

Sam Rayburn Reservoir

2022 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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Survey and Management Summary

Fish populations in Sam Rayburn Reservoir were surveyed in 2020 and 2022 using electrofishing and in 2021 and 2023 using gill netting. Anglers were surveyed from June 2022 through May 2023 with a creel survey. Historical data are presented with the 2019-2023 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir.

Reservoir Description: Sam Rayburn Reservoir is a 114,500-acre impoundment of the Angelina River in Angelina, Jasper, Nacogdoches, Sabine, San Augustine, and Tyler counties in southeast Texas. Water level fluctuations average 6 to 7 feet annually. Aquatic habitat consists of aquatic vegetation (primarily hydrilla and American lotus) and standing timber.

Management History: The black bass fishery is the most popular at Sam Rayburn Reservoir (75 to 80% of annual angling effort, which includes over 400 bass tournaments per year). Approximately 10 to 15% of anglers target crappie and < 10% target catfish. Angler interest in more restrictive length limits for Largemouth Bass and potential biological and economic impacts of bass tournaments prompted research from 2004 to 2009. Results indicated that the proportion of the Largemouth Bass population harvested was relatively low (9%) and more restrictive length limits would provide little benefit. In addition, impacts of tournaments on the Largemouth Bass population were low (only 5% of population retained by tournament anglers) but tournament expenditures were high (66% of total). To increase abundance of large Largemouth Bass (≥ 8 pounds), fingerlings have been annually stocked since 1994 (Florida Largemouth Bass from 1994 to 2021 and Lone Star Bass from 2022 to 2023). Giant salvinia was found in the reservoir in 2008 and is now present in a majority of creeks and embayments. Coverage exceeded 4,000 acres in 2014, but aggressive herbicide treatments along with high inflows and flushing have reduced abundance to < 1,500 acres during most years.

Fish Community

- **Prey species:** Gizzard Shad, Threadfin Shad, and Bluegill were the most abundant prey species and provided ample forage for sport fish.
- **Catfishes:** Over the last three survey years, Blue Catfish were moderately abundant with variable catch rates, and Channel Catfish numbers steadily increased. Angler catch rates averaged 3.2 fish/hour. Blue and Flathead Catfish provided trophy opportunities for anglers.
- **Temperate basses:** Historically, White Bass abundance has been low. Gill net catch rates ranged from 0.5 to 2.7 fish/nn over the last three sample years. Yellow Bass were present in moderate numbers. Few anglers target temperate bass.
- **Black basses:** Few Spotted Bass were sampled with electrofishing. Largemouth Bass abundance was relatively high. Electrofishing catch rates were consistent, ranging from 152.3 to 174.0 fish/hour over the last three sampling years. Size structure and fish condition were favorable and stable. The black bass fishery was most popular (78.4% of anglers targeted bass), and angler catch rate was high (1.4 fish/hour).
- **Crappie:** White and Black Crappie were present in the reservoir. Angler catch (3.1/hour) and total annual harvest (155,554 fish) increased and reflected an abundant crappie population.

Management Strategies: Continue to manage Largemouth Bass harvest with a 14-inch minimum length limit. Collect angler catch of trophy Largemouth Bass via the tournament-monitoring program, ShareLunker Program, and creel surveys to justify Lone Star Bass stockings. Request annual stockings of Lone Star Bass to maximize trophy fish abundance. Maintain information signs, conduct annual aerial vegetation surveys, and apply herbicides when appropriate to minimize impacts of giant salvinia. Continue to promote fish handling procedures that minimize tournament-related mortality to reduce impacts on the Largemouth Bass population and conflicts with non-tournament anglers. Consult with the U.S. Army Corps of Engineers regarding potential to expand parking lots and install courtesy docks at popular access points, and to construct additional fishing piers.

Introduction

This document is a summary of fisheries data collected from Sam Rayburn Reservoir from 2019-2023. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2019-2023 data for comparison.

Reservoir Description

Sam Rayburn Reservoir is an impoundment of the Angelina River in Angelina, Jasper, Nacogdoches, Sabine, San Augustine, and Tyler counties in southeast Texas. The U.S. Army Corps of Engineers (USACE) constructed the reservoir in 1966 for flood control, generation of hydroelectric power, and for municipal, industrial, agricultural, and recreational uses. At conservation pool, Sam Rayburn Reservoir is 114,500 surface acres, has a shoreline length of 750 miles, and a mean depth of 20 feet. Water level fluctuations average 6 to 7 feet annually but can exceed 10 feet during years of heavy rainfall or drought (Figure 1). During June 2021, the water level reached an historic high of 175.2 feet above mean sea level (MSL). The reservoir was mesotrophic with a mean Trophic State Index chl-a of 48.1 (Texas Commission of Environmental Quality 2022). Habitat at time of sampling consisted of aquatic vegetation (primarily hydrilla) and standing timber. Most of the land around the reservoir is used for timber production and agriculture. Other descriptive characteristics for Sam Rayburn Reservoir are in Table 1. The Texas Department of State Health Services (TDSHS) has a fish consumption advisory in effect due to dioxins and mercury. Species affected include Smallmouth Buffalo, gar, Blue and Flathead Catfish, and Spotted and Largemouth Bass (TDSHS 2013).

Angler Access

Sam Rayburn Reservoir has 21 public boat ramps. Additional boat ramp characteristics are in Table 2. Shoreline access is limited to public boat ramp areas.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Driscoll and Ashe 2019) included:

1. Stock Florida Largemouth Bass (FLMB) annually ($\geq 500,000$ fingerlings) to maintain and improve the trophy Largemouth Bass population.
Action: FLMB were stocked from 2019 to 2021, and Lone Star Bass (LSB) were stocked in 2022 and 2023. LSB are 2nd generation offspring of pure Florida-strain ShareLunker Largemouth Bass (≥ 13 pounds).
2. Conduct biennial electrofishing and creel surveys to monitor status of Largemouth Bass population and examine growth every four years.
Action: Electrofishing surveys were conducted in 2020 and 2022, and a creel survey was conducted in 2022/2023. Growth was examined in 2022.
3. Continue black bass tournament-monitoring program to increase information on relative abundance of large fish (> 20 inches).
Action: Since 2019, data from 100 tournaments were entered and are summarized in Appendix D.
4. Conduct annual vegetation surveys to monitor hydrilla abundance and locate giant salvinia coverage suitable for herbicide treatments.
Action: Annual surveys were conducted from 2019 to 2022.
5. Conduct gill netting surveys every two years to monitor the status of catfish populations.
Action: Surveys were conducted in 2021 and 2023.
6. Publish research manuscript exploring effects of plastic fish attractor shape and material type on effectiveness.

Action: Research was published in the Journal of the Southeastern Association of Fish and Wildlife Agencies (Driscoll et al. 2020).

7. Promote fish handling procedures that minimize tournament-related mortality, impacts on Largemouth Bass population, and conflicts with non-tournament anglers.

Action: Discussions with numerous tournament organizers and presentations for several bass clubs promoted optimum fish care in livewells and at weigh-ins.

8. Minimize giant salvinia introductions and overall coverage.

Action: The USACE and Aquatic Habitat Enhancement (AHE) office have led giant salvinia monitoring and control efforts. Educational signs at access sites were maintained. Plant control methods included herbicide treatments (contract applicators funded by the USACE, Texas Parks and Wildlife Department [TPWD], and Lower Neches Valley Authority [LNVA]) and salvinia weevil releases.

Harvest regulation history: Historically, all sport fishes in Sam Rayburn Reservoir were managed with statewide regulations. In 2021, harvest regulations for Channel and Blue Catfish were changed to a no minimum length limit, 50-fish daily bag limit (no more than five fish \geq 30 inches may be retained) (Table 3).

Stocking history: FLMB were stocked annually from 1994 to 2021 (Table 4). LSB were stocked in 2022 and 2023. From 1991 to 2000, Palmetto Bass were stocked annually but were discontinued due to low directed angler effort and harvest. The complete stocking history is in Table 4.

Vegetation/habitat management history: Historically, aquatic vegetation coverage at Sam Rayburn Reservoir (primarily hydrilla) has approached 20,000 surface acres and included over 25 plant species. Although hydrilla is an exotic invasive species and is listed on the TPWD list of prohibitive plants, hydrilla coverage has provided beneficial aquatic habitat at Sam Rayburn Reservoir and has never been problematic or created access problems. Herbicide treatments targeting hydrilla have been rare and have only included swimming areas in USACE parks. Annual hydrilla coverages have varied considerably and are primarily affected by water level fluctuations (i.e., water levels $>$ 168 feet MSL result in significant plant mortality). Nuisance exotic species include common salvinia, giant salvinia, and water hyacinth. Common salvinia and water hyacinth have persisted in shallow backwaters of creeks and embayments and caused few problems. Giant salvinia was first documented in 2008, persists in a majority of the embayments and creeks, and reached a historic high coverage of 4,308 surface acres in 2014. The USACE, TPWD, and LNVA fund herbicide treatments via private applicators. Since 2013, annual herbicide treatments of giant salvinia have ranged from 1,449 to 2,463 surface acres.

Water transfer: The State of Texas has issued water rights in Sam Rayburn Reservoir totaling 820,000 acre-feet per year. The LNVA oversees the use of the entire firm yield. As the non-federal sponsor of the reservoir, LNVA paid its share of the first cost of construction, and its water rights are for downstream use (municipal, industrial and irrigation purposes). This implies that whether releases are made for flood control or hydroelectric power generation, LNVA is putting that water to beneficial use in the lower basin. The LNVA operates an extensive canal system across Jefferson, Chambers, and Liberty counties that is used to deliver water lifted out of the river to the majority of its customers. Additionally, LNVA contracts for direct diversion off the river with the TPWD East Texas State Fish Hatchery, the WestRock paper mill in Jasper County, and the City of Beaumont. The City of Lufkin has contracted with the USACE for 28,000 acre-feet of firm yield from the pool of Sam Rayburn Reservoir for future municipal and industrial use. However, LNVA has agreed to market the Lufkin water rights for short-term industrial use in oil fields of the counties surrounding the reservoir. While the USACE is the operator of the reservoir, Southwest Power Administration, the marketing arm of the hydroelectric power generation, contracted with Sam Rayburn Dam Electric Cooperative for the purchase of all the hydropower and energy generated, independent of water rights.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Sam Rayburn Reservoir (Driscoll and Ashe 2019). 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).

Electrofishing – Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1.3 hours at 16, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. Ages for Largemouth Bass were determined using otoliths from 14 randomly selected fish (range 13.0 to 14.9 inches).

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

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

Creel survey – A roving creel survey (36 days; 9 days per quarter) was conducted from June 2022 through May 2023. 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). Total angler catch of Largemouth Bass \geq 4, 7, and 10 pounds was also estimated. Anglers were asked if released fish were within weight categories. Harvested fish lengths were converted to weights for classification (19 inches = 4 pounds; 23 inches = 7 pounds; 25 inches = 10 pounds). Harvested and released fish were combined to represent total catch for weight categories.

Habitat –Vegetation surveys via airplane were conducted annually from 2019 to 2022 to monitor hydrilla, water hyacinth, and giant salvinia coverages. Coverages were calculated using the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2022).

Water level – Source for water level data was the USACE website (USACE 2023).

Results and Discussion

Habitat: A structural habitat survey conducted in 2002 indicated the littoral zone included primarily natural bank and standing timber (Driscoll and Parks 2003). Approximately 24,000 acres of standing timber were present. Since 2002, structural habitat has changed little, as the USACE controls a wide flood easement throughout nearly all of the reservoir, resulting in no shoreline development. Abundant areas of torpedograss, buttonbush, willow, and cypress are inundated when water level is > 164 feet MSL. Prevalent aquatic vegetation providing beneficial fish habitat includes hydrilla, American lotus, and torpedograss (Table 6). Since 2018, hydrilla and American lotus coverages have varied due to water levels. Extremely high water levels during the spring of 2019 and 2021 reduced coverage of both plants. Since 2022, lower water levels have resulted in an increase in hydrilla coverage (4,730 surface acres). Torpedograss tolerates water level fluctuations and is very stable from year to year, but the actual amount of aquatic coverage varies due to water levels during the September surveys. During most years, overall habitat conditions are excellent relative to effects on centrarchid recruitment and year class strength, resulting in relatively stable and high abundances of adult black basses and crappies. Giant salvinia was first documented in 2008 and is present in the majority of embayments and creeks due to frequent introductions via boat trailers, plant growth, and wind dispersal. Since 2010, plant coverage has varied seasonally due to water level fluctuations, with maximum coverage during April/May and trace amounts during fall and winter. In 2014, relatively high water levels throughout the growing season resulted in a historic high amount of giant salvinia (4,308 surface acres). Aggressive herbicide treatments directed by

the USACE and several recent periods of prolonged, freezing air temperatures have reduced coverage considerably. Since 2018, coverage has ranged from 382 to 1,467 surface acres.

Creel: Similar to previous survey years, fishing effort at Sam Rayburn Reservoir was primarily directed at black basses (78.4%) (Table 7). Over the last three survey periods, directed effort for crappies increased from 10.6 to 16.1% while effort for catfishes declined from 9.6 to 3.1%. Total fishing effort for all species steadily increased and was 625,965 hours in 2022/2023 (direct expenditures were \$10,139,096) (Table 8). However, expenditures estimated from creel surveys from the last three survey years were much lower than total annual expenditures derived from economic research in 2008 (\$32,259,314) (Driscoll and Myers 2014).

Prey species: Primary prey species included Gizzard Shad, Threadfin Shad, and Bluegill. Since 2018, Gizzard Shad catch rates have decreased and IOV has ranged from 62 to 76 (Figure 2). Historically, Threadfin Shad have been extremely abundant, but electrofishing catch rates were highly variable. The catch rate in 2022 was 4,050.8/h (Appendix A). Bluegill catch rate was 290.3/h in 2018 and declined to 103.5/h and 101.3/h in 2020 and 2022, respectively (Figure 3). Few anglers targeted sunfish during the last three annual creel surveys (Tables 7 and 9). Overall, prey species abundance was adequate, as reflected by electrofishing catch rates and desirable relative weights of sport fish.

Catfish: Historically, Blue Catfish recruitment and abundance was relatively stable, with gill net catch rates typically ranging from 3.0 to 6.0/nn. In 2021, catch rates increased to 12.9/nn and reflected higher abundance of 11- to 20-inch fish (Figure 4). However, catch rates declined within the historical range in 2023 (3.9/nn). Although few Blue Catfish > 25 inches were collected, anecdotal information indicates passive gear anglers frequently catch fish > 30 pounds. Over the last three survey years, Channel Catfish catch rates have steadily increased from 3.0/nn (2019) to 9.7/nn (2023). In 2023, catch rates of stock-sized fish were high (8.1/nn) and included an increase of 14- to 17-inch fish.

Directed rod and reel angler effort towards catfishes decreased in 2022/2023 (19,206 hours) (Table 10). Angler catch rates were high (3.2 fish/h) and increased over the last three survey years. Total estimated harvest ranged from 25,124 to 44,071 fish; 89% of harvested fish were Channel Catfish (Figure 6). The proportion of legal-sized fish released increased considerably in 2022/2023 (43%), but this was due to the removal of the 12-inch minimum length limit in 2021.

White Bass and Yellow Bass: During most sampling years, White Bass catch rates from gill nets indicate a low population density in the reservoir. Since 2004, catch rates have been < 3.0/nn, with the exception of 2011 (6.3/nn). Catch rates from the last three surveys were \leq 2.7/nn (Figure 7). Yellow Bass gill net catch was not recorded, but an abundant population was present with high numbers of fish > 8 inches. Few anglers target temperate bass in the reservoir (Table 11), but a seasonal fishery exists in the Angelina River above the reservoir during the spring spawning run.

Black bass: Historically, electrofishing catch rates of Spotted Bass have been low. Catch rates were \leq 5.3/h from 2018 to 2022 (Figure 8) and few fish >10 inches were collected. Estimated angler harvest was 2,651 fish in 2022/2023.

Fall electrofishing catch rates of Largemouth Bass from 2018 to 2022 reflected relatively high and stable recruitment rates and population abundance (range = 152.3 to 174.0/h; Figure 9). Population size structure was similar and desirable across years (PSD range = 60 to 69; PSD-14 range = 27 to 38). Nearly all relative weights were > 85, indicating Largemouth Bass were in adequate condition. Growth rate was also adequate, as average age at 14 inches was 3.0 years (N = 14; range = 2 to 4 years).

The black bass fishery accounted for the majority of annual fishing effort (78.4%; Table 7). Total angler directed effort (329,368 to 490,837 h) and tournament effort (136,741 to 310,733 h) increased considerably over the last three survey years (Table 12). The proportion of black bass effort attributed to tournaments also increased from 42 to 63%. Non-tournament angler effort was relatively stable. Despite the increase in angling effort, catch rates remained high (1.4 fish/h). Concomitant with the increase in tournament-related effort, fish retained for tournament weigh-ins also increased from 37,837 to 99,896 fish. In 2022/2023, non-tournament harvest declined to 20,119 fish and voluntary release rates of legal-

sized fish increased to 74%. The majority of harvested and tournament-retained Largemouth Bass were 14 to 16 inches in length (Figure 10). The proportion of total catch for all four weight categories was similar during the last three survey years. Fish from 4 to 6.9 pounds comprised 2.0 to 2.5% of catch, and 7 to 9.9-pound fish comprised 0.1 to 0.4%.

A tournament-monitoring program was implemented in June 2003 to increase information on fish ≥ 14 inches and provide greater insight regarding large (> 20 inches) fish abundance (Appendix D). Overall, most tournament variables were favorable and similar during 2019 to 2022. The percent of anglers catching 5-fish limits was $> 40\%$ for all years and as high as 71%, indicating high and stable numbers of fish ≥ 14 inches. Average big bass weight for both individual and team tournaments was > 9 pounds for all years but one, and average weight to win events ranged from 24.1 to 27.9 pounds, reflecting relatively high and stable numbers of large fish. Similarly, results of the 3-day Sealy Outdoors Big Bass Splash tournaments also suggested high and stable numbers of large bass. Over the past four events, average weights ranged from 6.0 to 6.8 pounds for the top 10 fish/h, 8.1 to 8.6 pounds for the top 10 fish/day, 8.9 to 9.6 pounds for the overall top 10, and 9.7 to 11.3 for the overall big bass.

Crappie: Historically, Sam Rayburn Reservoir has supported one of the most productive and popular crappie fisheries throughout Texas. Since 2014, creel data has reflected an abundant and increasing crappie population. In 2022/2023, total angling effort (100,514 h) and total harvest (155,554 fish) more than doubled when compared to 2014/2015 and angler catch rates remained high (3.1 fish/h) (Table 13). A majority of harvested fish were 10 to 12 inches in length (Figure 11).

Fisheries Management Plan for Sam Rayburn Reservoir, Texas

Prepared – July 2023

ISSUE 1: Sam Rayburn Reservoir supports a high-use, nationally recognized Largemouth Bass fishery. The Bassmaster organization has ranked the fishery within the Top 10 in the U.S. during 7 out of the last 10 years, including a #1 ranking in 2018. The economic contribution of the Largemouth Bass fishery to the local area is high, as the total economic value of the recreational fishery was estimated at \$46.7 million (Driscoll and Myers 2014). The reservoir hosts over 400 bass tournaments per year with an economic value of \$31.1 million (Driscoll and Myers 2014) and tournament-related effort has increased considerably since 2014. The reservoir also has demonstrated a high potential for producing trophy fish.

MANAGEMENT STRATEGIES

1. Continue to manage the Largemouth Bass population with the statewide 14-inch minimum length limit.
2. Continue annual stocking of LSB ($\geq 500,000$ fingerlings/year) to maintain and improve the trophy Largemouth Bass population.
3. Continue the tournament monitoring program and promote angler participation in the ShareLunker Program to increase data on fish ≥ 8 pounds and justify LSB stockings.
4. Continue to promote fish handling procedures that minimize tournament-related mortality to reduce impacts on Largemouth Bass population and conflicts with non-tournament anglers.

ISSUE 2: In 2008, giant salvinia was documented in Sam Rayburn Reservoir. The plant is now present in a majority of embayments and creeks due to frequent introductions via boat trailers, plant growth, and wind dispersion. Relatively high water levels in 2014 resulted in a historic high of 4,308 surface acres. Since then, aggressive herbicide treatments overseen by the USACE, and several extended periods of freezing air temperatures have reduced coverage to $< 1,500$ surface acres during most years.

MANAGEMENT STRATEGIES

1. Support USACE efforts relative to herbicide treatments via private applicators to control plant coverage.
2. Maintain the seven areas established in 2021 in which no private applicator treatments are allowed. These areas have abundant emergent vegetation (i.e., high potential for collateral mortality of these beneficial plants). Any necessary salvinia treatments will be conducted by AHE.
3. Support AHE efforts with salvinia weevil research.
4. Maintain all educational signs at access points to minimize potential transport to other waters.
5. Conduct an annual reservoir-wide aerial survey and post-treatment surveys, when applicable, to monitor trends in giant salvinia coverage.

ISSUE 3: The crappie fishery at Sam Rayburn Reservoir has been productive and popular. Historically, annual directed effort and harvest have exceeded 3.0 h/acre and 400,000 fish. Over the last three creel survey years, effort and harvest have increased and were 0.9h/acre and 155,554 fish in 2022/2023.

MANAGEMENT STRATEGIES

1. Conduct creel surveys every four years to monitor the crappie fishery, as trap netting at Sam Rayburn Reservoir is not effective.
2. Monitor condition of 15 plastic fish attractor reefs via sonar and scuba. Refurbish with additional attractors as necessary to increase fishing success.

ISSUE 4: Few angler access areas have been enhanced since impoundment of the reservoir. Usage at popular boat ramps during peak times exceeds available parking spaces, and courtesy docks are absent at most access areas. Only one fishing pier is present on the entire reservoir.

MANAGEMENT STRATEGY

1. Consult with the USACE regarding potential state and federal funding opportunities to expand parking lots and install courtesy docks at popular access points, and to construct additional fishing piers.

ISSUE 5: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant salvinia and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species and provide them with posters and literature so they can educate their customers.
3. Educate the public about invasive species using media and the internet.
4. Discuss invasive species when presenting to constituent and user groups.
5. Document existing and future inter-basin water transfers to facilitate potential invasive species responses.

Objective-Based Sampling Plan and Schedule (2023–2027)

Sport fish, forage fish, and other important fishes

Sport fishes in Sam Rayburn Reservoir include Largemouth Bass, Spotted Bass, crappies, Channel Catfish, Blue Catfish, Flathead Catfish, and White Bass. Important forage species include Bluegill, Gizzard Shad, and Threadfin Shad.

Low-density or underutilized fisheries

Historically, White Bass catch rates from gill net surveys were $\leq 2.5/n$, indicating a low population density in the reservoir. Since 2008, creel surveys have documented low directed effort towards temperate basses. Although no future directed sampling is planned, White Bass catch will be recorded from gill net surveys directed at catfishes (see below).

Currently, little is known about the Flathead Catfish population at Sam Rayburn Reservoir. During the summer of 2014, a low-frequency electrofishing survey was conducted to establish a baseline relative abundance estimate for trend comparisons over time. However, no Flathead Catfish were collected from 10 random electrofishing stations and no additional surveys are planned.

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Largemouth Bass are the most popular sport fish in Sam Rayburn Reservoir, accounting for approximately 75 to 80% of the annual angling effort. The reservoir supports a high-quality, nationally recognized fishery with substantial economic contributions. The annual economic value of the recreational fishery was estimated at \$46.7 million. The reservoir also hosts over 400 bass tournaments per year with an economic value of \$31.1 million. Largemouth Bass have been managed with the statewide 14-inch MLL regulation since 1986. For nearly 20 years, trend data on CPUE, size structure, and body condition were collected annually with fall electrofishing. Since 2013, fall electrofishing has been conducted biennially. The population is abundant, recruitment rates have been high and steady, and size structure has been desirable and stable. Continuation of biennial trend data with night electrofishing in the fall of 2024 and 2026 will allow for determination of any large-scale changes in the Largemouth Bass population that may spur further investigation. A minimum of 16 randomly selected 5-min electrofishing sites will be sampled, but sampling will continue at random sites until 50 stock-size fish are collected and the RSE of CPUE-S is ≤ 25 (the anticipated effort to meet both sampling objectives is 12-20 stations with 80% confidence). If failure to achieve either objective has occurred after one night of sampling and objectives can be attained with 6-12 additional random stations, another night of effort will be expended.

In addition, average age of Largemouth Bass between 13.0 and 14.9 inches (Category 2; N = 13) will be estimated in 2026, and every four years thereafter.

Crappies: The crappie fishery is the second most popular at Sam Rayburn Reservoir, accounting for 10 – 15% of the annual angling effort. Historically, standard, tandem, and offshore trap netting has resulted in low and variable catch rates. For approximately 15 years, creel surveys have been used to monitor the crappie fishery and make inferences about the population. Although directed effort and harvest have varied over the years, angler catch rates have remained relatively high since 2004 (range = 1.5 – 3.7 fish/h), reflecting an abundant crappie population. A creel survey will be conducted in 2026/2027 (4

quarters, 5 weekend and 4 weekdays/quarter) to detect any large-scale changes in the crappie population that may warrant additional sampling.

Catfishes: The rod and reel catfish fishery accounts for < 10% of the annual angling effort. Anecdotal information indicates that the passive gear fishery is more popular and accounts for frequent catches of Blue and Flathead Catfish > 30 pounds. Catfish populations were historically managed with statewide regulations. In 2021, harvest regulations for Channel and Blue Catfish were changed to a no minimum length limit, 50-fish daily bag limit (no more than five fish \geq 30 inches may be retained).

Biennial gill netting data has indicated relatively stable Channel and Blue Catfish recruitment and abundance and should provide adequate population-level insight relative to large-scale changes that would dictate further investigation. A minimum of 15 randomly selected gill netting sites will be sampled in 2025 and 2027, but sampling will continue at random sites until 50 stock-size Channel and Blue Catfish are collected and the RSEs of CPUE-S are \leq 25 (the anticipated effort to meet both sampling objectives is 12-18 stations with 80% confidence). Additional sampling will occur (5-10 gill netting sites) if objectives are not attained.

Prey species: Bluegill, Gizzard Shad, and Threadfin Shad are the primary forage at Sam Rayburn Reservoir. Like Largemouth Bass, trend data on CPUE and size structure were collected annually for 20 years with fall electrofishing. Since 2013, fall electrofishing has been conducted biennially. Continuation of biennial sampling, as per Largemouth Bass above, will allow for monitoring of large-scale changes in Bluegill and Gizzard Shad relative abundance and size structure. Effort based on achieving sampling objectives for Largemouth Bass will result in enough Bluegill for size structure (PSD; 50 fish minimum) and relative abundance (RSE \leq 25 of CPUE-Total) and Gizzard Shad size structure (IOV; 50 fish minimum). At the effort needed to achieve sampling objectives for Largemouth Bass, the expected RSE for total CPUE is 33 for Gizzard Shad and 60 for Threadfin Shad. No additional effort will be expended to achieve an RSE \leq 25 for Bluegill, Gizzard Shad, or Threadfin Shad, but Largemouth Bass body condition (fish \geq 8 inches) will be used to provide additional information on forage abundance and vulnerability.

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Tables and Figures

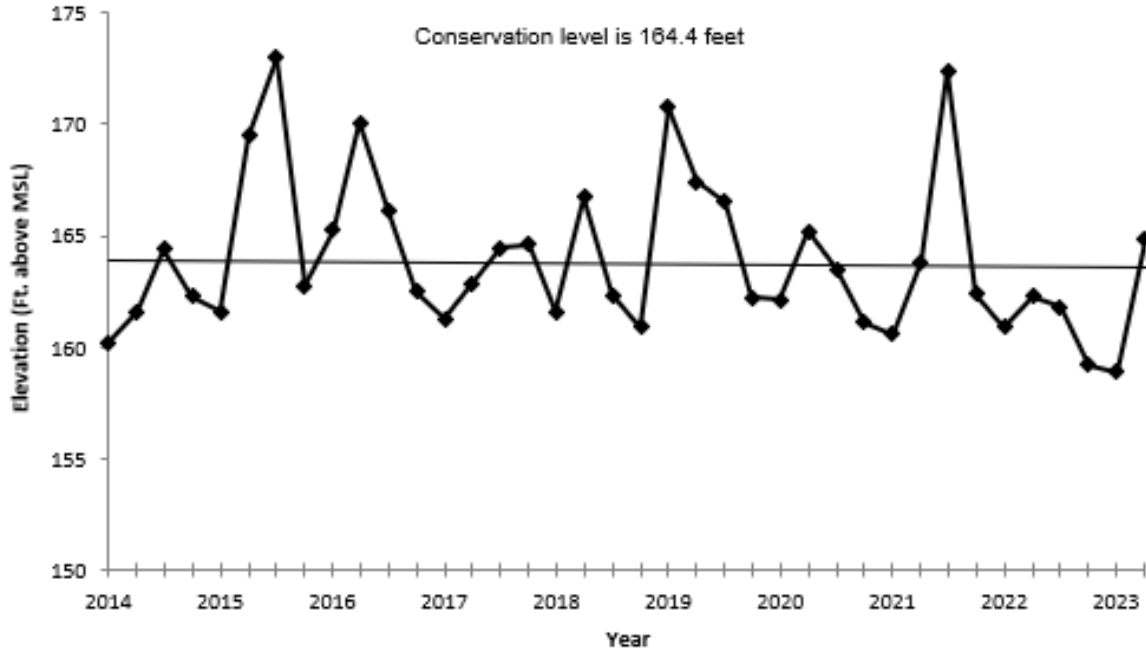


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Sam Rayburn Reservoir, Texas.

Table 1. Characteristics of Sam Rayburn Reservoir, Texas.

Characteristic	Description
Year constructed	1966
Controlling authority	U.S. Army Corps of Engineers
Counties	Angelina, Jasper, Nacogdoches, Sabine, San Augustine, and Tyler
Reservoir type	Mainstem
Shoreline Development Index	16.25
Conductivity	120 $\mu\text{S}/\text{cm}$

Table 2. Boat ramp characteristics for Sam Rayburn Reservoir, Texas, April 2023. Reservoir elevation at time of survey was 164 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of ramp (ft)	Condition
South Public	31.06760 94.06395	Y	90	154	Excellent
Twin Dikes	31.07524 94.06818	Y	220	154	Excellent
Sandy Creek	31.09588 94.20363	Y	25	155	Adequate
Caney Creek	31.13540 94.25561	Y	72	155	Excellent
Cassels-Boykin	31.21247 94.35019	Y	144	153	Excellent
Monterey Park	31.21262 94.31095	Y	50	154	Excellent
Hanks Creek	31.26812 94.39908	Y	60	152	Excellent
Ewing Park	31.37201 94.48117	Y	20	159	Adequate
Marion's Ferry	31.39718 94.52679	Y	20	154	Excellent
Kingtown	31.40910 94.51677	Y	15	154	Adequate
Etoile	31.37700 94.46490	Y	45	158	Adequate
Shirley Creek	31.30942 94.37302	Y	30	153	Adequate
Ralph McAllister	31.37532 94.33169	Y	24	161	Excellent
Townsend	31.34788 94.31304	Y	20	157	Excellent
Jackson Hill	31.27023 94.32260	Y	40	154	Excellent
Five Fingers	31.12935 94.11796	Y	20	150	Adequate
Rayburn Park	31.10501 94.11017	Y	75	152	Excellent

Powell Park	31.13034 94.08379	Y	36	151	Excellent
Highway 83	31.26591 94.11160	Y	15	161	Adequate
San Augustine Park	31.20293 94.08047	Y	30	152	Excellent
Mill Creek	31.14974 94.00761	Y	45	156	Excellent

Table 3. Harvest regulations for Sam Rayburn Reservoir, Texas.

Species	Bag limit	Length limit
Gar, Alligator	1 ^a	None
Catfish: Channel and Blue Catfish, their hybrids and subspecies	50 (only 5 \geq 30 inches)	None
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Largemouth	5 ^b	14-inch minimum
Bass, Spotted	5 ^b	None
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

^a Mandatory harvest reporting required for all harvested Alligator Gar (reporting available through the My Texas Hunt Harvest app or at <https://apps.tpwd.state.tx.us/huntharvest/home.faces>).

^b Daily bag for Largemouth Bass and Spotted Bass = 5 fish in any combination.

Table 4. Stocking history of Sam Rayburn Reservoir, Texas. FGL = fingerling; AFGL = advanced fingerling; ADL = adults; UNK = unknown.

Species	Year	Number	Size
Blue Catfish	1966	105,100	UNK
	1987	199,870	FGL
	2019	4	ADL
	Total	304,974	
Channel Catfish	1966	74,600	AFGL
	1966	6,100	FGL
	1973	110,000	AFGL
	Total	190,700	
Florida Largemouth Bass	1975	25,000	FRY
	1976	60,000	FRY
	1977	60,000	FRY
	1978	165,000	FGL
	1978	47,000	FRY
	1980	361,840	FGL
	1983	1,200	AFGL
	1983	37,700	FGL
	1987	249,660	FRY
	1990	1,000	AFGL
	1994	159,360	FGL
	1994	782,966	FRY
	1995	232,392	FGL
	1996	948,017	FGL
	1996	276,051	FRY
	1997	317,729	FRY
	1998	229,200	FGL
	1999	1,329,160	FGL
	2000	510,735	FGL
	2001	500,783	FGL
	2001	273,407	FRY
	2002	42	ADL
	2002	1,066,781	FGL
	2003	1,033,318	FGL
	2003	291,008	FRY
	2004	523,648	FGL
	2005	1,026,943	FGL
2006	499,858	FGL	
2007	500,033	FGL	
2008	501,382	FGL	
2009	1,284,341	FGL	
2009	377,936	FRY	
2010	500,100	FGL	
2011	952,285	FGL	

Species	Year	Number	Size
	2012	1,466,043	FGL
	2013	522,120	FGL
	2014	500,331	FGL
	2014	96,250	FRY
	2015	501,113	FGL
	2016	502,125	FGL
	2017	585,163	FGL
	2018	760,099	FGL
	2018	7,920	FRY
	2019	865,278	FGL
	2020	519,615	FGL
	2021	308,330	FGL
	Total	21,760,262	
Largemouth Bass	1965	364,000	FGL
	1966	97,000	FGL
	1988	21	ADL
	Total	461,021	
Lone Star Bass ^a	2022	532,946	FGL
	2023	531,033	FGL
	2023	57,160	FRY
	Total	1,121,139	
Longear Sunfish	1965	40,000	FGL
Paddlefish	1990	3,581	FRY
	1991	16,741	FRY
	1992	43,584	FRY
	1995	46,529	FRY
	Total	110,435	
Palmetto Bass	1979	571,400	FRY
	1981	447,528	FRY
	1982	1,000,000	FRY
	1985	1,000,000	FRY
	1987	1,500,000	FRY
	1988	1,100,000	FRY
	1989	279,748	FGL
	1989	1,130,036	FRY
	1991	1,111,683	FRY
	1992	1,347,961	FRY
	1993	1,140,000	FRY
	1994	1,175,000	FRY
	1995	943,903	FGL
	1995	1,469,882	FRY
	1996	116,000	FGL

Species	Year	Number	Size
	1997	186,577	FGL
	1998	406,229	FGL
	1998	168,428	FRY
	1999	289,974	FGL
	2000	290,990	FGL
	Total	15,675,339	
Redear Sunfish	1966	1,400	FGL
	1967	530,000	FGL
	Total	531,400	
ShareLunker Largemouth Bass ^b	2008	2,604	FGL
	2018	7,843	FGL
	2021	21,030	FGL
	2022	17,971	FGL
	Total	49,448	
Striped Bass	1976	115,108	UNK
	1977	843,161	UNK
	1978	182,800	UNK
	1979	215,490	UNK
	1983	1,000,000	UNK
	Total	2,356,559	
Walleye	1973	426,000	FRY
	1974	349,400	FRY
	1975	378,376	FRY
	1976	220,000	FRY
	Total	1,373,776	
Warmouth	1965	80,000	UNK
	1966	800	UNK
	Total	80,800	
White crappie	1965	7,000	FGL

^a Lone Star Bass are 2nd generation offspring of pure Florida-strain ShareLunker Largemouth Bass (fish \geq 13 pounds).

^b ShareLunker Largemouth Bass are 1st generation offspring from angler-donated Largemouth Bass \geq 13 pounds from the Toyota ShareLunker Program.

Table 5. Objective-based sampling plan components for Sam Rayburn Reservoir, Texas 2022–2023.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Abundance	CPUE – stock	RSE-stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Age-and-growth	Age at 14 inches	$N = 13$, 13.0 – 14.9 inches
	Condition	W_r	10 fish/inch group (max)
Bluegill ^a	Abundance	CPUE – total	
	Size structure	PSD, length frequency	$N \geq 50$
Gizzard Shad ^a	Abundance	CPUE – total	
	Size structure	PSD, length frequency	$N \geq 50$
	Prey availability	IOV	$N \geq 50$
Threadfin Shad ^a	Abundance	CPUE – total	
<i>Gill netting</i>			
Blue Catfish	Abundance	CPUE– stock	RSE-stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Condition	W_r	10 fish/inch group (max)
Channel Catfish ^a	Abundance	CPUE– stock	
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Condition	W_r	10 fish/inch group (max)
<i>Creel survey^b</i>			
Black basses	Trend information on angler utilization	Angler effort, CPUE, total harvest and size composition	
Crappies	Trend information on angler utilization	Angler effort, CPUE, total harvest and size composition	
Catfishes	Trend information on angler utilization	Angler effort, CPUE, total harvest and size composition	

^a No additional effort will be expended to achieve an RSE ≤ 25 for CPUE of Bluegill, Gizzard Shad, Threadfin Shad, or Channel Catfish, if not reached from designated Largemouth Bass or Blue Catfish sampling effort.

^b Angler utilization data and associated statistics will be calculated for all sport fish.

Table 6. Aerial survey of prevalent aquatic vegetation, Sam Rayburn Reservoir, Texas, September 2018–2022. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2018	2019	2020	2021	2022
American lotus	994 (1)	1,042 (1)	2,102 (2)	0	36 (<1)
Giant salvinia	1,467 (1)	897 (1)	1,445 (1)	847 (1)	382 (<1)
Hydrilla	8,453 (8)	588 (1)	4,093 (4)	470 (<1)	4,730 (4)
Torpedograss	252 (<1)	1,318 (1)	1,125 (1)	651 (1)	7 (<1)

Table 7. Percent directed angler effort by species for Sam Rayburn Reservoir, Texas, 2014–2023. Survey periods were from 1 June through 31 May.

Species	2014/2015	2018/2019	2022/2023
Catfishes	9.6	6.5	3.1
Sunfishes	0.2	0.1	0.0
Black basses	74.7	80.8	78.4
Temperate basses	1.0	0.1	<0.1
Crappies	10.6	11.8	16.1
Anything	3.9	0.7	2.4

Table 8. Total fishing effort (h) for all species and total directed expenditures at Sam Rayburn Reservoir, Texas, 2014-2023. Survey periods were from 1 June through 31 May. Relative standard error is in parentheses.

Creel statistic	2014/2015	2018/2019	2022/2023
Total fishing effort	441,709 (18)	514,624 (18)	625,965 (16)
Total directed expenditures	\$4,670,828 (29)	\$7,436,724 (24)	\$10,139,096 (23)

Gizzard Shad

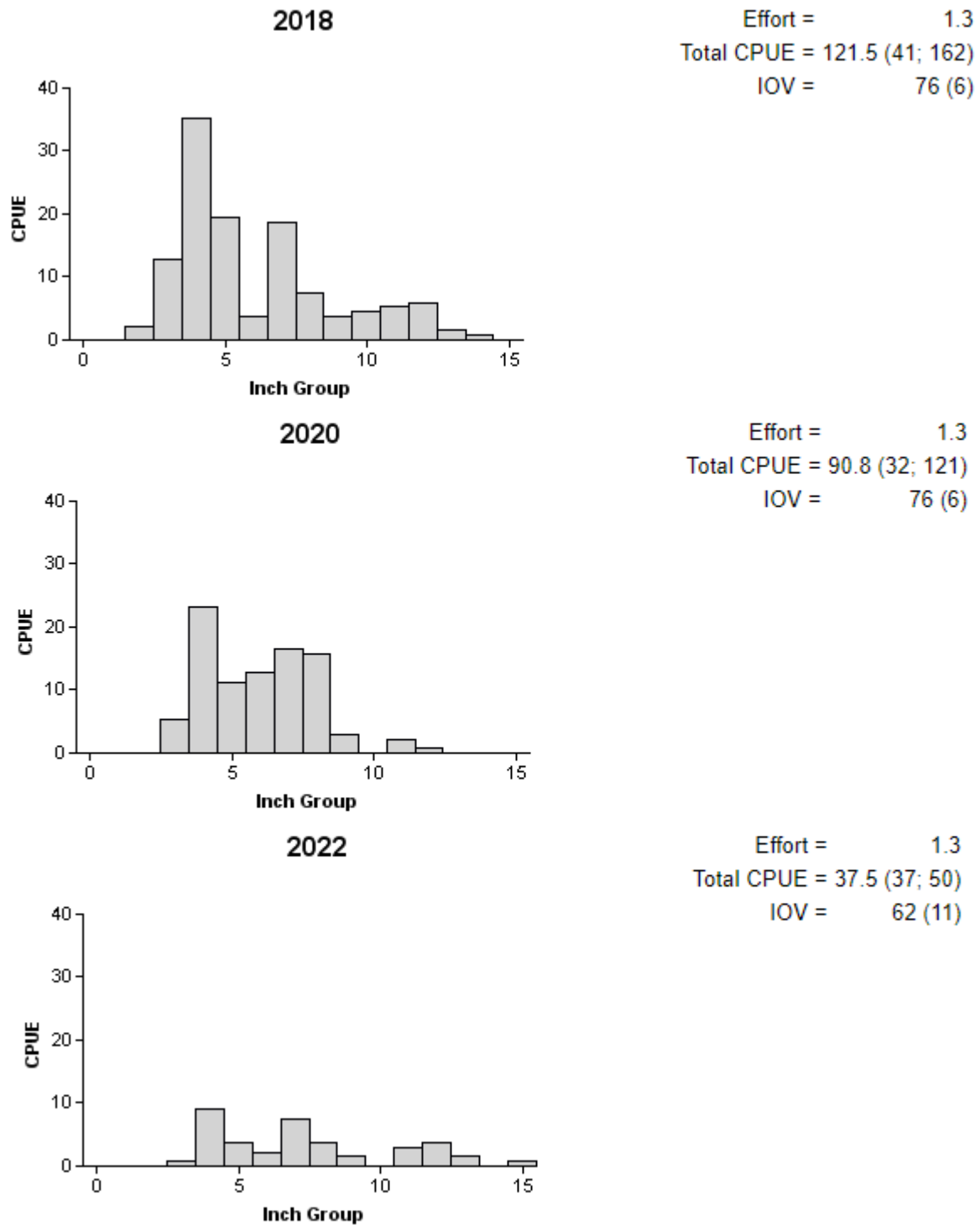


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Sam Rayburn Reservoir, Texas, 2018, 2020, and 2022.

Bluegill

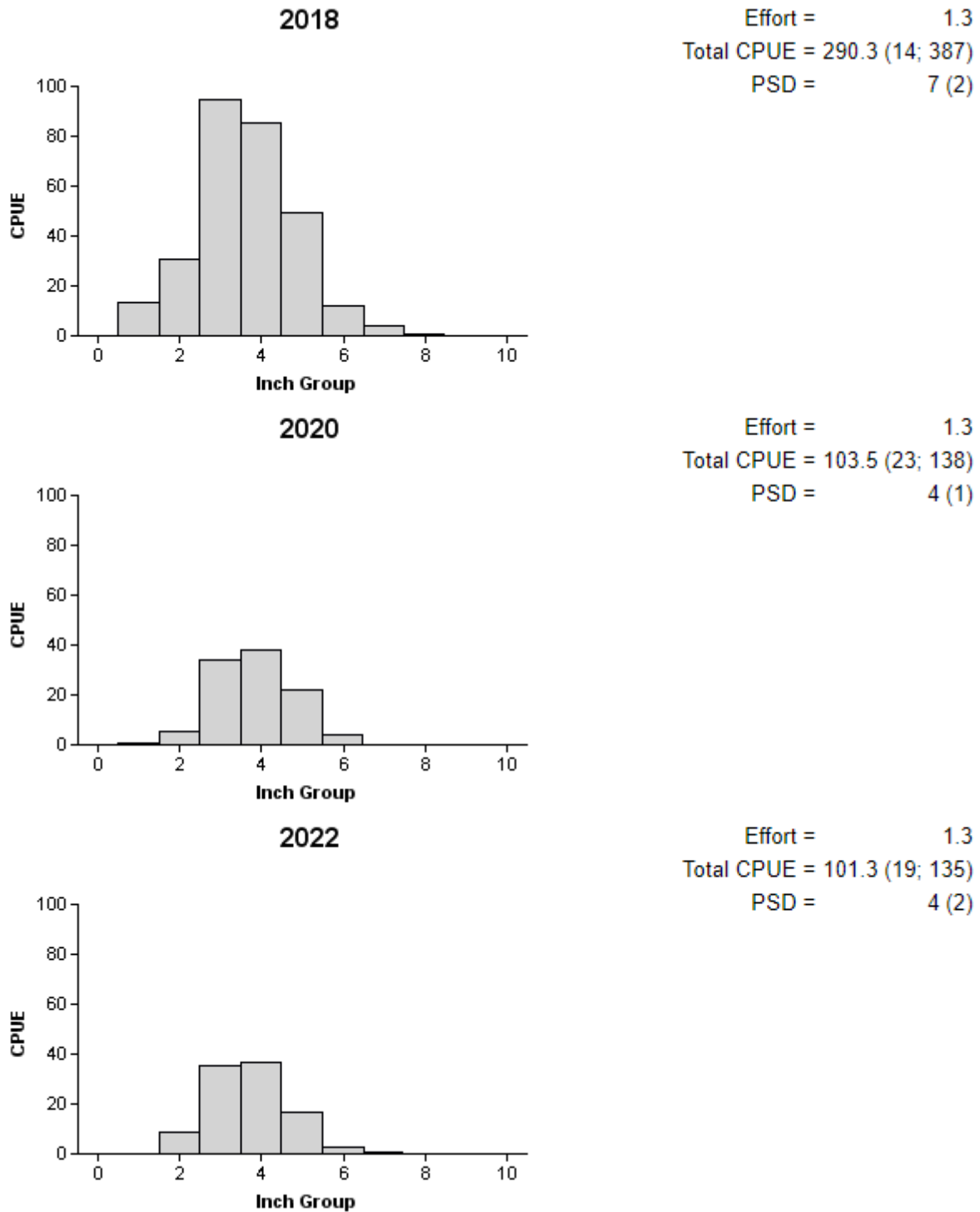


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sam Rayburn Reservoir, Texas, 2018, 2020, and 2022.

Sunfishes

Table 9. Creel survey statistics for sunfishes at Sam Rayburn Reservoir, Texas, from June 2014 through May 2015, June 2018 through May 2019, and June 2022 through May 2023. Total catch per hour is for anglers targeting sunfishes and total harvest is the estimated number of sunfishes harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2014/2015	2018/2019	2022/2023
Directed effort (h)	672 (121)	733 (98)	0
Directed effort/acre	0.01 (121)	0.01 (98)	0
Total catch per hour	1.3 (.)	0.0	.
Total harvest	0	834 (389)	546 (652)
Harvest/acre	0	0.01 (389)	0.01 (652)
Percent legal released	100	54	39

Blue Catfish

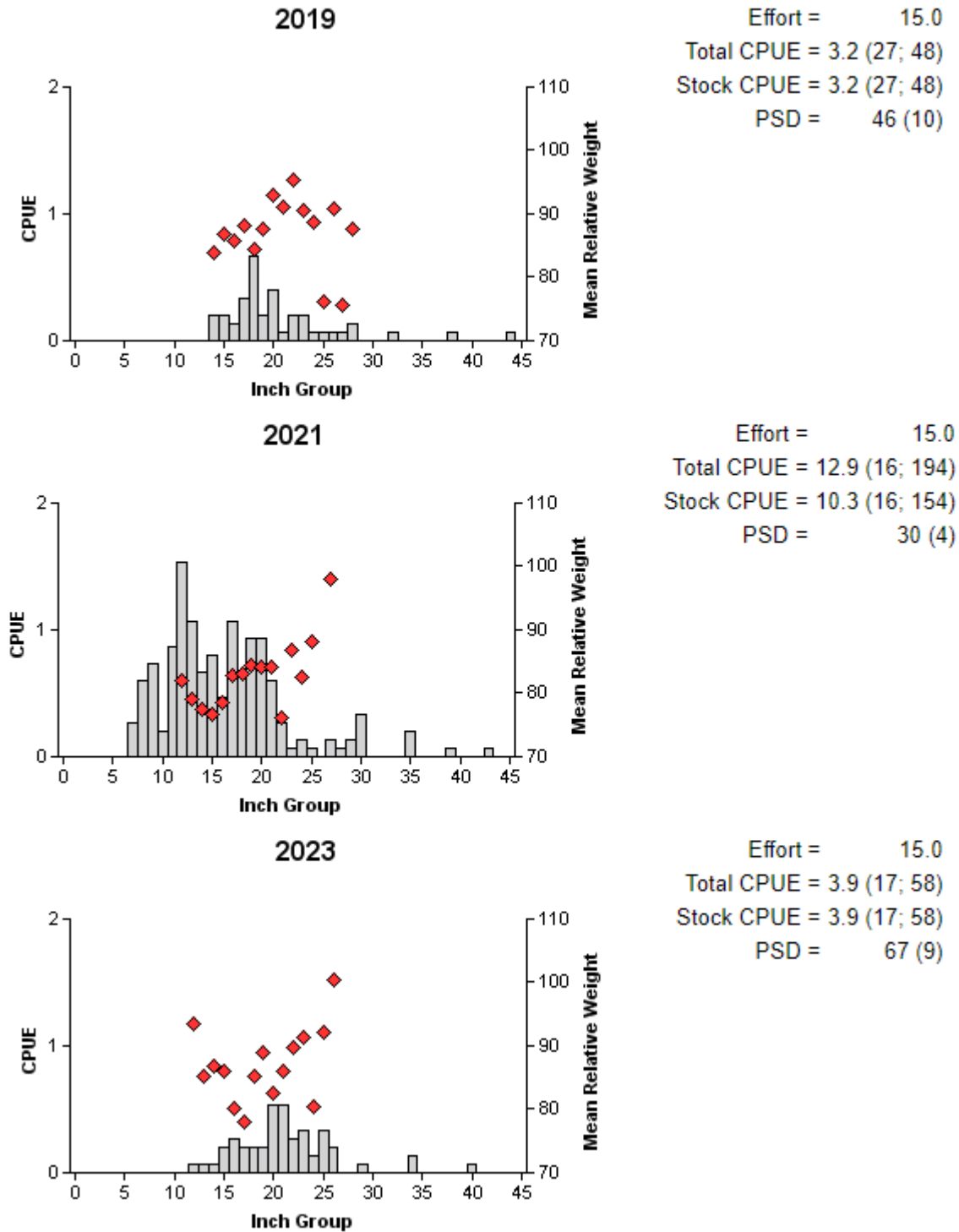


Figure 4. Number of Blue Catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill net surveys, Sam Rayburn Reservoir, Texas, 2019, 2021, and 2023.

Channel Catfish

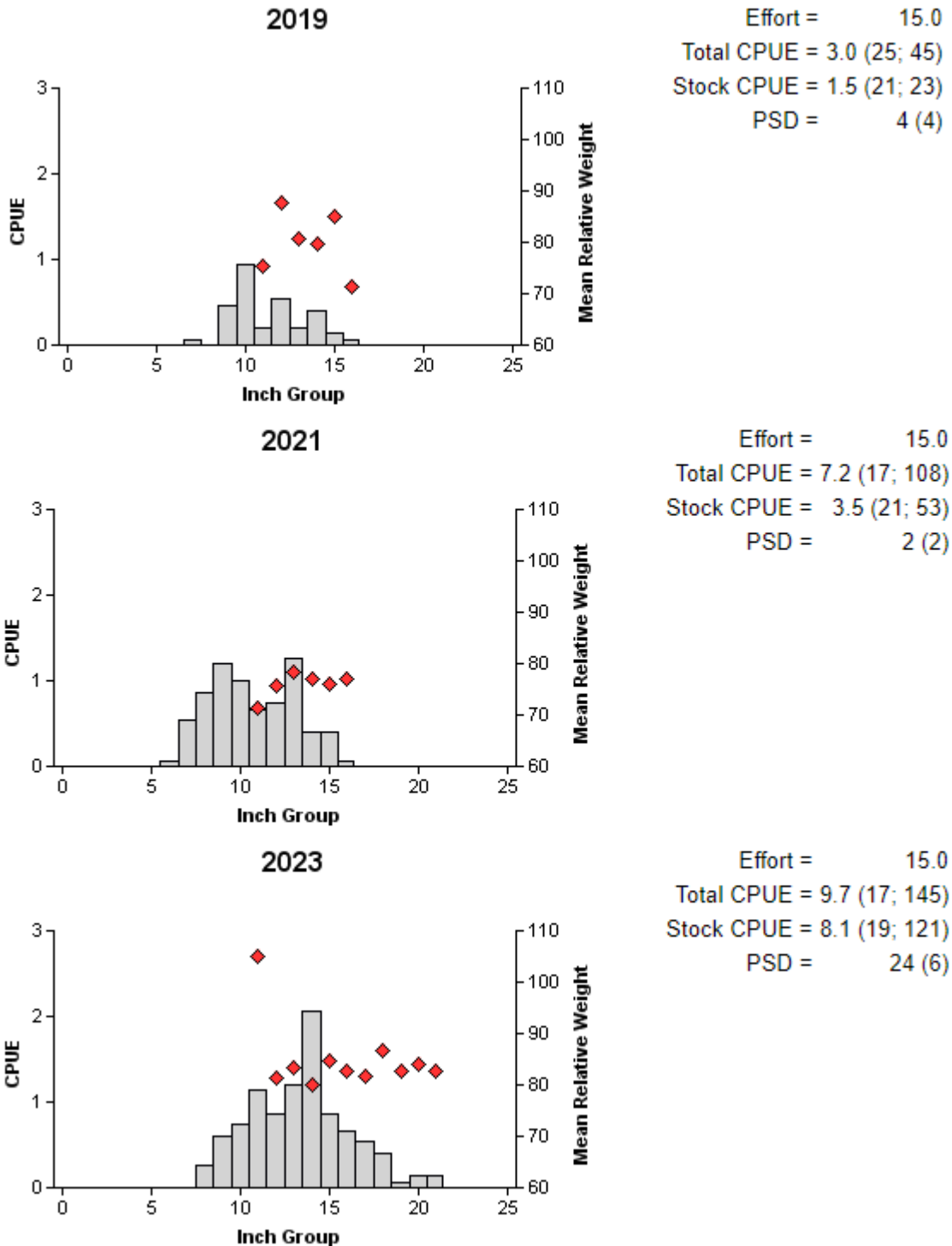


Figure 5. Number of Channel Catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill net surveys, Sam Rayburn Reservoir, Texas, 2019, 2021, and 2023.

Catfishes

Table 10. Creel survey statistics for catfishes at Sam Rayburn Reservoir, Texas, from June 2014 through May 2015, June 2018 through May 2019, and June 2022 through May 2023. Total catch per hour is for anglers targeting catfishes and total harvest is the estimated number of catfishes harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2014/2015	2018/2019	2022/2023
Directed effort (h)	42,431 (22)	60,378 (20)	19,206 (25)
Directed effort/acre	0.38 (22)	0.54 (20)	0.17 (25)
Total catch per hour	1.65 (39)	2.68 (30)	3.16 (54)
Total harvest	25,124 (52)	44,071 (35)	31,787 (41)
Harvest/acre	0.23 (52)	0.40 (35)	0.28 (41)
Percent legal released	1	1	43

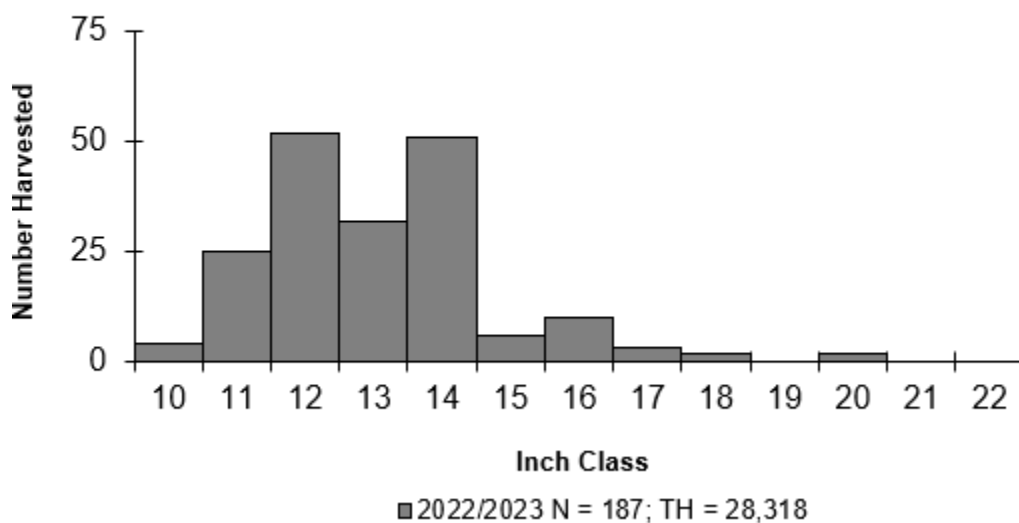


Figure 6. Length frequency of harvested Channel Catfish observed during creel surveys at Sam Rayburn Reservoir, Texas, June 2022 through May 2023, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

White Bass

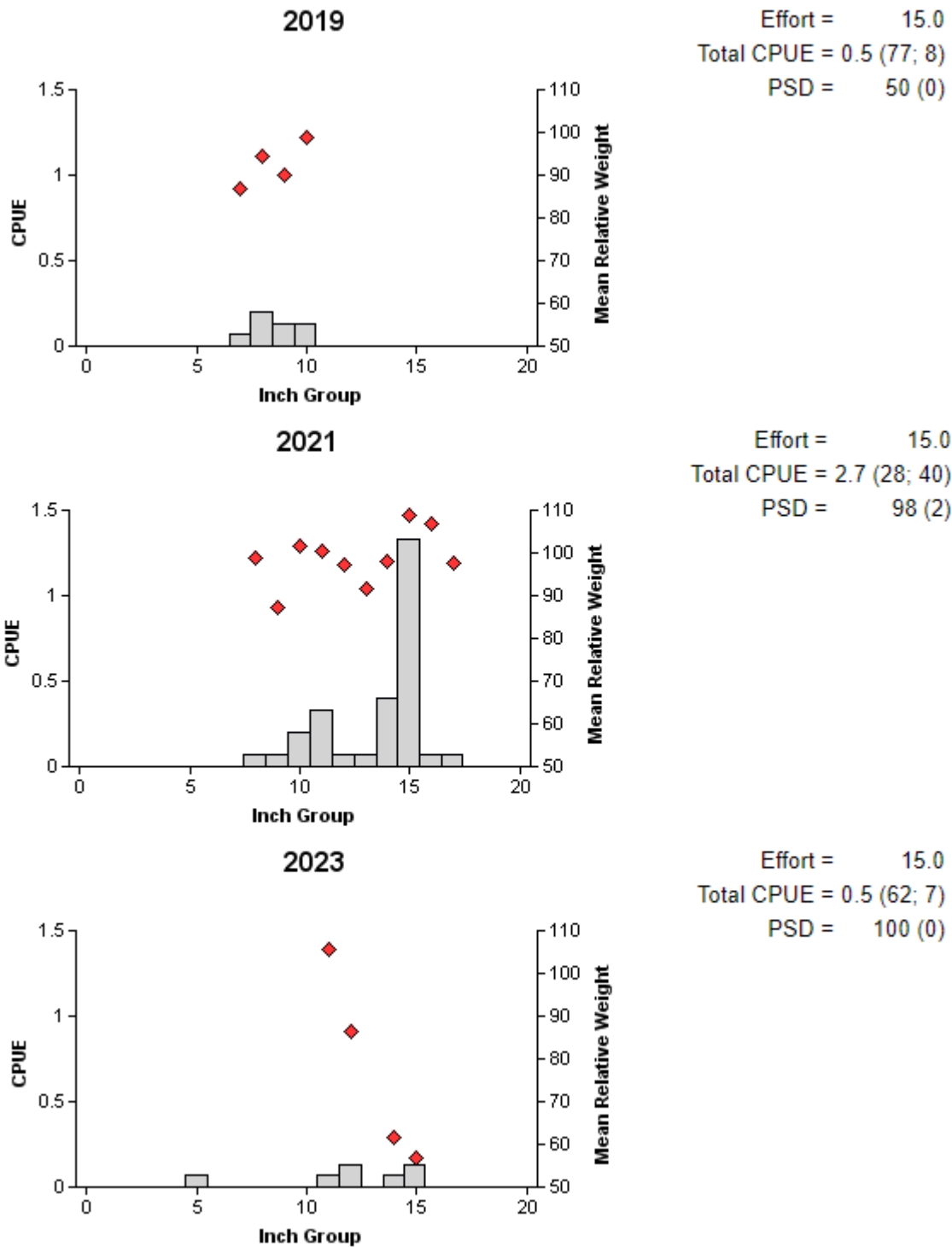


Figure 7. Number of White Bass caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill net surveys, Sam Rayburn Reservoir, Texas, 2019, 2021, and 2023.

Temperate Basses

Table 11. Creel survey statistics for temperate basses at Sam Rayburn Reservoir, Texas, from June 2014 through May 2015, June 2018 through May 2019, and June 2022 through May 2023. Total catch per hour is for anglers targeting temperate basses and total harvest is the estimated number of temperate basses harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2014/2015	2018/2019	2022/2023
Directed effort (h)	4,569 (43)	403 (147)	266 (195)
Directed effort/acre	0.04 (43)	0.01 (147)	<0.01 (195)
Total catch per hour	2.68 (45)	18.86 (.)	0.00 (.)
Total harvest	15,715 (71)	4,181 (325)	1,668 (376)
Harvest/acre	0.14 (71)	0.04 (325)	0.01 (376)
Percent legal released	32	48	23

Spotted Bass

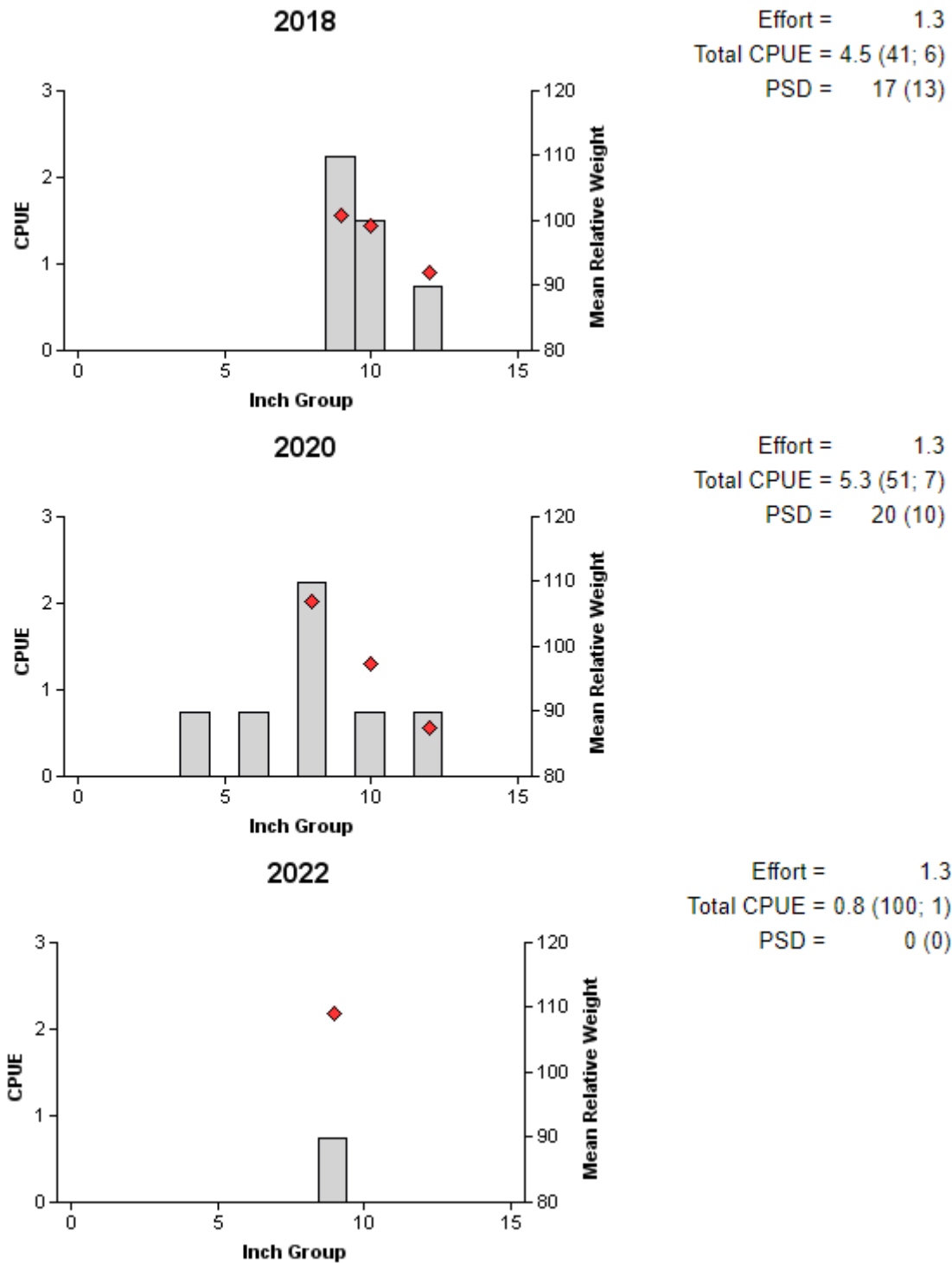


Figure 8. Number of Spotted Bass caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sam Rayburn Reservoir, Texas, 2018, 2020, and 2022.

Largemouth Bass

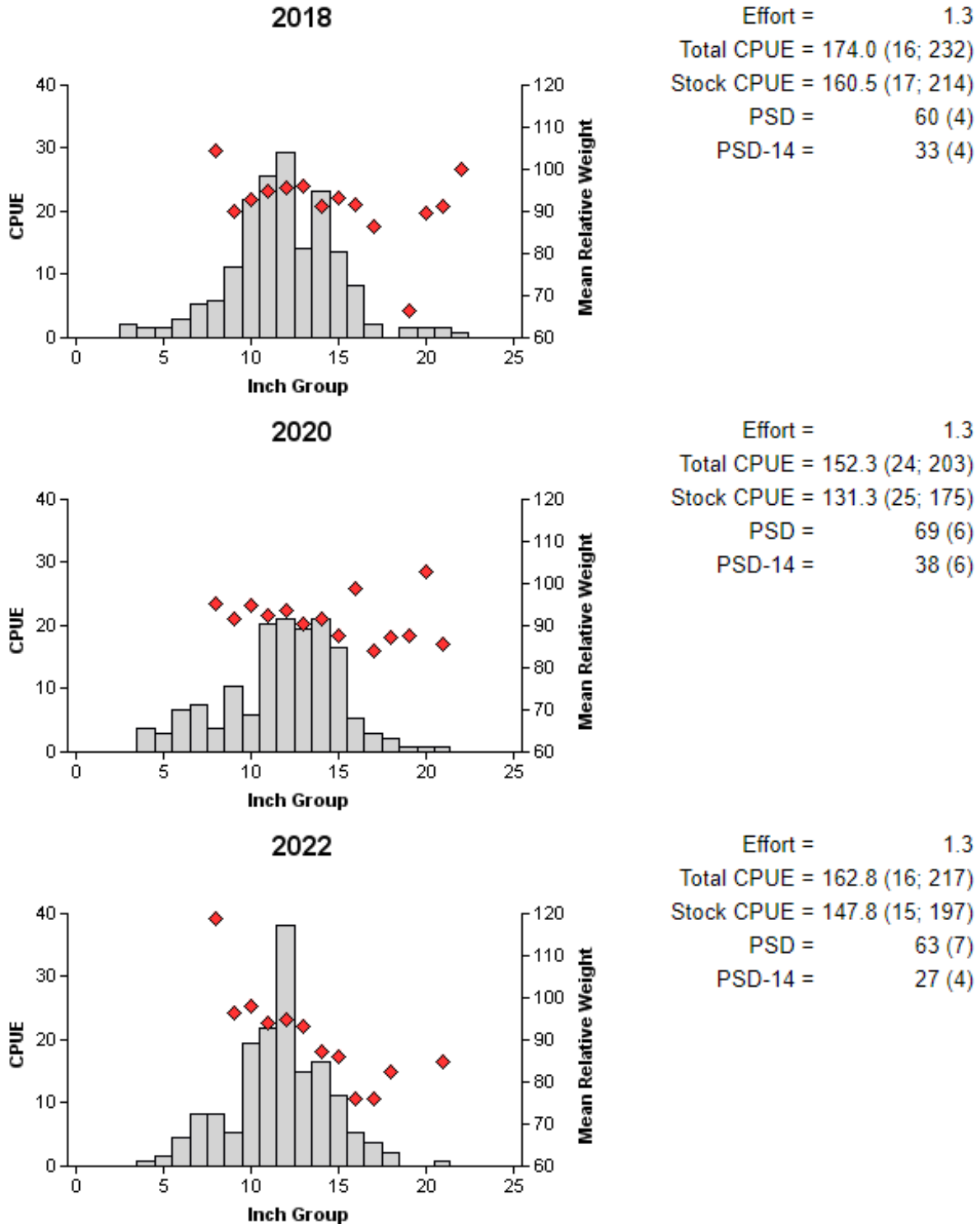


Figure 9. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sam Rayburn Reservoir, Texas, 2018, 2020, and 2022.

Black Basses

Table 12. Creel survey statistics for black basses at Sam Rayburn Reservoir, Texas, from June 2014 through May 2015, June 2018 through May 2019, and June 2022 through May 2023. Catch rate is for all anglers targeting black basses. Harvest is partitioned by the estimated number of fish harvested by non-tournament anglers and the number of fish retained by tournament anglers for weigh-in and release. The estimated number of fish caught by weight category is for all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2014/2015	2018/2019	2022/2023
Directed angling effort (h)			
Tournament	136,741 (19)	209,727 (21)	310,733 (17)
Non-tournament	192,628 (22)	205,226 (18)	180,104 (21)
All black bass anglers combined	329,368 (21)	414,953 (19)	490,837 (18)
Angling effort/acre	3.0 (21)	3.7 (19)	4.3 (18)
Catch rate (number/h)	1.5 (16)	1.3 (11)	1.4 (10)
Harvest			
Non-tournament harvest	27,847 (38)	26,399 (38)	20,119 (36)
Harvest/acre	0.3 (38)	0.2 (38)	0.2 (36)
Tournament weigh-in and release	37,837 (28)	73,728 (27)	99,896 (29)
Total catch	356,748 (25)	466,585 (24)	634,351 (56)
< 4.0 lbs	347,823 – 97.5%	453,439 – 97.2%	621,146 – 97.9%
≥ 4-6.9 lbs	7,461 – 2.1%	11,803 – 2.5%	12,454 – 2.0%
≥ 7-9.9 lbs	1,464 – 0.4%	1,063 – 0.2%	595 – 0.1%
≥ 10 lbs	0	280 – 0.1%	156 – <0.1%
Percent legal released (non-tournament)	60	71	74

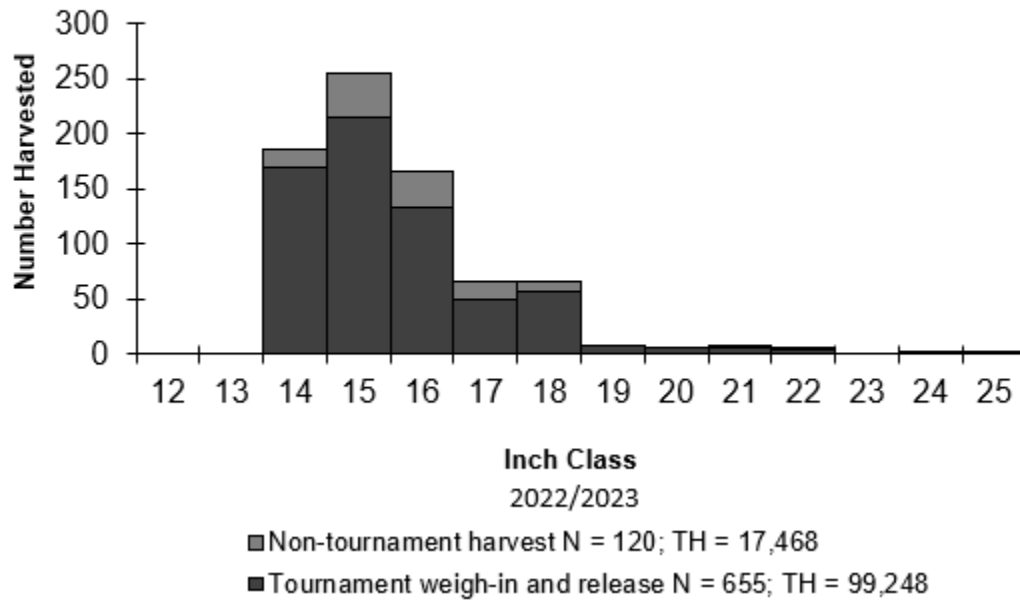


Figure 10. Length frequency of harvested Largemouth Bass observed during creel surveys at Sam Rayburn Reservoir, Texas, June 2022 through May 2023, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

Crappie

Table 13. Creel survey statistics for crappies at Sam Rayburn Reservoir, Texas, from June 2014 through May 2015, June 2018 through May 2019, and June 2022 through May 2023, where total catch per hour is for anglers targeting crappies and total harvest is the estimated number of crappies harvested by all anglers. Relative standard errors (RSE) are in parentheses

Creel Survey Statistic	Year		
	2014/2015	2018/2019	2022/2023
Directed effort (h)	46,659 (21)	60,377 (20)	100,514 (14)
Directed effort/acre	0.42 (21)	0.54 (20)	0.88 (14)
Total catch per hour	3.68 (45)	2.87 (22)	3.12 (20)
Total harvest	74,292 (30)	85,388 (29)	155,554 (20)
Harvest/acre	0.67 (30)	0.77 (29)	1.36 (20)
Percent legal released	0	<1	3

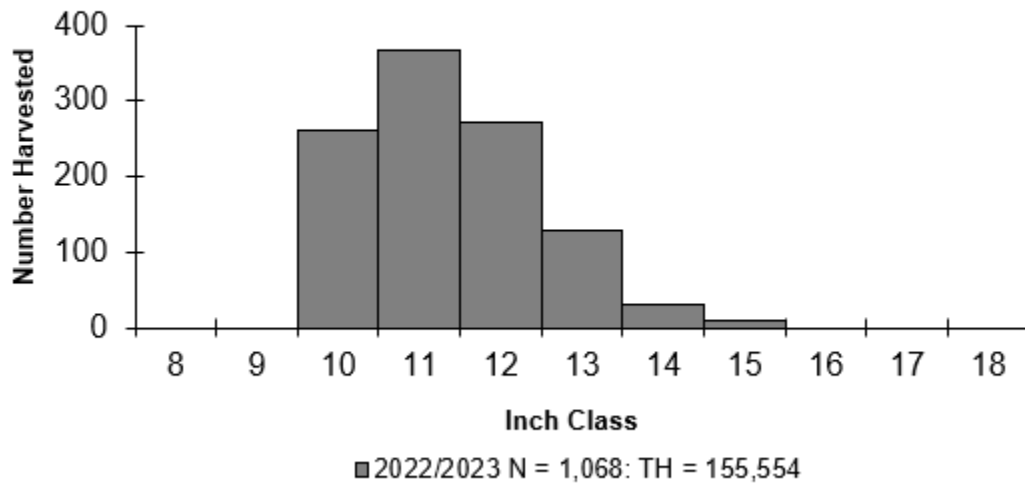


Figure 11. Length frequency of harvested crappie observed during creel surveys at Sam Rayburn Reservoir, Texas, June 2022 through May 2023, all anglers combined. N is the number of harvested crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Proposed Sampling Schedule

Table 14. Proposed sampling schedule for Sam Rayburn Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the winter, while electrofishing surveys are conducted in the fall.

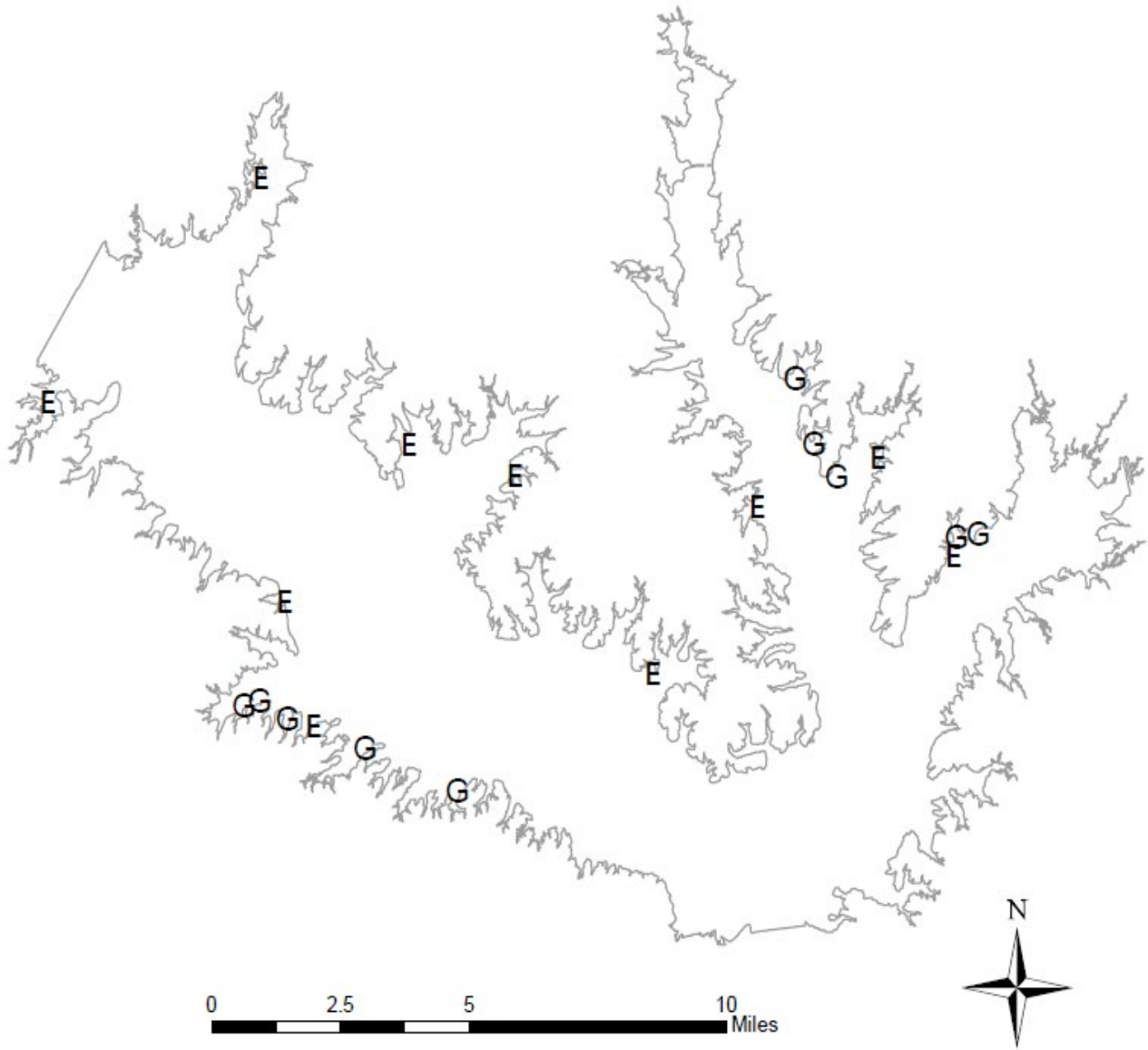
	Survey year			
	2023-2024	2024-2025	2025-2026	2026-2027
Angler Access				X
Vegetation	X	X	X	X
Electrofishing – Fall		X		X
Gill netting		X		X
Creel survey				X
Report				X

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

Number (N) and catch rate (CPUE) (RSE in parentheses) of all target species collected from all gear types from Sam Rayburn Reservoir, Texas, 2022-2023. Sampling effort was 15 net nights for gill netting and 1.3 hours for electrofishing.

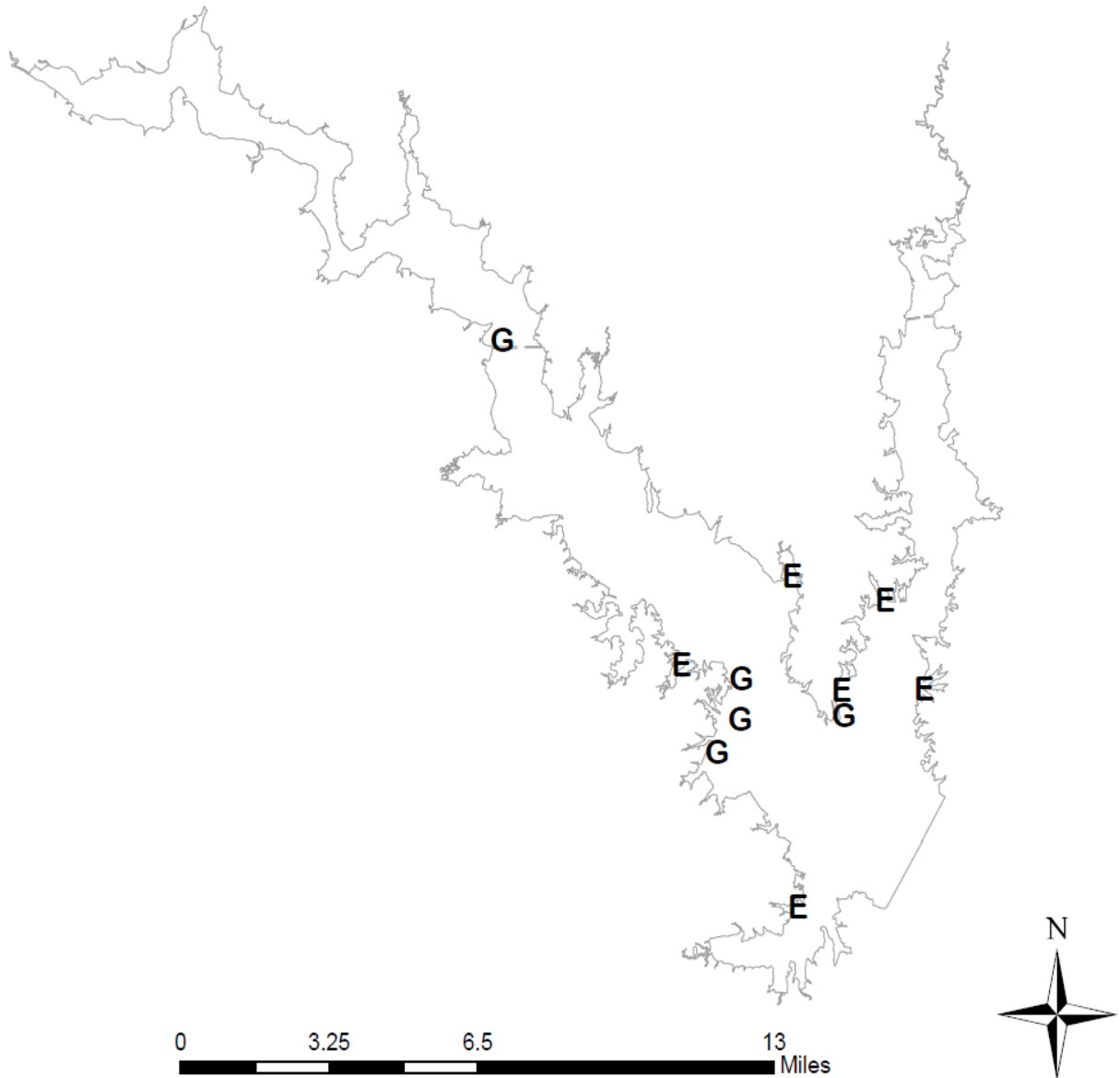
Species	Gill Netting		Electrofishing	
	N	CPUE	N	CPUE
Gizzard Shad			50	37.5 (37)
Threadfin Shad			5,401	4,050.8 (32)
Blue Catfish	58	3.9 (17)		
Channel Catfish	145	9.7 (17)		
White Bass	7	0.5 (62)		
Redbreast Sunfish			1	0.8 (100)
Warmouth			1	0.8 (100)
Bluegill			135	101.3 (19)
Longear Sunfish			5	3.8 (38)
Redear Sunfish			25	18.8 (32)
Redspotted Sunfish			2	1.5 (68)
Spotted Bass			1	0.8 (100)
Largemouth Bass			217	162.8 (16)
White Crappie	14	0.9 (29)		
Black Crappie	14	0.9 (29)		

APPENDIX B – Map of sampling locations



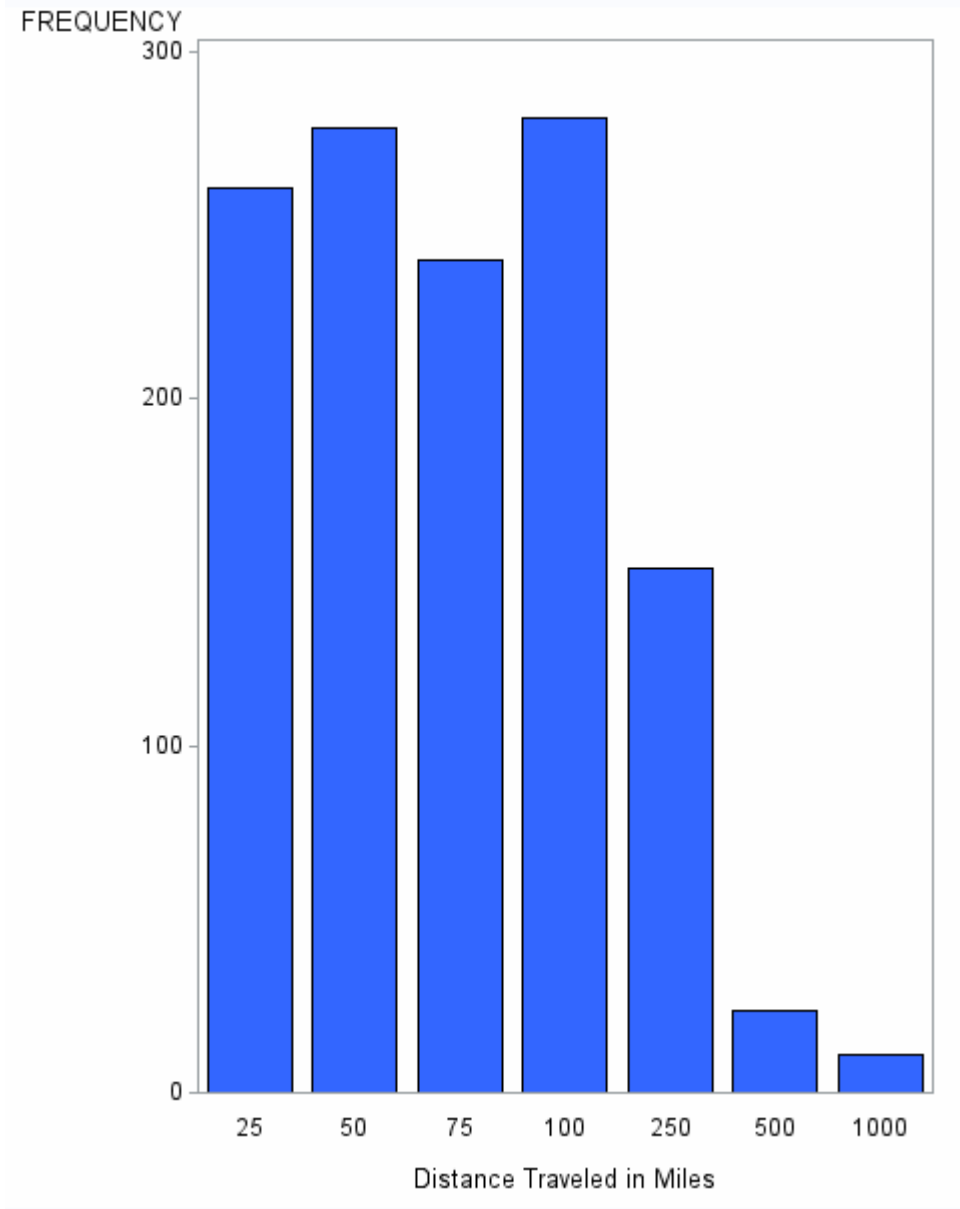
Location of sampling sites, lower Sam Rayburn Reservoir, Texas, 2022-2023. Gill net and electrofishing stations are indicated by G and E, respectively. Water level was near full pool at time of sampling.

APPENDIX B – Map of sampling locations



Location of sampling sites, upper Sam Rayburn Reservoir, Texas, 2022-2023. Gill net and electrofishing stations are indicated by G and E, respectively. Water level was near full pool at time of sampling.

APPENDIX C – Creel ZIP code data



Frequency of anglers that traveled various distances (miles) to Sam Rayburn Reservoir, Texas, as determined from the June 2022 through May 2023 creel survey.

APPENDIX D - Black bass tournament results

Results from individual and team format bass tournaments at Sam Rayburn Reservoir, 2019-2022. Only tournaments with 5-fish bag limits and greater than 50 participants or teams were included. Average weights are expressed in pounds.

Year	N	1 st place weight	2 nd place weight	3 rd place weight	% total weights > 15 lbs.	% catching limit	Big bass weight
Individual							
2019	11	25.3	22.3	20.6	16.8	70.6	9.1
2020	11	24.4	20.5	19.0	9.1	45.5	8.6
2021	13	26.4	22.3	19.9	10.3	55.0	9.2
2022	12	24.1	22.3	20.0	11.0	58.8	9.1
Team							
2019	11	25.9	23.6	22.0	20.5	54.2	9.7
2020	16	27.9	22.6	21.4	14.9	41.9	9.7
2021	13	25.8	23.2	21.7	17.8	46.2	9.5
2022	13	26.5	24.0	23.1	23.3	48.3	9.8

Results of Sealy Outdoors Big Bass Splash tournaments, Sam Rayburn Reservoir, 2019 – 2023. Weights are expressed in pounds.

Year	Average weight of Top 10 fish/hour (N = 210 each year)	Average weight of Top 10 fish/day (N = 30 each year)	Average weight of overall top 10 fish (N = 10 each year)	Weight of overall big fish
2019	6.8	8.5	9.3	10.0
2021	6.5	8.6	9.6	11.3
2022	6.4	8.4	9.3	11.1
2023	6.0	8.1	8.9	9.7



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