Alan Henry Reservoir

2021 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-4

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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Survey and Management Summary

Fish populations in Alan Henry Reservoir were surveyed in 2018, 2019, 2020, and 2021 using electrofishing, in 2019 using baited tandem hoop netting, and in 2020 using trap netting. Anglers were surveyed from April 1 through June 30 in 2018 and 2021 with a creel survey. Historical data are presented with the 2018-2021 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

Reservoir Description: Alan Henry Reservoir was constructed in 1993 on the South Fork of the Double Mountain Fork of the Brazos River. It is located 6 miles east of Justiceburg in Garza County, Texas. At conservation pool (2,220 feet above mean sea level; FMSL), Alan Henry Reservoir is a 2,884-acre impoundment. Productivity of Alan Henry Reservoir was characterized as low. Habitat features consisted of flooded terrestrial vegetation, rocks, and very small amounts of native submerged aquatic plants.

Management History: Sport fish in the reservoir included Blue Catfish, Channel Catfish, Flathead Catfish, Alabama Bass, Largemouth Bass, and White Crappie. Alabama Bass were managed with restrictive harvest regulations of 18-inch minimum length limit (MML) since their introduction in 1996 until September 1, 2011 in order to establish a viable population. In 2002, the Largemouth Bass harvest regulation was liberalized with the allowance of 2 fish under the 18-inch MML to promote recruitment of fish into size classes larger than the 18-inch MML. The Alabama Bass regulation was changed in 2011 from the 18-inch MML to be included with the Largemouth Bass regulation mentioned above (no MML on all black bass, but no more than to under 18 inches). To encourage more harvest of small black bass, the Alabama Bass regulation was further liberalized in 2019, by placing the Alabama Bass under statewide spotted bass regulations.

Fish Community

- **Prey species** Gizzard Shad and Bluegill are the primary prey species in the reservoir. Threadfin Shad have been introduced to the reservoir, but their relative abundance is low.
- **Catfishes:** Blue Catfish, Channel Catfish, and Flathead Catfish have been observed in the reservoir, but lack of angler effort to pursue catfish species and difficulties in sampling adequate numbers indicate that all three species are present in low numbers.
- **Black basses:** From 2001 to 2011 electrofishing catch rates of Alabama Bass exhibited a general increase. Since 2014, while there have been spikes in the electrofishing catch rates that coincide with heavy rain event years and reservoir level increases, non-rain event years appear to have stabilized catch rates between 20 and 30 fish collected per hour of sampling. The 2021 Largemouth Bass catch rate (58.3 fish per hour) was more than double the Alabama Bass catch rate (23.7 fish per hour). All Largemouth Bass sampled were less than 18 inches in length.
- **White Crappie:** Forty-eight White Crappie were collected during the 2021 electrofishing survey. While crappie as large as 15 inches were surveyed, the majority of fish sampled were smaller than the 10-inch minimum length limit. An intensive trap net survey was conducted in 2020 and resulted in 341 crappie being surveyed. While the majority of fish surveyed were smaller than 10 inches, there were several fish surveyed that ranged from 10 to 13 inches. Survey results indicated that the majority of crappie appear to be concentrated in the extreme upper end of the reservoir.

Management Strategies: Conduct additional electrofishing surveys in 2022, 2023, 2024, and 2025 to monitor continued survival and abundance of Threadfin Shad and abundance and size structure of other forage species. Collect black bass species during all electrofishing surveys for age and growth analysis. Inform the public about the negative impacts of aquatic invasive species. Access and vegetation surveys will be conducted in 2025.

Introduction

This document is a summary of fisheries data collected from Alan Henry Reservoir in 2018 - 2021. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2018-2021 data for comparison.

Reservoir Description

Alan Henry Reservoir is a 2,884-acre impoundment on the South Fork of the Double Mountain Fork of the Brazos River. It is located 6 miles east of Justiceburg, Garza County, Texas. The reservoir is owned by the City of Lubbock, Lubbock County, Texas and is operated by the Brazos River Authority. The reservoir is used for recreational purposes and as a water supply. Alan Henry Reservoir first filled to capacity in October of 2004, and the water level remained within 5 feet of conservation pool until 2011 (Figure 1). From 2011 through mid-2014 there was a steady decline in water level (16.3 feet below conservation pool) due to pumping by the municipal supply and evaporation. The reservoir filled to capacity in 2015, and since that time has remained within 6 feet of conservation pool (Figure 1). Alan Henry Reservoir is characterized as a deep oligotrophic reservoir with low productivity; Trophic State Index (TSI) ranks the reservoir as the third clearest lake in Texas with a secchi mean of 10.8 feet and a Chl α TSI of 37.8 (Texas Commission on Environmental Quality 2020). Since impoundment of the reservoir, secchi disk readings have shown wide fluctuations from a low of 1.3 feet to a high of 15.4 feet; however, most historic secchi disk readings range from 6 -13 feet. At the time of sampling, the habitat consisted primarily of boulder, rock, and flooded terrestrial vegetation. Boat access was limited to one public boat ramp at the Sam Wahl Recreation Area operated by the City of Lubbock. Due to the physical characteristics of the shoreline, shoreline access is limited to a floating fishing dock and a few areas adjacent to the public ramp. The fishing dock is the only ADA compliant facility. Other descriptive characteristics for Alan Henry Reservoir are in Table 1.

Angler Access

Alan Henry Reservoir has one public boat ramp, four private boat ramps, and one city owned restricted access boat ramp. The public ramp, located at the Sam Wahl Recreation Area, was available for use by anglers throughout the survey period. Additional boat ramp characteristics are in Table 2. Shoreline access is limited to the public boat ramp area and the fishing dock located at the Sam Wahl Recreation Area.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Clayton and Munger 2018) included:

1. Stock Bluegill and Threadfin Shad at 50 fish/acre for four years to boost Bluegill population and to establish a self-sustaining population of Threadfin Shad.

   Action: Bluegill were stocked in 2019, 2020, 2021, and scheduled for 2022. Threadfin Shad were purchased from a private hatchery and stocked at a rate of about 10 fish/acre in 2019, 2020, and 2022.

2. Change current black bass regulation to statewide black bass regulations.

   Action: Online and mail-in angler surveys were conducted in 2018 about possible regulation change options. In 2019, Alabama Bass were placed under the statewide Spotted Bass regulation and Largemouth Bass remained under their current regulation of no minimum length limit with no more than 2 < 18 inches in the daily bag of 5 black bass in any combination.

3. Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically.

Action: Cooperated with the controlling authority and educated the public when opportunities arise. The controlling authority, U.S. National Park Service, is aware of most invasive species concerns and works to address any concerns and keep the public informed.

Harvest regulation history: Sport fishes in Alan Henry Reservoir are currently managed with statewide regulations with the exception of Largemouth Bass (Table 3). Until September 1, 1997, Largemouth Bass were managed under a 3 fish daily bag and 18-inch minimum length limit, and Smallmouth Bass were managed under a 5 fish daily bag limit and 14-inch minimum length limit. Alabama Bass were introduced to Alan Henry in 1996. On September 1, 1997, the harvest regulation for Smallmouth Bass and Alabama Bass changed to a 3 fish daily bag in aggregate and 18-inch minimum length limit. The harvest regulation for Largemouth Bass was then changed to a 5 fish daily bag and 18-inch minimum length limit. On September 1, 2002, the Largemouth Bass harvest regulation changed to no minimum length limit and 5 fish bag with no more than two Largemouth Bass under 18 inches. On September 1, 2011, the black bass regulation was simplified to, “For black bass and their hybrids there is no MLL; however, only 2 may be less than 18 inches”. The daily bag was changed to include 5 black bass in any combination. Anecdotal evidence, supported by creel survey results, suggested that most anglers were unwilling to harvest only 2 short black bass. In an effort to encourage more harvest of smaller black bass, the Alabama Bass regulation was further liberalized, in 2019, by placing Alabama Bass under the statewide Spotted Bass regulation of no minimum length limit with a total of 5 black bass in any combination in the daily bag limit. On September 1, 2021, the statewide harvest regulation for Channel Catfish, Blue Catfish, their hybrids and subspecies changed to no minimum length limit with a 25 fish daily bag (in any combination – only 10 can be 20 inches or greater in length). Current regulations are found in Table 3.

Stocking history: Stocking of Alan Henry Reservoir began in 1993 with the introductions of Gizzard Shad, Blue Catfish, Channel Catfish, Smallmouth Bass, Florida Largemouth Bass, and White Crappie. Alabama Bass were introduced to Alan Henry Reservoir in 1996. In 2019, a four-year Bluegill and Threadfin Shad stocking plan was started; Bluegill were stocked in 2019, 2020, 2021, and 2022. Threadfin Shad were stocked in 2019, 2020, and 2022. ShareLunker Largemouth Bass were stocked in 2020. The complete stocking history is available in Table 4.

Vegetation/habitat management history: In September 2019, native plants were obtained from the TPWD plant nursery. Plants requested and planted in the reservoir included 6 American Pond Weed, 6 American White Water Lily, 6 Water Willow, and 12 Water Stargrass. Plants were planted in approximately 2 feet of water in enclosed structures; soon after planting there was a lake level increase. Some of the plants appear to have survived, but there has been no observed growth or expansion of the new plants.

Water transfer: Alan Henry Reservoir is primarily used for municipal water supply and recreation. One permanent pumping station on the reservoir transfers water to the Southwest Water Reclamation Plant in Lubbock, Texas. As part of Lubbock’s Strategic Water Supply Plan, the city has proposed to divert storm water and treated city effluent from the North Fork of the Double Mountain Fork of the Brazos River (the natural drainage for the City of Lubbock) to the South Fork (the natural drainage for Alan Henry Reservoir), thereby increasing water availability for the City of Lubbock; this proposal has not yet been approved. Currently no interbasin transfers are known to exist.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Alan Henry Reservoir (Clayton and Munger 2018). Primary components of the OBS plan are listed in Table 5. All electrofishing and tandem hoop net survey sites were randomly selected, and trap net sites were biologist selected. All surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Electrofishing – Largemouth Bass, Alabama Bass, sunfishes, Threadfin Shad, and Gizzard Shad were collected by electrofishing (3 hours at 36, 5-min stations). The reservoir was divided into approximately 3 equal sections and 12 random stations were selected within each section. 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 (N=73) and Alabama Bass (N=18) were determined using otoliths collected from all black bass surveyed between 305 mm to 482 mm (range 12.0 to 18.9 inches).

Trap netting – White Crappie were collected using trap nets (30 net nights at 30 biologist-selected stations). CPUE for trap netting was recorded as the number of fish caught per net night (fish/nn).

Tandem Hoop nets – Channel Catfish were collected using 5 tandem hoop-net series at 5 stations. Nets were baited with soap and deployed for 2-night soak durations. CPUE for tandem hoop netting was recorded as the number of fish caught per tandem hoop net series (fish/series).

Genetics – Genetic analysis of Largemouth Bass and Alabama Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017). Micro-satellite DNA analysis was used to determine genetic composition of individual fish since 2005. Electrophoresis analysis was used prior to 2005.

Statistics – Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight (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 – An access-point creel survey was conducted from April 1, 2021 through June 30, 2021. 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).

Habitat – A structural habitat survey was last conducted in August 2017, (Clayton and Munger 2018), and a vegetation survey was conducted in August 2021. Vegetation was assessed with the random point method (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Water level – Source for water level data was the United States Geological Survey (USGS 2022).

Results and Discussion

Habitat: Littoral zone habitat consisted primarily of natural shoreline, boulder, and terrestrial vegetation (Table 6). Aquatic vegetation was observed in approximately 12% of the reservoir and consisted of American pondweed, coontail, and a small stand of cattails (Table 7).

Creel: Directed fishing effort by anglers was 74.1% for black bass species combined (Table 8). Largemouth Bass were the most sought-after species (44.4%), followed by any black bass (27.5%), and White Crappie (17.2%) (Table 8). Total fishing effort for all species at Alan Henry Reservoir was 37,245.3 hours from April 1, 2021 to June 30, 2021, and anglers spent an estimated $400,205 on trip expenditures (Table 9).

Prey species: In 2021 electrofishing catch rate of Gizzard Shad was 161/h; much higher than 2019 and 2020 (16.0/h and 36.5/h respectively). Gizzard Shad IOV was 8, indicating that the majority were of sizes

too large for existing predators. This was much lower than IOV estimates from 2019 (IOV=53) (Figure 2); however, this was identical to 2020 (IOV=8) and typical of most years. The higher CPUE in 2021 (CPUE=161.0/h) is most likely attributed to a combination of factors including a brief "new-lake" effect and flooded habitat due to several heavy rain events in 2020 and 2021 and successive forage stockings that may have reduced predation on the existing Gizzard Shad population. The catch rate for Bluegill was slightly lower in 2021 (CPUE=65.0/h) than in 2020 (CPUE=78.0/h) but much higher than 2019 (CPUE=38.0/h) (Figure 3). The first Threadfin Shad was detected in the reservoir in 2019 (CPUE=2.0/h) when 4 fish were sampled. However, the shad were collected about 5 miles from the closest stocking location. In 2021, the catch rate for Threadfin Shad increased to 10.7/h with 32 individuals observed in the survey. Objective-based sampling (OBS) objectives for all prey species were achieved.

Channel Catfish: While Channel Catfish are the most abundant catfish species in the reservoir; catch rates for Channel Catfish surveyed with gill nets have historically indicated low relative abundance. In an effort to improve Channel Catfish data, baited tandem hoop nets were used in summer 2020. Five hoop nets resulted in only two Channel Catfish collected (Figure 4). The 2021 creel survey indicated only 0.2% of angler directed effort for Channel Catfish, with no reported catch or harvest of fish. Due to the low catch-rate with baited hoop nets no OBS objectives were achieved.

Alabama Bass: Electrofishing catch rate of Alabama Bass decreased from 47.0/h in 2020 to 23.7/h in 2021, but it is similar to 21.0/h in 2019 (Figure 5). Size structure was dominated by smaller individuals with most fish sampled measuring 12 inches or less. Body condition in 2021 was similar to previous surveys with relative weights for most size classes averaging between 70 and 90 (Figure 5). Catch rates between 2001 and 2021 have shown a high degree of fluctuation with a generally increasing trend until 2014 (Figure 6). Since 2014, catch rates appear stabilized with most years having a catch rate between 20.0/h and 30.0/h (Figure 6). Size structure since 2001 has been dominated by smaller individuals; few fish over 15 inches have ever been sampled (Figure 6). The 2009 creel survey reported the first directed effort specifically targeting Alabama Bass (74.2 hours). All creel surveys since 2009, except for 2018, have shown a small amount of directed angler effort for Alabama Bass (70 hours in 2013, 253 hours in 2015, and 833 hours in 2021) (Table 10). Total estimated catch for Alabama Bass during the Spring quarter of 2021 was 21,360 with an estimated harvest of 1,232 fish (Table 10). Although harvest has shown an overall increasing trend, harvest continues to remain low, and percent legal/release (94.2%) remains high. Fifty-seven Alabama Bass measuring between 10 and 19 inches were reported during the 2021 creel survey (Figure 7). In past years anglers have suggested that the Alabama Bass were hybridizing with Largemouth Bass. In 2010, a large genetics study was conducted to evaluate the possibility of hybridization, and no instances of hybridization were found. As part of the black bass genetic analysis that was being conducted in 2021, fin clips were collected from any black bass that exhibited physical characteristics of both Largemouth Bass and Alabama Bass and evaluated for the possibility of hybridization. Thirteen fin clips were collected and analyzed for the possibility of hybridization. Three fin clips did not yield enough DNA for evaluation. The other ten samples tested as 100% Alabama Bass genetics, and no hybridization was detected. Age and Growth analysis on Alabama Bass indicates that growth has increased slightly in age 2 and 3 fish, but growth appears to stall around 14 inches (Figure 8). Increased growth in younger fish is most likely due to the forage species stockings that have occurred in 2018 – 2021. Future evaluations may determine if older fish will eventually exhibit an increase in growth. OBS objectives for size structure, age and growth, and genetics were achieved; however, objectives for abundance (RSE-stock ≤25) were not achieved, and for body condition (5 fish per inch class) objectives were achieved for most inch classes.

Largemouth Bass: The electrofishing catch rate of Largemouth Bass was 58.3/h in 2021; this was much higher than 2020 (9.0/h) and 2019 (25.0/h) (Figure 9). Relative weight in 2021 ranged between 80 and 90 for most size classes and was comparable to body condition in previous surveys (Figure 9). Catch rates since 2001 show a decreasing trend, and historically very few fish over 18 inches have been surveyed; no fish over 18 inches were surveyed in 2021 (Figure 10). Creel survey data from 2021 shows that black bass species are the most sought-after fish category in the reservoir with a combined total of 74.1% of effort (Largemouth Bass = 44.4%, black bass = 27.5%, and Alabama Bass = 2.2%); this is a slight increase over previous creel surveys (Table 11). Two Largemouth Bass measuring 15 inches were measured during the 2021 creel survey, and there was a total estimated harvest of 43 fish (Figure 11). Florida largemouth bass influence was 80% and Florida genotype was 29% (Table 12). Recent age and

growth analysis appear to show a slight increase in growth for age 2 and 3 fish; however, growth appears to stall around 14 inches with few fish sampled reaching over 15 inches (Figure 12). An extensive electrofishing survey was conducted in 2010, and the results indicated that the majority of Largemouth Bass sampled were found in the upper third, a mixture of Largemouth Bass and Alabama Bass in the middle third, and predominantly Alabama Bass in the lower third of the reservoir Appendix D. Sampling for 2017 and 2021 showed the same general trend of black bass habitat preference Appendix D. All three survey years show a continued preference of Largemouth Bass for the shallower water, especially on the upper end of the reservoir. OBS objectives for abundance, size structure, age and growth, and genetics were achieved. Objectives for body condition (5 fish per inch class) were achieved for most inch classes.

White Crappie: Several attempts have been made to improve crappie catch rates. White Crappie are often encountered during electrofishing surveys and gill net surveys, but typically only low numbers are collected during trap net surveys. In an attempt to improve crappie data, a large trap net survey consisting of 30 biologist selected stations was conducted in 2020. Catch rate was greatly improved from the typical CPUE of <0.1/nn to a CPUE of 11.4/nn (Figure 13). Three hundred and forty-one White Crappie measuring between 2 and 12 inches were collected during the 2020 trap net survey (Figure 13). The majority of fish were collected in 4 of the 30 nets that were located in the extreme upper end of the reservoir on the main stem of the South Fork of the Double Mountain Fork of the Brazos River, and eighteen of the 30 trap nets caught no crappie. Creel survey data from 2021 showed similar directed angler effort (6,392 hours) to most past creel survey years (Table 13). White Crappie are a harvest-oriented species with only 13.9 percent legal release (Table 13) and were the third most sought after species category in the reservoir with 17.2% of the directed angler effort. There were 56 crappie ranging between 10 and 16 inches measured during the 2021 creel survey, and an estimated total harvest of 1,868 crappie (Figure 14). OBS objectives for abundance were not achieved; however, objectives for size structure were achieved.

Fisheries Management Plan for Alan Henry Reservoir, Texas

Prepared – July 2022

ISSUE 1: Low CPUE of forage species, black basses, and Channel Catfish, and poor body condition of black basses appear to be the result of the reservoir's low productivity. Black bass are the most popular sport fish in Alan Henry (44.4% of angler effort for Largemouth Bass, 27.5% of angler effort for any black bass species, and 2.2% for Alabama Bass). Managing sport fish populations given low productivity is a major concern in this reservoir, and general monitoring data indicate black bass and forage populations cannot support quality fishing opportunities.

MANAGEMENT STRATEGIES

1. Encourage anglers to harvest more Alabama Bass and Largemouth Bass under 18 inches.
2. Monitor Gizzard Shad, Threadfin Shad, and Bluegill populations in the reservoir.
3. Monitor relative weights of Alabama Bass and Largemouth Bass.

ISSUE 2: Age and Growth data collected in 2021 indicates that age 2 and 3 Alabama Bass and Largemouth Bass have increased growth rate slightly, but growth appears to stall around 14 inches for both species.

MANAGEMENT STRATEGY

1. Collect and age all black bass collected during the annual electrofishing surveys to continue monitoring a potential increase in black bass growth.

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches, and plugging engine cooling systems. Giant salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for 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 maintain appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc… so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

Objective-Based Sampling Plan and Schedule (2022–2026)

Sport fish, forage fish, and other important fishes

Sport fishes in Alan Henry Reservoir include Channel Catfish, Blue Catfish, Flathead Catfish, Largemouth Bass, Alabama Bass, and White Crappie. The primary forage species are Bluegill and Gizzard Shad; however, Threadfin Shad have been introduced to the reservoir and catch rates have increased.

Low-density fisheries

Catfish: Blue Catfish and Flathead Catfish are typically collected in gill nets at a rate below 1.0/nn; past angler surveys indicated no directed effort toward either of these species. Channel Catfish are typically collected at a higher rate between 1.0/nn and 4.0/nn; the 2021 angler surveys indicate that Channel Catfish received only 0.2% (222 hours) of angler effort, and anglers fishing for any catfish make-up only 3% (1,128 hours) of angler effort.

Survey objectives, fisheries metrics, and sampling objectives

Black Bass: Largemouth Bass were the most sought-after fish (44.4% – 16,529 hrs – 6.2 hrs/acre of directed angler effort) at Alan Henry Reservoir according to the 2021 creel survey. Largemouth Bass and Alabama Bass are the only black bass species in the reservoir. Alabama Bass received 2.2% of directed effort in 2021. When combining the effort of anglers fishing for “Any” black bass (27.5%) with those specifically targeting Largemouth Bass and Alabama Bass, 74.1% of total directed effort is focused on black bass species. Relative abundance and size structure of Largemouth Bass and Alabama Bass has been collected annually since 1995 with fall nighttime electrofishing. Continuation of trend data with night electrofishing in the fall will allow for general monitoring of any large-scale changes in the black bass populations that may spur further investigation. Analysis of past sampling indicates that it would require a minimum of 28 electrofishing sites to achieve a CPUE-S RSE≤ 25 for Largemouth Bass. Effort for size structure estimation (PSD; 50 stock size fish minimum with 80% confidence) would also require a minimum of 28 random electrofishing stations. For Alabama Bass, achieving a CPUE-S RSE≤25 would require 31 stations, and effort for size structure estimation (PSD; 50 stock size fish minimum with 80% confidence) would require 26 stations.

For 2022, 2023, 2024, and 2025 eighteen 5-min electrofishing sites will be sampled (Table 14). Past sampling has shown that the majority of Largemouth Bass reside in the upper end of the reservoir where the water is shallower and contains more suitable habitat, and Alabama Bass tend to reside in the lower third of the reservoir especially near the dam. The reservoir will be divided into thirds and there will be 6 randomly selected sites from each third for a total of 18 survey sites. It is unlikely that we will be able to achieve an N≥50. All Black Bass of all sizes surveyed will be retained for Age and Growth analysis; in the event that fewer than 30 Largemouth Bass and 30 Alabama Bass are collected, additional electrofishing time will be added at biologist selected locations until 30 of each species are obtained. If 30 fish have not been obtained after an additional 30 minutes of electrofishing, sampling effort will be suspended. A standard access creel survey will be conducted from April 1, 2024 through June 30, 2024.

White Crappie: According to the 2021 creel survey, White Crappie at Alan Henry reservoir were targeted with 17.2% of direct angler effort. Due to trap net catch rates of White Crappie being highly variable, past trend data has only been able to determine presence/absence of the species. A 2020 trap net survey indicated that large numbers of White Crappie can be collected in minimal stations, if survey sites are concentrated in the upper end of the reservoir. To continue determining presence/absence we will document any White Crappie observed during the annual electrofishing surveys. The 2020 trap net survey indicates that as few as 5 biologist selected trap net stations may be adequate to achieve a CPUE-S RSE≤ 25 and size structure estimation (PSD; 50 fish minimum with 80% confidence). To continue developing improved size structure, relative abundance, and body condition data, White Crappie will be sampled with a minimum of 6 Trap nets during the 2025-2026 survey year (Table 14). Trap net stations will be biologist selected.

Forage Fish: Bluegill and Gizzard Shad are the primary forage species at Alan Henry Reservoir, and Threadfin Shad were introduced to the reservoir in 2018 and have been collected in 2020, and 2021 electrofishing surveys. Trend data has been collected annually since 1995. Productivity of the reservoir and relative abundance of forage appear to be limiting factors preventing better body condition and growth of black bass species; sampling, as per black bass above, will allow for general monitoring of large-scale changes and improvement of relative abundance, size structure, and IOV data for forage species. Historically, no additional effort has been extended beyond what is used for black bass sampling. Past electrofishing surveys indicate that the effort for black bass has been adequate to collect data needed to evaluate abundance (N>50) and size structure (PSD; 50 fish minimum, 80% confidence). Threadfin Shad will be monitored annually for survival, increasing abundance, and spreading in the reservoir by tracking CPUE and locations in the reservoir where fish are encountered. No additional effort will be extended beyond what is used for black bass sampling.

Literature Cited

Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Clayton, J., and C.Munger. 2018. Alan Henry Reservoir, 2017 fisheries management survey report. Texas Parks and Wildlife Department, Federal Aid Report F-221-M-3, Austin.

DiCenzo, V. J., M. J. Maceina, and M. R. Stimpert. 1996. Relations between reservoir trophic state and Gizzard Shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.

Guy, C. S., R. M. Neumann, D. W. Willis, and R. O. Anderson. 2007. Proportional size distribution (PSD): a further refinement of population size structure index terminology. Fisheries 32(7): 348.

Texas Commission on Environmental Quality. 2020. Trophic classification of Texas reservoirs. 2020 Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d), Austin. 9 pp.

United States Geological Society (USGS). 2022. National water information system: Web interface. Available: http://waterdata.usgs.gov/tx/nwis (May 2022).

Tables and Figures

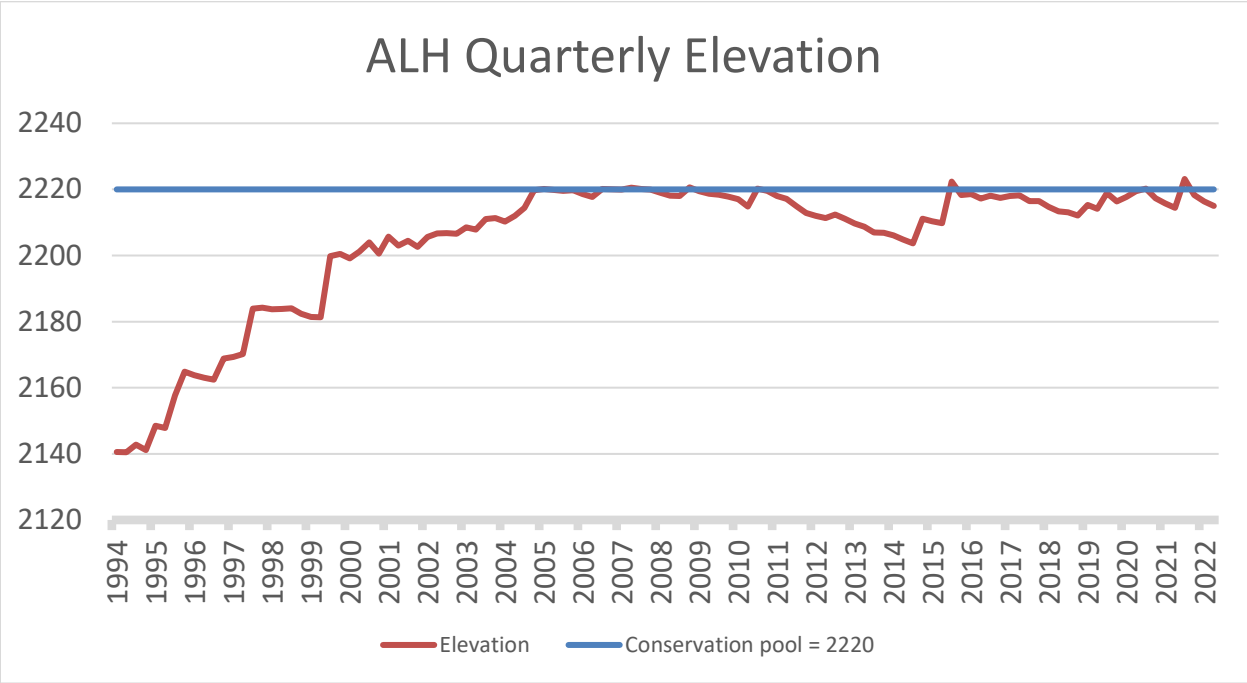


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Alan Henry Reservoir, Texas.

Table 1. Characteristics of Alan Henry Reservoir, Texas.

Characteristic	Description
Year constructed	1993
Controlling authority	City of Lubbock and Brazos River Authority
County	Garza
Reservoir type	Main stem
Mean depth (ft)	40.0
Maximum depth (ft)	100.0
Watershed (mi^2)	394
Shoreline Development Index	15.15
Conductivity	1385 µS/cm

Table 2. Boat ramp characteristics for Alan Henry Reservoir, Texas, August 2021. Reservoir elevation at time of survey was 2,219.5 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Sam Wahl Area	33.048837 -101.082143	Y	100	UNK	Excellent, no access issues
Ince Cove	33.055091 -101.082363	N	50	UNK	Private neighborhood ramp, no access issues
Private Ramp 1	33.032184 -101.035520	N	1	UNK	Private neighborhood ramp, no access issues
Private Ramp 2	33.041601 -101.030371	N	3	UNK	Private neighborhood ramp, no access issues
Private Ramp 3	33.045845 -101.042714	N	3	UNK	Private neighborhood ramp, no access issues
Dam	33.063718 -101.052036	N	5	UNK	City owned restricted access ramp, no access issues

Table 3. Harvest regulations for Alan Henry Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination only 10 ≥ 20 inches)	None
Catfish, Flathead	5	18-inch minimum
Bass: Largemouth	5[a] (only 2 < 18 inches)	None
Bass: Alabama	5[a]	None
Crappie: White and Black crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

[a] Daily bag for Alabama Bass and Largemouth Bass = 5 fish in any combination.

Table 4. Stocking history of Alan Henry Reservoir, Texas. FGL = fingerling; ADL = adults.

Species	Year	Number Stocked	Size
Shad, Gizzard	1993	80	ADL
Shad, Threadfin	2019	24,970	FGL
	2020	27,502	FGL
	2022	24,950	FGL
	Total	77,422	
Catfish, Blue	1993	143,564	FGL
	1994	143,004	FGL
	Total	286,568	
Catfish, Channel	1993	143,951	FGL
	1994	32,013	FGL
	Total	175,964	
Bluegill	2019	79,725	FGL
	2020	132,255	FGL
	2021	130,315	FGL
	Total	342,295	
Bass, Smallmouth	1993	72,021	FGL
	1994	75,650	FGL
	Total	147,671	
Bass, Alabama	1996	150	ADL
Bass, Florida Largemouth	1993	144,124	FGL
	1993	149	ADL
	1994	144,000	FGL
	1994	351	ADL
	2009	144,082	FGL
	2011	143,879	FGL
	2013	145,819	FGL
	2015	103,013	FGL
	Total	825,417	
Bass, ShareLunker Largemouth	2004	3,038	FGL
	2005	10,000	FGL
	2006	7,184	FGL
	2020	8,933	FGL
	Total	29,155	
Crappie, White	1993	67,042	FGL

Table 5. Objective-based sampling components for Alan Henry Reservoir, Texas 2018-2021.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Abundance	CPUE-Stock	RSE-Stock ≤ 25
	Size Structure	PSD, length frequency	N ≥ 50 stock
	Age and Growth	Growth for all ages	N = all Largemouth Bass, 12.0 – 18.9 inches
	Condition	W_r	5 fish/inch group (min)
	Genetics	% FLMB	N = 30, any age
Alabama Bass	Abundance	CPUE-Stock	RSE-Stock ≤ 25
	Size Structure	PSD, length frequency	N ≥ 50 stock
	Age and Growth	Growth for all ages	N = all Alabama Bass, 12.0 – 18.9 inches
	Condition	W_r	5 fish/inch group (min)
Bluegill [a]	Abundance	CPUE–Total	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
Gizzard Shad [a]	Abundance	CPUE–Total	RSE-Stock ≤ 25
	Size Structure	length frequency	N ≥ 50 stock
	Prey availability	IOV	N ≥ 50 stock
Threadfin Shad	Stocking Survival	CPUE-Total	Presence/Absence
Trap netting			
White Crappie	Abundance	CPUE-Total	RSE-Stock ≤ 25
	Size Structure	PSD, length frequency	N ≥ 50 stock
Tandem hoop netting			
Channel Catfish	Abundance	CPUE-Stock	RSE-Stock ≤ 25
	Size Structure	PSD, length frequency	N ≥ 50 stock

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

Table 6. Survey of structural habitat types, Alan Henry Reservoir, Texas, 2017. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Natural	33.8 miles	54.0
Boulder	25.6 miles	40.9
Rock Bluff	3.2 miles	5.1
Standing timber	88.9 acres	3.2

Table 7. Percent occurrence of vegetation with lower and upper 95% confidence limits (CL) of vegetation at 100 random sites in Alan Henry Reservoir, Texas, August 2021. Water level at time of survey was about 6 inches below conservation pool.

Vegetation Type	Percent occurrence	Lower CL	Upper CL
Native submersed	11	4.87	17.13
Native emergent	1	0.00	2.95
Flooded terrestrial vegetation	2	0.00	4.74
Standing timber	26	17.40	34.60

Table 8. Percent directed angler effort by species for Alan Henry Reservoir, Texas, 2013, 2015, 2018, and 2021. Survey periods 2013 and 2015 were from March 1 through May 31, and survey periods in 2018 and 2021 were April 1 through June 30.

Species	2013	2015	2018	2021
Catfishes	0.0	0.5	6.6	3.0
Channel Catfish	1.1	2.2	2.0	0.2
Black basses	39.7	52.0	36.5	27.5
Alabama Bass	0.2	1.1	0.0	2.2
Largemouth Bass	25.6	12.0	28.3	44.4
White Crappie	21.0	26.43	9.6	17.2
Anything	12.4	5.7	17.0	5.5

Table 9. Total fishing effort (h) for all species and total directed expenditures at Alan Henry Reservoir, Texas, 2013, 2015, 2018 and 2021. Survey periods 2013 and 2015 were from March 1 through May 31, and in 2018 and 2021 survey periods were April 1 through June 30. Relative standard error is in parentheses.

Creel statistics	2013	2015	2018	2021
Total fishing effort - hours	33,882.5 (25)	23,214.2 (30)	28,755.0 (24)	37,245.3 (22)
Total directed expenditures	$369,303 (34)	$215,739 (42)	$254,802 (31)	$400,205 (47)

Gizzard Shad

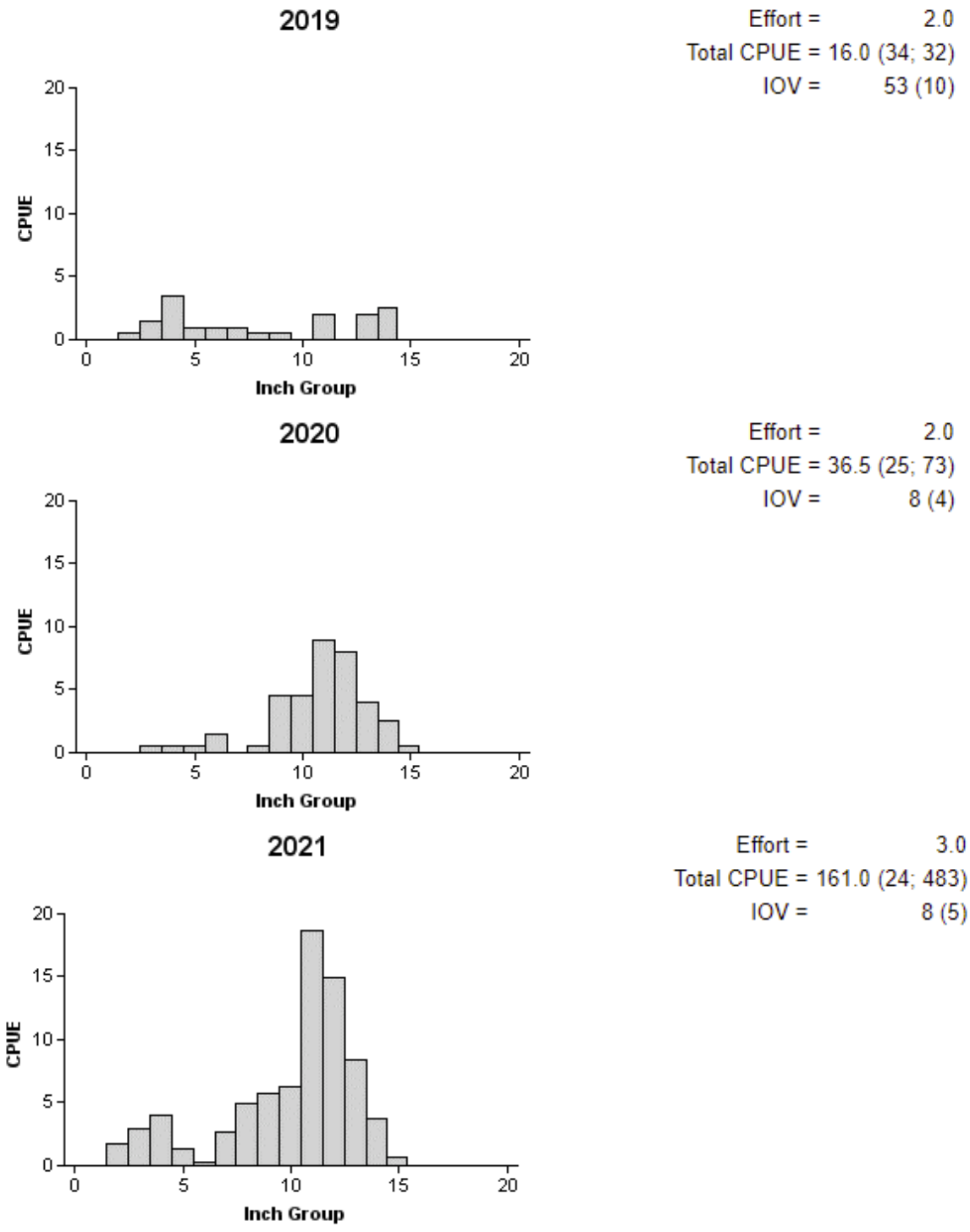


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys Alan Henry Reservoir, Texas, 2019, 2020, and 2021.

Bluegill

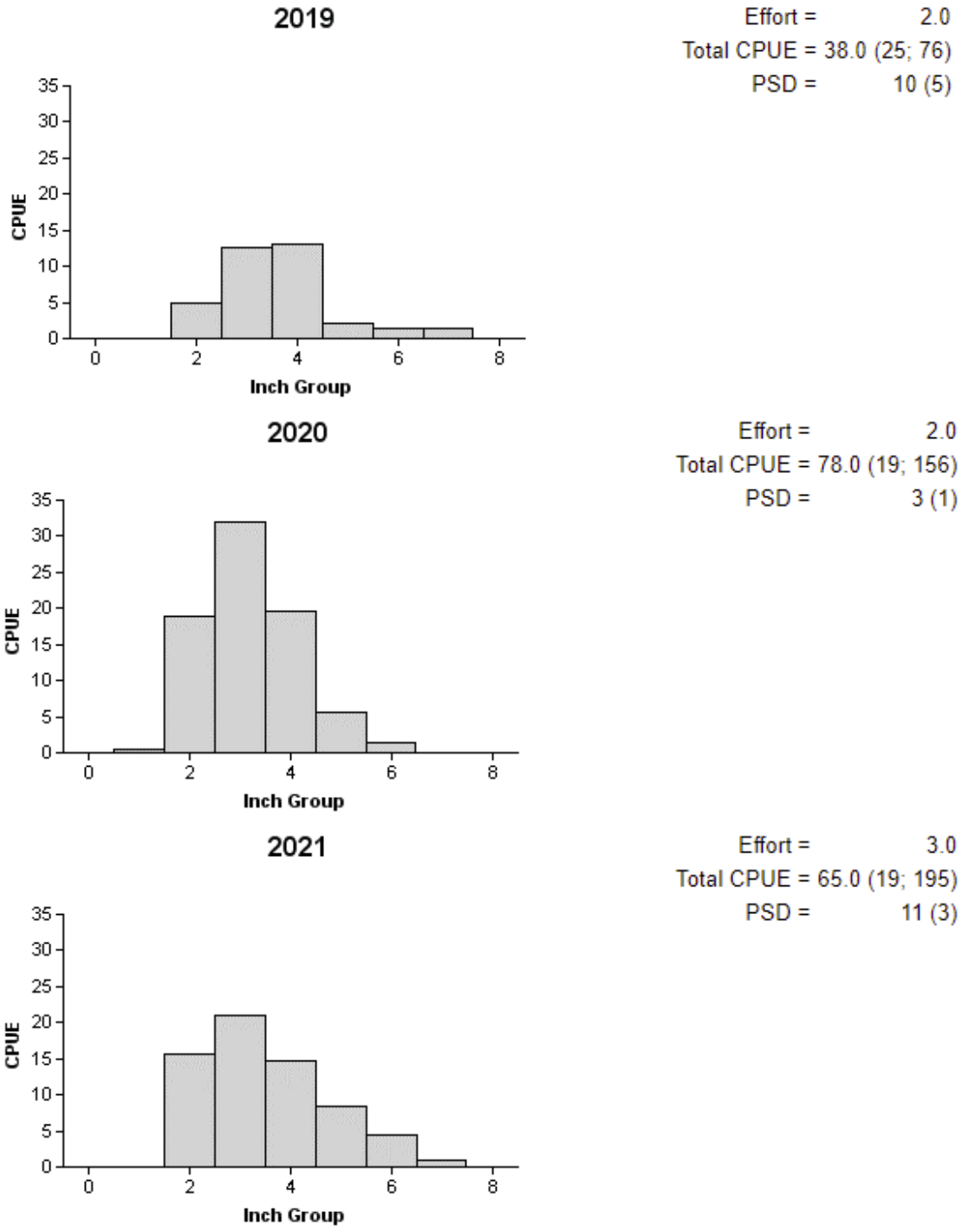


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2019, 2020, and 2021.

Channel Catfish

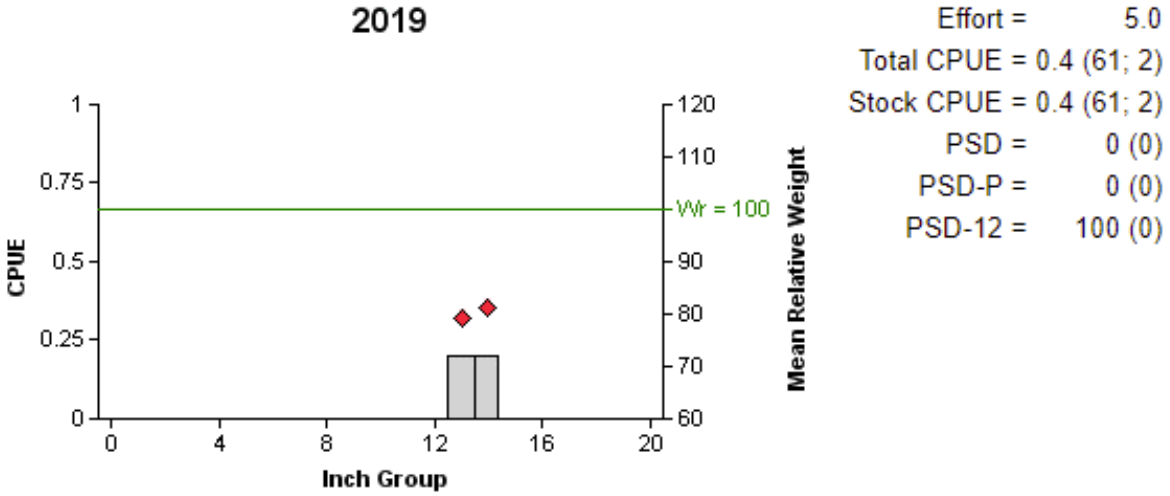


Figure 4. Number of Channel Catfish caught per tandem hoop net series (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for summer tandem hoop net surveys, Alan Henry Reservoir, Texas, 2019. Horizontal line represents relative weight of 100.

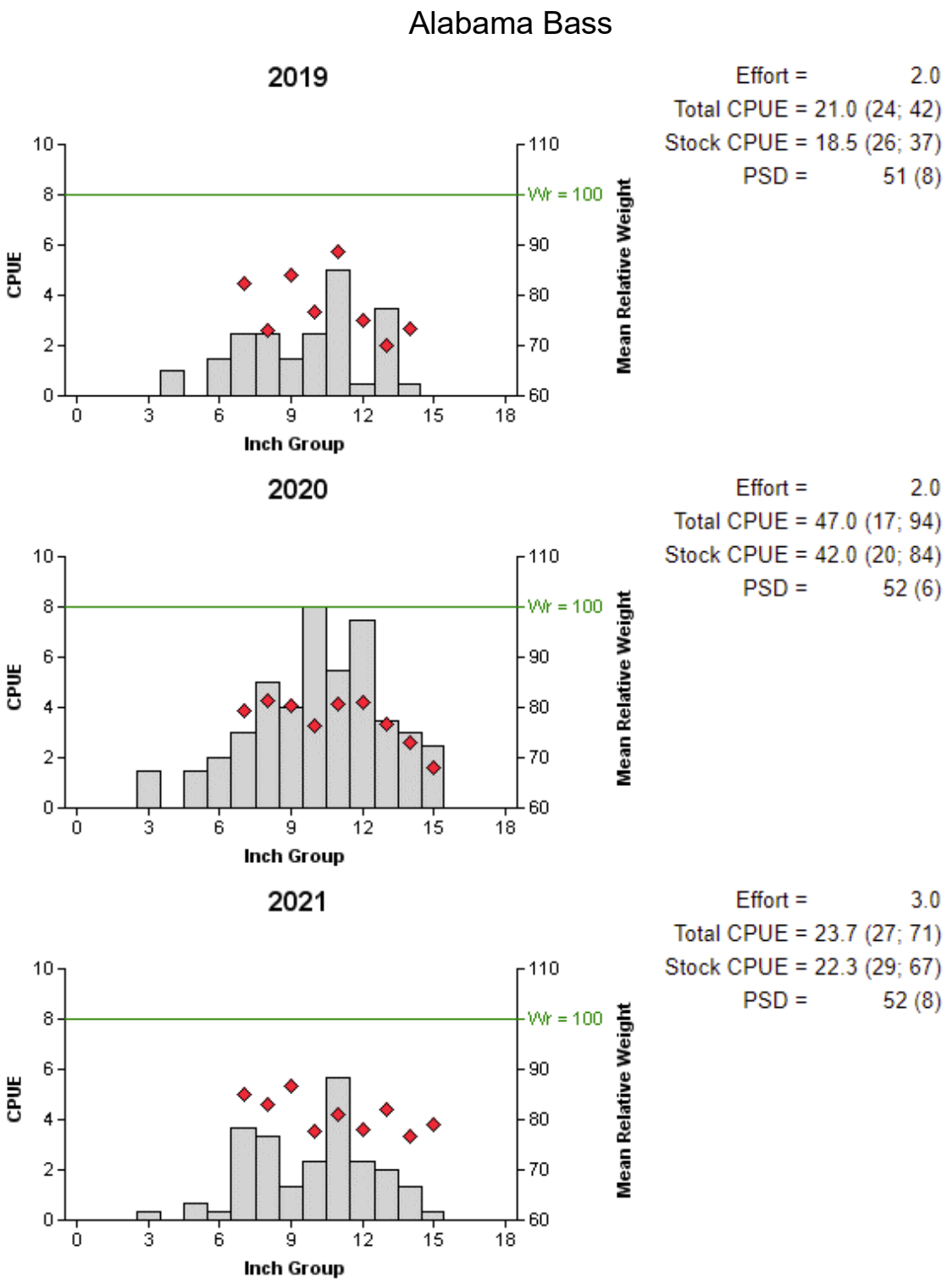


Figure 5. Number of Alabama Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2019, 2020, and 2021. Horizontal line represents relative weight of 100.

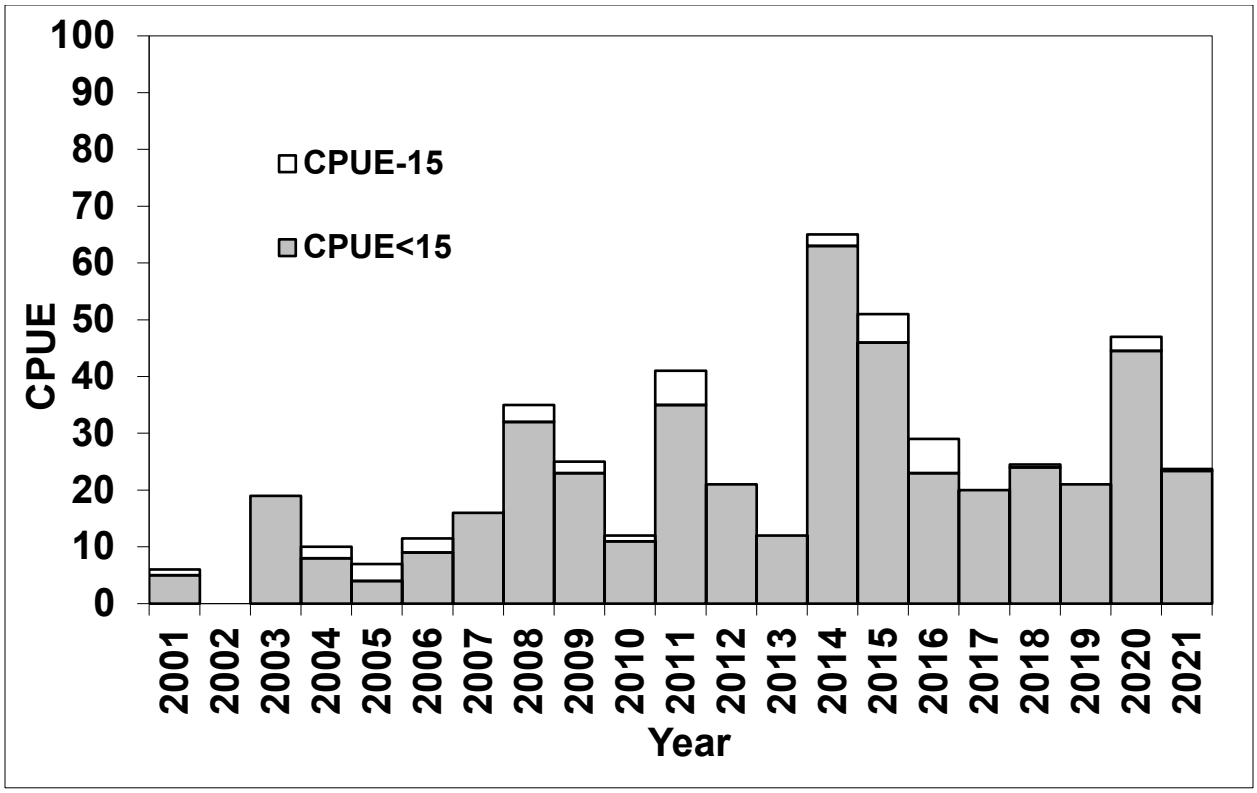


Figure 6. Number of Alabama Bass less than 15 inches caught per hour (CPUE<15, gray bars) and number of Alabama Bass greater than or equal to 15 inches caught per hour (CPUE-15, white bars) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2001 – 2021.

Table 7. Creel survey statistics for Alabama Bass at Alan Henry Reservoir from March 1 through May 31, 2013 and 2015, and April 1 through June 30, 2018 and 2021, where total catch per hour is for anglers targeting Alabama Bass and total harvest is the estimated number of Alabama Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistics	Year			
	2013	2015	2018	2021
Surface area (acres)	2,176.9	2,190.0	2,401.1	2,651.8
Directed effort (h)	70 (167)	253 (93)	0	833 (60)
Directed effort/acre	0.02 (167)	0.11 (93)	0	0.31 (60)
Total catch per hour	0.00 (0)	0.42 (0)	0	2.06 (32)
Total catch	13,625 (29)	6,492 (31)	9,754 (36)	21,360 (26)
Total harvest	313 (17)	616 (35)	118 (58)	1,232 (52)
Harvest/acre	0.01 (17)	0.28 (35)	0.05 (58)	0.47 (52)
Percent legal released	97.7	90.5	98.8	94.2

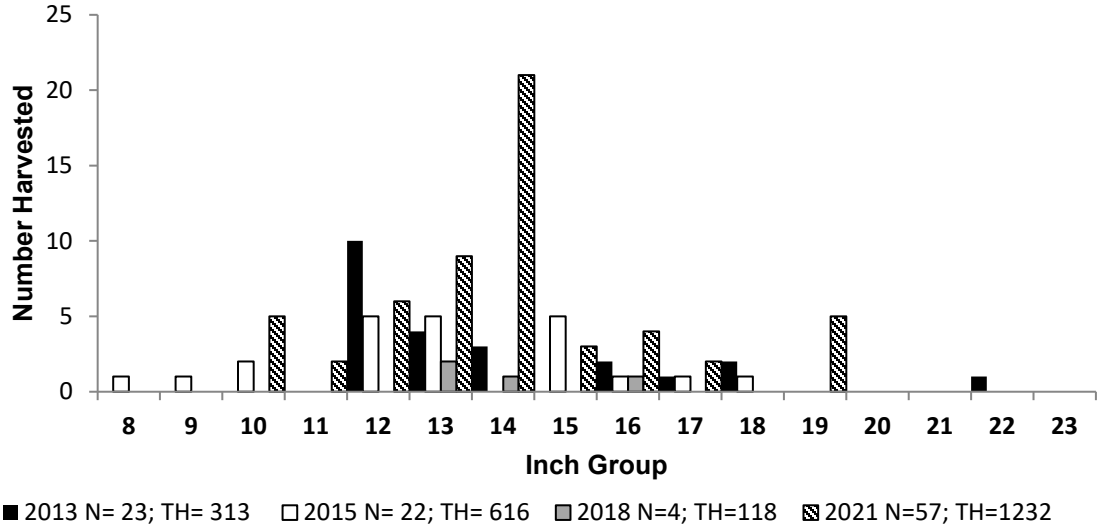


Figure 7. Length frequency of harvested Alabama Bass observed during creel survey at Alan Henry Reservoir, Texas, March 1 through May 31, 2013 and 2015, and April 1 through June 30, 2018 and 2021, all anglers combined. N is the number of harvested Alabama Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

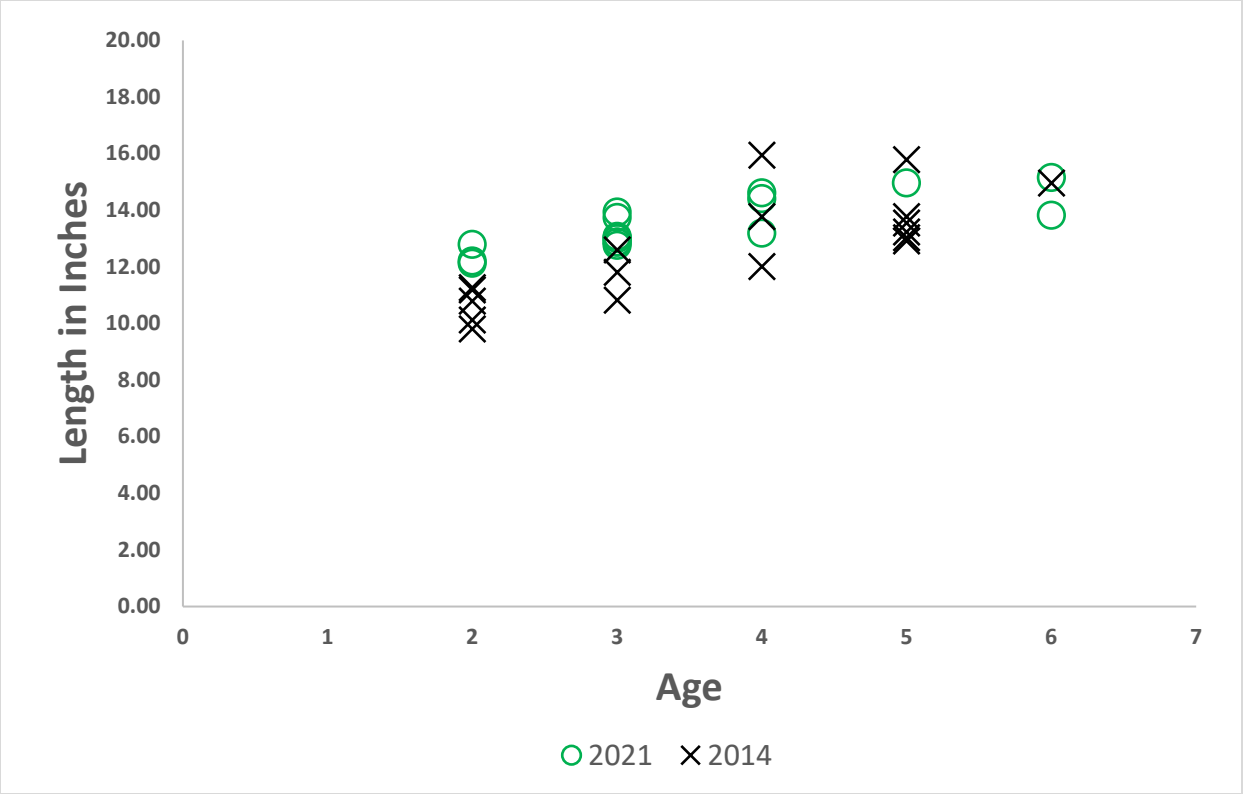


Figure 8. Length at age for Alabama Bass collected form electrofishing at Alan Henry Reservoir, Texas, October 2014 and October 2021.

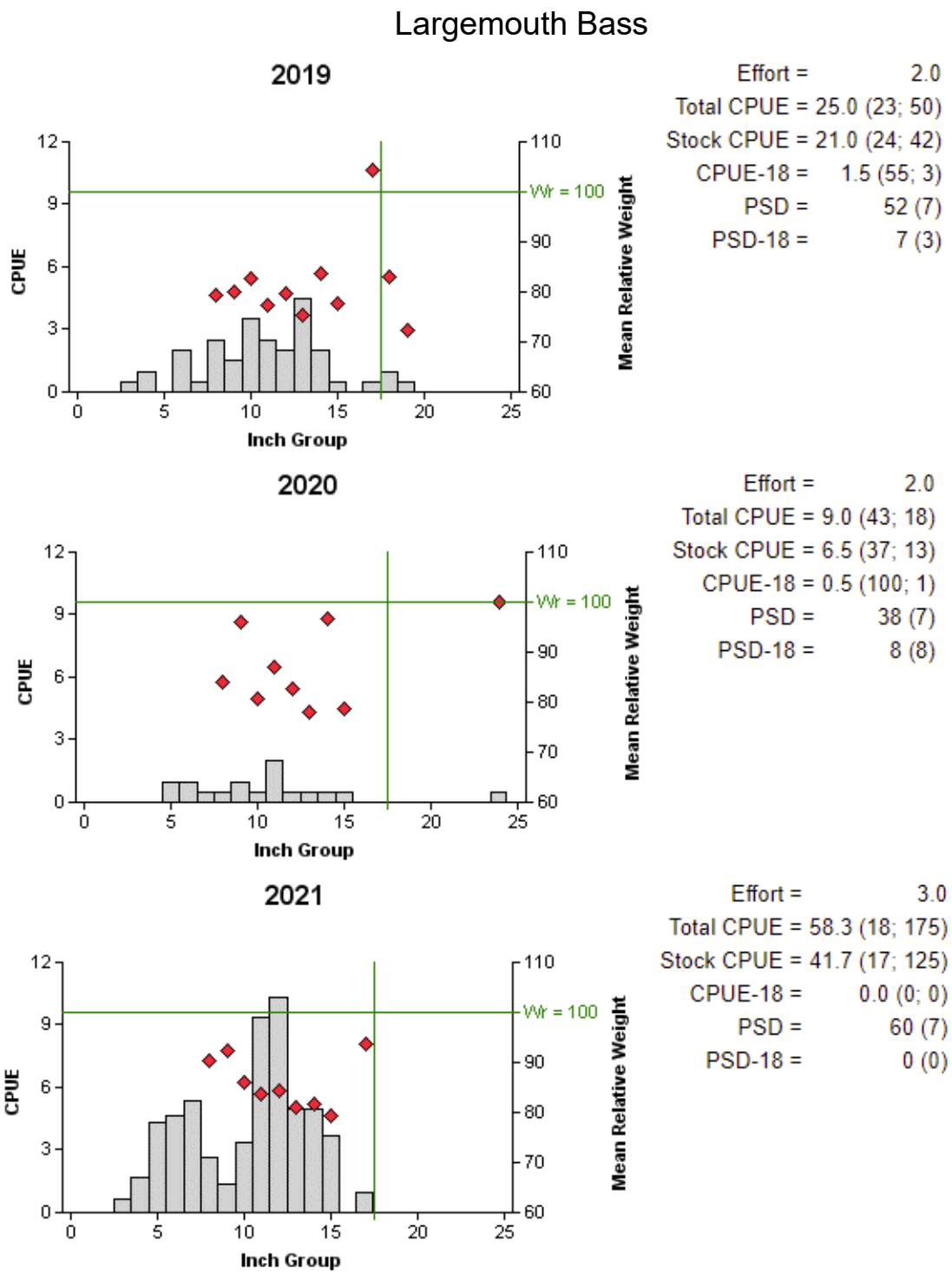


Figure 9. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2019, 2020, and 2021. Vertical line represents 18-inch length and horizontal line represents relative weight of 100.

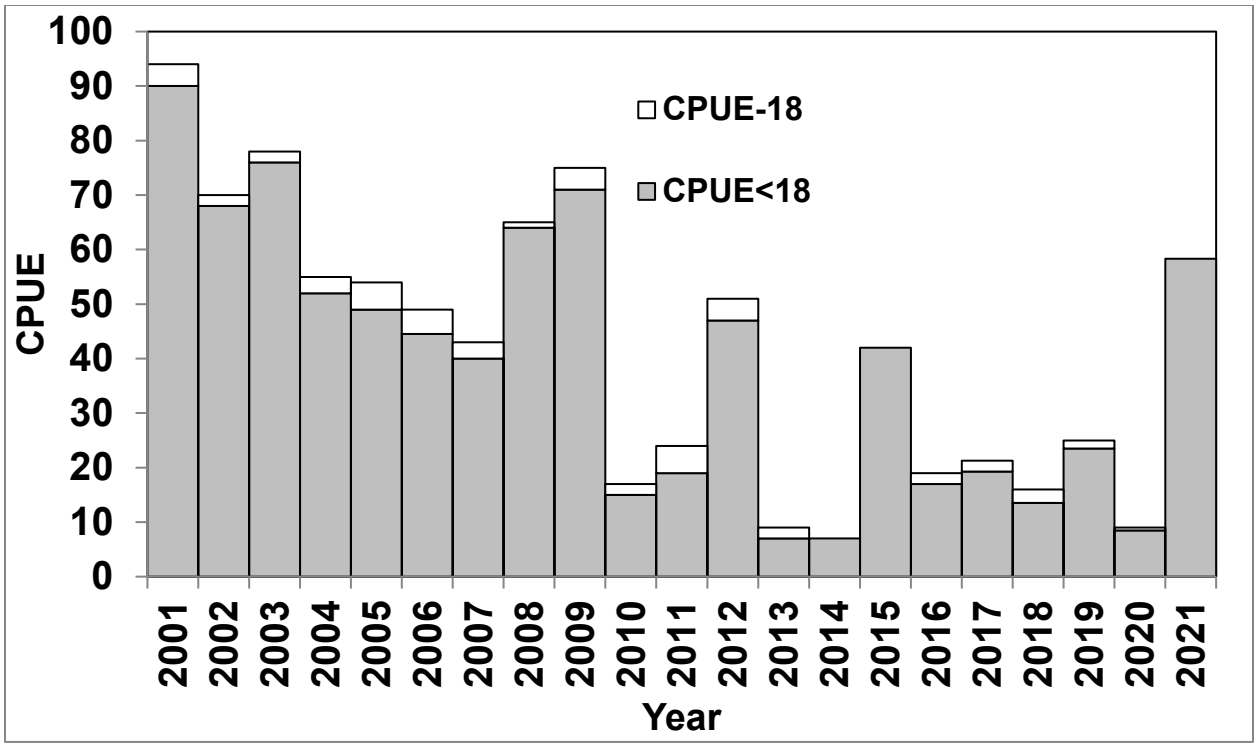


Figure 4. Number of Largemouth Bass less than 18 inches caught per hour (CPUE<18, bars) and number of Largemouth Bass greater than or equal to 18 inches caught per hour (CPUE-18, white bars) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2001–2021.

Table 8. Creel survey statistics for Largemouth Bass at Alan Henry Reservoir, Texas, from March 1 to May 31, 2013 and 2015, and April 1 through June 30, 2018 and 2021. Catch rate is for all anglers targeting Largemouth Bass. 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 released by weight category is for anglers targeting Largemouth Bass. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistics	Year			
	2013	2015	2018	2021
Surface area (acres)	2176.9	2190.0	2,401.1	2,651.8
Directed effort (%)				
Largemouth Bass	25.6	12.0	28.3	44.4
Black Bass	39.7	52.0	36.5	27.5
% Total	**65.3**	**64.0**	**64.8**	**71.9**
Directed effort (h)				
Largemouth Bass	8,681 (30)	2,780 (37)	8,124 (25)	16,529 (22)
Black Bass	13,456 (28)	12,079 (28)	10,480 (24)	10,253 (26)
Directed effort/acre				
Largemouth Bass	4.0 (30)	1.3 (37)	3.4 (25)	6.2 (22)
Black Bass	6.2 (28)	5.5 (28)	4.4 (24)	3.9 (26)
Total catch per hour				
Largemouth Bass	0.16 (27)	0.17 (53)	0.32 (25)	0.15 (26)
Black Bass	0.70 (13)	0.36 (16)	0.15 (28)	0.93 (19)
Total catch	6,667 (31)	1,614 (44)	5,921 (37)	3,042 (52)
Total Harvest	187 (53)	171 (50)	174 (70)	43 (98)
Harvest/acre	0.06 (53)	0.08 (50)	0.07 (70)	0.02 (98)
Percent legal released	66.1	45.2	75.3	98.6

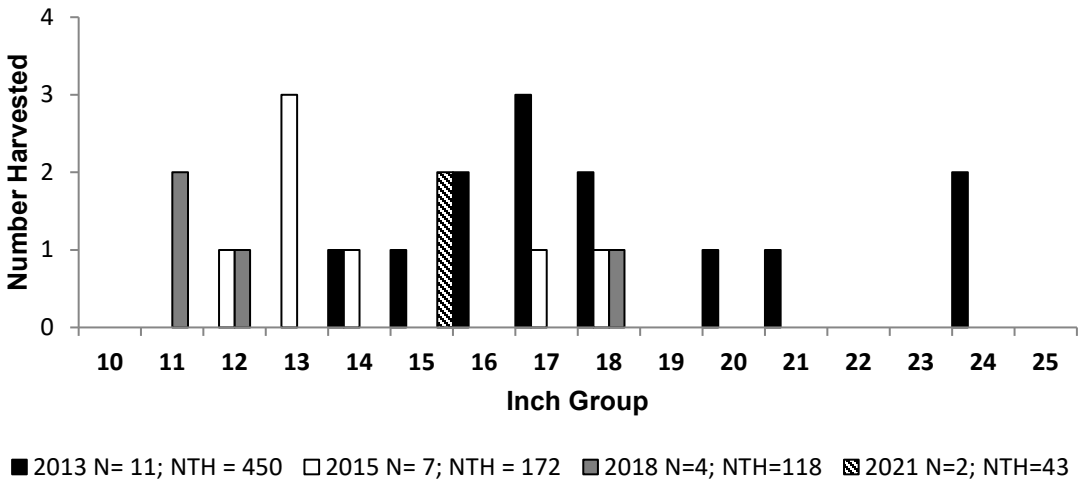


Figure 5. Length frequency of non-tournament harvested Largemouth Bass observed during creel surveys at Alan Henry Reservoir, Texas, March 1 through May 31, 2013 and 2015, and April 1 through June 30, 2018 and 2021, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and NTH is the estimated non-tournament harvest for the creel period.

Table 12. Results of genetic analysis of largemouth bass collected by fall electrofishing, Alan Henry Reservoir, Texas, 2003, 2005, 2009, 2014, and 2021. N = Northern largemouth bass, F = Florida largemouth bass, F1 = first generation hybrid between a F and a N.

Year	Genotype					
	Sample Size	N-alleles	F-alleles	N-genotypes	F-genotypes	F1
2003	19	37%	63%	16%	37%	21%
2005	19	43%	57%	16%	21%	5%
2009	30	28%	72%	0%	10%	10%
2014	7	52%	48%	29%	29%	0%
2021	30	20%	80%	0%	21%	0%

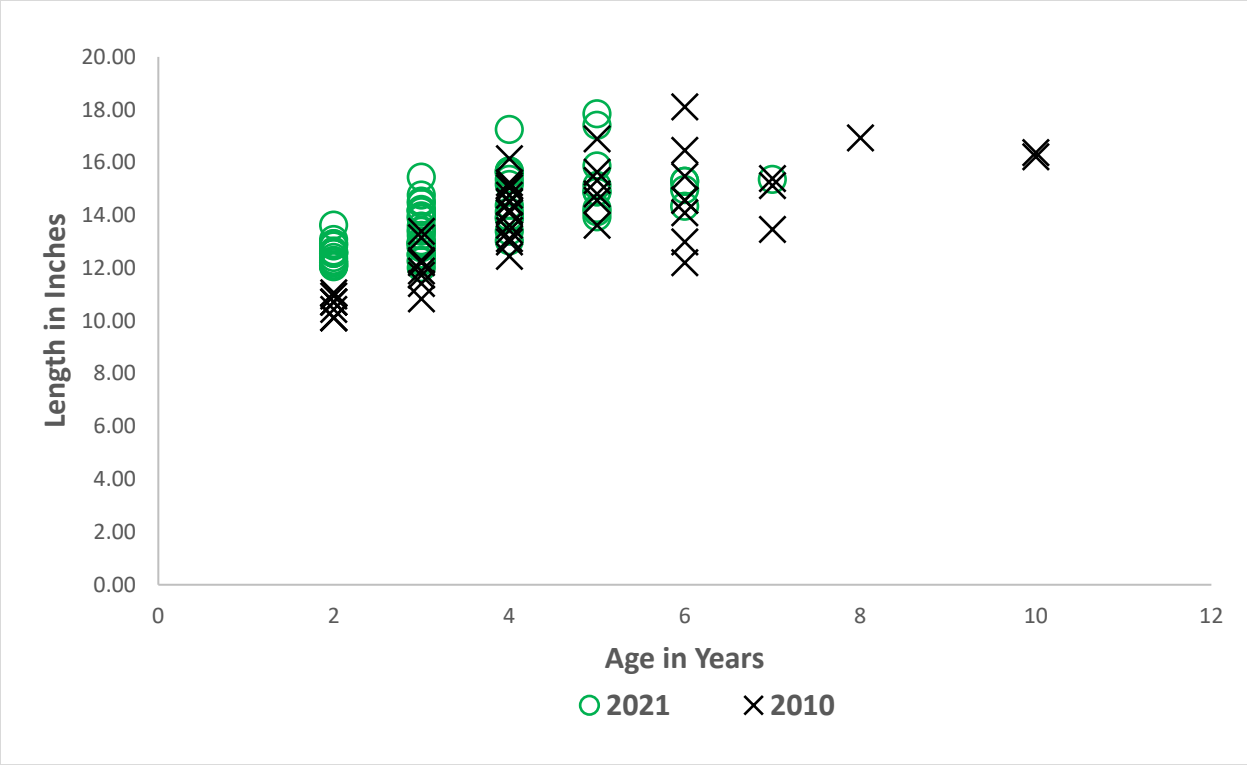


Figure 12. Length at age for Largemouth Bass collected from electrofishing at Alan Henry Reservoir, Texas, May 2010 and October 2021.

White Crappie

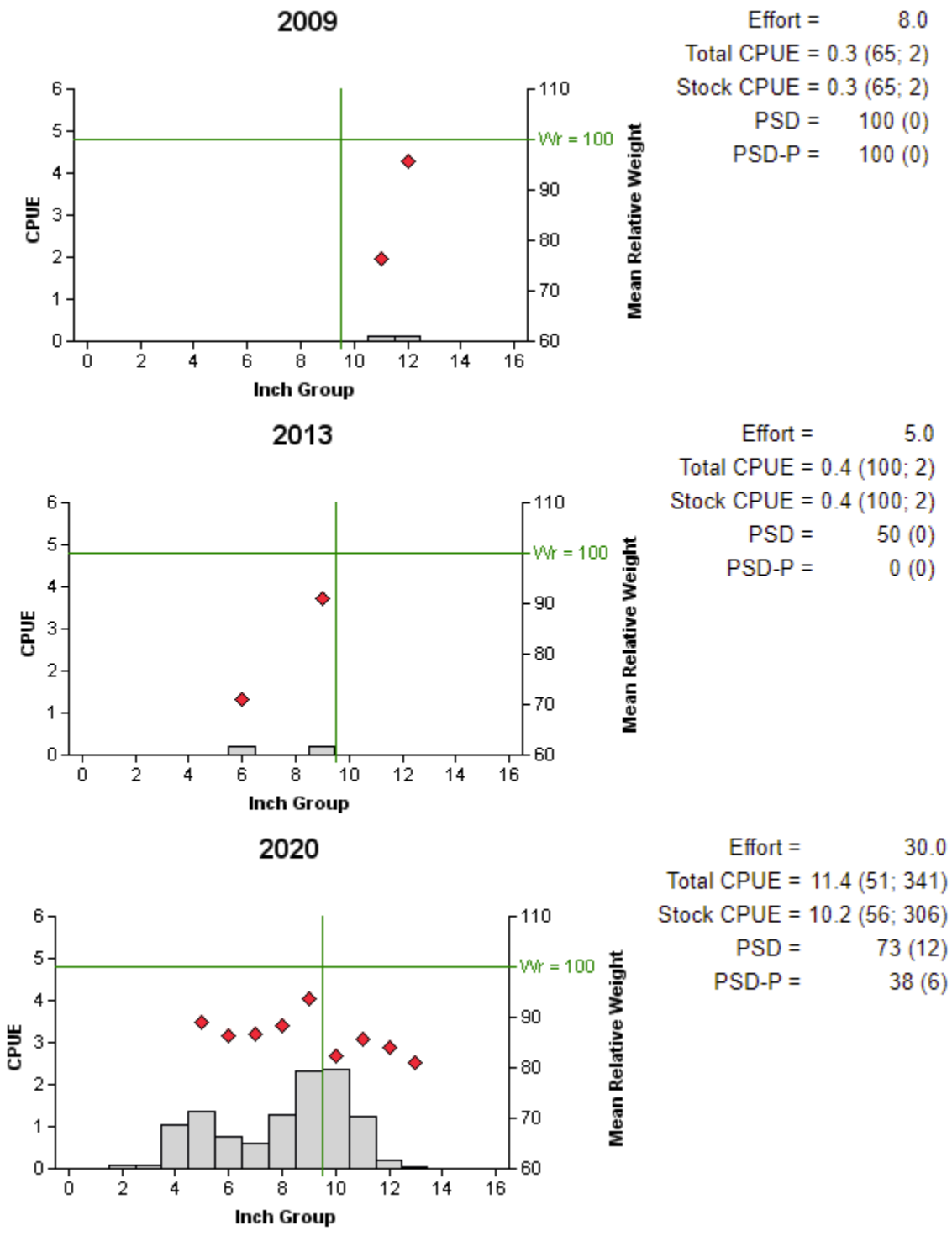


Figure 6. Number of White Crappie caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring trap net survey, Alan Henry Reservoir, Texas, 2020. Vertical line represents 10-inch minimum length limit. Horizontal line indicates WR=100

Table 9. Creel survey statistics for White Crappie at Alan Henry Reservoir, Texas, from March 1 to May 31, 2013 and 2015, and April 1 through June 30, 2018 and 2021. Total catch per hour is for anglers targeting White Crappie and total harvest is the estimated number of White Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistics	Year			
	2013	2015	2018	2021
Surface area (acres)	2176.9	2190.0	2,401.1	2,651.8
Directed effort (h)	7,111 (28)	6,136 (33)	2,768 (34)	6,392 (29)
Directed effort/acre	2.47 (28)	2.80 (33)	1.14 (34)	2.41 (29)
Total catch per hour	0.27 (32)	0.23 (61)	0.13 (53)	1.18 (66)
Total catch	2,958 (37)	1780 (46)	716 (109)	12,733 (40)
Total harvest	1,115 (51)	444 (45)	264 (58)	1,868 (56)
Harvest/acre	0.39 (51)	0.20 (45)	0.11 (58)	0.70 (56)
Percent legal released	19.8	5.76	35.3	13.9

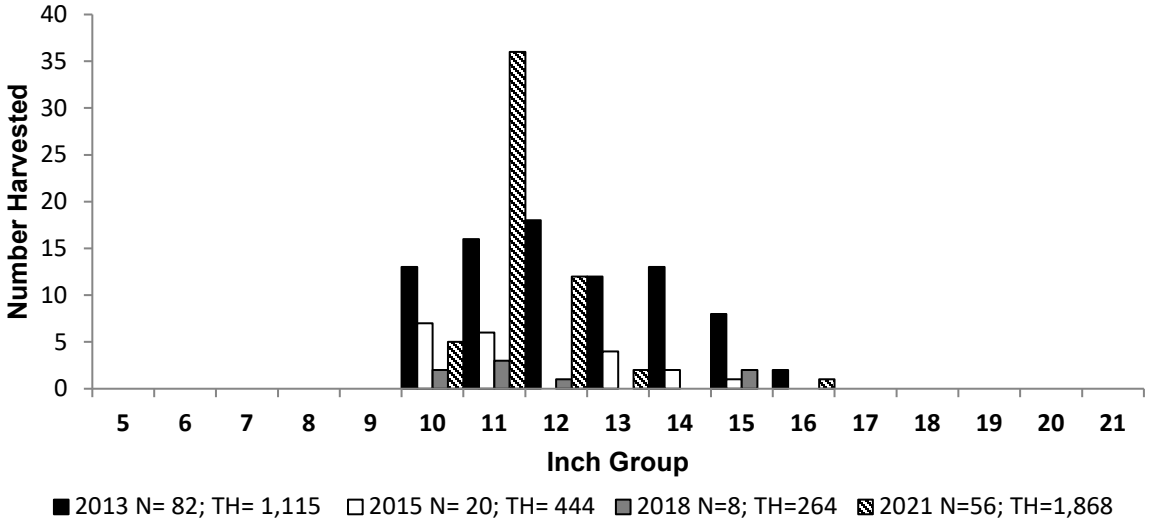


Figure 7. Length frequency of harvested White Crappie observed during creel surveys at Alan Henry Reservoir, Texas, March 1 through May 31, 2013 and 2015, and April 1 through June 30, 2018 and 2021, all anglers combined. N is the number of harvested White Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Proposed Sampling Schedule

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

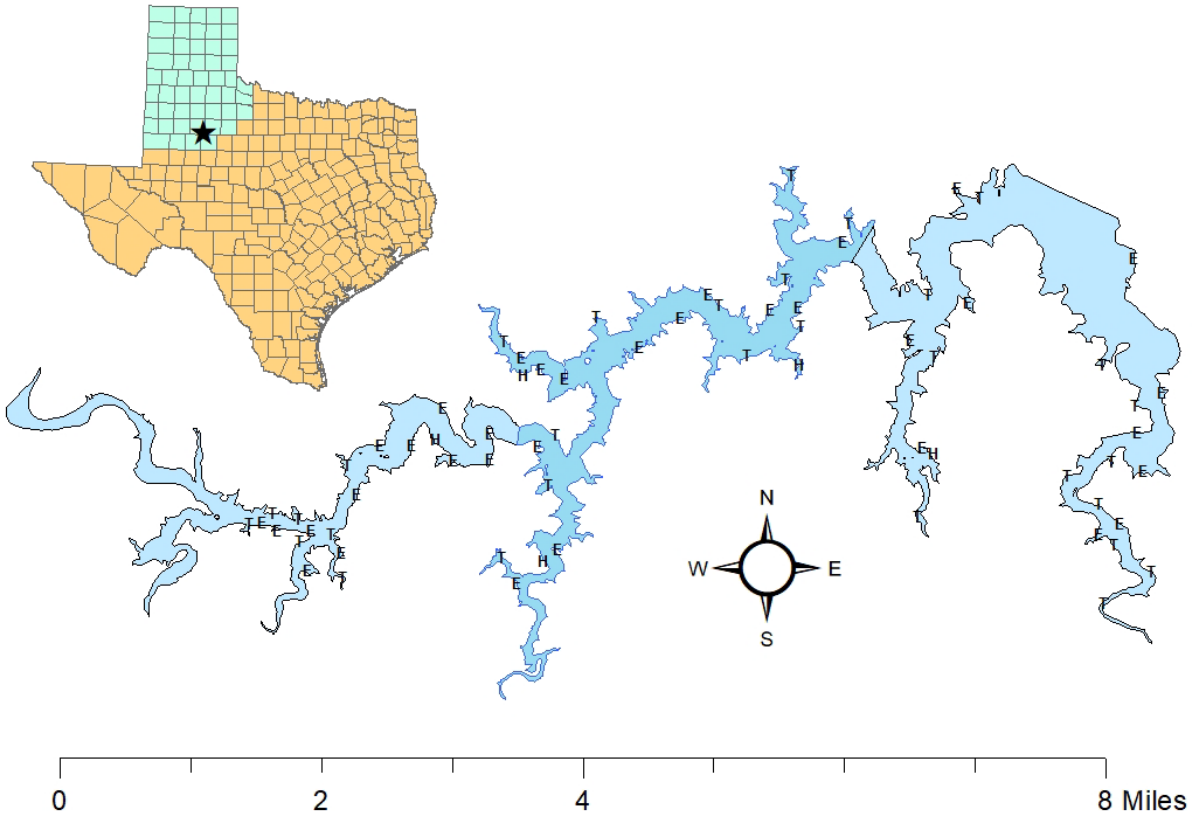
	Survey year			
	2022-2023	2023-2024	2024-2025	2025-2026
Angler Access				X
Structural Habitat				X
Vegetation				X
Electrofishing – Fall	X	X	X	X
Electrofishing – Spring				
Electrofishing – Low frequency				
Trap netting				X
Gill netting				
Baited tandem hoop netting				
Creel survey			X	
Report				X

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

Number (N) and catch rate (CPUE) (RSE in parentheses) of all species collected from all gear types from Alan Henry Reservoir, Texas, 2019-2021. Sampling effort was 3 hours for electrofishing in 2021, 5 net series for hoop netting in 2019, and 30 net nights for trap netting in 2020.

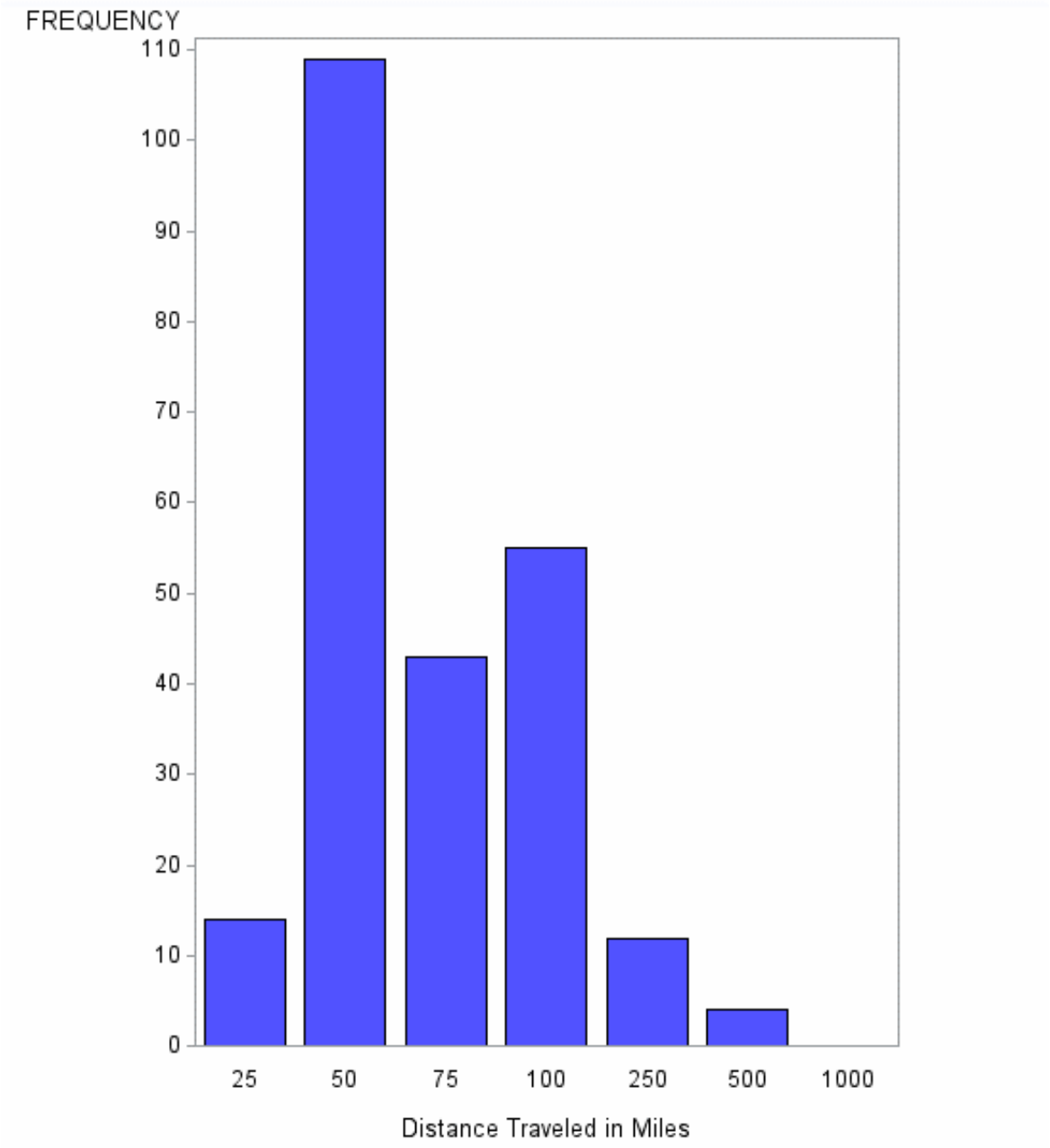
Species	Electrofishing		Hoop Netting		Trap Netting	
	N	CPUE	N	CPUE	N	CPUE
Longnose Gar	15	5 (40)	1	0.2 (100)		
Gizzard Shad	483	161.0 (52)			1	<0.1 (100)
Threadfin Shad	32	10.7 (57)				
Common Carp	42	14.0 (29)	2	0.4 (61	1	<0.1 (100)
River Carpsucker	1	0.3 (100)				
Channel Catfish	2	0.7 (100)	2	0.4 (61)	1	<0.1 (100)
Green Sunfish	95	31.7 (27)			1	<0.1 (100)
Orangespotted Sunfish					1	<0.1 (100)
Bluegill	195	65.0 (19)	14	2.8 (36)	231	7.7 (39)
Longear Sunfish	3	1.0 (56)			6	0.2 (61)
Largemouth Bass	175	58.3 (18)				
White Crappie	48	16.0 (24)	15	3.0 (51)	341	11.4 (51)
Freshwater Drum	28	9.3 (26)				
Alabama Bass	71	23.7 (27)				

APPENDIX B – Map of sampling locations



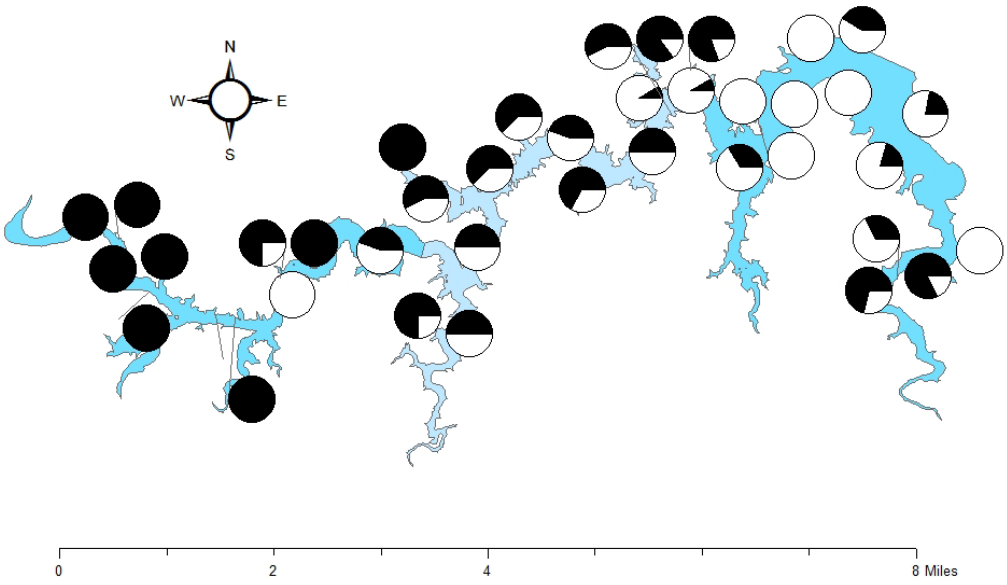
Location of sampling sites, Alan Henry Reservoir, Texas, 2019-2021. Hoop net (2019), Gill net (2020) and Electrofishing (2021) stations are indicated by H, G and E, respectively. For electrofishing survey, the reservoir was divided into thirds, and 12 stations were randomly selected for each third. Water level was 2,217.9 ft MSL (approximately two feet below full pool) at time of sampling.

APPENDIX C – reporting of creel ZIP code data

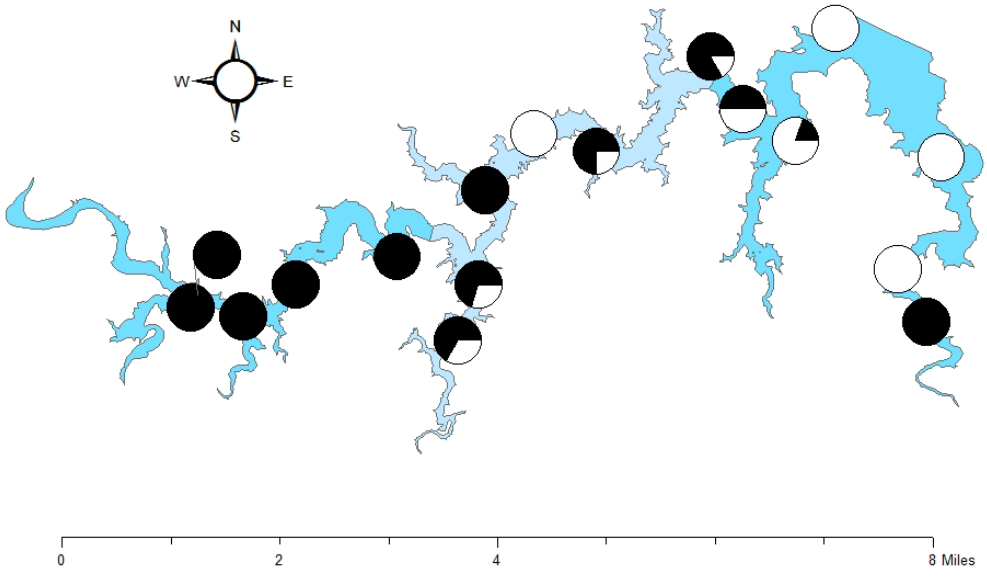


Frequency of anglers that traveled various distances (miles) to Alan Henry Reservoir, Texas, as determined from the April 1 through June 30, 2021 creel survey.

APPENDIX D - Distribution of black bass in Alan Henry Reservoir

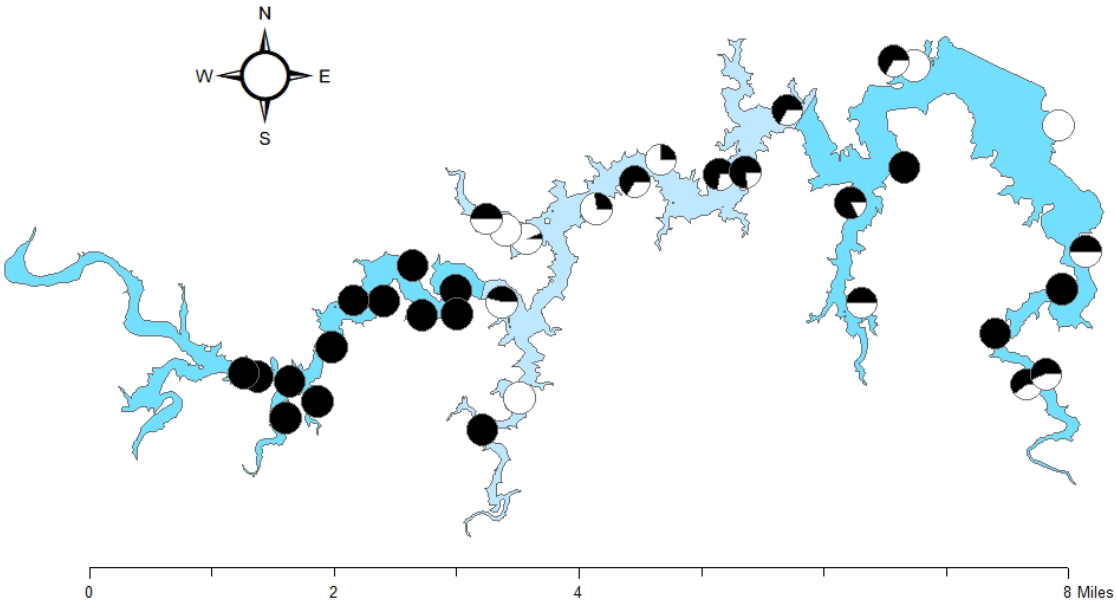


Distribution of black bass species in Alan Henry Reservoir, Texas from 2010 electrofishing survey. Circle pie charts show percentages of black bass species collected at each location. Black represents Largemouth Bass and white represents Alabama Bass.



Distribution of black bass species in Alan Henry Reservoir, Texas from 2017 electrofishing survey. Circle pie charts show percentages of black bass species collected at each location. Black represents Largemouth Bass and white represents Alabama Bass.

APPENDIX D – Continued



Distribution of black bass species in Alan Henry Reservoir, Texas from 2021 electrofishing survey. Circle pie charts show percentages of black bass species collected at each location. Black represents Largemouth Bass and white represents Alabama Bass.

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