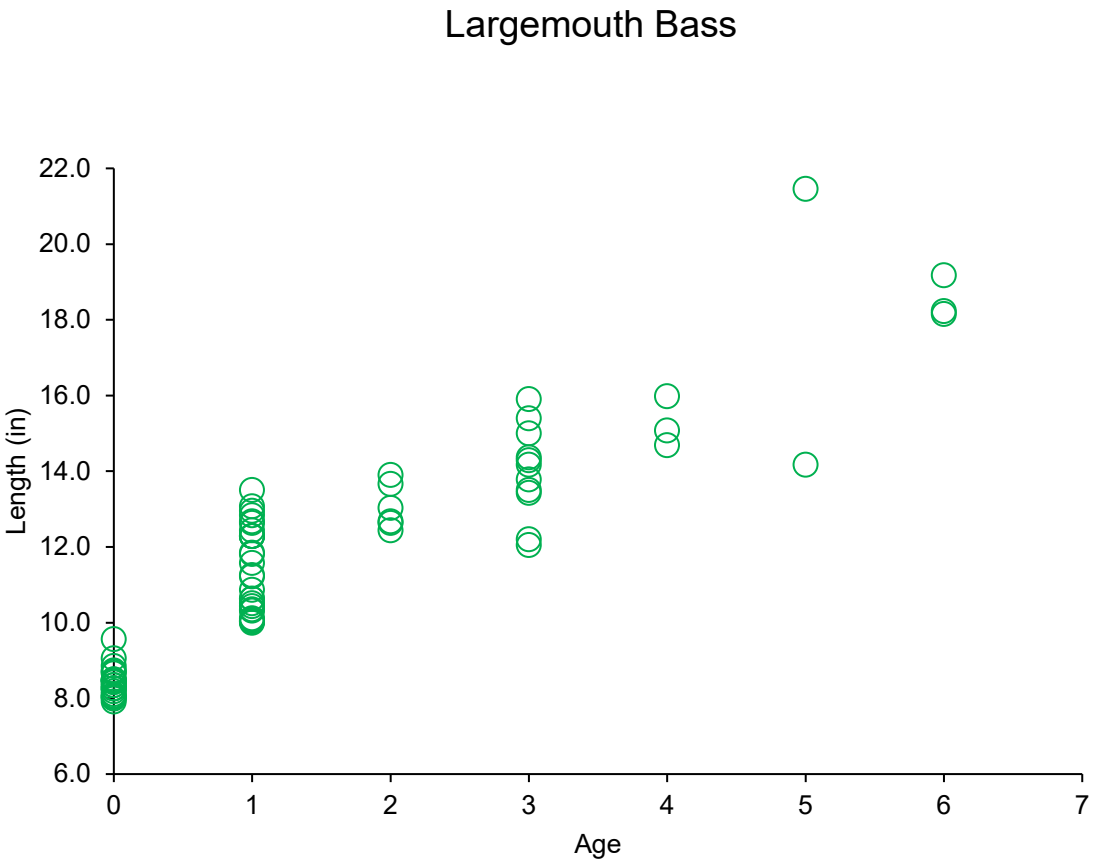


Figure 8. Length (in) at age for Largemouth Bass (N=78) collected during fall 2024 electrofishing, Brownwood Reservoir, Texas.

Largemouth Bass

Table 12. Mean length at age (mm) for Largemouth Bass collected in the fall 2024 electrofishing survey, Brownwood Reservoir, Texas.

	Age (Years)						
	0	1	2	3	4	5	6
Mean Length (mm)	8.4 (24)	11.5 (30)	13.1 (5)	14.0 (11)	15.2 (3)	17.8 (2)	18.5 (3)

Largemouth Bass

Table 13. Creel survey statistics for Largemouth Bass at Brownwood Reservoir, Texas, from June 2024 through May 2025. Total catch per hour is for all anglers and tournament anglers targeting Largemouth Bass and total harvest is the estimated number of Largemouth Bass harvested by all anglers and by tournament anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year
	2024/2025
Surface area (acres)	6,814
Directed effort (h)	43,191.0 (13)
Non-tournament effort (h)	26,606.6 (13)
Tournament effort (h)	16,584.4 (19)
Directed effort/acre	6.3 (13)
Non-tournament effort/acre	3.9 (13)
Tournament effort/acre	2.4 (19)
Total catch per hour	0.6 (60)
Non-tournament catch per hour	0.3 (60)
Tournament catch per hour	0.3 (29)
Total harvest	1,234.5 (40)
Harvest/acre	0.2 (65)
Percent legal released	84.7

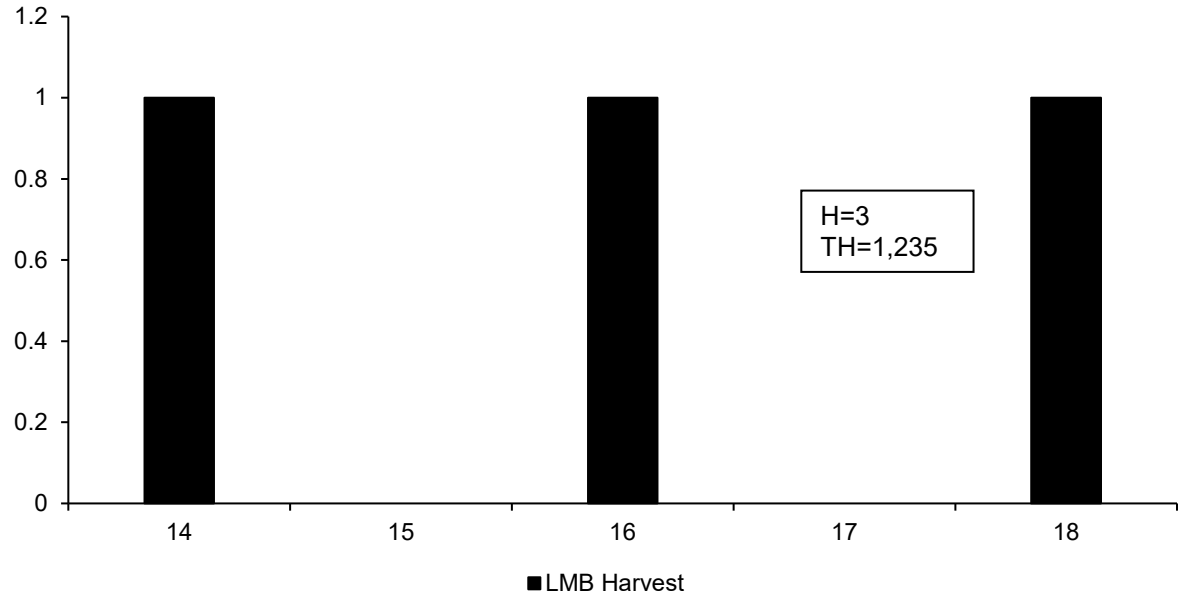


Figure 9. Largemouth Bass observed harvested (H) and estimated total harvest (TH) from the 2024-2025 roving creel survey, Brownwood Reservoir, Texas.

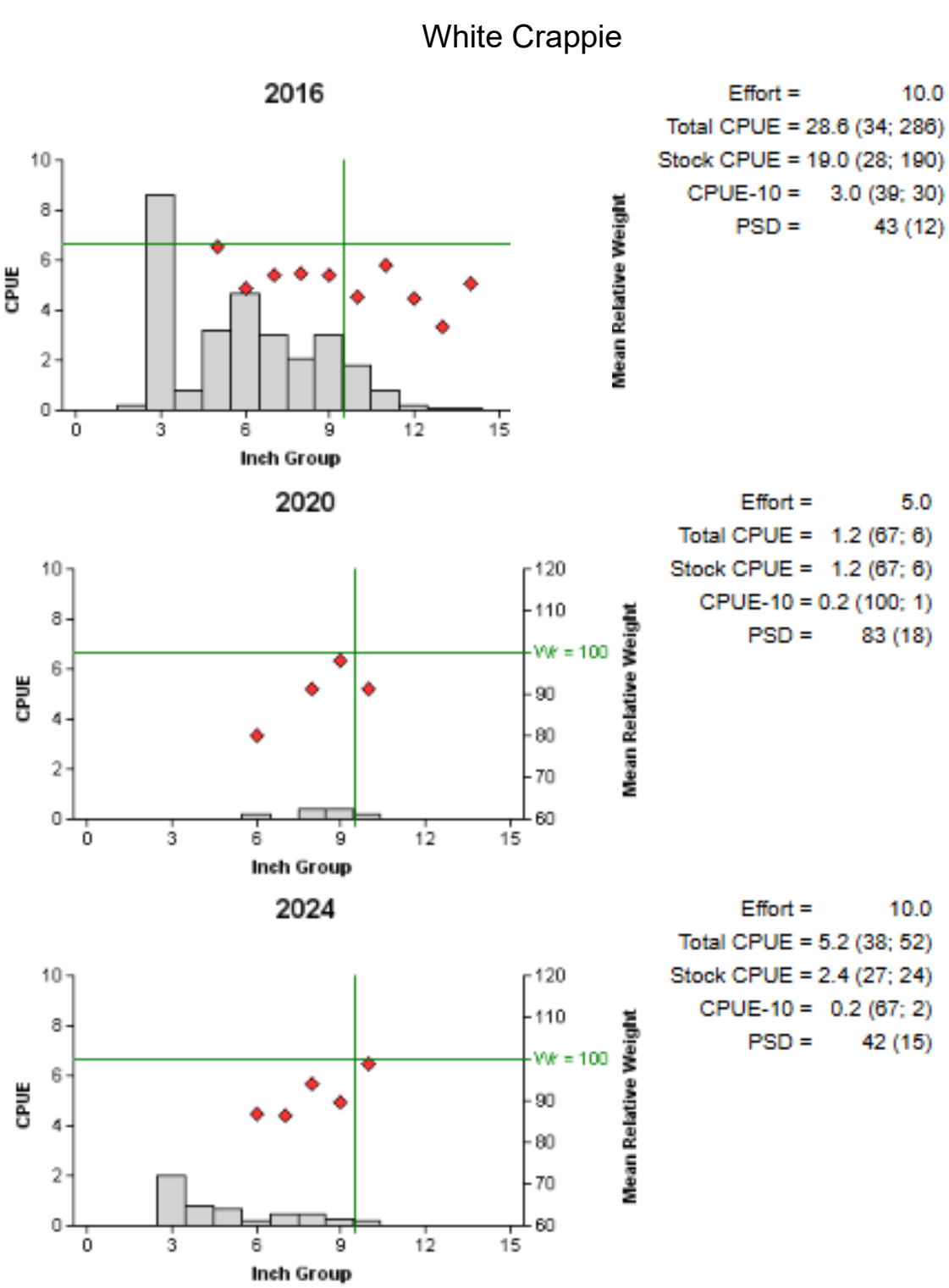


Figure 10. Number of White Crappie caught per net night (CPUE, bars), mean relative weights by inch group (red diamonds), mean relative weights (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Brownwood Reservoir, Texas, 2016, 2020, and 2024. The vertical green line indicates the 10-inch minimum length limit.

White Crappie

Table 14. Creel survey statistics for White Crappie at Brownwood Reservoir, Texas, from June 2024 through May 2025. Total catch per hour is for anglers targeting White Crappie and total harvest is the estimated number of White Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year
	2024/2025
Surface area (acres)	6,814
Directed effort (h)	11,480.3 (14)
Directed effort/acre	1.7 (14)
Total catch per hour	1.3 (69)
Total harvest	6,349.0 (51)
Harvest/acre	0.9 (51)
Percent legal released	3.0

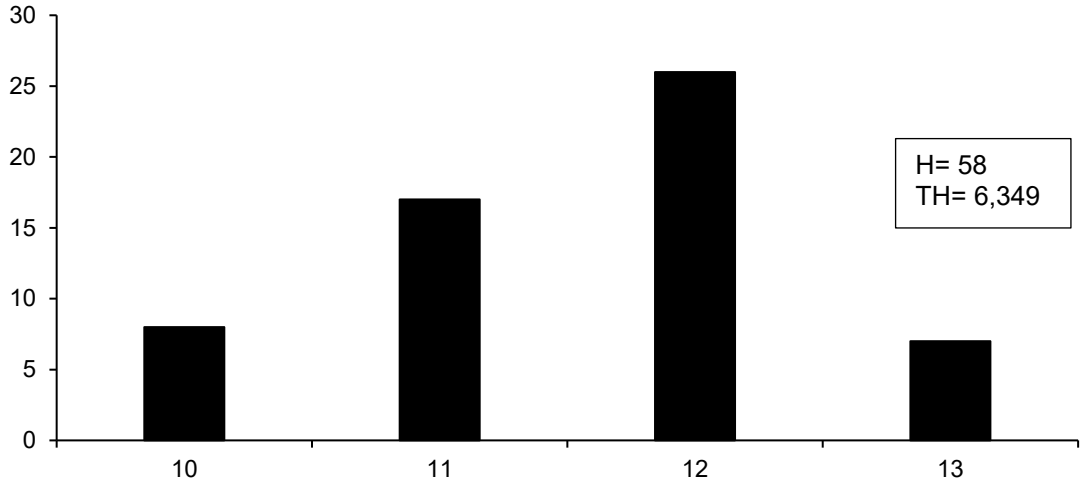


Figure 11. White Crappie (WCR) observed harvested (H) during the 2024-2025 roving creel survey, Brownwood Reservoir, Texas.

Proposed Sampling Schedule

Table 15. Proposed sampling schedule for Brownwood Reservoir, Texas. The survey period is June through May. Gill netting surveys are conducted in the spring, while low-frequency electrofishing is conducted in the summer, and electrofishing and trap netting surveys are conducted in the fall. Surveys and reports to be completed are labeled as X.

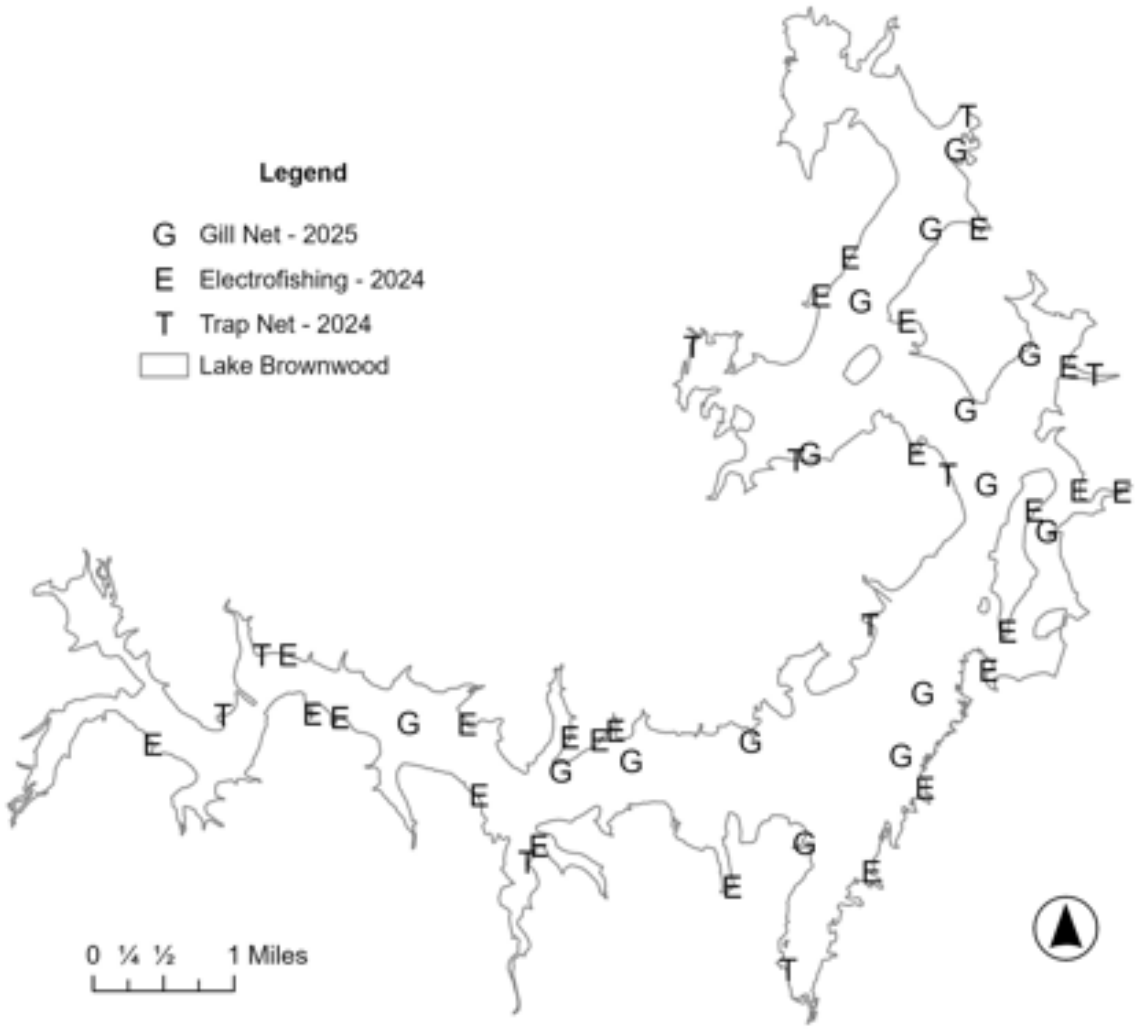
Survey Type	Survey year			
	2025-2026	2026-2027	2027-2028	2028-2029
Angler Access				X
Vegetation				X
Electrofishing – Fall				X
Low-frequency Electrofishing			X	
Trap Netting				X
Jug Lining				X
Gill Netting				X
Creel				
Report				X

APPENDIX A – Catch Rates for All Species and All Gears

Number (N) and catch rate (CPUE) and associated relative standard error (RSE) in parentheses for all species enumerated from all gear types from Brownwood Reservoir, Texas, 2024-2025. The sampling effort was 2 hours for electrofishing, 10 net nights for trap netting, and 15 net nights for gill netting. Water level at the time of sampling was about conservation pool elevation.

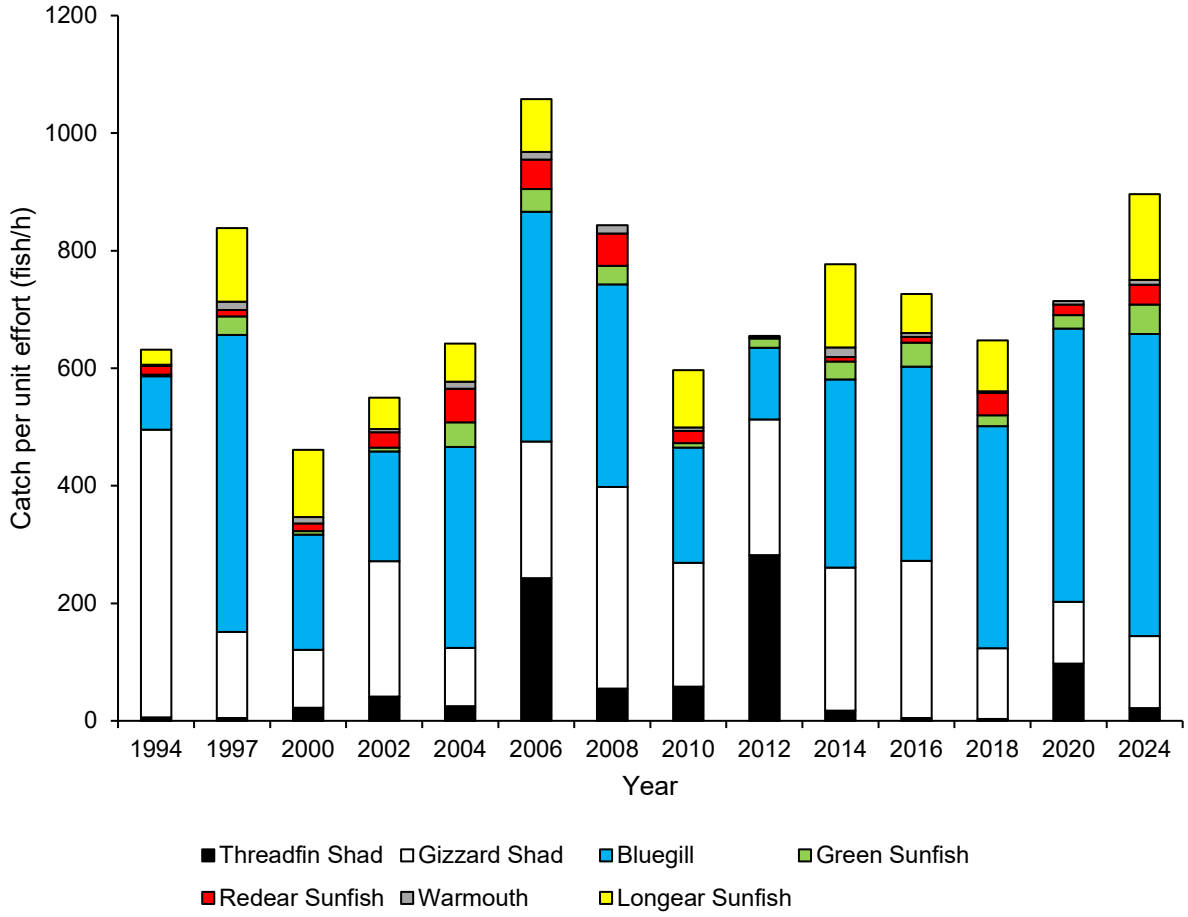
Species	Electrofishing		Gill Netting		Trap Netting	
	N	CPUE	N	CPUE	N	CPUE
Longnose Gar	12	6.0 (100)				
Gizzard Shad	245	122.5 (53)				
Threadfin Shad	43	21.5 (98)				
Common Carp	27	13.5 (49)				
Smallmouth Buffalo	5	2.5 (82)				
Blue Catfish			21	1.4 (24)		
Channel Catfish	3	1.5 (73)	16	1.1 (34)		
Flathead Catfish	2	1.0 (69)	2	0.1 (68)		
White Bass			90	6.0 (27)		
Green Sunfish	101	50.5 (26)			3	0.3 (71)
Warmouth	16	8.0 (57)			2	0.2 (67)
Orangespotted Sunfish	7	3.5 (86)				
Bluegill	1028	514.0 (15)			381	38.1 (38)
Longear Sunfish	292	146.0 (31)			41	4.1 (34)
Redear Sunfish	67	33.5 (29)			16	1.6 (41)
Largemouth Bass	248	124.0 (13)				
White Crappie	13	6.5 (51)	46	3.1 (38)	52	5.2 (38)
Black Crappie					2	0.2 (67)
Logperch	4	2.0 (78)				
Freshwater Drum	13	6.5 (38)	1	0.1 (100)		

APPENDIX B – Sampling Locations (2021-2025)



Locations of electrofishing (E), trap netting (T), and gill netting (G) sampling sites, Brownwood Reservoir, 2021-2025. Low frequency electrofishing points are not depicted because the survey was halted because of equipment issues. Water level at the time of sampling was about conservation pool elevation.

APPENDIX C – Historical Catch Rates for Commonly Sampled Prey Species



Total catch per unit effort for commonly sampled prey species in fall electrofishing surveys, Brownwood Reservoir, Texas, 1994-2024.

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