

# Sam Rayburn Reservoir

## 2018 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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July 31, 2019



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## Survey and Management Summary

Fish populations in Sam Rayburn Reservoir were surveyed in 2018 using electrofishing and in 2019 using gill netting. Anglers were surveyed from June 2018 through May 2019 with a creel survey. Historical data are presented with the 2018-2019 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir.

**Reservoir Description:** Sam Rayburn Reservoir is an 111,422-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 (70 - 80% of annual angling effort, which includes over 400 bass tournaments per year). Approximately 10 - 15% of anglers target crappie and 5 - 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 - 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). Florida Largemouth Bass (FLMB) have been stocked annually since 1994 to increase abundance of large bass (>8 pounds). 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 < 2,000 acres.

### Fish Community

- **Prey species:** Gizzard Shad, Threadfin Shad, and Bluegill were the most abundant prey species and provided ample forage for sport fish.
- **Catfishes:** The relative abundance of Blue Catfish was stable compared to previous years, but Channel Catfish numbers declined. Angler catch rates averaged 2.7 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 1.6 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 ( $\geq 174$  fish/hour) but varied over the last three sampling years. Size structure and fish condition were favorable and stable. The black bass fishery was most popular (81% of anglers targeted bass) and angler catch rate was high (1.3/hour).
- **Crappie:** White and Black Crappie were present in the reservoir. Angler catch (2.9/hour) 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 and creel surveys to justify Florida Largemouth Bass stockings. Request annual stockings of Florida Largemouth 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 minimize impacts on Largemouth Bass population and reduce conflicts with non-tournament anglers. Publish monthly articles in the Lakecaster magazine to inform angling public regarding TPWD activities.

## Introduction

This document is a summary of fisheries data collected from Sam Rayburn Reservoir from June 2018 through May 2019. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2018-2019 data for comparison.

## Reservoir Description

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 111,422 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). The reservoir was eutrophic with a mean Trophic State Index chl-*a* of 47.1 (Texas Commission of Environmental Quality 2018). Habitat at time of sampling consisted of aquatic vegetation (primarily hydrilla and American lotus) 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 22 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 2015) included:

1. Stock FLMB annually ( $\geq 500,000$  fingerlings) to maintain and improve the trophy Largemouth Bass population.  
**Action:** Since 2015, FLMB were stocked every year.
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 2016 and 2018, and a creel survey was conducted in 2018/2019. Growth was examined in 2018.
3. Continue black bass tournament-monitoring program to increase information on relative abundance of large fish ( $> 20$  inches).  
**Action:** Since 2014, data from 108 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 2015 to 2018.
5. Conduct gill netting surveys every two years to monitor the status of catfish populations.  
**Action:** Surveys were conducted in 2017 and 2019.
6. Complete sampling for research exploring effects of plastic type and shape on fish attractor effectiveness.  
**Action:** Sampling was completed in 2016, and a draft manuscript was in progress.

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 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) and salvinia weevil releases.
9. Publish monthly popular articles in the Lakecaster, a newsletter distributed to 30 counties in Texas and Louisiana.  
**Action:** Articles highlighting TPWD activities at Sam Rayburn Reservoir have been published monthly since 2000.

**Harvest regulation history:** Historically, all sport fishes in Sam Rayburn Reservoir have been managed with statewide regulations (Table 3).

**Stocking history:** Since 1994, FLMB have been stocked annually (Table 4). 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 has historically provided beneficial aquatic habitat at Sam Rayburn Reservoir, as coverage has never been problematic or created access problems. 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 funds 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:** Nearly 1,000,000 acre-feet of water rights are annually appropriated from Sam Rayburn Reservoir. The Lower Neches Valley Authority (LNVA) is the local sponsor of the reservoir and shared initial construction costs as well as annual reservoir operation expenses with the USACE. The LNVA has rights to 820,000 acre-feet annually to provide water via releases through the reservoir powerhouse. Municipal, agricultural, and industrial water is pumped from the lower Neches River and Pine Island Bayou and delivered to Jefferson, Chambers, and Liberty counties via a 400-mile canal system. The LNVA also contracts with Westvaco Corporation to provide their appropriated 50,000 acre-feet of water annually. The City of Lufkin has 56,000 acre-feet of water rights from Sam Rayburn Reservoir for future municipal and industrial use, but no infrastructure exists to pump water. The USACE has a contractual agreement with Southwest Power Corporation to produce hydropower throughout the year, 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 2015). 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 2015).

**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 13 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 2018 through May 2019. 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 2017). 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 in 2015–2018 to monitor hydrilla, water hyacinth, and giant salvinia coverages. Coverages were calculated using the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

**Water level** – Source for water level data was the USACE website (USACE 2019).

## Results and Discussion

**Habitat:** A 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. Abundant areas of torpedograss, buttonbush, willow, and cypress are inundated when water level is above 164 feet MSL. Prevalent aquatic vegetation providing beneficial fish habitat includes hydrilla, American lotus, and torpedograss (Table 6). Since 2014, hydrilla and American lotus coverages have varied due to water levels. In 2014, hydrilla and American lotus covered 11,945 and 2,112 surface acres, respectively. Extremely high water levels during spring and summer of 2015 reduced coverage of both plants. Since then, coverages have been rebounding. 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. 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). Since that time, aggressive herbicide treatments directed by the USACE have reduced coverage considerably.

**Creel:** Similar to previous survey years, fishing effort at Sam Rayburn Reservoir was primarily directed at black basses (80.8%) (Table 7). Total fishing effort for all species steadily increased over the last three

survey periods and was 514,624 hours in 2018/2019 (direct expenditures were \$7,436,724) (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. In 2018, Gizzard Shad catch rates increased and IOV was relatively high (76) (Figure 2). Historically, Threadfin Shad catch rates have been highly variable and likely not reflective of population status. The catch rate in 2018 was 1,860.0/h (Appendix A). Bluegill are relatively abundant, but catch rates varied during the last three survey years (171.0 to 325.5/h) (Figure 3). Few anglers targeted sunfish in 2018/2019 (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 and Channel Catfish recruitment have been relatively stable. During the last three survey years, Blue Catfish catch rates ranged from 3.2 to 5.1/n (Figure 4). Although few Blue Catfish >25 inches were collected, anecdotal information indicates passive gear anglers frequently catch fish >30 pounds. In 2019, Channel Catfish catch rates declined to 3.0/n, compared to 8.3 and 6.2/n in 2015 and 2017 (Figure 5). However, this decline may be due to extremely high water levels (> 174 feet above MSL) and related reduction in sampling efficiency, rather than an actual drop in population abundance. Few fish > 15 inches were present.

Directed rod and reel angler effort towards catfishes increased from 2012 to 2019 (Table 10). Catfish anglers accounted for 7 to 10% of the total fishing effort and catch rates were high (1.7 to 3.0 fish/h). Total estimated harvest increased to 44,071 fish in 2018/2019; 92% of harvested fish were Channel Catfish (Figure 6).

**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 < 2.5/n, with the exception of 2011 (6.3/n). Catch rates from the last three surveys were  $\leq$  1.6/n (Figure 7). Yellow Bass gill net catch was not recorded, but an abundant population was present. Few anglers target temperate bass in the reservoir (Table 11), but a 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 <9.8/h from 2014 to 2018 (Figure 9). Few Spotted Bass >10 inches were collected. Estimated angler harvest was 7,655 fish in 2018/2019.

Fall electrofishing catch rates of Largemouth Bass from 2014 to 2018 reflected relatively high recruitment rates and population abundance (range = 177.0 - 290.3/h; Figure 10). Population size structure was similar and desirable across years (PSD range = 60 - 68; PSD-14 range = 30 - 33). Nearly all relative weights were > 85, indicating Largemouth Bass were in adequate condition. Growth rate was relatively high, as average age at 14 inches was 2.2 years (N = 13; range = 1 - 4 years).

The black bass fishery accounted for the majority of annual fishing effort (80.8%; Table 7). Total angler directed effort increased over the last three survey years (range = 257,825 - 414,953 h); proportion tournament-related (range = 42 - 52%) was relatively stable (Table 12). Angler catch rates remained high and stable (range = 1.3 - 1.5 fish/h). In 2018/2019, total angler catch (466,585 fish) and tournament-retained catch (73,728 fish) were higher than the previous two survey. Non-tournament harvest in 2018/2019 (26,399 fish) was similar to 2014/2015 (27,847 fish). The proportion of legal fish released (non-tournament) ranged from 60 to 74%. The majority of harvested Largemouth Bass were 14 to 16 inches in length and 80% were temporarily retained during tournaments (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 2.1 to 2.5% of catch, and 7 to 9.9-pound fish comprised 0.2 to 0.4% of the catch each year.

A tournament-monitoring program was implemented in June 2003 to increase information on fish  $\geq$  14 inches and provide greater insight regarding large (> 20 inches) fish abundance (Appendix D). Overall,

most tournament variables were favorable and similar during 2014 - 2018. The percent of anglers catching 5-fish limits was > 40% for most years and as high as 79%, indicating high and stable numbers of fish  $\geq 14$  inches. Average big bass weight in team tournaments was >8 pounds for all years but one (with two estimates > 10 pounds), and average weight to win events ranged from 19.8 to 29.1 pounds, reflecting relatively high and stable numbers of large fish. Similarly, results of the 3-day Sealy Outdoors McDonald's Big Bass Splash tournaments also suggested high and stable numbers of large bass. In 2019, average weights of the top 10 fish/hour (6.7 pounds; N = 210), top 10 fish/day (8.5 pounds, N = 30), and overall top 10 (9.3 pounds, N = 10) were similar to the previous five years.

**Crappie:** Creel data reflected an abundant crappie population. In 2018/2019, total fishing effort (60,377 h) nearly doubled when compared to 2012/2013 (32,867 h) (Table 13). Similarly, harvest increased from 46,423 to 85,388 fish. Angler catch was high and varied over the last three survey years (1.9 – 3.7 fish/h) (Table 13).



# Fisheries Management Plan for Sam Rayburn Reservoir, Texas

Prepared – July 2019

**ISSUE 1:** Creel surveys indicate most sportfishing effort at Sam Rayburn Reservoir is for Largemouth Bass. 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 also hosts over 400 bass tournaments per year with an economic value of \$31.1 million (Driscoll and Myers 2014). The reservoir also has a demonstrated potential for producing trophy fish.

## MANAGEMENT STRATEGIES

1. Continue to manage the Largemouth Bass population with the statewide 14-inch length limit.
2. Continue annual stocking of FLMB ( $\geq 500,000$  fingerlings/year) to maintain and improve the trophy Largemouth Bass population.
3. Continue the tournament monitoring program to collect information on larger fish to justify FLMB stockings.
4. Continue to promote fish handling procedures that minimize tournament-related mortality to minimize impacts on Largemouth Bass population and reduce 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 have reduced coverage to 1,000 to 1,500 surface acres.

## MANAGEMENT STRATEGIES

1. Support USACE efforts relative to herbicide treatments via private applicators to control plant coverage.
2. Support Aquatic Habitat Enhancement efforts with salvinia weevil research.
3. Maintain all educational signs at access points to minimize potential transport to other waters.
4. 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, directed effort and harvest has exceeded 3.0 h/acre and 400,000 fish, respectively. Since 2008, directed effort ( $< 0.6$  h/acre) and total harvest ( $< 100,000$  fish) has been stable but considerably lower than historical highs.

## 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. Publish research manuscript exploring effects of plastic fish attractor shape and material type on effectiveness.
3. Monitor condition of 15 plastic fish attractor reefs via sonar and scuba, and refurbish with additional attractors as necessary to increase fishing success.

**ISSUE 4:** Area constituents are interested in TPWD activities and management actions related to Sam Rayburn Reservoir and need to be informed.

#### MANAGEMENT STRATEGY

1. Continue to publish monthly popular articles on TPWD activities in the Lakecaster, a newsletter distributed to approximately 30 counties in Texas and Louisiana.

**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. Document existing and future inter-basin water transfers to facilitate potential invasive species responses.

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

### 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  $\leq 1.5/n$ , indicating a low population density in the reservoir. Since 2008, creel surveys have not documented 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% 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-in 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 2020 and 2022 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  $\leq 25$  (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 330 and 381 mm (Category 2; N = 13) will be estimated in 2022, and every four years thereafter. If growth problems are detected from this cursory estimate, mean length-at-age will be estimated from a random population sample of 400 fish > 150 mm, subsampled at 10 fish per 10 mm strata (Category 4).

**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 over 10 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 – 3.0 fish/h), reflecting an abundant crappie population. We will conduct a creel survey in 2022/2023 (4 quarters, 5

weekend and 4 week days/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 approximately 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 have historically been managed with statewide regulations.

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 2021 and 2023, but sampling will continue at random sites until 50 stock-size fish are collected and the RSE of CPUE-S is  $\leq 25$  (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 CPUE-T is 33 for Gizzard Shad and 60 for Threadfin Shad. No additional effort will be expended to achieve an RSE25 for Gizzard or Threadfin Shad, but Largemouth Bass body condition (fish  $\geq 8$ " TL) will be used to provide additional information on forage abundance and vulnerability.

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## Tables and Figures

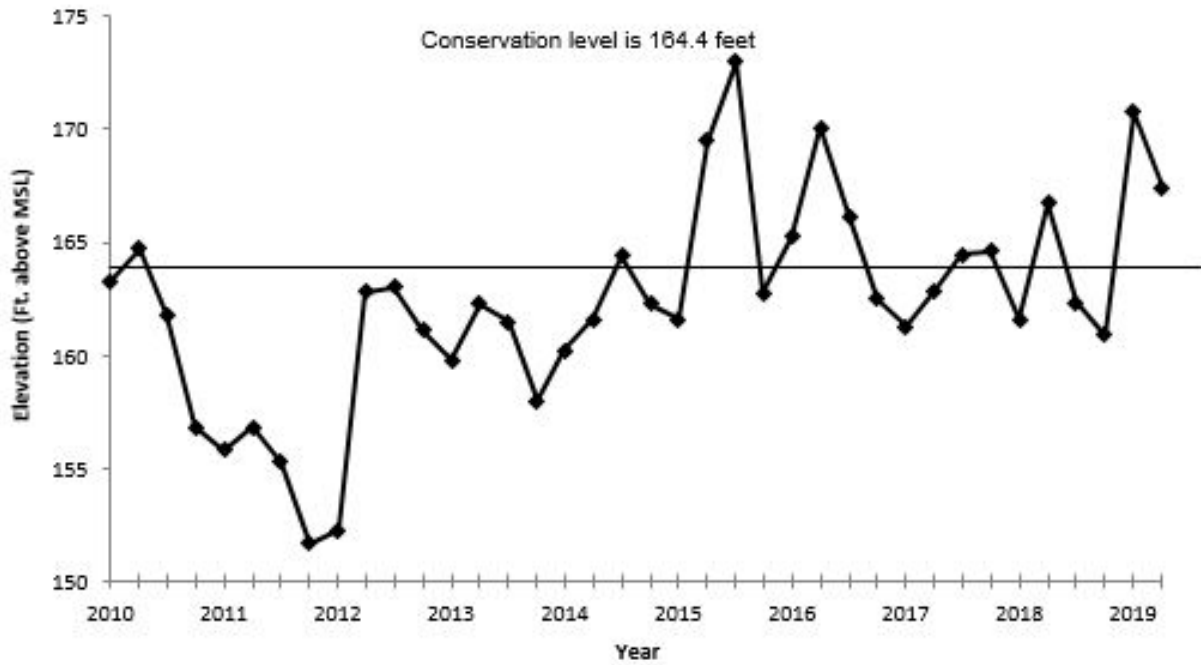


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Sam Rayburn Reservoir, Texas.

Table 1. Characteristics of Sam Rayburn Reservoir, Texas.

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

Table 2. Boat ramp characteristics for Sam Rayburn Reservoir, Texas, August 2018. Reservoir elevation at time of survey was 162 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
Harvey Creek	31.21371 94.32260	Y	25	154	Adequate
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

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

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Largemouth	5 <sup>a</sup>	14-inch minimum
Bass, Spotted	5 <sup>a</sup>	None
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

<sup>a</sup>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
	Total	304,970	
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	
2012	1,466,043	FGL	

Species	Year	Number	Size
	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
	Total	20,067,039	
Largemouth Bass	1965	364,000	FGL
	1966	97,000	FGL
	1988	21	ADL
	Total	461,021	
Longear Sunfish	1965	40,000	UNK
	Total	40,000	
Paddlefish	1990	3,581	UNK
	1991	16,741	UNK
	1992	43,584	UNK
	1995	46,529	UNK
	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
	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	UNK
	1967	530,000	

Species	Year	Number	Size
	Total	531,400	
ShareLunker Largemouth Bass	2008	2,604	FGL
	2018	7,843	FGL
	Total	10,447	
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
	Total	7,000	

Table 5. Objective-based sampling plan components for Sam Rayburn Reservoir, Texas 2018–2019.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Abundance	CPUE – stock	RSE-stock $\leq 25$
	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 <sup>a</sup>	Abundance	CPUE – total	
	Size structure	PSD, length frequency	$N \geq 50$
Gizzard Shad <sup>a</sup>	Abundance	CPUE – total	
	Size structure	PSD, length frequency	$N \geq 50$
	Prey availability	IOV	$N \geq 50$
Threadfin Shad <sup>a</sup>	Abundance	CPUE – total	
<i>Gill netting</i>			
Blue Catfish	Abundance	CPUE– stock	RSE-stock $\leq 25$
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Condition	$W_r$	10 fish/inch group (max)
Channel Catfish <sup>a</sup>	Abundance	CPUE– stock	
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Condition	$W_r$	10 fish/inch group (max)
<i>Creel survey<sup>b</sup></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	

<sup>a</sup> No additional effort will be expended to achieve an  $RSE \leq 25$  for CPUE of Bluegill, Gizzard Shad, Threadfin Shad, or Channel Catfish, if not reached from designated Largemouth Bass or Blue Catfish sampling effort.

<sup>b</sup> 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, 2014–2018. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2014	2015	2016	2017	2018
American lotus	2,112 (2)		153 (<1)		994 (1)
Giant salvinia	4,308 (4)	3,053 (3)	1,521 (1)	982 (1)	1,467 (1)
Hydrilla	11,945 (11)		558 (1)	8,088 (7)	8,453 (8)
Torpedograss	1,872 (2)	1,280 (1)	165 (<1)	1,515 (1)	252 (<1)
Water hyacinth	trace	1,031 (1)			

Table 7. Percent directed angler effort by species for Sam Rayburn Reservoir, Texas, 2012–2019. Survey periods were from 1 June through 31 May.

Species	2012/2013	2014/2015	2018/2019
Catfishes	9.4	9.6	6.5
Sunfishes		0.2	0.1
Black basses	78.4	74.7	80.8
Temperate basses		1.0	0.1
Crappies	10.0	10.6	11.8
Anything	2.1	3.9	0.7

Table 8. Total fishing effort (h) for all species and total directed expenditures at Sam Rayburn Reservoir, Texas, 2012-2019. Survey periods were from 1 June through 31 May. Relative standard error is in parentheses.

Creel statistic	2012/2013	2014/2015	2018/2019
Total fishing effort	328,874 (22)	441,709 (18)	514,624 (18)
Total directed expenditures	\$3,751,136 (26)	\$4,670,828 (29)	\$7,436,724 (24)

## Gizzard Shad

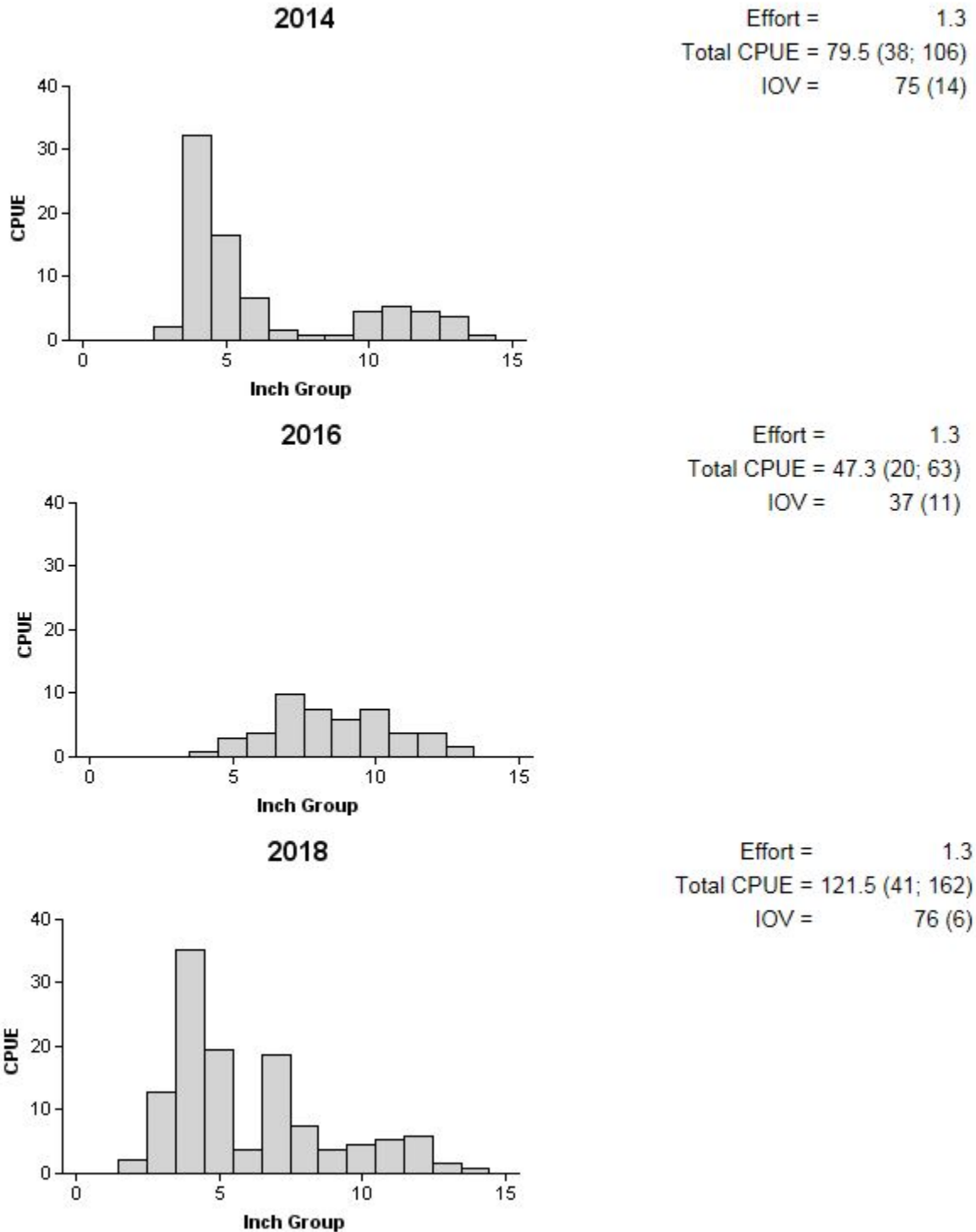


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Sam Rayburn Reservoir, Texas, 2014, 2016, and 2018.

## Bluegill

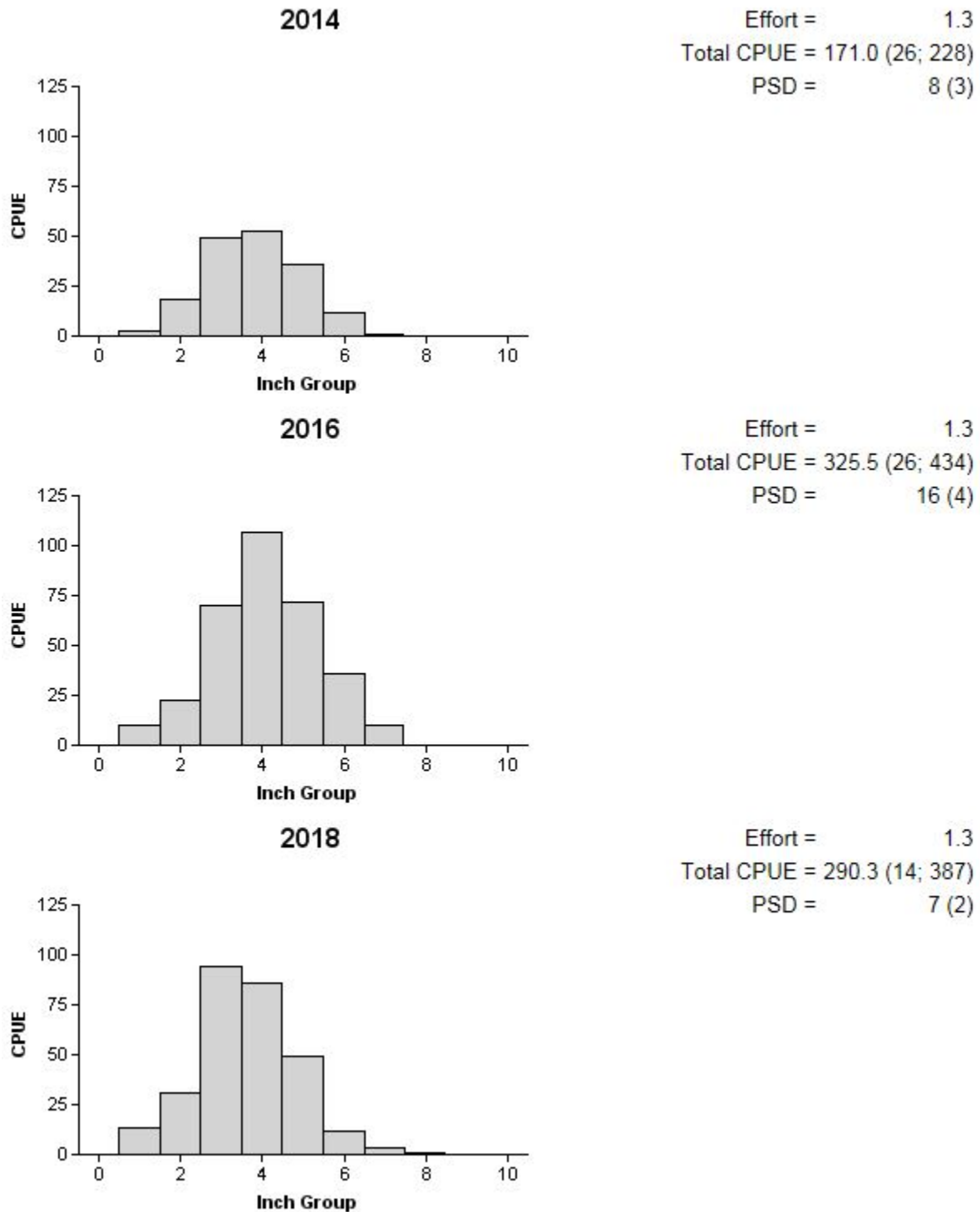


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sam Rayburn Reservoir, Texas, 2014, 2016, and 2018.



## Sunfishes

Table 9. Creel survey statistics for sunfishes at Sam Rayburn Reservoir, Texas, from June 2012 through May 2013, June 2014 through May 2015, and June 2018 through May 2019. 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		
	2012/2013	2014/2015	2018/2019
Directed effort (h)		672 (121)	733 (98)
Directed effort/acre		0.01 (121)	0.01 (98)
Total catch per hour		1.3 (.)	0
Total harvest	3,208 (186)	0	834 (389)
Harvest/acre	0.02 (186)	0	0.01 (389)
Percent legal released	2	100	54

## Blue Catfish

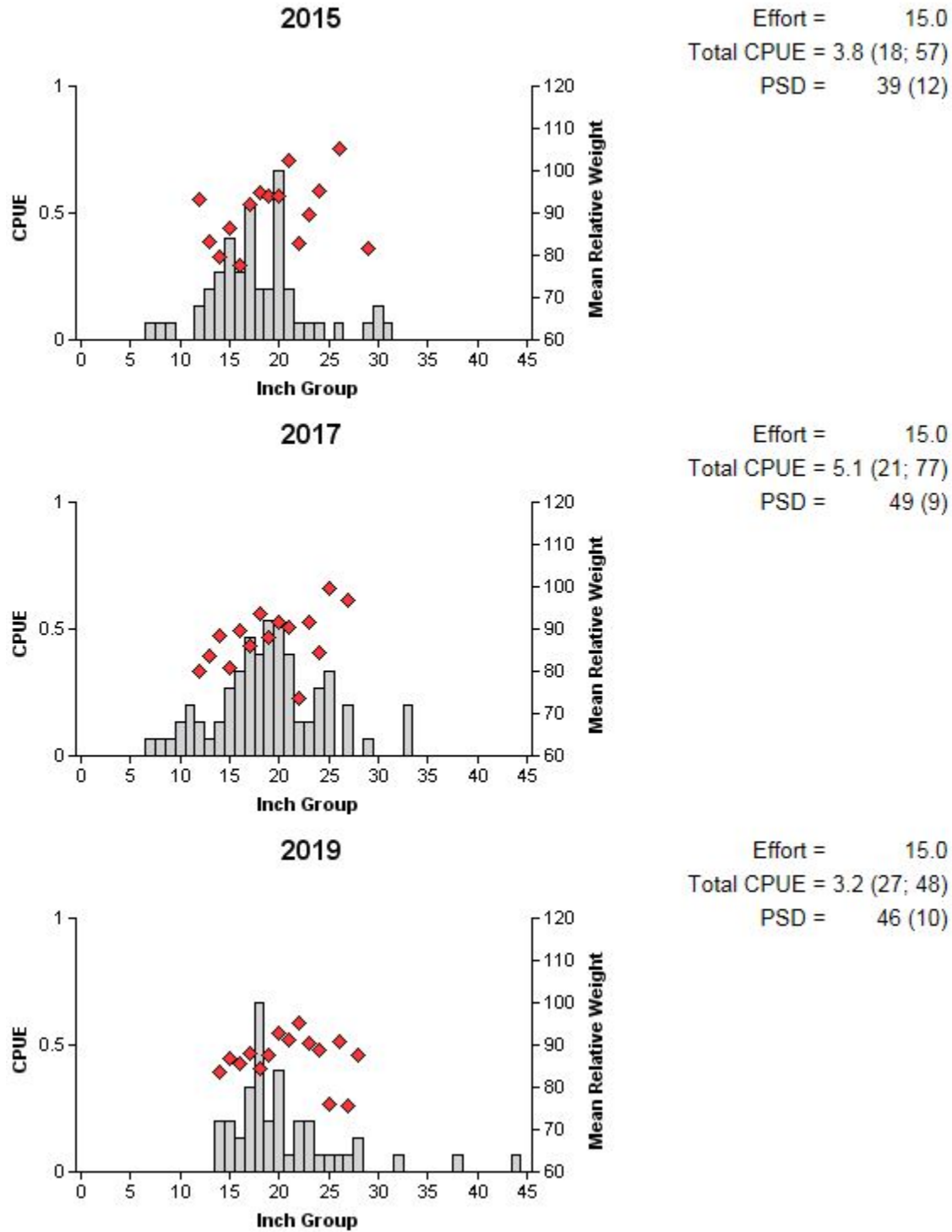


Figure 4. Number of Blue Catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill net surveys, Sam Rayburn Reservoir, Texas, 2015, 2017, and 2019.

## Channel Catfish

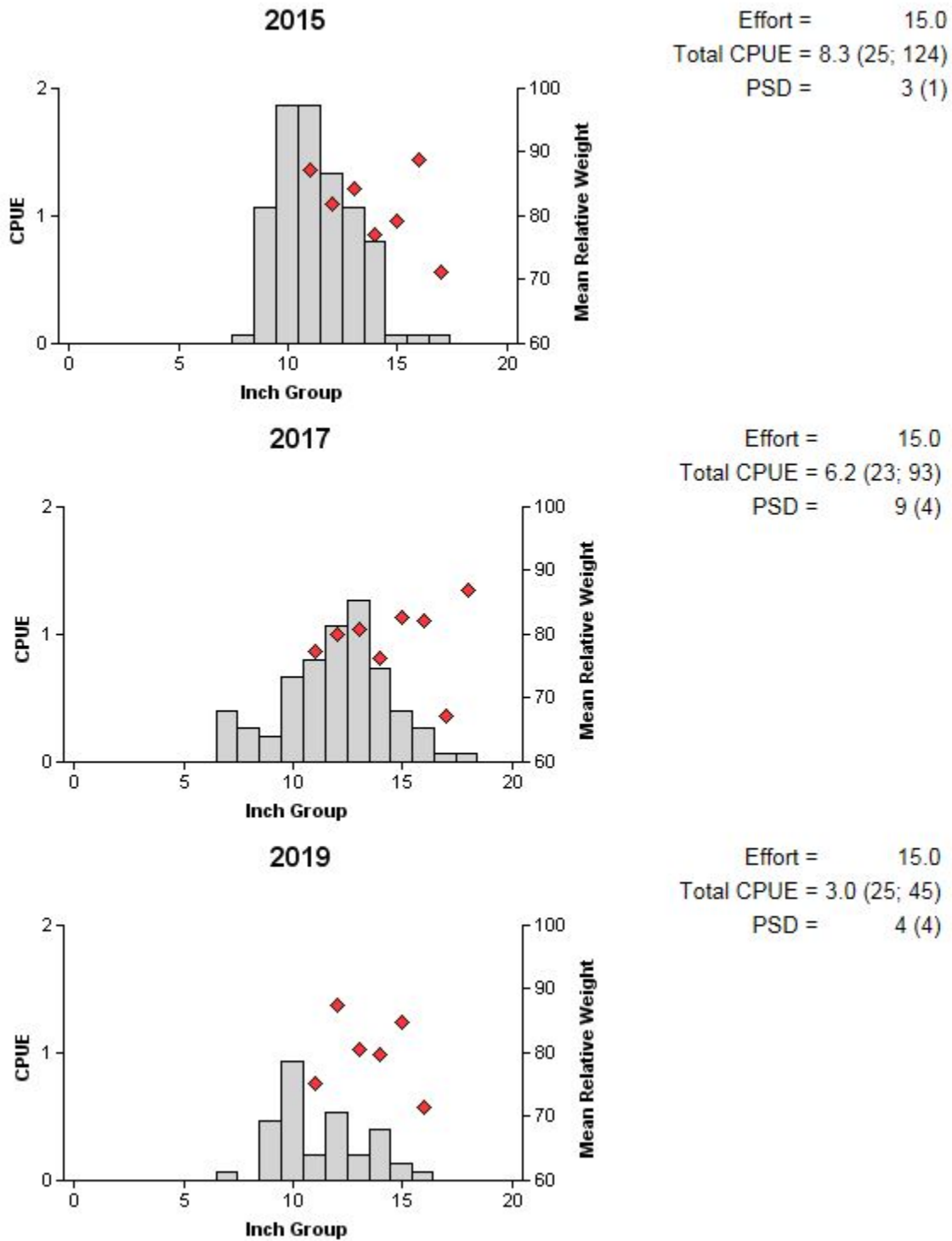


Figure 5. Number of Channel Catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill net surveys, Sam Rayburn Reservoir, Texas, 2015, 2017, and 2019.

## Catfishes

Table 10. Creel survey statistics for catfishes at Sam Rayburn Reservoir, Texas, from June 2012 through May 2013, June 2014 through May 2015, and June 2018 through May 2019. Total catch per hour is for anglers targeting catfishes and total harvest is the estimated number of catfishes harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2012/2013	2014/2015	2018/2019
Directed effort (h)	30,926 (37)	42,431 (22)	60,378 (20)
Directed effort/acre	0.28 (37)	0.38 (22)	0.54 (20)
Total catch per hour	2.96 (20)	1.65 (39)	2.68 (30)
Total harvest	35,844 (29)	25,124 (52)	44,071 (35)
Harvest/acre	0.32 (29)	0.23 (52)	0.40 (35)
Percent legal released	1	1	1

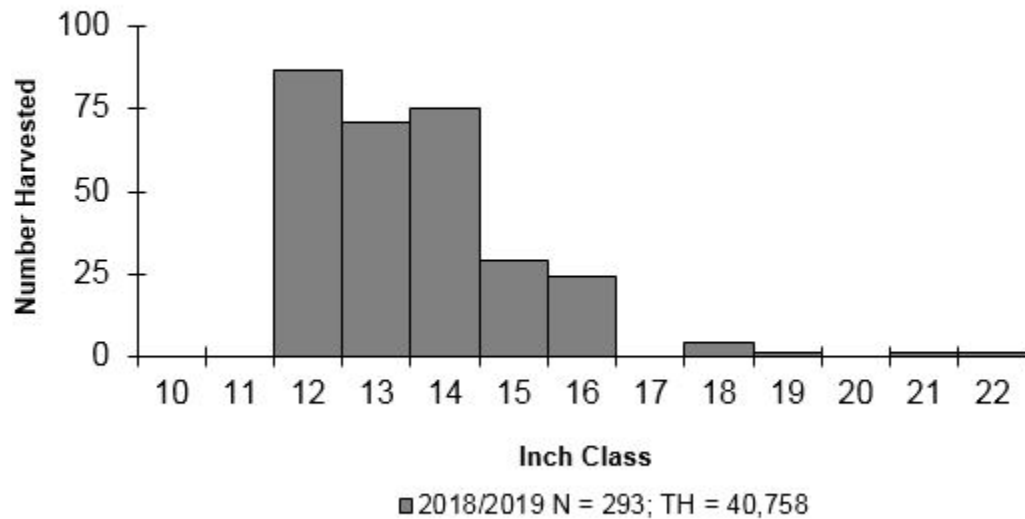


Figure 6. Length frequency of harvested Channel Catfish observed during creel surveys at Sam Rayburn Reservoir, Texas, June 2018 through May 2019, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

## White Bass

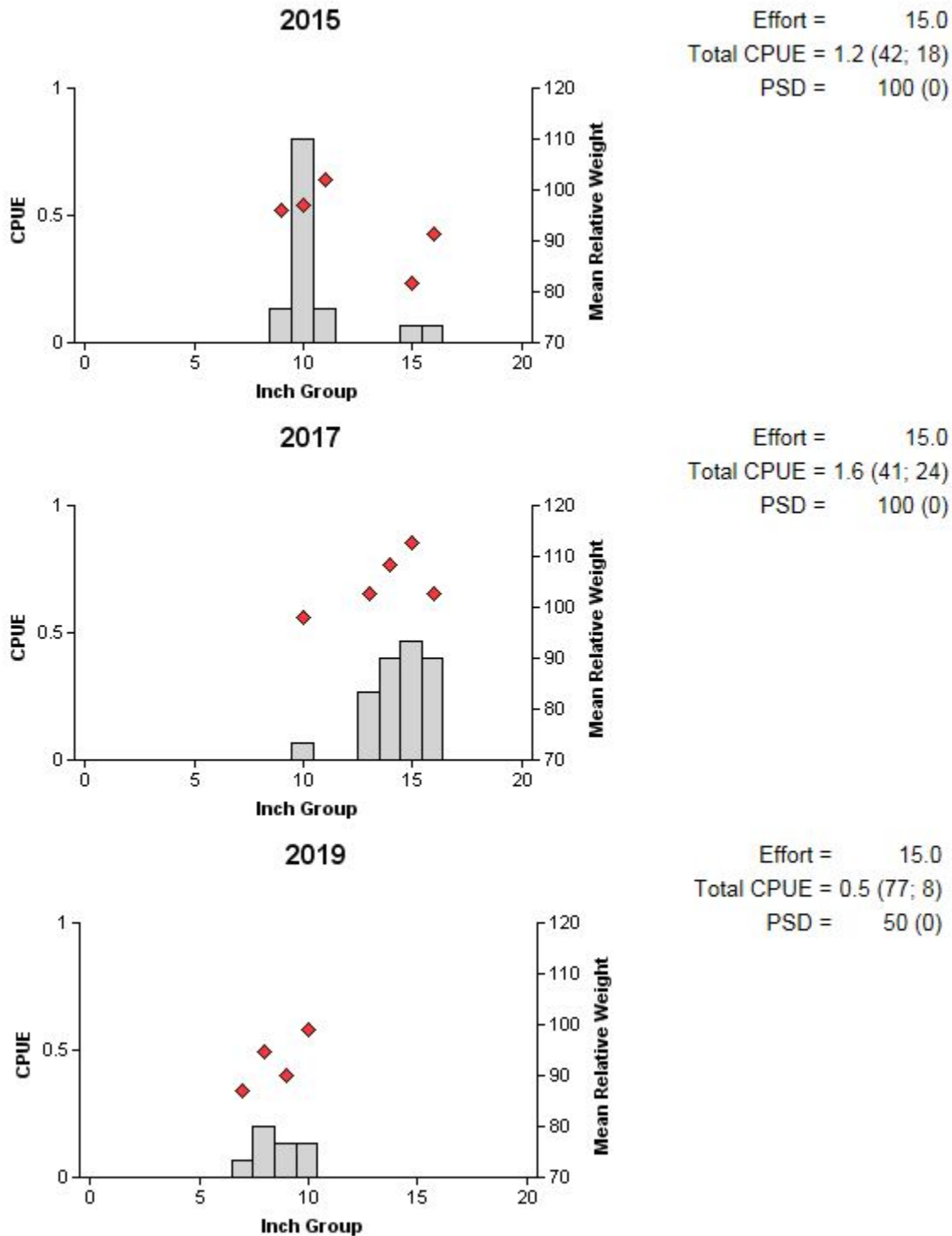


Figure 7. Number of White Bass caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill net surveys, Sam Rayburn Reservoir, Texas, 2015, 2017, and 2019.

## Temperate Basses

Table 11. Creel survey statistics for temperate basses at Sam Rayburn Reservoir, Texas, from June 2012 through May 2013, June 2014 through May 2015, and June 2018 through May 2019. Total catch per hour is for anglers targeting temperate basses and total harvest is the estimated number of temperate basses harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2012/2013	2014/2015	2018/2019
Directed effort (h)		4,569 (43)	403 (147)
Directed effort/acre		0.04 (43)	0.01 (147)
Total catch per hour		2.68 (45)	18.86 (.)
Total harvest	398 (447)	15,715 (71)	4,181 (325)
Harvest/acre	<0.01 (447)	0.14 (71)	0.04 (325)
Percent legal released	87	32	48

## Spotted Bass

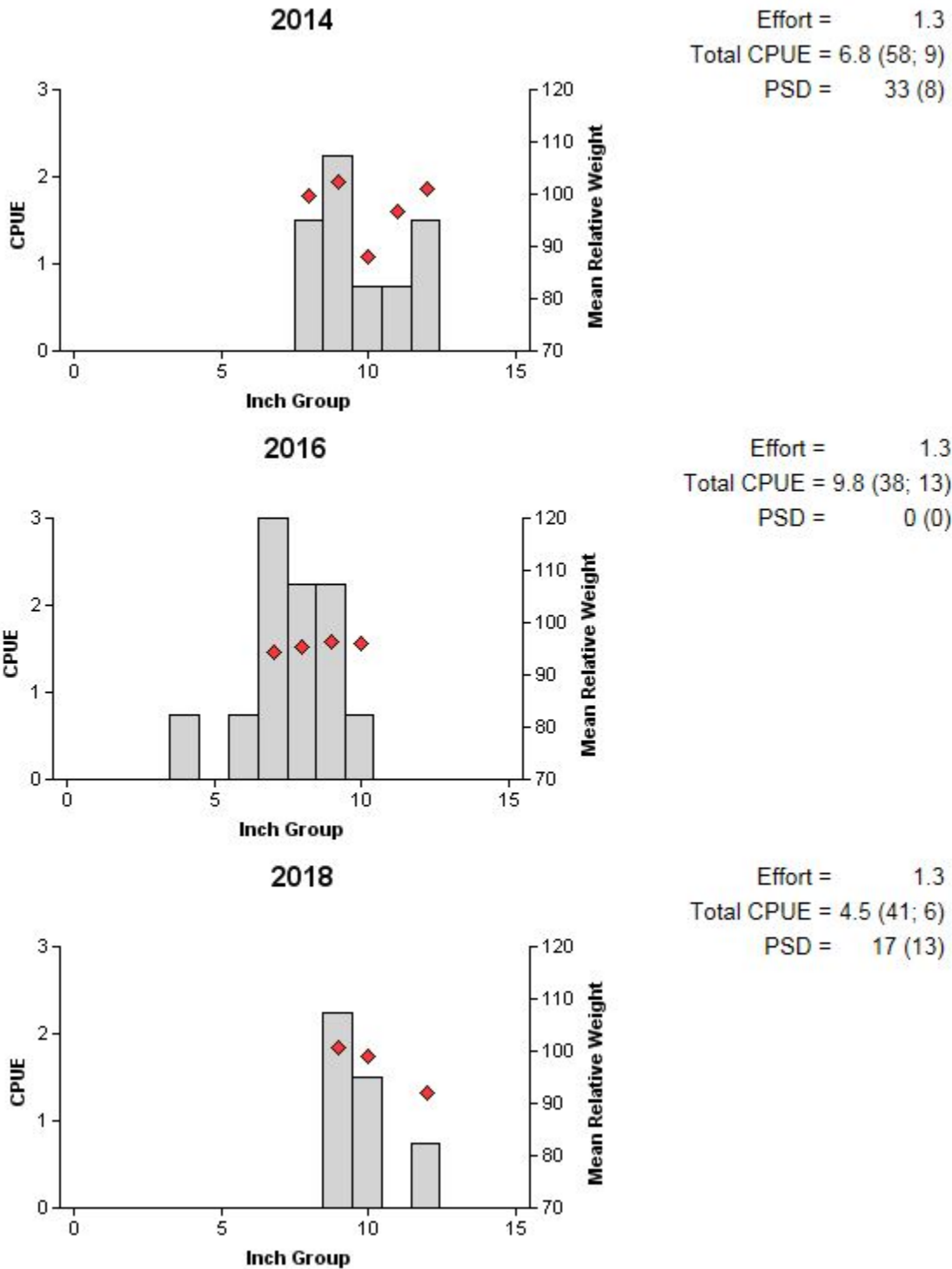


Figure 8. Number of Spotted Bass caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sam Rayburn Reservoir, Texas, 2014, 2016, and 2018.

## Largemouth Bass

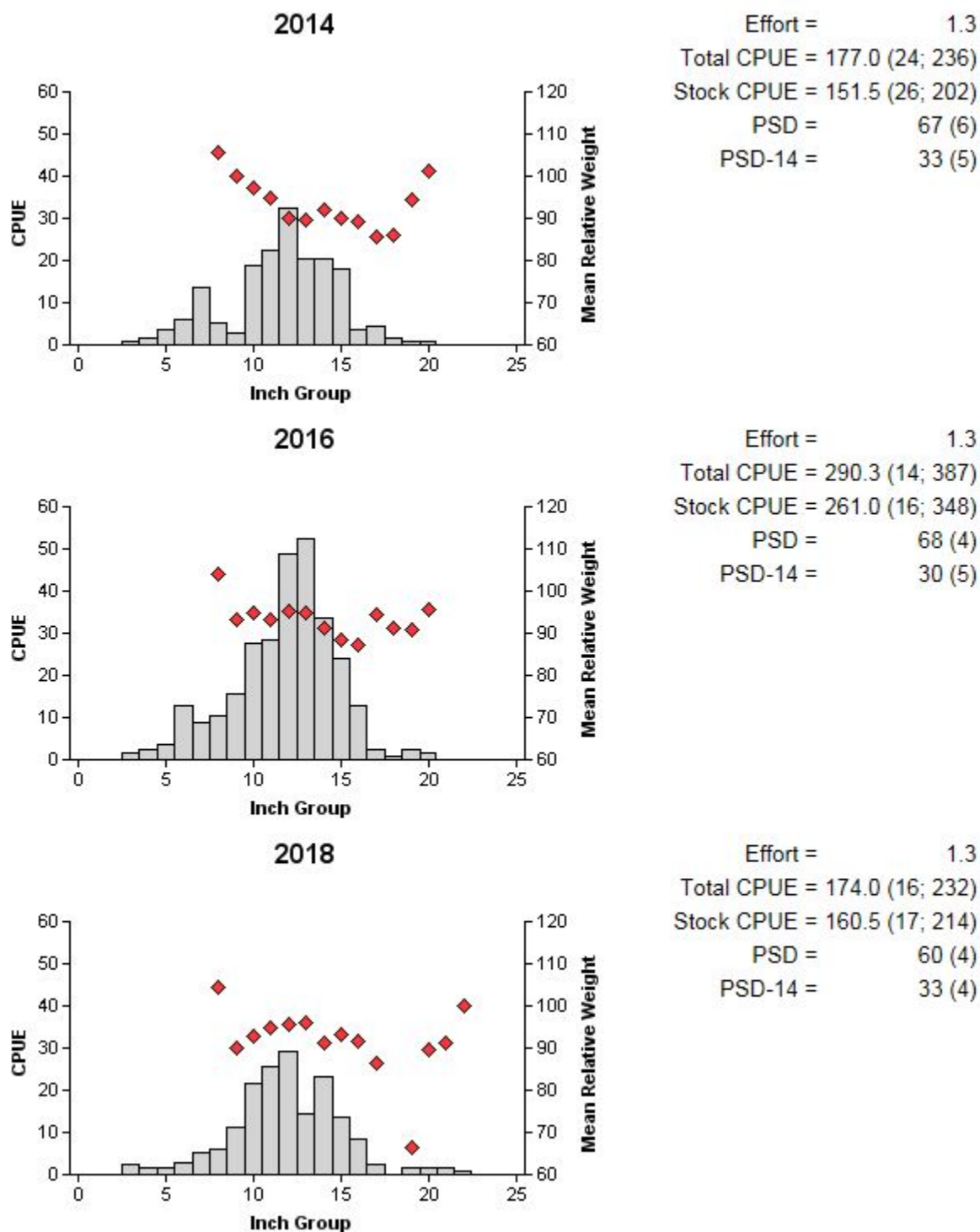


Figure 9. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sam Rayburn Reservoir, Texas, 2014, 2016, and 2018.



## Black Basses

Table 12. Creel survey statistics for black basses at Sam Rayburn Reservoir, Texas, from June 2012 through May 2013, June 2014 through May 2015, and June 2018 through May 2019. 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		
	2012/2013	2014/2015	2018/2019
<b>Directed angling effort (h)</b>			
Tournament	135,145 (22)	136,741 (19)	209,727 (21)
Non-tournament	122,680 (22)	192,628 (22)	205,226 (18)
All black bass anglers combined	257,825 (22)	329,368 (21)	414,953 (19)
Angling effort/acre	2.3 (22)	3.0 (21)	3.7 (19)
Catch rate (number/h)	1.3 (12)	1.5 (16)	1.3 (11)
<b>Harvest</b>			
Non-tournament harvest	11,453 (51)	27,847 (38)	26,399 (38)
Harvest/acre	0.1 (51)	0.3 (38)	0.2 (38)
Tournament weigh-in and release	12,645 (43)	37,837 (28)	73,728 (27)
<b>Total catch</b>	<b>262,560 (25)</b>	<b>356,748 (25)</b>	<b>466,585 (24)</b>
< 4.0 lbs	255,227 – 97.2%	347,823 – 97.5%	453,439 – 97.2%
≥ 4-6.9 lbs	6,525 – 2.5%	7,461 – 2.1%	11,803 – 2.5%
≥ 7-9.9 lbs	807 – 0.3%	1,464 – 0.4%	1063 – 0.2%
≥ 10 lbs	0	0	280 – 0.1%
Percent legal released (non-tournament)	74	60	71

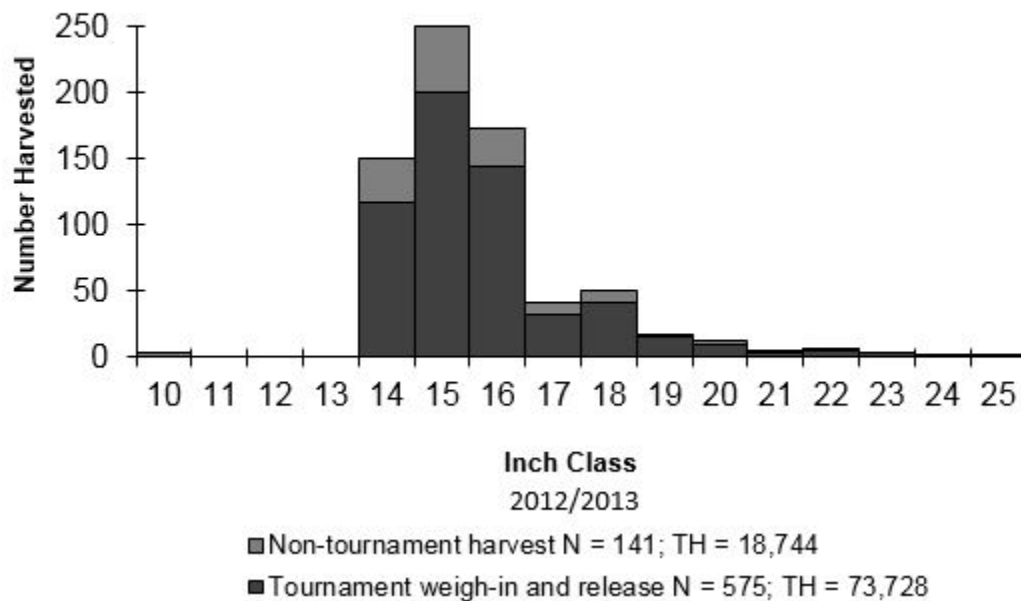


Figure 10. Length frequency of harvested Largemouth Bass observed during creel surveys at Sam Rayburn Reservoir, Texas, June 2014 through May 2015, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

## Crappie

Table 13. Creel survey statistics for crappies at Sam Rayburn Reservoir, Texas, from June 2012 through May 2013, June 2014 through May 2015, and June 2018 through May 2019, 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		
	2012/2013	2014/2015	2018/2019
Directed effort (h)	32,867 (32)	46,659 (21)	60,377 (20)
Directed effort/acre	0.29 (32)	0.42 (21)	0.54 (20)
Total catch per hour	1.93 (24)	3.68 (45)	2.87 (22)
Total harvest	46,243 (40)	74,292 (30)	85,388 (29)
Harvest/acre	0.42 (40)	0.67 (30)	0.77 (29)
Percent legal released	0	0	<1

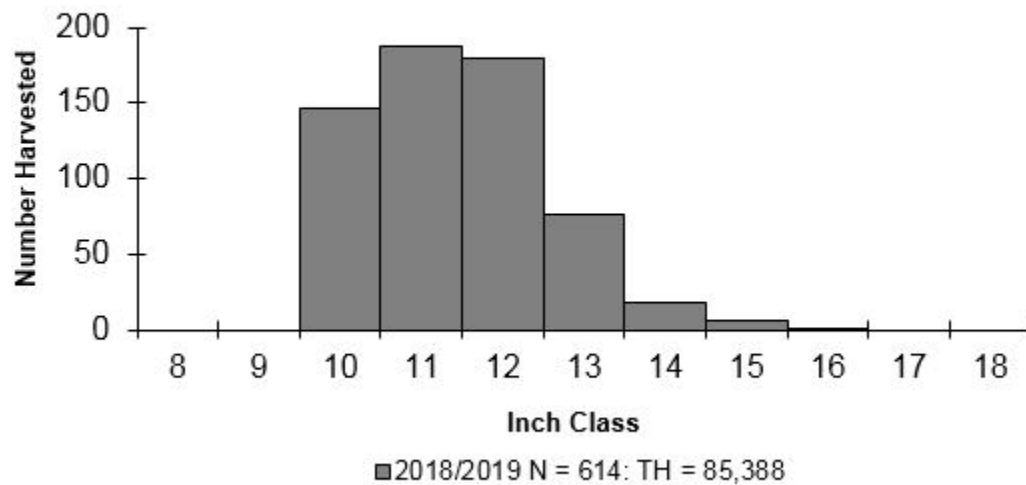


Figure 11. Length frequency of harvested crappie observed during creel surveys at Sam Rayburn Reservoir, Texas, June 2018 through May 2019, all anglers combined. N is the number of harvested crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

## 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. Standard survey denoted by S and additional survey denoted by A.

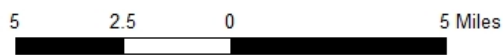
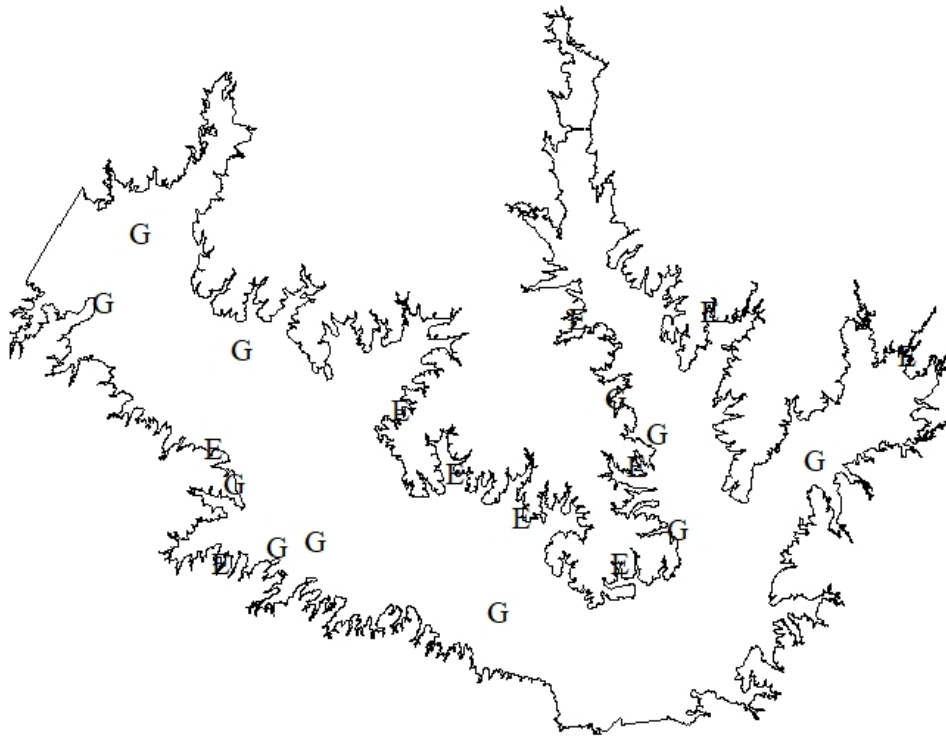
	Survey year			
	2019-2020	2020-2021	2021-2022	2022-2023
Angler Access				S
Vegetation	A	A	A	S
Electrofishing – Fall		A		S
Gill netting		A		S
Creel survey				A
Report				S

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

Number (N) and catch rate (CPUE) (RSE in parentheses) of all target species collected from all gear types from Sam Rayburn Reservoir, Texas, 2018-2019. Sampling effort was 15 net nights for gill netting and 1.3 hours for electrofishing.

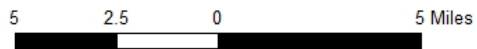
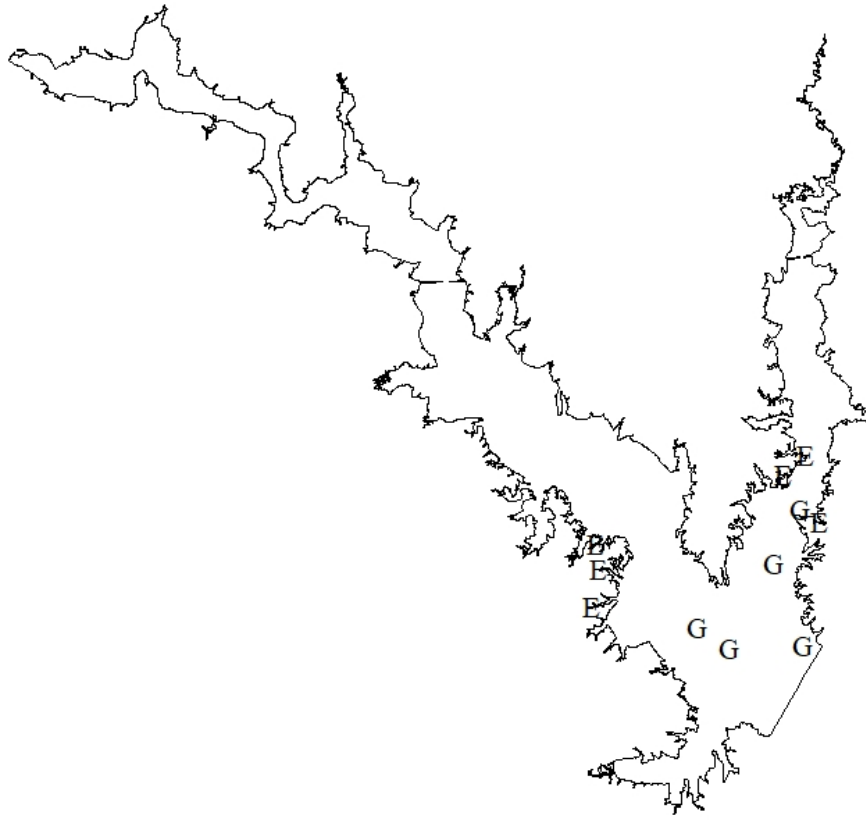
Species	Gill Netting		Electrofishing	
	N	CPUE	N	CPUE
Gizzard Shad			162	121.5 (41)
Threadfin Shad			2,480	1,860.0 (44)
Blue Catfish	48	3.2 (27)		
Channel Catfish	45	3.0 (25)		
White Bass	8	0.5 (77)		
Redbreast Sunfish			2	1.5 (68)
Warmouth			2	1.5 (100)
Bluegill			387	290.3 (14)
Longear Sunfish			17	12.8 (29)
Redear Sunfish			49	36.8 (35)
Redspotted Sunfish			7	5.3 (51)
Spotted Bass			6	4.5 (41)
Largemouth Bass			232	174.0 (16)
White Crappie	2	0.1 (68)		
Black Crappie	17	1.1 (41)		

## APPENDIX B – Map of sampling locations



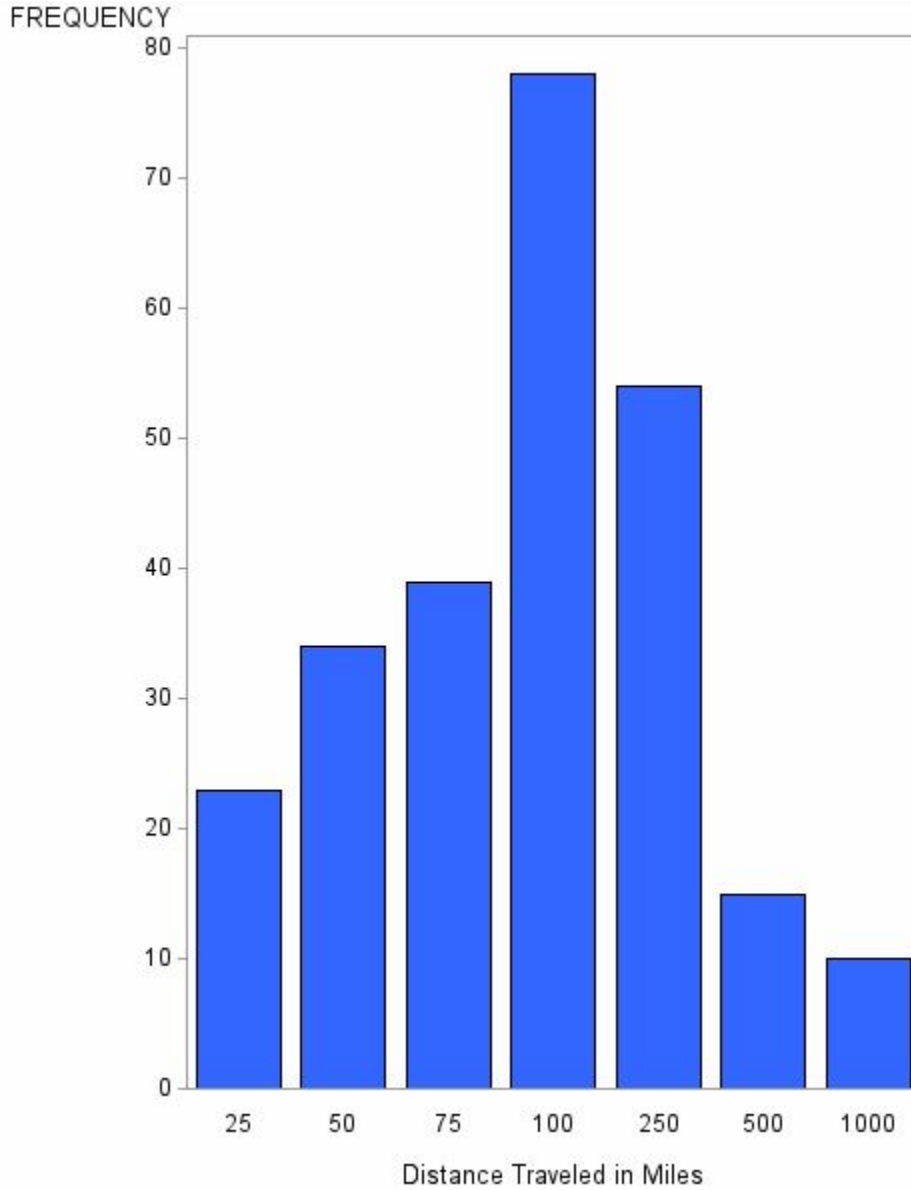
Location of sampling sites, lower Sam Rayburn Reservoir, Texas, 2018-2019. Gill net and electrofishing stations are indicated by G and E, respectively. Water level was near full pool at time of sampling.

## APPENDIX B – Map of sampling locations



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

## APPENDIX C – Creel ZIP code data



Frequency of anglers that traveled various distances (miles) to Sam Rayburn Reservoir, Texas, as determined from the June 2018 through May 2019 creel survey.



## APPENDIX D - Black bass tournament results

Results from individual and team format bass tournaments at Sam Rayburn Reservoir, 2014 to 2018. 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 <sup>st</sup> place weight	2 <sup>nd</sup> place weight	3 <sup>rd</sup> place weight	% total weights > 15 lbs.	% catching limit	Big bass weight
<b>Individual</b>							
2014	15	21.4	19.5	18.2	8.4	30.5	8.1
2015	11	19.8	18.0	17.1	6.2	44.1	7.7
2016	5	23.9	23.0	22.1	20.1	62.3	10.1
2017	11	26.6	23.7	22.1	31.2	78.6	8.7
2018	7	22.4	19.6	17.9	8.8	52.3	8.3
<b>Team</b>							
2014	18	22.7	20.6	19.6	11.1	41.1	8.9
2015	8	26.3	21.8	20.7	12.2	40.6	10.0
2016	11	25.4	23.2	22.0	23.9	66.8	9.5
2017	9	27.5	25.2	20.7	24.6	58.0	9.2
2018	13	29.1	26.1	24.2	20.7	51.5	9.2

Results of Sealy Outdoors McDonald's Big Bass Splash tournaments, Sam Rayburn Reservoir, 2015 – 2019. Weights are expressed in pounds. Sample sizes in parentheses.

Year	Average weight of Top 10 fish/hour	Average weight of Top 10 fish/day	Average weight of overall top 10 fish	Weight of overall big fish
2015	6.8 (210)	8.3 (30)	9.1 (10)	10.0
2016	6.9 (210)	8.7 (30)	9.6 (10)	12.0
2017	6.3 (210)	7.9 (30)	8.6 (10)	9.6
2018	6.7 (210)	8.6 (30)	9.6 (10)	12.1
2019	6.7 (210)	8.5 (30)	9.3 (10)	10.0



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