Lake Pat Cleburne

2023 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 Lake Pat Cleburne were surveyed in 2023 using electrofishing, and in 2024 using trap netting and gill netting. Historical data are presented with the 2023-2024 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

Reservoir Description: Lake Pat Cleburne is a 1,568-acre impoundment located on the Nolan River within the Brazos River Basin, Johnson County. Water level has been within 9.5' feet of conservation pool (733.5 above mean sea level [MSL]) since January 2020. Habitat features consisted of natural shoreline, rocky shoreline and limited boat docks and piers. There is extensive shore access for anglers.

Management History: Important sport fish include catfishes, Largemouth Bass, and White Crappie. Sport fish have always been managed with statewide regulations. The management plan from the 2012 survey report included conducting vegetation and physical habitat surveys and publicizing the reservoir's angling opportunities. Structural habitat was surveyed during 2012, while full aquatic vegetation surveys have been completed every four years since. Several fishing and angling articles have been released to local television and radio stations highlighting fishing opportunities since that time also. The management plan from the 2016 report recommended deploying fish attractors and working with the City of Cleburne to purchase hybrid striped bass (HSB) fry from the private market. Crappie condos and PVC cube structures were built and placed into the reservoir in 2016 and 2017 respectively. The City of Cleburne purchased HSB fry in 2017, 2018, 2019, 2021, 2023 and 2024; Texas Parks and Wildlife Department (TPWD) stocked HSB in 2017 and 2022. The statewide regulation for Blue and Channel Catfish changed on September 1, 2021; the current regulations are in this report. Recent management efforts consist of vegetation surveys, aquatic invasive species (AIS) education, limited habitat enhancement efforts and monitoring the creation of the HSB fishery.

Fish Community

- **Prey species:** Collected prey species included Gizzard Shad, Threadfin Shad, Bluegill, Longear Sunfish, and Redear Sunfish. Catch rates for all prey species were below historical averages. Most Gizzard Shad were available as prey to sport fish.
- **Catfishes:** Collected catfishes included Blue Catfish, Channel Catfish and Flathead Catfish. Catch rates for all three species were above historical averages, and body condition was good to excellent for Blue and Channel Catfish.
- **Temperate Bass:** Collected temperate bass included White Bass and HSB. White Bass were collected in low numbers and body condition was average. Hybrid striped bass catch rates improved from the previous survey and a low-density population currently exists.
- **Largemouth Bass:** Largemouth Bass catch rates were the lowest on record however body condition was excellent.
- **Crappie:** Collected crappies included White Crappie and Black Crappie. White Crappie catch rates were the highest on record and body condition was excellent across most length categories. Black Crappie were collected in very low numbers.

Management Strategies: Continue managing sport fishes at Lake Pat Cleburne with statewide regulations. Conduct one daytime and one nighttime electrofishing survey in fall 2025 to monitor Largemouth Bass and forage species – and to compare daytime to nighttime catch rates. Conduct a gill netting survey in spring 2026, angler access, vegetation, and electrofishing surveys in late-summer and fall 2027, and trap netting and gill netting in late winter and spring 2028. Request supplemental sport fish stockings when available, perform additional habitat enhancements when possible and continue working to inform the public about the negative impacts of AIS.

Introduction

This document is a summary of fisheries data collected from Lake Pat Cleburne in 2023-2024. 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 2023-2024 data for comparison.

Reservoir Description

Lake Pat Cleburne was impounded in 1964 and is a 1,568-acre impoundment of the Nolan River within the Brazos River Basin, Johnson County, and is located within the City of Cleburne. It is owned and operated by the City of Cleburne and primary water uses include municipal water supply and recreation. Maximum depth is 33.5 feet. The reservoir has a drainage area of 100 square miles, a storage capacity of 26,008 acre-feet, and a shoreline length of 15.3 miles at the conservation pool of 733.5 feet above mean sea level (MSL). Lake Pat Cleburne is eutrophic with a TSI *chl-a* of 61.66 (Texas Commission on Environmental Quality, 2022). Habitat at time of sampling was dominated by natural shoreline, rock shoreline and limited boat docks and piers. Aquatic vegetation was either absent or dry due to low reservoir water level when the survey was conducted. Water level has been within 9.5' feet of conservation pool (733.5 above MSL) since the last report and was 5.7' low during the summer 2023 vegetation survey, 6.1' low during the 2023 electrofishing survey, 0.5' high during the 2024 trap netting survey and 0.6' high during the 2024 gill netting survey (Figure 1). Other descriptive characteristics for Lake Pat Cleburne are in Table 1.

Angler Access

Lake Pat Cleburne has four public boat ramps (Nolan River, West, East and South-east Ramps) and several private boat ramps. The East Ramp by the golf course is the best for larger craft. The other ramps are seldom used for launching anything other than small watercraft (Table 2). Much of Lake Pat Cleburne's shoreline is accessible to anglers, including the Nolan River area via Buddy Stewart Park, and the lower east side of the reservoir.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Tibbs and Baird 2020) included:

1. Continue advocating for the City of Cleburne to purchase HSB fry from Keo Fish Farms in Arkansas and share survey reports and HSB monitoring trends with the City of Cleburne when available.

   Action: The City of Cleburne has been a good partner to work with on the HSB effort, and they have consistently purchased HSB from Keo Fish Farms. We shared pictures, data and monitoring results for HSB with the City in spring 2020 and again during spring 2024 in an effort to keep them aware of the progress being made with the program.

2. Increase stocking rate for HSB if possible, and have the fish delivered in at least two bags and stock them in at least two areas of the reservoir.

   Action: Each year, we encourage the City of Cleburne to expand the program by purchasing an additional 100,000 HSB fry; to date, the city has not been able to incur the additional costs. Texas Parks and Wildlife Department has however, stocked over 400,000 additional HSB into Lake Pat Cleburne to support the program and its goals. We have also worked with the City of Cleburne and Keo Fish Farms to receive HSB fry in different boxes – and try to stock them in different areas of the reservoir.

3. Collect genetics and age and growth data on all stock-size HSB collected during 2024 gill netting.

Action: Complete data sets were collected on HSB age and growth and genetics in spring 2024. These data and results are included in this report.

4. Cooperate with the City of Cleburne to post appropriate AIS signage at access points throughout the reservoir. Educate the public about AIS and make a speaking point about AIS when presenting to constituent and user groups. Keep track of (i.e., map) all existing and future interbasin water transfer routes to facilitate potential invasive species responses.

   Action: Invasive species signage was posted at Lake Pat Cleburne access points during summer 2013 and have been maintained as needed. District biologists have made a speaking point about AIS, how to prevent their spread, and potential effects on Lake Pat Cleburne while speaking to anglers over the past several years. Interbasin water transfers will be updated as needed.

Harvest regulation history: Sport fishes in Lake Pat Cleburne have always been managed with statewide regulations. The statewide regulation for Blue and Channel Catfish changed on September 1, 2021, and now the regulation is no minimum length limit; daily bag of 25 (in any combination – only 10 can be 20 inches or greater in length). The current harvest regulations are listed in Table 3.

Stocking history: Lake Pat Cleburne was stocked with Blue Catfish and HSB (either palmetto bass or sunshine bass) during the period covered by this report. The complete stocking history is in Table 4.

Water Transfer: Lake Pat Cleburne is primarily used for municipal water supply and recreation. The City of Cleburne has the only raw water intake structure on the reservoir, which serves the adjoining 20 million gallons per day treatment plant. The City also transfers water to Lake Pat Cleburne from Lake Aquilla via a 31-mile pipeline. There is an indirect reuse line in the planning stages with no other additional water transfers being considered.

Reservoir capacity: Lake Pat Cleburne was impounded in 1964. Original plans calculated the reservoirs capacity at conservation pool (733.5 feet above MSL) to be 25,560 acre-feet with a surface area of 1,545 acres. Two volumetric surveys have been conducted by the Texas Water Development Board (TWDB) on Lake Pat Cleburne since impoundment; one in 1998 and one in 2008. The 1998 survey found a volume of 25,730 acre-feet and a surface area of 1,558 acres, whereas the 2008 survey found a volume of 26,008 acre-feet and a surface area of 1,568 acres at conservation pool elevation. Since both surveys report capacities greater than the original volume of the lake, no estimated sedimentation rate could be determined, and none is presumed to have occurred up to the time of the 2008 report.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Lake Pat Cleburne (Tibbs and Baird 2020). 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).

Common names of fishes and their hybrids in this report are used following Page et al. (2023) with an exception for Largemouth Bass. While we recognize recent changes to black bass names, Texas reservoirs contain a mix of Florida Bass, Largemouth Bass, and their intergrade offspring. Therefore, Largemouth Bass is used in this report for simplicity as well as consistency with previous reports.

Electrofishing – Largemouth Bass, sunfishes, Gizzard Shad and Threadfin Shad were collected by daytime electrofishing (1.0 hour at 12, 5-min stations) in 2023. Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. Electrofishing in 2023 was conducted using a Smith-Root Apex electrofisher, while previous surveys used a GPP 7.5 electrofisher.

Trap netting – White Crappie were collected by late-winter (February) trap netting (5 net nights at 5 stations) in 2024. The 2023 survey is the first late-winter trap netting survey completed on Lake Pat Cleburne. Catch per unit of effort (CPUE) for trap netting was recorded as the number of fish caught per net night (fish/nn).

Gill netting – Channel Catfish, Blue Catfish, HSB, White Bass and White Crappie were collected by spring gill netting (10 net nights at 10 stations) in 2024. Catch per unit effort (CPUE) for gill netting was recorded as the number of fish caught per net night (fish/nn).

Genetics – Genetic analysis of Largemouth Bass and all temperate bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2022). Micro-satellite DNA analysis was used to determine genetic composition of individual fish from 2005 to present, and by electrophoresis for previous years.

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 Neumann et al. (2012). Hybrid striped bass PSD was calculated according to Dumont and Neely (2011). Texas Parks and Wildlife Department has stocked both HSB crosses (palmetto bass and sunshine bass) in the past. Most HSB currently produced by TPWD hatcheries are sunshine bass. Even though PSD length categories and standard weight equation were developed based on palmetto bass populations, they are applied to sunshine bass under the assumption that there is little difference in the growth of the two hybrids. Index of Vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE and creel statistics.

Habitat – The 2011 structural habitat survey was conducted according to Tibbs and Baird (2012). The 2023 vegetation survey was conducted using an adaptation of the point method (TPWD, Inland Fisheries Division, unpublished manual revised 2022). Points were randomly generated on the shoreline and averaged a minimum of one point per shoreline mile. Aquatic vegetation has always been found close to the shore in Lake Pat Cleburne, so stratifying the random points to exclude deep-water areas increased precision and resulted in better data.

Water level – Source for water level data was the United States Geological Survey (USGS 2024).

Results and Discussion

Habitat: The last structural habitat survey estimated 13.8 miles (90.2%) of natural shoreline, 1.5 miles (9.7%) of rock shoreline and trace amounts of bulk headed shoreline (Tibbs and Baird 2012). Littoral zone habitat in summer 2023 was dominated by natural shoreline and terrestrial vegetation (100% or 36 of 36 randomly selected shoreline points). No aquatic vegetation was observed during the survey.

Prey species: Gizzard Shad and Threadfin Shad catch rates were 329.0/h and 128.0/h, respectively, and below their historical averages (Figure 2; Appendices A and B). The IOV for Gizzard Shad was excellent, indicating that 89% of individuals were available as prey to predators; this was lower than IOV estimates in previous years. The total CPUE of Gizzard Shad in 2023 was considerably lower than 2019 and considerably higher than 2015 (Figure 2). Other forage species collected were Bluegill (82.0/h), Longear Sunfish (16.0/h), and Redear Sunfish (2.0/h; Figures 3 and 4; Appendices A and B). Sunfish seldom reach preferred size classes in Lake Pat Cleburne, and few anglers actively seek them.

Catfishes: Blue Catfish were collected at a rate of 3.4 fish/nn, which is the highest catch rate since 2008 (Figure 5 Appendices A and B). The OBS goals for Blue Catfish, general monitoring to collect abundance (CPUE – Total; RSE ≤ 25) and size structure (PSD and length-frequency; N ≥ 50 stock) data, were partially achieved with 34 stock-length individuals and an RSE value of 20 (Table 5; Figure 5). The PSD value decreased between 2020 and 2024, from 67 to 38, reflecting higher proportions of smaller fish in the population due to the exceptional 17 to 19-inch length classes represented. Relative weight (Wr), or body condition, decreased from 2020 to 2024 but still remained good for most length categories.

Channel Catfish were collected at a rate of 8.1 fish/nn, which is above the historical average for the species (Figure 6 Appendices A and B). The OBS goals for Channel Catfish, general monitoring to collect abundance (CPUE – Total; RSE ≤ 25) and size structure (PSD and length-frequency; N ≥ 50 stock) data, were both achieved with 78 stock-length individuals and an RSE value of 21 (Table 5; Figure 6). The PSD value in 2024 (60) remained similar to that of 2020 (56) and reflects a balanced population; many Channel Catfish were in the quality length category. Relative weight (Wr), or body condition, remained excellent for most length classes (Figure 6).

Temperate Bass: White Bass were collected at a rate of 1.4 fish/nn, which is a large decrease from the previous survey and below the historical average (Figure 7; Appendices A and B). The OBS goals for White Bass, general monitoring to collect abundance (CPUE – Total; RSE ≤ 25) and size structure (PSD and length-frequency; N ≥ 50 stock) data, were not achieved with only 14 stock-length individuals and an RSE value of 37 (Table 5; Figure 7). White Bass reached the minimum length limit of 10 inches by age two (Figure 8). Relative weight (Wr), or body condition, was generally lower in 2024 compared to those observed in 2020.

Hybrid striped bass (palmetto bass and sunshine bass) fry were stocked in 2017, sunshine bass fry were stocked from 2017 through 2022 with the exception of 2020, and palmetto bass and sunshine bass fry were both stocked again in 2023 (Table 4). Hybrid striped bass were collected at a rate of 1.5 fish/nn, almost twice that of 2020 (Figure 9; Appendices A and B). The OBS goals for HSB, general monitoring to collect abundance (CPUE – Total; RSE ≤ 25) and size structure (PSD and length-frequency; N ≥ 50 stock) data, were not achieved with only 10 stock-length individuals and an RSE value of 39 (Table 5; Figure 9). Relative weight (Wr), or body condition, was good to excellent for all but one length category. Most HSB reach the minimum length limit of 18 inches by age three (Figure 10).

Similar to 2020, genetic samples were again collected from all temperate bass to ensure accurate identification of HSB and their associated strains. Prior studies on Belton and Lake Pat Cleburne comparing field-identified temperate bass to genetic samples found errors in identification (Baird and Tibbs, 2007; Tibbs and Baird 2020), indicating that use of the tongue patch to differentiate between HSB and White Bass isn't 100% accurate. Problems with identification continued at Lake Pat Cleburne, as 6 of 18 fish (33%) originally identified as White Bass were confirmed to be HSB by genetics. All six of these mis-identified HSB were less than stock length (8-inches). All fish originally identified as HSB were confirmed to be HSB with genetics, and all HSB collected in 2024 were identified as sunshine bass (Figure 10).

Largemouth Bass: Largemouth Bass were collected at a rate of 49.0 fish/h, which is the lowest catch rate on record (Figure 11; Appendices A and B). Drought and poor sampling conditions in 2023 (i.e., water level at 6.1' below conservation pool) are likely to blame for the low catch rates of Largemouth Bass in this survey. The OBS goals for this species, general monitoring to collect abundance (CPUE – Total; RSE ≤ 25) and size structure (PSD and length-frequency; N ≥ 50 stock) data, were not achieved since only 10 stock-length individuals were collected with an RSE value of 49 (Figure 11). Only a few collected individuals were preferred length (15-inches) and none were memorable length (20-inches; Figure 11). Body condition was excellent with few exceptions. Florida Largemouth Bass influence was similar between 2015 (35%) and 2023 (32%; Table 6).

White Crappie: White Crappie were collected at a rate of 11.6 fish/nn, which is the highest catch rate on record for this species (Figure 12; Appendices A and B). The OBS goals for White Crappie, general monitoring to collect abundance (CPUE – Total; RSE ≤ 25) and size structure (PSD and length-frequency; N ≥ 50 stock) data, were partially achieved with 57 stock-length individuals and an RSE value of 32 (Table 5; Figure 12). The PSD value was high (84), reflecting higher proportions of larger fish in the population; many White Crappie reached or approached the memorable length category. Relative weight (Wr), or body condition, was excellent for most length classes (Figure 12).

Fisheries Management Plan for Lake Pat Cleburne, Texas

Prepared – July 2024

ISSUE 1: A partnership with the City of Cleburne to stock commercially available HSB fry into Lake Pat Cleburne has been ongoing since 2017. This approach was necessary because demand for HSB from our hatchery system already exceeds supply most years and existing reservoir fisheries have priority. The effort has already been successful in creating a low-density HSB fishery and catch rates from 2024 collections were nearly twice those from 2020. A new water body HSB record was caught on March 6, 2024, weighed over nine pounds, and was 25.25 inches in length. This fishery is expected to improve as additional HSB recruit to legal length.

MANAGEMENT STRATEGIES

1. Share report with the City of Cleburne and continue advocating for private purchase of fry. Cost for each year of stocking has been $500-$700 to deliver 100k fry (64/acre) from Keo Fish Farms in Arkansas to Love Field in Dallas.
2. Increase stocking rate if possible, have the fish delivered in at least two bags and stock them in at least two areas of the reservoir. This spreads out the risk due to packaging errors as well as localized issues with stocking site choice and may result in more frequent recruitment events.
3. If the city isn't willing or indicates that they can't continue financing these efforts indefinitely, look for additional partners to fund current stocking rates.
4. Sample the population with gill nets in spring 2026 and 2028. Identify all stock-length HSB collected for age and growth purposes while on the water during collection.
5. Perform a roving creel survey during fall 2027 to evaluate angler effort, success, preferences, and economic impact – and also to determine the extent to which anglers are utilizing the HSB fishery.

ISSUE 2: Lake Pat Cleburne has experienced both severe flooding and drought conditions within the last five years. Given its shallow nature, these events can be particularly damaging to the fishery. Largemouth Bass and forage species catch rates were near or at all-time lows during 2023.

MANAGEMENT STRATEGIES

1. Request Lone Star Bass fingerlings, which are 2nd generation offspring of pure Florida strain ShareLunker Largemouth Bass ≥ 13 pounds, at a rate of 1,000/km shoreline, two additional years before the next report.
2. Request supplemental Bluegill when available to mitigate these natural losses.
3. Consider constructing spawning beds or habitat in several areas of the reservoir to improve populations of nest spawning prey and sport fishes.
4. Place fish habitat structures (freshwater reefs) in appropriate areas throughout the lower end of the reservoir to provide much-needed habitat for forage and sport fishes.
5. Conduct a 12-station daytime versus 12-station nighttime fall electrofishing survey prior to fall 2027, to assess differences between daytime and nighttime survey results, monitor forage species, and to observe whether or not catch rates have improved for Largemouth Bass.
6. Pending results from the daytime versus nighttime electrofishing survey, conduct a standard 12-station electrofishing survey in fall 2027 to monitor forage species and Largemouth Bass.

ISSUE 3: Many AIS threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (Dreissena polymorpha) 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 (Salvinia molesta) 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 AIS 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 City of Cleburne to maintain appropriate signage at access points around the reservoir.
2. Educate the public about AIS through social media and the internet.
3. Make a speaking point about AIS when presenting to constituent and user groups.
4. Keep track of (i.e., map) existing and future interbasin water transfers to facilitate potential AIS responses.

Objective-Based Sampling Plan and Schedule (2024–2028)

Sport fish, forage fish, and other important fishes

Sport fishes in Lake Pat Cleburne include Largemouth Bass, Channel Catfish, Blue Catfish and White Crappie. Important forage fishes include Gizzard Shad, Threadfin Shad, Bluegill and Longear Sunfish.

Sport fishes with low-density populations

Spotted Bass, Flathead Catfish, HSB, White Bass and Black Crappie occur in low abundance in Lake Pat Cleburne. We will continue collecting and reporting data for these species and upgrade their status if appropriate.

Survey objectives, fisheries metrics, and sampling objectives

Fall Electrofishing: The 2023 Largemouth Bass catch rate (49.0 fish/h) was the lowest on record. Catch rates for all sunfish species were also at or near historical lows. Possible reasons for historically low catch rates include the recent change from nighttime to daytime electrofishing surveys, drought and/or low water conditions, a statewide change in electrofishing systems, or some combination of the three. This issue requires additional attention and sampling, so electrofishing surveys will be conducted during the fall, once prior to 2027, and again during fall 2027.

The early survey will be used primarily to determine whether daytime electrofishing is adequate to sample the reservoir or if sampling procedures need to revert back to nighttime electrofishing for Lake Pat Cleburne. Additionally, this early survey will be used to evaluate Largemouth Bass, Bluegill, Longear Sunfish, Redear Sunfish, Gizzard Shad, and Threadfin Shad populations. Twelve random five-minute daytime electrofishing stations and twelve five-minute nighttime electrofishing stations will be sampled to assess the status of target species and to determine which survey yields the best data with the most precision.

Daytime and nighttime survey results for Black Bass and sunfish species will be compared using abundance (CPUE-Stock), size structure (PSD and length frequency), and condition (mean relative weight) as metrics to determine the best survey style. Target precision for CPUE-Stock will be an RSE-Stock ≤ 25 and target sample size for size structure will be N ≥ 50 stock. Black Bass body condition will be determined by measuring and weighing at least 5 fish per represented inch group ≥ stock-length. Index of vulnerability (IOV) will be calculated for Gizzard Shad to assess the relative proportion of individuals in the population suitable as prey for sport fishes.

Pending the results of the early survey, the 2027 survey will either use daytime or nighttime electrofishing to evaluate populations of the above species with the same metrics. Additionally, A genetic sample of 30 randomly selected Largemouth Bass will be collected to access stocking success (if appropriate) and/or Florida Bass influence within the population.

Late winter trap netting: Recent creel survey data show White Crappie are sought-after and harvested in Lake Pat Cleburne. Although White Crappie catch rates are generally low, the catch rate (11.6 fish/nn) from the 2024 trap net survey was the highest on record for Lake Pat Cleburne, and OBS targets were still only partially achieved with 57 stock-length individuals and an RSE of 32. The goal of this survey will be to conduct an exploratory survey for this species. Five randomly selected trap netting stations will be sampled overnight during late winter 2028.

Spring gill netting: This survey will be used to evaluate catfishes and HSB. Catfishes were collected above their historical averages in 2024 while HSB were collected at around 1.5 fish/nn. A minimum of ten randomly selected gill net stations will be sampled in spring 2026 and spring 2028. Catfishes and HSB will be monitored using abundance (CPUE-Stock), size structure (PSD and length frequency), and condition (mean relative weight) as metrics to make comparisons with historical and future data sets. Target precision for CPUE-Stock will be an RSE-Stock ≤ 25 and target sample size for size structure will be N ≥ 50 stock, allowing us to calculate proportional size distributions with 80% confidence. Body condition will be determined by measuring and weighing at least 5 fish per represented inch group ≥ stock-length for each species. If the goal for a species isn't attained in 5 randomly selected stations, and catch rates indicated that collecting the proposed number of fish is reasonable, sampling will continue at random stations until targets are reached.

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Tables and Figures

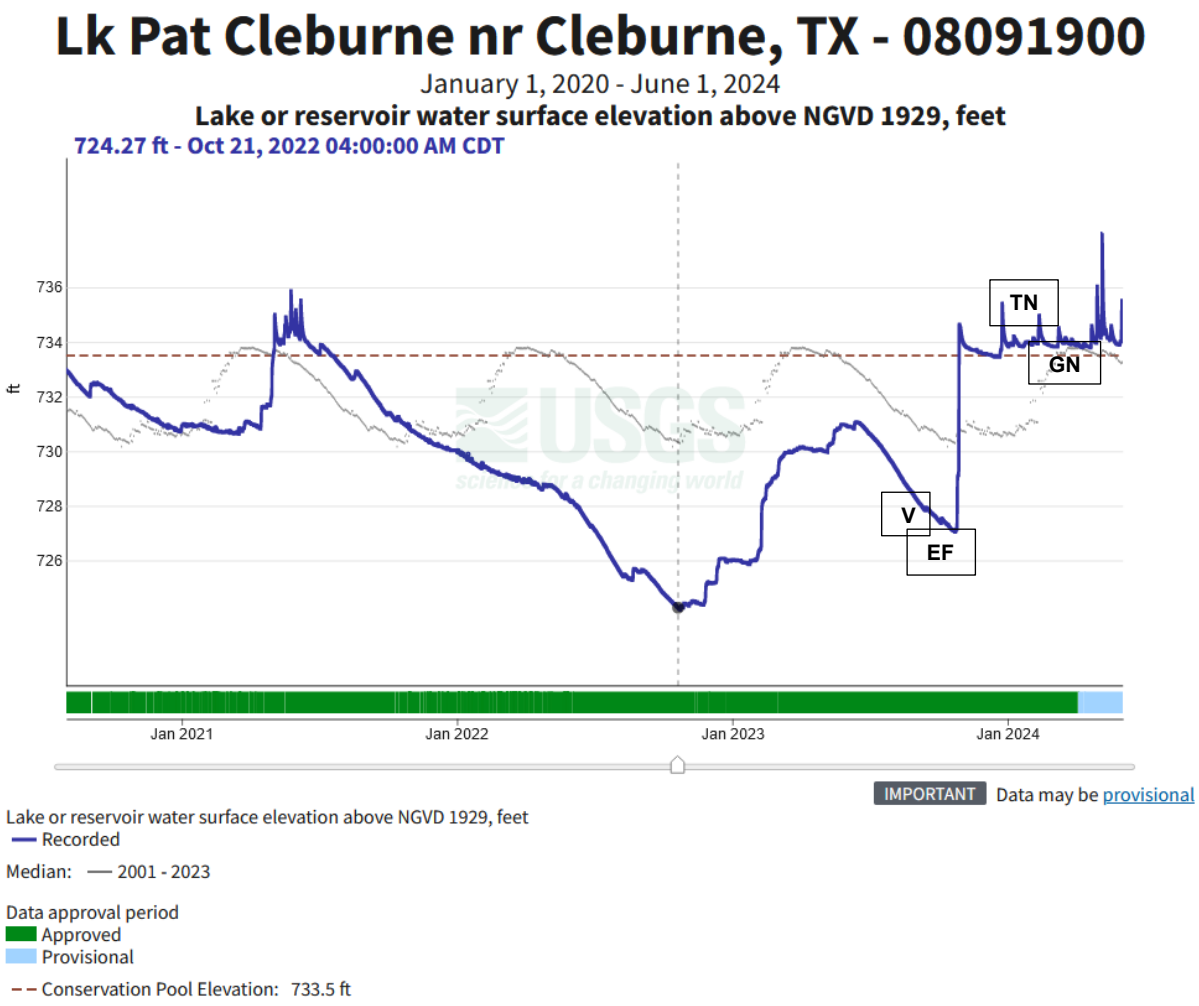


Figure 1. Mean daily water level elevations in feet above MSL recorded for Lake Pat Cleburne, Texas, January 1, 2020, through June 1, 2024 (USGS 2024). NGVD 1929 refers to the National Geodetic Vertical Datum of 1929. The vertical dashed line represents the lowest water elevation during the period (724.25 MSL), the horizontal dashed line indicates Conservation pool (733.5), the thick line represents daily water level elevations, and the thin line represents median water elevations during the period. Sampling times for vegetation (V), electrofishing (EF), trap netting (TN) and gill netting (GN) are noted.

Table 1. Characteristics of Lake Pat Cleburne, Texas.

Characteristic	Description
Year Constructed	1964
Controlling authority	City of Cleburne
County	Johnson
Reservoir type	Tributary
Shoreline Development Index (SDI)	1.6
Conductivity	320 umhos

Table 2. Boat ramp characteristics for Lake Pat Cleburne, Texas, September 2023. Reservoir elevation at time of survey was 727.8 feet above MSL (5.7 feet below conservation pool).

Boat ramp	Latitude/Longitude (dd)	Parking capacity (N)	Condition
East Ramp	32.304095/-97.422440	18	Good
West Ramp	32.300566/-97.437423	14	Narrow
Nolan River Ramp	32.325982/-97.447815	6	Good
SE Ramp	32.294766/-97.416414	12	Good

Table 3. Harvest regulations for Lake Pat Cleburne, Texas.

Species	Bag Limit	Length limit
Catfish: Channel Catfish, Blue Catfish, their hybrids and subspecies[1]	25 (only 10 ≥ 20 inches)	No minimum
Catfish, Flathead	5	18 – inch minimum
Bass, White	25	10 – inch minimum
Hybrid Striped Bass	5	18 – inch minimum
Bass, Largemouth	5	14 – inch minimum
Bass, Spotted, Guadalupe and hybrids[2]	5	No minimum
Crappie: White Crappie, Black Crappie, their hybrids and subspecies	25 (in any combination)	10 – inch minimum

[1]The Blue and Channel Catfish regulation is no minimum length limit; daily bag of 25 (in any combination – no more than 10 can be 20 inches or greater in length).

[2] Daily bag for Largemouth Bass and Spotted Bass = 5 in any combination.

Table 4. Stocking history of Lake Pat Cleburne, Texas. Life stages are fingerlings (FGL), advanced fingerlings (AFGL), adults (ADL) and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species mean total length (Mean TL; in) is given. For years where there were multiple stocking events for a particular species and life stage the mean TL is an average for all stocking events combined.

Species	Year	Number	Life Stage	Mean TL (in)
Blue Catfish	2017	38,506	FGL	2.2
	2018	38,932	FGL	2.5
	2022	78,150		
	Total	155,588		
Channel Catfish	1990	15,723	FGL	2.5
	1998	39,182	AFGL	8.6
	Total	54,905		
Flathead Catfish	1982	18	UNK	UNK
	Total	18		
Florida Largemouth Bass	1992	154,689	FGL	1.0
	1995	155,332	FGL	1.3
	Total	310,021		
Largemouth Bass	1971	50,000	UNK	UNK
	1980	235	UNK	UNK
	Total	50,235		
Palmetto Bass (Striped x White Bass hybrid)	2017	105,233	FRY	0.2
	2023	200,405	FRY	0.2
		305,638		
ShareLunker Largemouth Bass	2024	98	ADL	12.7
	Total	98		
Sunshine Bass (Striped x White bass hybrid)	2017	100,000	FRY	0.2
	2018	100,000	FRY	0.2
	2019	100,000	FRY	0.2
	2021	100,000	FRY	0.6
	2022	312,244	FRY	0.2
	2024	18,471	FGL	1.8
	Total	730,715		

Table 5. Objective-based sampling plan components for Lake Pat Cleburne, Texas 2023 – 2024.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Abundance	CPUE-Stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Condition	W_r	10/inch group (max)
	Genetics	% FLMB	N = 30, any age
Bluegill	Exploratory	Presence/Absence	Practical Effort
Longear Sunfish	Exploratory	Presence/Absence	Practical Effort
Gizzard Shad	Exploratory	Presence/Absence	Practical Effort
Threadfin Shad	Exploratory	Presence/Absence	Practical Effort
Trap Nets			
White Crappie	Exploratory	Presence/Absence	Practical Effort
Gill Nets			
Channel Catfish	Abundance	CPUE-Stock	RSE-Stock ≤ 25
	Size Structure	PSD, length frequency	N ≥ 50 stock
	Condition	W_r	10/inch group (max)
Blue Catfish	Abundance	CPUE-Stock	RSE-Stock ≤ 25
	Size Structure	PSD, length frequency	N ≥ 50 stock
	Condition	W_r	10/inch group (max)
HSB	Abundance	CPUE-Stock	RSE-Stock ≤ 25
	Size Structure	PSD, length frequency	N ≥ 50 stock
	Age and Growth	Age	N = all ≥ stock
	Condition	W_r	10/inch group (max)
	Genetics	Species ID	N = all individuals
White Bass	Abundance	CPUE-Stock	RSE-Stock ≤ 25
	Size Structure	PSD, length frequency	N ≥ 50 stock
	Age and Growth	Age	N = all ≥ stock
	Condition	W_r	10/inch group (max)
	Genetics	Species ID	N = all individuals

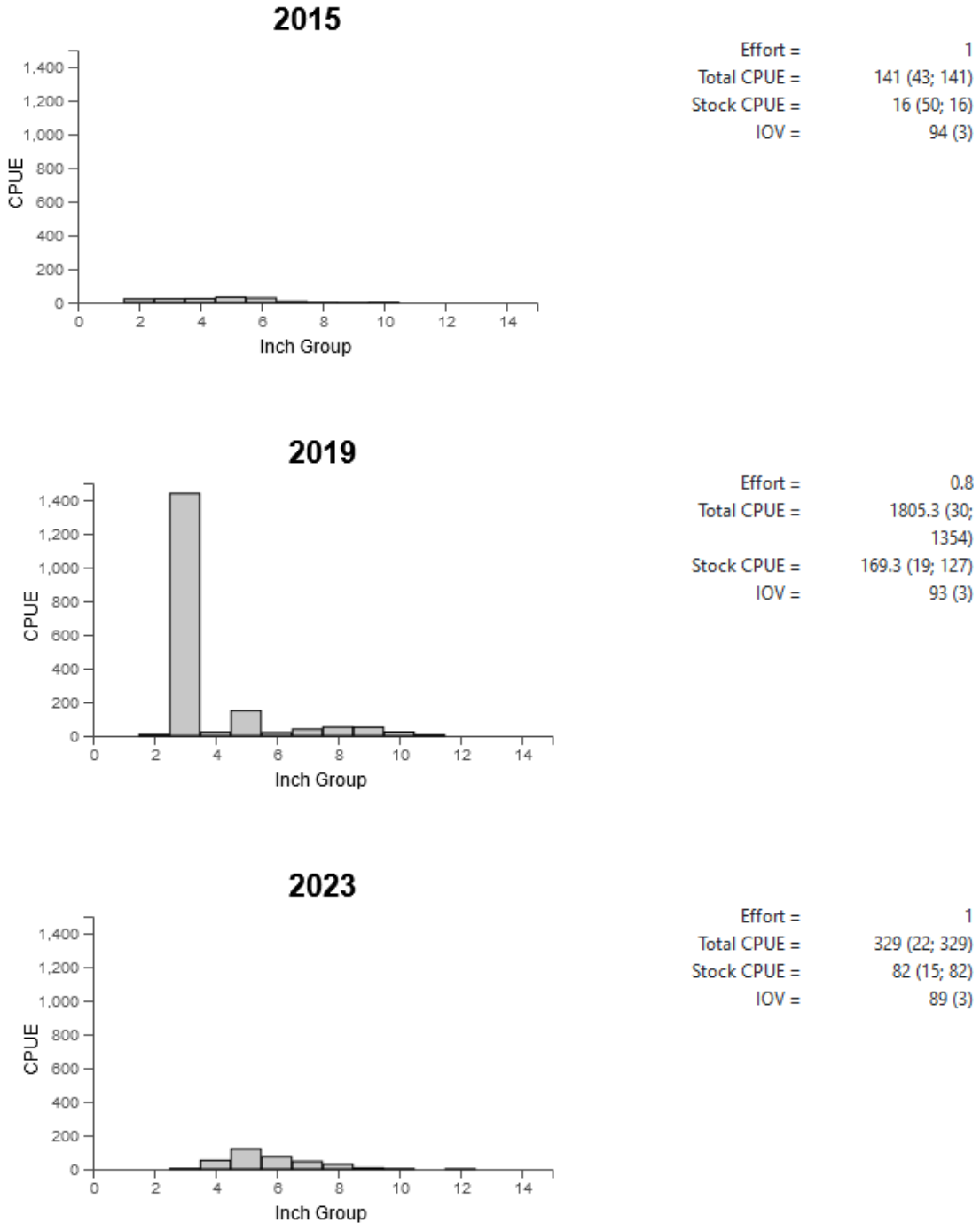


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Pat Cleburne, Texas, 2015 (nighttime), 2019 (daytime) and 2023 (daytime).

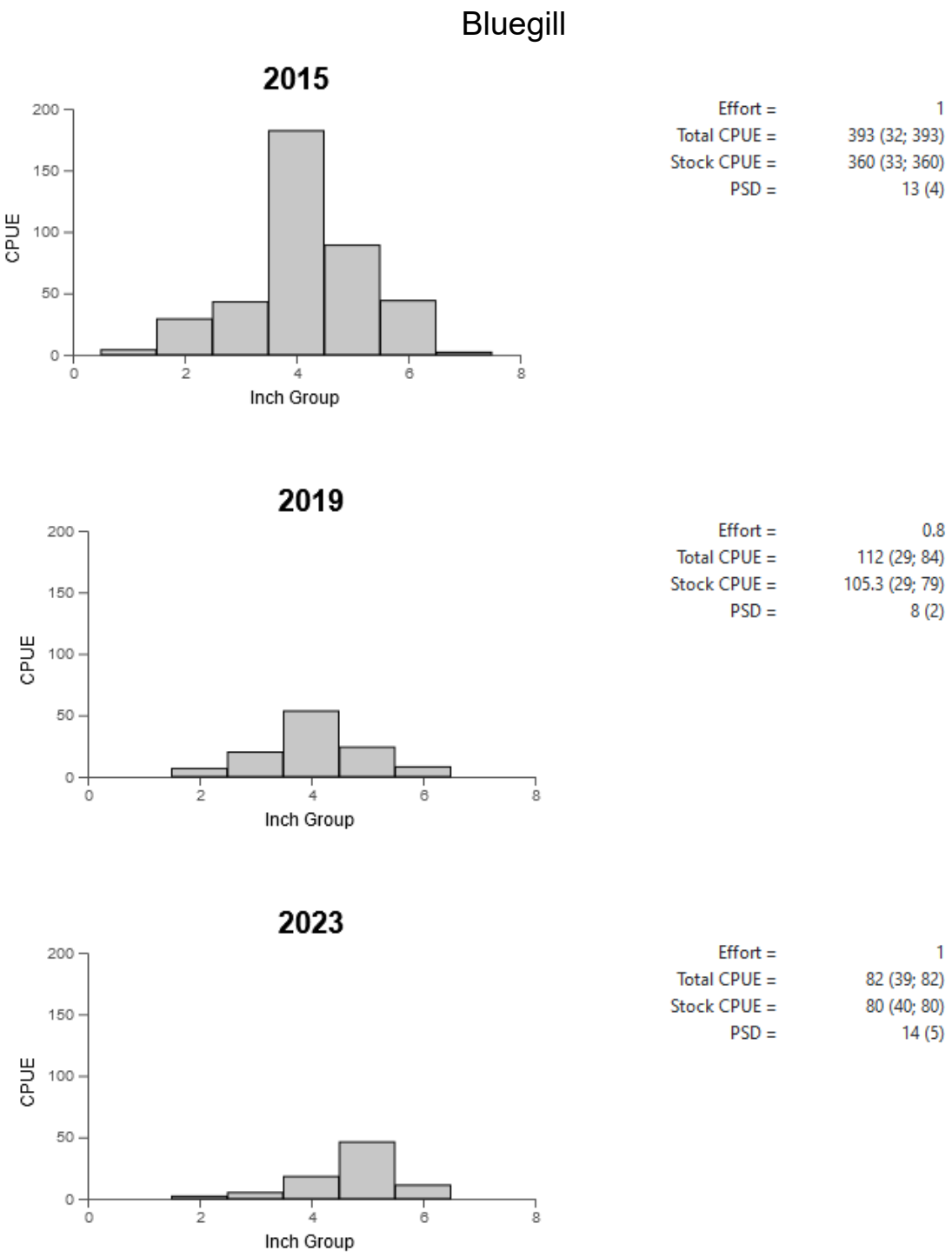


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Pat Cleburne, Texas, 2015 (nighttime), 2019 (daytime) and 2023 (daytime).

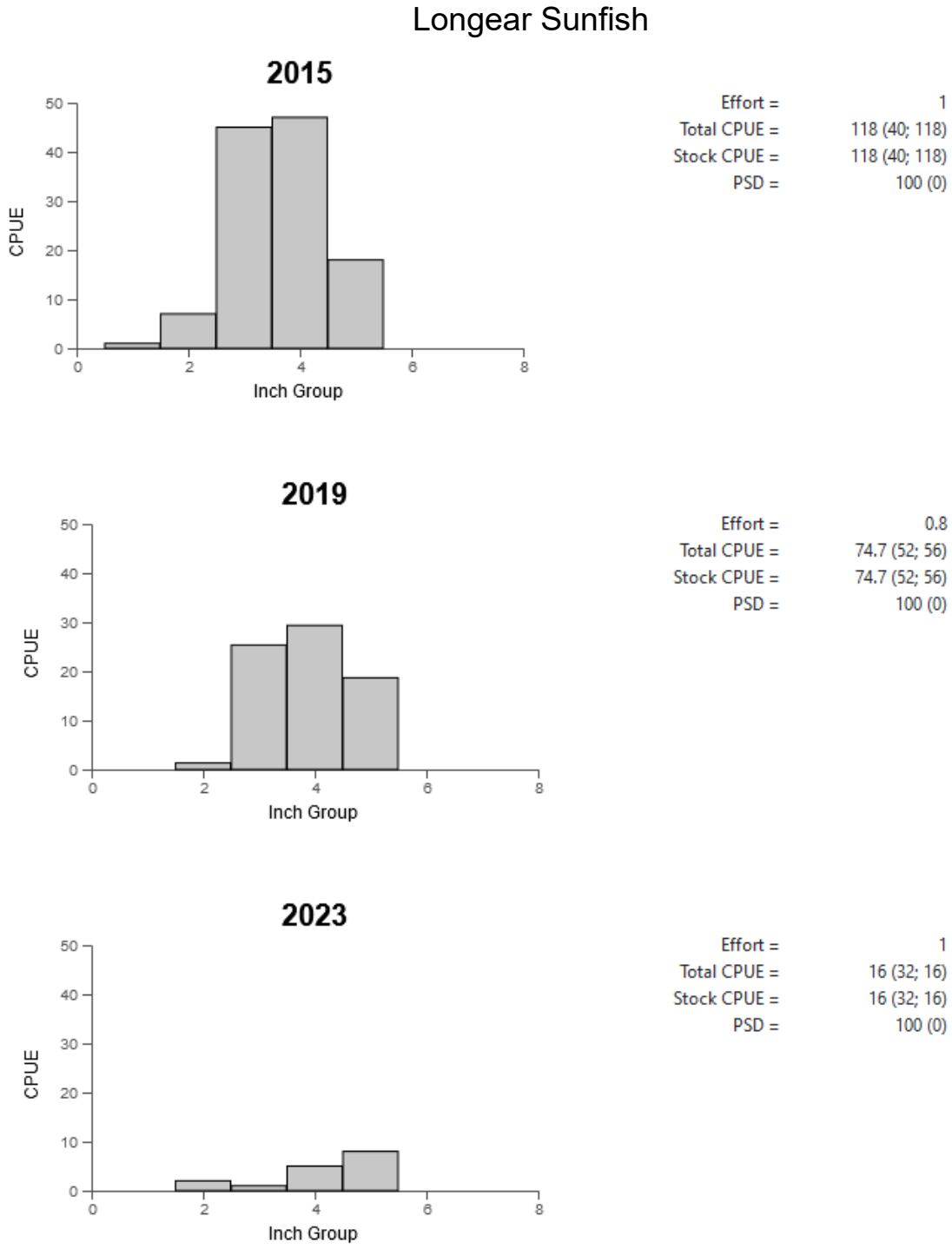


Figure 4. Number of Longear Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Pat Cleburne, Texas, 2015 (nighttime), 2019 (daytime) and 2023 (daytime).

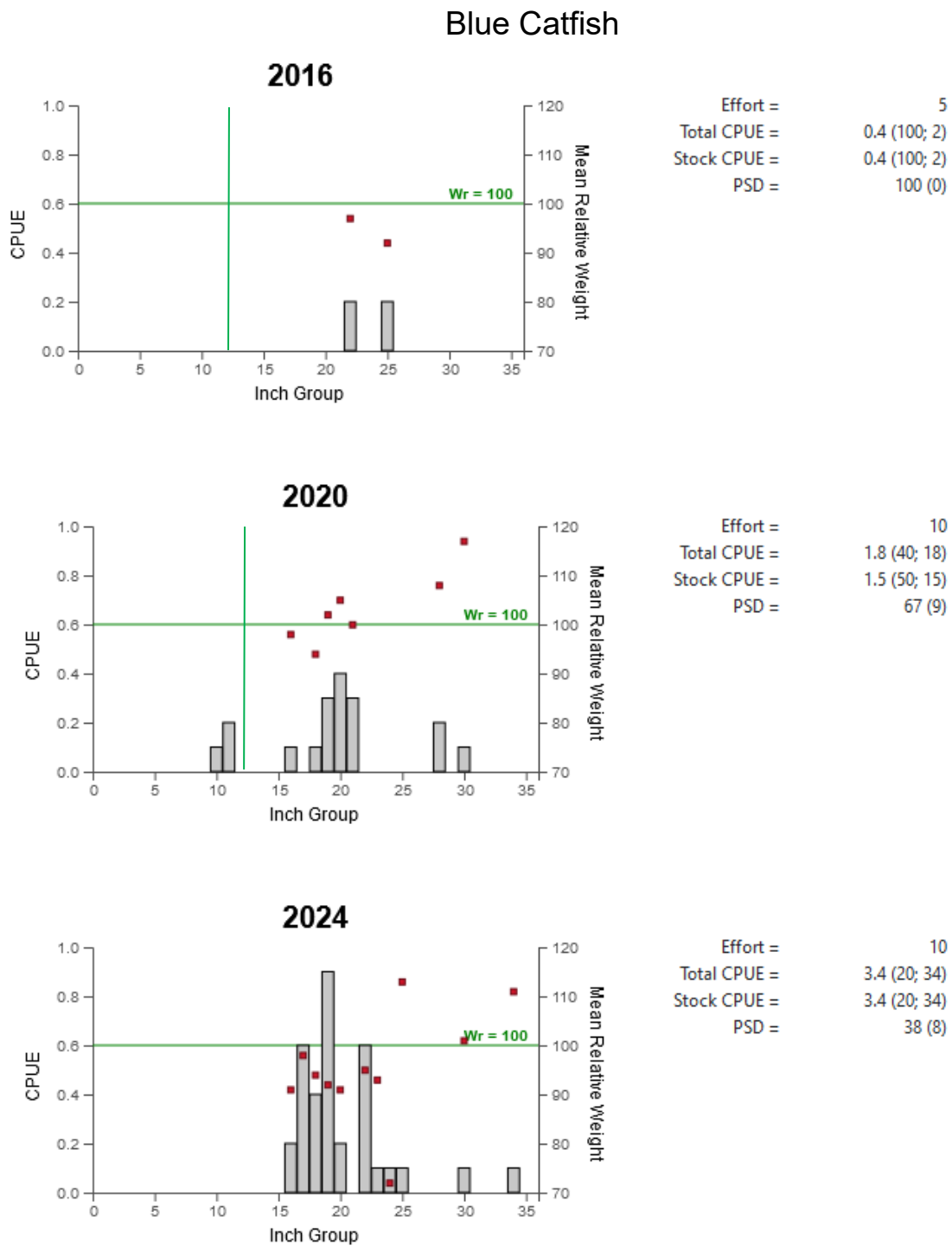


Figure 5. Number of Blue Catfish caught per net night (CPUE, bars), mean relative weights (squares) and population indices (RSE and N for CPUE and SE for size structure in parentheses) for spring gill net surveys, Lake Pat Cleburne, Texas, 2016, 2020, and 2024. The minimum length limit (vertical line) for Blue Catfish was 12-inches during 2016 and 2020; there was none after September 1, 2021.

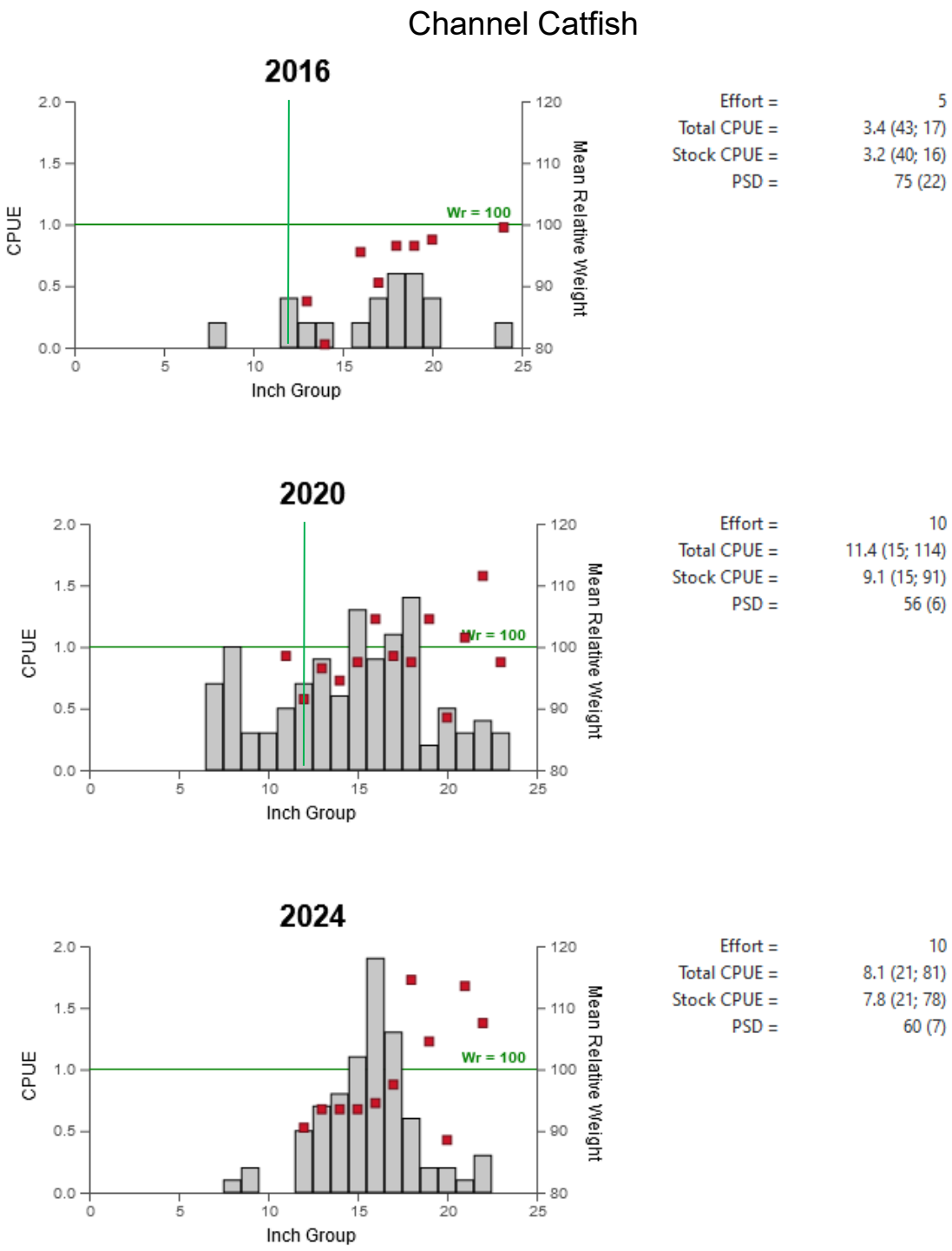


Figure 6. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weights (squares) and population indices (RSE and N for CPUE and SE for size structure in parentheses) for spring gill net surveys, Lake Pat Cleburne, Texas, 2016, 2020, and 2024. The minimum length limit (vertical line) for Channel Catfish was 12-inches during 2016 and 2020; there was none after September 1, 2021.

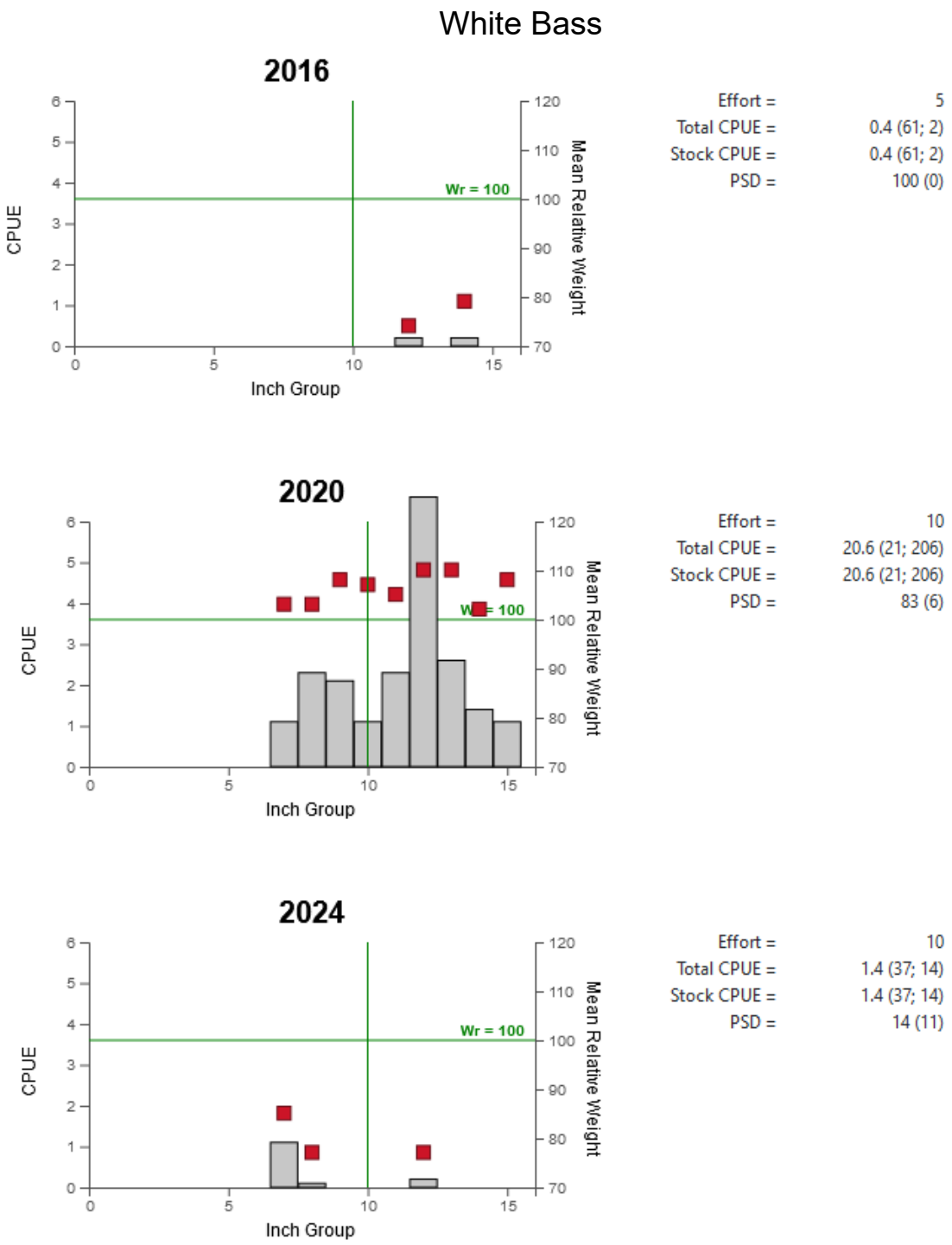


Figure 7. Number of White Bass caught per net night (CPUE, bars), mean relative weight (squares), and population indices (RSE and N for CPUE and SE for size structure in parentheses) for spring gill netting surveys, Lake Pat Cleburne, Texas, 2016, 2020, and 2024. The minimum length limit (vertical line) for White Bass was 10-inches for all three survey periods.

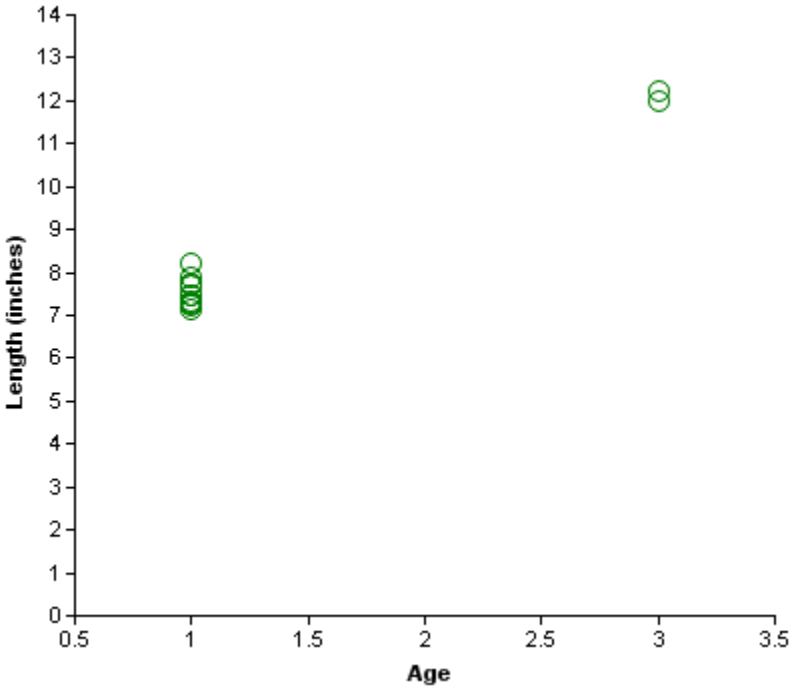


Figure 8. Length at age for White Bass (n = 14) collected by gill netting, Lake Pat Cleburne, Texas, 2024. All individuals were genetically verified to be White Bass.

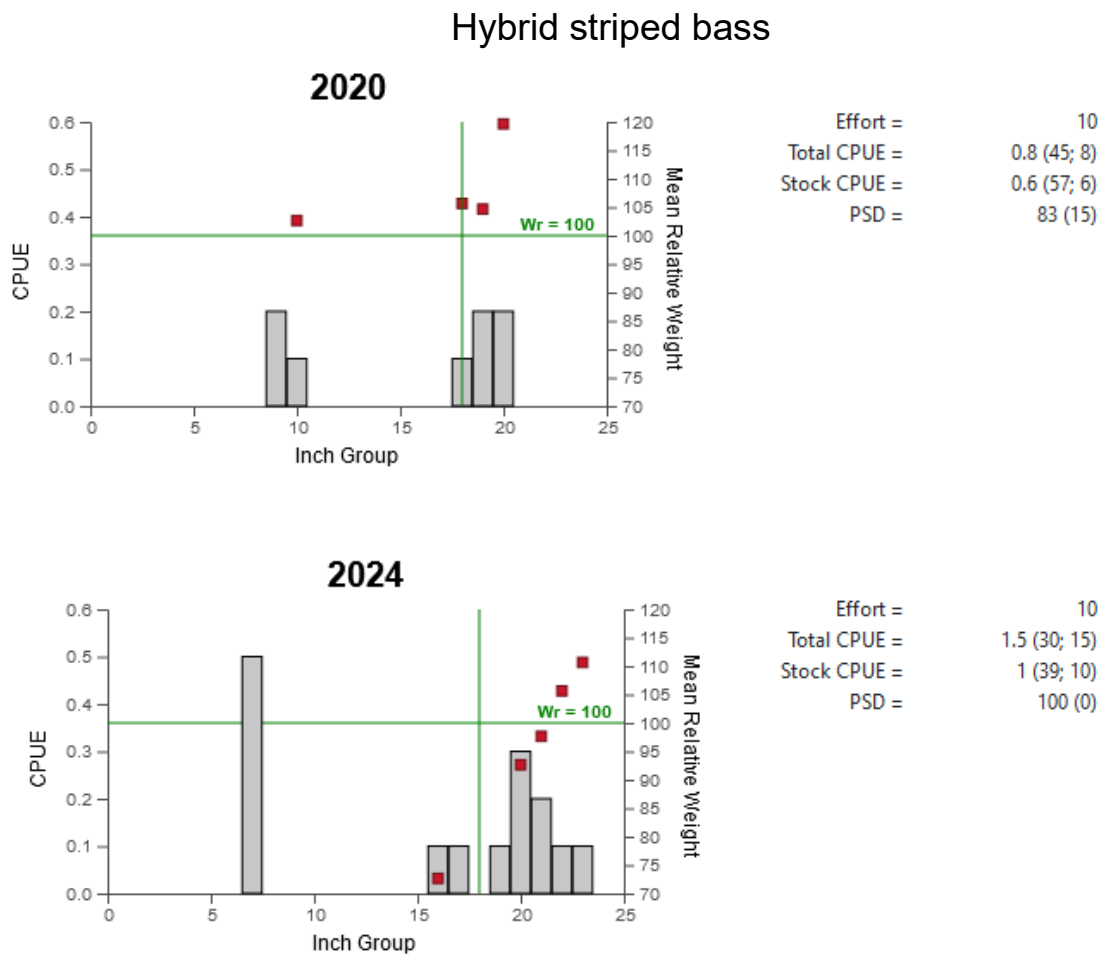


Figure 9. Number of HSB caught per net night (CPUE, bars), mean relative weight (squares), and population indices (RSE and N for CPUE and SE for size structure in parentheses) for spring gill netting surveys, Lake Pat Cleburne, Texas, 2020 and 2024. The minimum length limit (vertical line) for HSB was 18-inches for both survey periods.

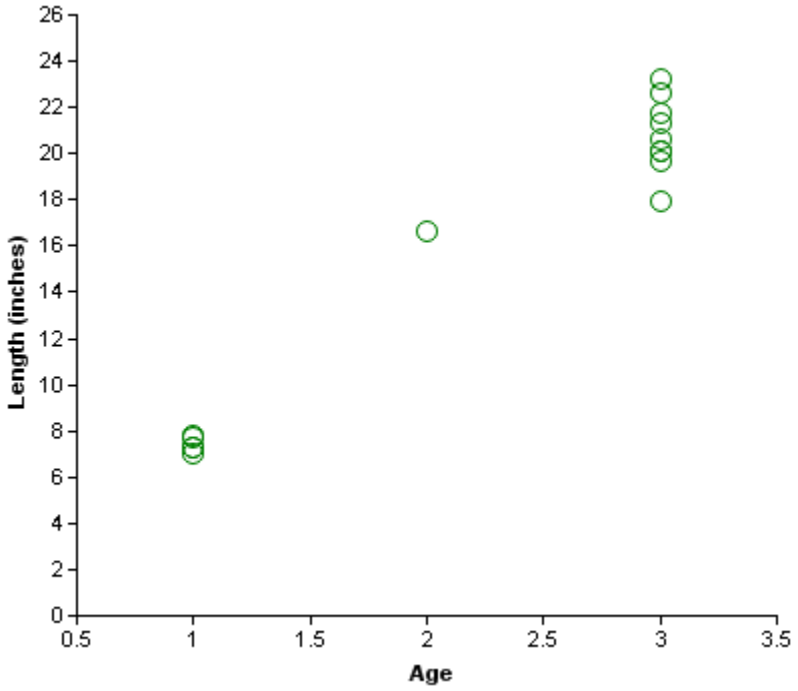


Figure 10. Length at age for HSB (n = 15) collected by gill netting, Lake Pat Cleburne, Texas, 2024. All individuals were genetically verified to be sunshine bass.

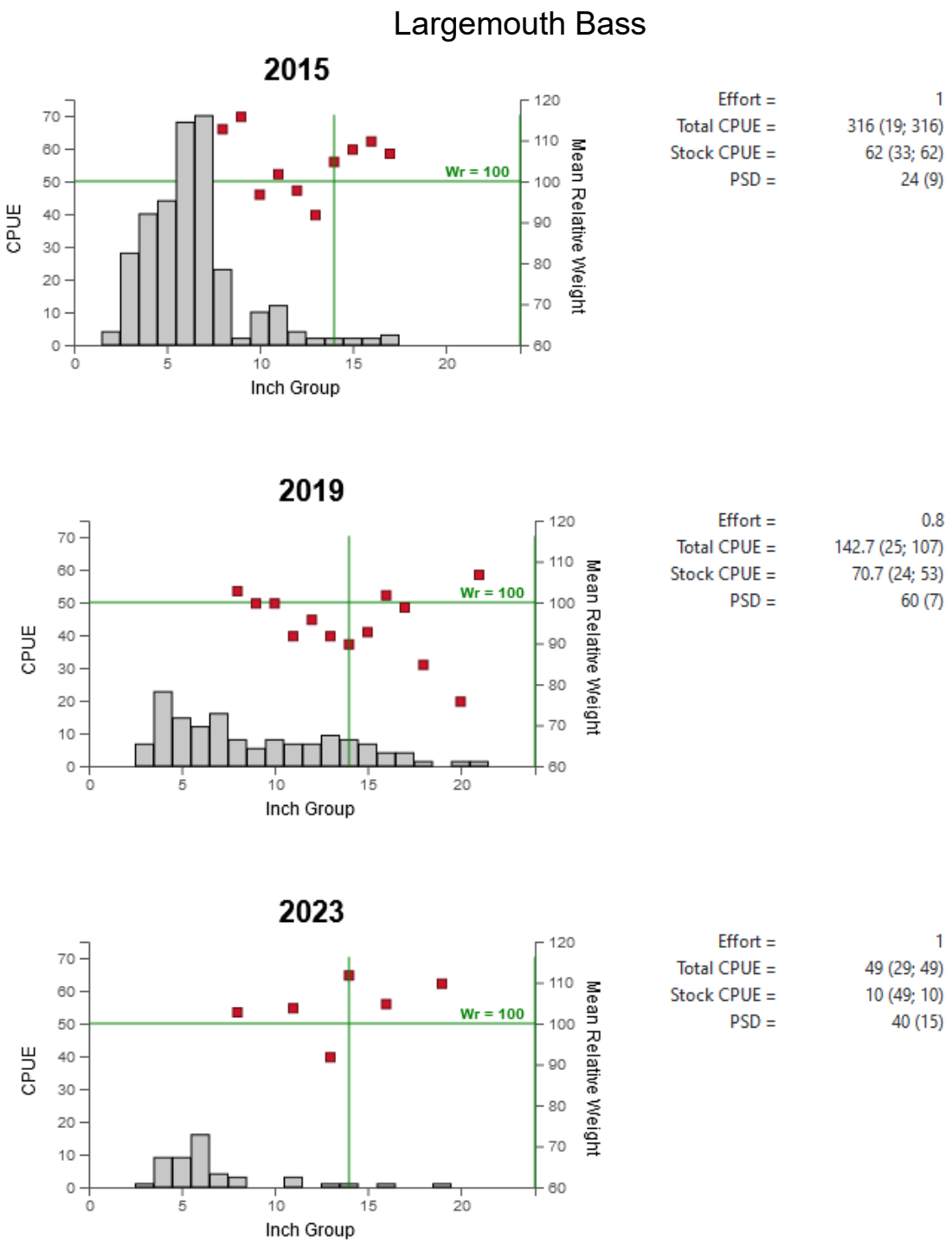


Figure 11. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weights (squares) and population indices (RSE and N for CPUE and SE for size structure in parentheses) for fall electrofishing surveys, Lake Pat Cleburne, Texas, 2015 (nighttime), 2019 (daytime) and 2023 (daytime). The minimum length limit (vertical line) for Largemouth Bass was 14-inches for all three survey periods.

Table 6. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Lake Pat Cleburne, Texas, 2003, 2007, 2015 and 2023. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

		Number of fish				
Year	Sample size	FLMB	Hybrid	NLMB	% FLMB alleles	% FLMB
2003	30	3	21	6	44	3
2007	30	0	24	6	37	0
2015	30	0	26	4	35	0
2023	30	0	28	2	32	0

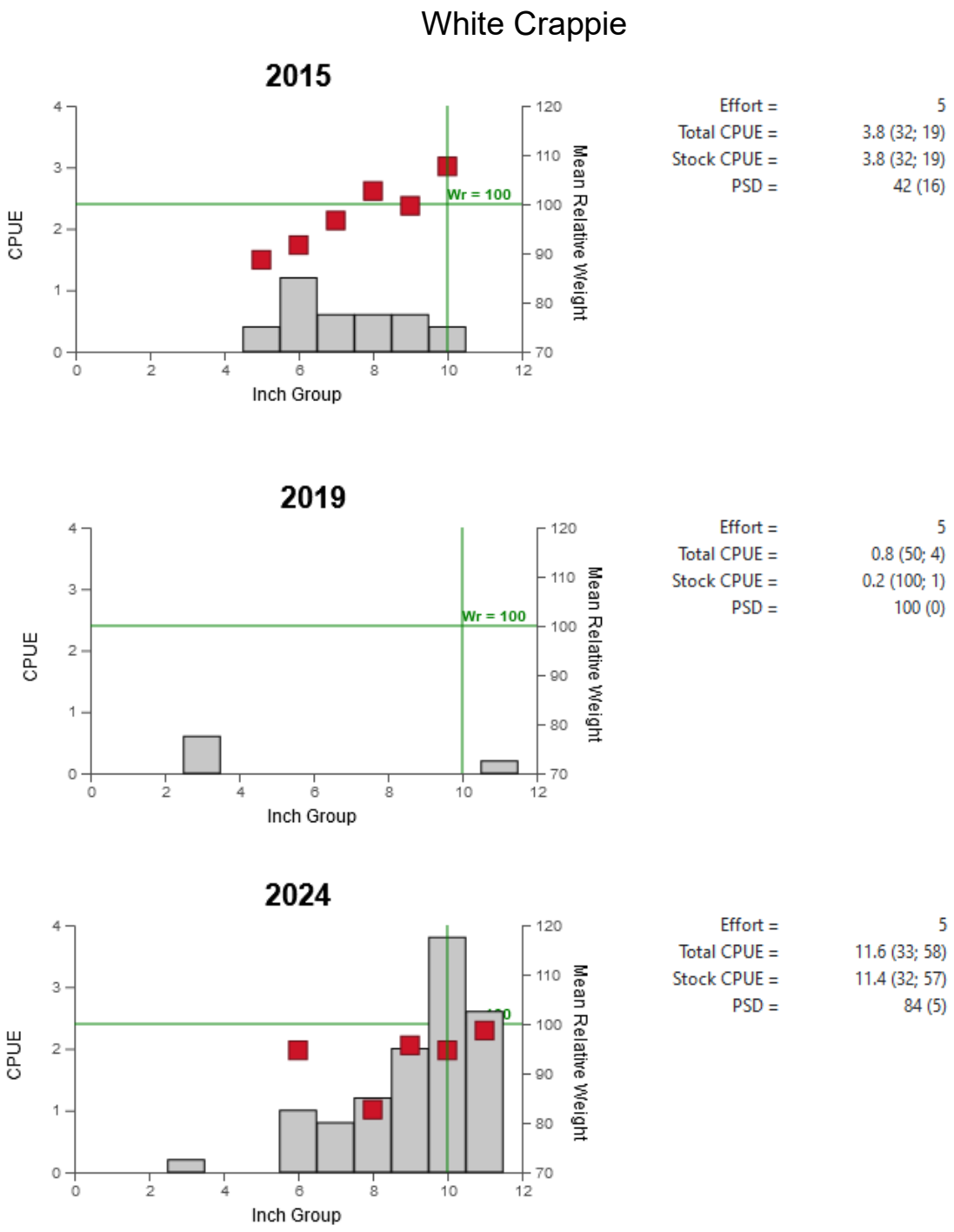


Figure 12. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (squares), and population indices (RSE and N for CPUE and SE for size structure in parentheses) for trap netting surveys, Lake Pat Cleburne, Texas, 2015 (December), 2019 (December) and 2024 (February). The minimum length limit (vertical line) for White Crappie was 10-inches for all three survey periods.

Proposed Sampling Schedule

Table 7. Proposed sampling schedule for Lake Pat Cleburne, Texas. Survey period is June through May. Gill net surveys are conducted in the spring while electrofishing and trap netting surveys are conducted in the fall and late winter respectively. Scheduled surveys are denoted by X.

	Survey year			
	2024-2025	2025-2026	2026-2027	2027-2028
Angler Access				X
Vegetation				X
Electrofishing – Fall		X		X
Trap netting				X
Gill netting			X	X
Report				X

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

Number (N), relative standard error (RSE), and catch per unit effort (CPUE) of all target species collected from all gear types from Lake Pat Cleburne, Texas, 2023-2024. Sampling effort was 10 net nights for gill netting, 5 net nights for trap netting, and 1 h for electrofishing.

Species	Gill Netting		Trap Netting		Electrofishing	
	N/RSE	CPUE	N/RSE	CPUE	N/RSE	CPUE
Gizzard Shad					329 (22)	329.0
Threadfin Shad					128 (31)	128.0
Blue Catfish	34 (20)	3.4				
Channel Catfish	81 (21)	8.1				
Flathead Catfish	3 (51)	0.3				
White Bass	14 (37)	1.4				
Hybrid striped bass	15 (27)	1.5				
Bluegill					82 (39)	82.0
Longear Sunfish					16 (32)	16.0
Redear Sunfish					2 (67)	2.0
Largemouth Bass					49 (29)	49.0
White Crappie	10 (45)	1.0	58 (33)	11.6	10 (45)	1.0
Black Crappie	2 (67)	0.2	3 (67)	0.6	2 (67)	0.2

APPENDIX B – Historical catch rates for targeted species

Catch rates (CPUE) of targeted species collected with electrofishing, trap netting and gill netting surveys on Lake Pat Cleburne, Texas, 1999 to present. Electrofishing stations were sampled with a 5.0 Smith-Root GPP (Gas Powered Pulsator) until 2010, a 7.5 Smith-Root GPP from 2010 to 2019, and a Smith-Root Apex unit thereafter. Species averages are in bold. Dashes represent no data available. Beginning in 2024, trap netting surveys were conducted in late winter instead of late fall.

Electrofishing

	1999	2003	2007	2011	2015	2019	2023	Average
Gizzard Shad	14.0	320.0	299.0	241.0	141.0	1805.3	329.0	**449.9**
Threadfin Shad	0.0	20.0	265.0	344.0	91.0	390.7	128.0	**161.3**
Bluegill	77.0	913.0	492.0	391.0	393.0	112.0	82.0	**351.4**
Longear	33.0	163.0	65.0	27.0	118.0	74.7	16.0	**71.0**
Redear	0.0	60.0	19.0	69.0	25.0	6.7	2.0	**6.0**
Warmouth	1.0	3.0	5.0	1.0	5.0	0.0	0.0	**2.1**
Green	1.0	5.0	18.0	1.0	3.0	1.3	0.0	**4.2**
Largemouth Bass	228.0	178.0	188.0	209.0	316.0	142.7	49.0	**187.3**

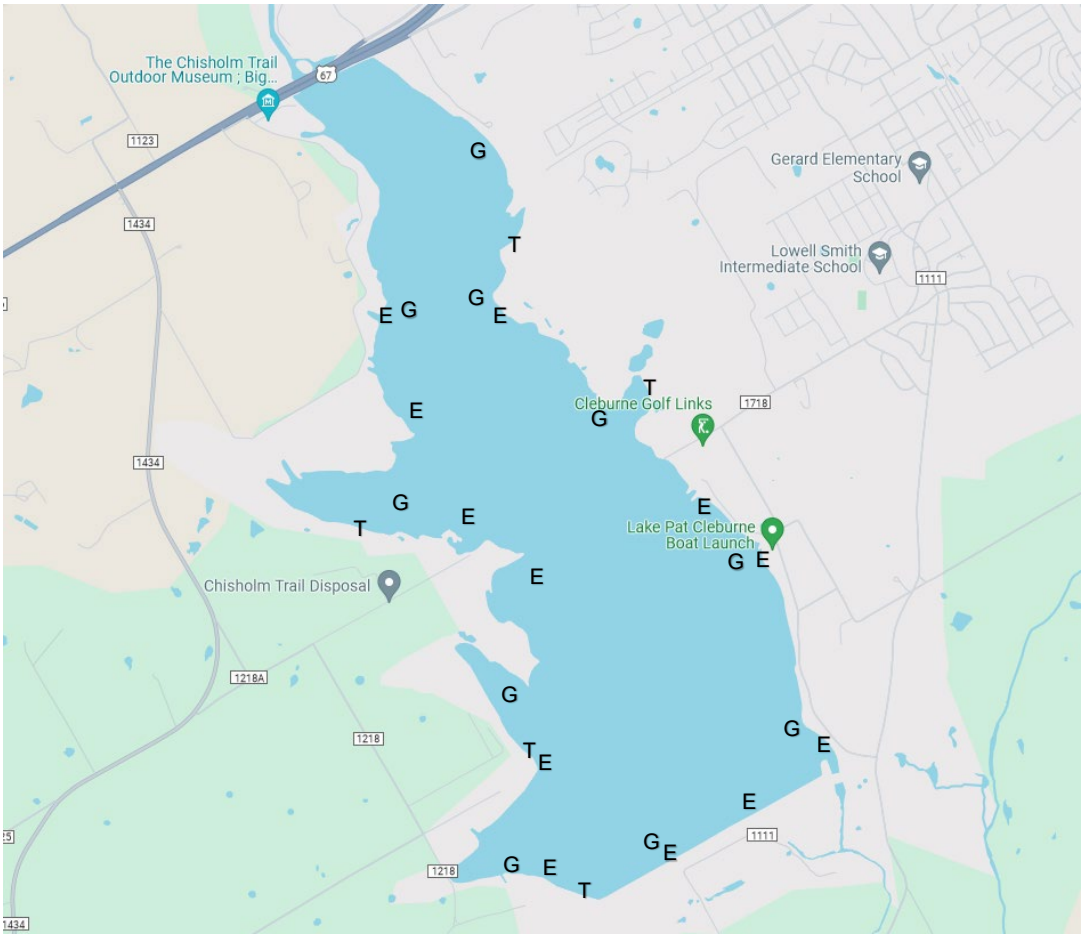
Trap netting

	1999	2003	2007	2011	2016	2020	2024	Average
White Crappie	5.5	3.0	1.0	1.0	3.8	0.8	11.6	**3.8**
Black Crappie	0.0	0.0	0.0	1.0	0.0	0.0	0.6	**0.2**

Gill netting

	1999	2004	2008	2012	2016	2020	2024	Average
Blue Catfish	4.0	2.8	5.4	0.2	0.4	1.8	3.4	**2.6**
Channel Catfish	3.4	3.5	7.6	8.4	3.4	11.4	8.1	**6.5**
Flathead Catfish	0.4	0.3	0.0	0.2	0.0	0.0	0.3	**0.2**
White Bass	8.8	18.3	9.0	4.2	0.4	20.6	1.4	**9.0**
Hybrid striped bass	---	---	---	---	---	0.8	1.5	**1.2**
White Crappie	---	---	---	6.6	---	1.1	1.0	**2.9**
Black Crappie	---	---	---	---	---	1.4	0.2	**0.8**

APPENDIX C – Map of sampling locations



Location of sampling sites, Lake Pat Cleburne, Texas, 2023-2024. Electrofishing, trap netting and gill netting stations are indicated by E, T and G respectively. Water level was 6.1' below conservation pool during the electrofishing survey and 0.5' above conservation pool during the trap netting and gill netting surveys.

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