

Alan Henry Reservoir

2017 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

Prepared by:

John Clayton, Assistant District Management Supervisor
and
Charles Munger, District Management Supervisor

Inland Fisheries Division
Amarillo District, Canyon, Texas

Carter Smith
Executive Director

Craig Bonds
Director, Inland Fisheries

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Survey and Management Summary

Fish populations in Alan Henry Reservoir were surveyed in 2017 using electrofishing and in 2018 using gill netting. Anglers were surveyed from March 2015 through May 2015 and April 2018 through June 2018 with creel surveys. Historical data are presented with the 2015-2018 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 is characterized as low. Habitat features consist of flooded terrestrial vegetation, rocks, and very small amounts of native submerged aquatic plants.

Management History: Sport fish in the reservoir includes Blue Catfish, Channel Catfish, Flathead Catfish, Alabama Bass, Largemouth Bass, and White Crappie. Alabama Bass were managed with an 18-inch minimum length limit since their introduction in 1996 until September 1, 2011 in order to establish a self-sustaining population. Largemouth Bass harvest regulations were liberalized with the allowance of 2 fish under the 18-inch minimum length limit in 2002 to promote recruitment of fish into size classes larger than the 18 inch minimum length limit. Alan Henry Reservoir has produced 27 entries into the ShareLunker program since 2000.

Fish Community

- **Prey species** Gizzard Shad and Bluegill are the primary prey species in the reservoir, and their relative abundance is low.
- **Catfishes:** Blue, Channel, and Flathead Catfishes were present in the reservoir. However, relative abundance was low for all three species. Angling effort targeting catfishes accounted for only 2.7% of the total angling effort at the reservoir during spring 2015 and 8.6% in spring 2018.
- **Black basses:** From 2001 to 2011 electrofishing catch rates of Alabama Bass have shown a general increase. In recent years catch rates have ranged between 51.0/h in 2016 and 12.0/n in 2013. The 2017 Largemouth Bass catch rate was slightly better than the Alabama Bass catch rate. The majority of Largemouth Bass sampled were less than 15 inches in length, and all Alabama Bass samples were less than 13 inches.
- **White Crappie:** Creel survey results report that approximately 10-26% of angler effort targets crappie each spring. White Crappie were present in the reservoir. A total of seventeen White Crappie were collected with electrofishing (N=8) and gill netting (N=9) during the 2017-2018 survey period. The majority of fish sampled were smaller than the 10-inch minimum length limit.

Management Strategies: Recommend stocking Bluegill and Threadfin Shad each at 50 fish/acre. Study options for a regulation change from current black bass regulation to options which would promote an increase in Largemouth Bass over 18 inches. Inform the public about the negative impacts of aquatic invasive species. Conduct additional electrofishing surveys in 2018, 2019, 2020, and 2021. Conduct exploratory hoop net survey in 2019 and exploratory trap net survey in 2020. Access and vegetation surveys will be conducted in 2020.

Introduction

This document is a summary of fisheries data collected from Alan Henry Reservoir in 2015-2018. 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 2015-2018 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 and operated by the City of Lubbock, Lubbock County, Texas. The reservoir is used for recreation 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 water level steadily declined to 16.3 feet below conservation pool due to pumping by the municipal supply and evaporation. From 2014 to 2016, the reservoir filled to capacity and remained within 6 feet of conservation pool during sampling (Figure 1). Alan Henry Reservoir is characterized as a deep reservoir with low productivity; Trophic State Index (TSI) ranks the reservoir as the third clearest lake in Texas with a mean secchi of 10.9 feet and a TSI of 42.76 (Texas Commission on Environmental Quality 2011). 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. Other descriptive characteristics for Alan Henry Reservoir are in Table 1.

Angler Access

Alan Henry Reservoir has one public boat ramp and four private boat ramps. The public ramp, located at the Sam Wahl Recreation Area, and operated by the City of Lubbock, was available for use by anglers throughout the survey period. Additional boat ramp characteristics are in Table 2. 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 handicap-specific facility.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Clayton and Munger 2014) included:

1. Collect 400 stock-sized Largemouth Bass and Alabama Bass for Category 4 age and growth in 2014.

Action: Only seven Largemouth Bass were collected after one hour of electrofishing in fall 2014. Due to the low catch rate the Category 4 age and growth sample was cancelled until productivity issue could be further investigated.

2. Investigate the possibility of introducing and actively managing Threadfin Shad.

Action: Two Onset HOB0 MX TidbiT 400 temperature data loggers were deployed into Alan Henry Reservoir to obtain winter water temperatures to determine survivability of Threadfin Shad. Water temperatures indicate that Threadfin Shad would survive and overwinter in the reservoir.

3. Conduct creel survey during spring 2015 and 2017 emphasizing weekend and afternoon time periods.

Action: Spring quarter creel surveys were scheduled for March 1 to May 31 in 2015 and 2017. The 2015 creel survey was conducted as scheduled, but the 2017 creel was moved to 2018 to coincide with a creel survey research project being conducted at Alan

Henry Reservoir. Due to low angler usage in March and the persistence of winter weather in the Texas Panhandle, the 2018 creel and future Spring quarter creels will be conducted from April 1 through June 30.

Harvest regulation history: Sport fishes in Alan Henry Reservoir are currently managed with statewide regulations with the exceptions of Alabama Bass, and Largemouth Bass (Table 3). Prior to 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 from a 5 fish daily bag and 18-inch minimum length limit, to a no minimum length limit and 5 fish bag with no more than 2 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. 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. The complete stocking history is available in Table 4.

Vegetation/habitat management history: Alan Henry Reservoir has no vegetation/habitat management history.

Water transfer: 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 2014). 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, and Gizzard Shad were collected by electrofishing (1.5 hours at 18, 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.

Gill netting – Catfishes were collected by gill netting (5 net nights at 5 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 – Access-point creel surveys were conducted March 1 through May 31, 2015 and April 1 through June 30, 2018. Angler interviews were conducted to quantify angler effort, fish catch, and harvest in accordance with the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015). In 2015, survey interviews were conducted on 7 weekend days and 6 weekdays; 2018 interviews were conducted on 5 weekend days and 5 weekdays.

Habitat – A structural habitat survey was conducted in 2017. A vegetation survey was also conducted in 2017. Habitat and vegetation was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Water level – Source for water level data was the United States Geological Survey (USGS 2018).

Results and Discussion

Habitat: Littoral zone habitat consisted primarily of natural shoreline, boulder, and terrestrial vegetation (Table 6). Aquatic vegetation consisted of a small 60 square feet area of pondweed at the Sam Wahl boat ramp, and a very small stand of cattails near the Ince Cove boat ramp.

Creel: Directed fishing effort by anglers was highest for black bass species combined (36.5%), followed by Largemouth Bass (28.3%), and Anything (17.0%; Table 7). Total fishing effort for all species at Alan Henry Reservoir was 28,755 h from April 1 to June 30, 2018, and anglers spent an estimated \$254,802 on trip expenditures (Table 8).

Prey species: In 2017 CPUE of Gizzard Shad was 93.3/h. Gizzard Shad IOV was 36, indicating that the majority were too large for existing predators; although, this was higher than IOV estimates from 2016 (IOV=18) and much lower than 2015 (IOV=86) (Figure 2). Lower IOV's are typical of most years; the historical average IOV is 33. The CPUE of Gizzard Shad typically ranges between 40 and 110 with a historical average of 137.4/h. The higher CPUE in 2015 (CPUE=309.0/h) is most likely attributed to an increase in nutrient levels and flooded habitat as a result of a seven foot rise in lake level that occurred in late 2014. Catch rates for Bluegill showed similar trends to CPUE for Gizzard Shad. In 2015 CPUE for

Bluegill was higher (CPUE=102.0/h) following the lake level increase in 2014 and declined to lower catch rates in 2016 and 2017 (CPUE=39.0/h and 29.3/h respectively) (Figure 3).

Blue Catfish: Catfish species are low density fisheries in Alan Henry Reservoir. The 2015 and 2018 creel surveys showed no directed angler effort for Blue Catfish. Historically only one or two Blue Catfish have been collected during gill net surveys (Figure 4). One Blue Catfish was collected during the 2018 survey; it measured 40 inches and had poor body condition ($W_r=62$) (Figure 4).

Channel Catfish: Channel Catfish are the most abundant catfish species in the reservoir; however, CPUE for Channel Catfish have historically indicated low relative abundance. Total CPUE for the 2018 gill net survey was 1.6/nn; similar to the total CPUE for 2014 (1.2/nn) and 2010 (1.6/nn) (Figure 5; Appendix A). Although relative abundance remained low, the majority of fish sampled were available to anglers for legal harvest (Figure 5). Directed fishing effort, catch per hour, and total harvest for Channel Catfish showed a minimal fishery (Table 9). Results from the 2015 and 2018 recent creel surveys continue to show few fish harvested (Figure 6).

Alabama Bass: Electrofishing catch rate of Alabama Bass decreased from 51.0/h in 2015 to 29.0/h in 2016, and to 20.0/h in 2017 (Figure 7). Smaller individuals dominated the population with most fish sampled measuring 12 inches or less. Body condition in 2017 was similar to previous surveys with relative weights for most size classes averaging between 60 and 80 (Figure 7). Catch rates between 2001 and 2017 have shown a generally increasing trend until 2014 (Figure 8). Size structure since 2001 has been dominated by smaller individuals; few fish over 15 inches were sampled (Figure 8). Although each creel survey from 2009 to 2015 has shown directed angler effort specifically targeting Alabama Bass; effort and harvest have remained low (Table 10). The 2018 creel survey showed no directed effort targeting Alabama Bass (Table 10). In 2015 Twenty-two Alabama Bass measuring between 8 and 18 inches were reported during the creel survey, while 2018 reported only 4 fish between 13 and 16 inches harvested (Figure 9).

Largemouth Bass: The electrofishing catch rate of Largemouth Bass was 21.3/h in 2017; this was similar to 2016 (19.0/h) but lower than 2015 (42.0/h) (Figure 10). Relative weight in 2017 ranged between 40 and 90 and was similar to body condition in previous surveys (Figure 10). Catch rates since 2001 show a decreasing trend, and the current largemouth regulation implemented September 1, 2002 has not resulted in an increase in CPUE of largemouth over 18 inches (Figure 11). Creel survey data from 2015 showed that black basses as a whole comprise 52.0% of angler effort, and Largemouth Bass are the dominant black bass species sought by anglers (12.0%; Table 11). In 2018, directed angler effort for Largemouth Bass increased to 28.3%; however, directed effort for black basses decreased to 36.5% (Table 8). When effort for all black bass species is combined the percent totals are similar from year to year (65.1% - 2015, and 64.8% - 2018; Table 8). Low electrofishing CPUE (Figure 11) and low angler catch rates (Table 11) indicate a low relative abundance of Largemouth Bass. Four Largemouth Bass ranging from 11 to 18 inches were measured during the 2018 creel survey, and there was a total estimated harvest of 174 fish (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 showed the same general trend of black bass habitat preference (Appendix D).

White Crappie: White Crappie are present in the reservoir. Eight White Crappie measuring between 3 and 6 inches were documented during the 2017 electrofishing survey (Figure 13). Directed angler effort in 2015 (6,136 hours) and 2018 (2,768 hours) showed a similar fluctuating trend to previous years (Table 12). There were 8 crappie ranging between 10 and 15 inches measured during the 2018 creel survey, and an estimated total harvest of 264 White Crappie (Figure 14).

Fisheries Management Plan for Alan Henry Reservoir, Texas

Prepared – July 2018

ISSUE 1: Declining CPUE of forage and black basses combined with poor body condition of black basses appear to be the result of the reservoir's low productivity. Managing sport fish populations given low productivity is a major concern in this reservoir. Data indicate black bass populations are limited due to lack of forage species.

MANAGEMENT STRATEGIES

1. Water temperature monitoring results indicate that Threadfin Shad could survive low winter water temperatures in the reservoir. Stock Threadfin Shad annually at 50 fish/acre for 4 years in an effort to establish a self-sustaining population.

ISSUE 2: Black bass are the most popular sport fish in Alan Henry (28.3% of angler effort for Largemouth Bass and 36.5% of angler effort for any black bass species). Electrofishing data indicates that the current black bass regulation implemented September 1, 2002 and simplified September 1, 2011 has not resulted in an increase in CPUE of black basses over 18 inches. Anglers indicate verbally that two "short" bass are not worth harvesting, and creel survey results confirm very little harvest of black bass.

MANAGEMENT STRATEGY

1. Investigate implementing a regulation that would encourage harvest of black basses smaller than 18 inches.

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 post 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 (2018–2022)

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.

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 2018 creel survey indicates that Channel Catfish received only 1.9% (571 hours) of angler effort, and anglers fishing for any catfish made-up 6.6% (1908 hours) of angler effort. An exploratory baited tandem hoop net survey will be evaluated with 5 stations during the 2019-2020 survey year to determine if Channel Catfish catch rates can be improved.

Survey objectives, fisheries metrics, and sampling objectives

Black Bass: Black bass species as a whole were the most sought after fish (36.5% – 8,142; h – 3.4 h/acre of directed angler effort) at Alan Henry Reservoir according to the 2018 creel survey. Largemouth Bass and Alabama Bass are the only black bass species in the reservoir. Creel statistics indicate that Largemouth Bass received 28.3% of directed effort and Alabama Bass received no directed effort in 2018. When combining the effort of anglers fishing for “Any” black bass species with those specifically targeting Largemouth Bass, the effort for these species totals 64.8% of directed effort. Relative abundance and size structure data for Largemouth Bass and Alabama Bass have been collected annually since 1995 using fall nighttime electrofishing. Continuation of trend data collected with annual nighttime 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 30 electrofishing sites to achieve a CPUE-S $RSE \leq 25$ for Largemouth Bass. Effort for size structure estimation (PSD; 50 stock size fish minimum with 80% confidence) would require a minimum of 40 random electrofishing stations. For Alabama Bass, achieving a CPUE-S $RSE \leq 25$ would require 38 stations, and effort for size structure estimation (PSD; 50 stock size fish minimum with 80% confidence) would require 30 stations. For 2021 an intensive effort will be made to achieve the above mentioned objectives for black bass. During the 2021 electrofishing survey a minimum of 36 stratified-random stations will be sampled. The reservoir will be divided into thirds as per a 2010 study conducted at the reservoir. In each third of the reservoir, there will be 12 randomly selected stations. Genetic samples will be taken from 30 Largemouth Bass to evaluate Florida genetic influence. Genetic samples will also be taken from any black bass that exhibits characteristics of both Largemouth Bass and Alabama Bass. These samples will allow for continued monitoring of any instances of Largemouth Bass/Alabama Bass hybridization in the reservoir. All black bass between 12 and 18 inches will be retained for age and growth analysis.

For 2018, 2019, and 2020 twenty-four 5-min electrofishing sites will be sampled. 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. The reservoir will be divided into thirds and there will be 8 stratified random sites selected from each third for a total of 24 survey sites. While it is unlikely that we will be able to achieve an $N \geq 50$, we will be able to compare results to similar surveys conducted in 2010 and 2017.

White Crappie: According to the 2015 and 2018 creel survey, White Crappie at Alan Henry Reservoir were targeted with approximately 26.4% and 9.6% of direct angler effort, respectively. Due to trap net catch rates of White Crappie being highly variable, trend data has only been able to determine presence/absence of the species. Analysis of past sampling indicates that it would require more than 80 trap net stations to achieve a CPUE-S $RSE \leq 25$. Effort for size structure estimation (PSD; 50 fish minimum with 80% confidence) would require more than 100 random trap net stations. Since this amount of sampling is not practical, general monitoring on a quadrennial basis will allow for the evaluation of presence/absence of White Crappie. To determine presence/absence we will document any White Crappie observed during the annual electrofishing survey and through creel surveys. A better

understanding of crappie size structure, relative abundance, and body condition would assist in determining Alan Henry Reservoir's potential as a crappie fishery. In order to improve upon size structure, relative abundance, and body condition data, White Crappie will be sampled with a minimum of 30 Trap nets during the 2020-2021 survey period. Trap net stations will be biologist selected targeting areas that have historically produced a higher CPUE.

Forage Fish: Bluegill and Gizzard Shad are the primary forage species at Alan Henry Reservoir. 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, IOV data for forage species, and assessment of Bluegill and Threadfin Shad stocking success. No additional effort will be extended beyond what is used for black bass sampling.

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Tables and Figures

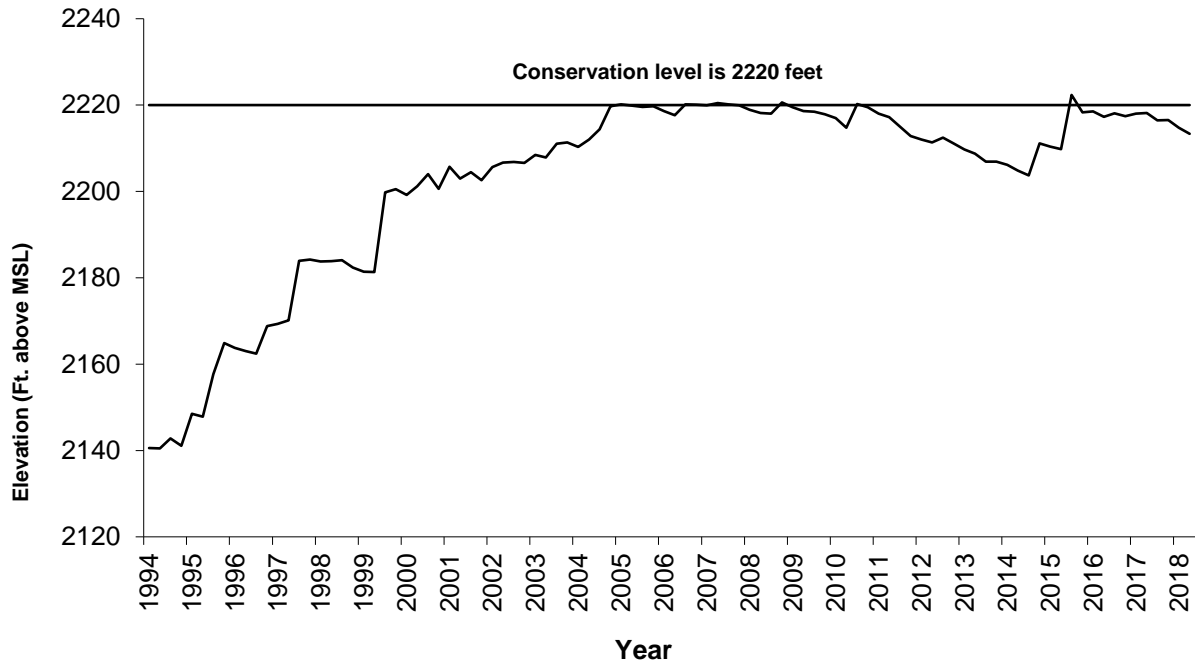


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded at Alan Henry Reservoir, Texas.

Table 1. Characteristics of Alan Henry Reservoir, Texas.

Characteristic	Description
Year constructed	1993
Controlling authority	City of Lubbock
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	1405 μ S/cm

Table 2. Boat ramp characteristics for Alan Henry Reservoir, Texas, August, 2017. Reservoir elevation at time of survey was 2,216.4 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	Neighborhood ramp, no access issues
Private Ramp 1	33.032184 -101.035520	N	1	UNK	Private ramp, no access issues
Private Ramp 2	33.041601 -101.030371	N	3	UNK	Private ramp, no access issues
Private Ramp 3	33.045845 -101.042714	N	3	UNK	Private 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)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass: Alabama and Largemouth ^a	5 (only 2 < 18 inches)	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
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	
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
	Total	20,222	
Crappie, White	1993	67,042	FGL

Table 5. Objective-based sampling components for Alan Henry Reservoir, Texas 2017-2018.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Evaluation of 2002 black bass regulation.	CPUE	Trend Data
		PSD, length frequency	Trend Data
Alabama Bass	Evaluation of 2002 black bass regulation.	CPUE	Trend Data
		PSD, length frequency	Trend Data
Bluegill ^a	General Monitoring	CPUE–Total	Trend Data
		PSD, length frequency	Trend Data
Gizzard Shad ^a	General Monitoring	CPUE–Total	Trend Data
		PSD, length frequency	Trend Data
	Prey availability	IOV	Trend Data
White Crappie	General Monitoring	Presence/Absence	Trend Data

^a No additional effort will be expended to achieve an RSE ≤ 25 for CPUE of Bluegill and Gizzard 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 directed angler effort by species for Alan Henry Reservoir, Texas. Survey periods for 2009, 2011, 2013, and 2015 were March 1 through May 31; 2018 survey period was April 1 through June 30.

Species	2009	2011	2013	2015	2018
Catfishes	0.0	0.4	0.0	0.5	6.6
Channel Catfish	2.9	1.1	1.1	2.2	1.9
Black basses	31.4	36.7	39.7	52.0	36.5
Alabama Bass*	0.1	0.5	0.2	1.1	
Largemouth Bass	36.9	42.3	25.6	12.0	28.3
White Crappie	13.4	10.9	21.0	26.4	9.6
Anything	15.3	8.1	12.4	5.7	17.0

*2018 survey showed no directed angler effort targeting Alabama Bass.

Table 8. Total fishing effort (h) for all species and total directed expenditures at Alan Henry Reservoir, Texas, 2009, 2011, 2013, 2015, and 2018. Survey periods for 2009, 2011, 2013, and 2015 were from March 1 through May 31; 2018 survey period was April 1 through June 30. Relative standard error is in parentheses.

Creel statistics	2009	2011	2013	2015	2018
Total fishing effort - hours	56,815 (16)	29,302 (19)	33,883 (25)	23,214 (30)	28,755 (24)
Total directed expenditures	\$457,510 (36)	\$356,312 (37)	\$369,303 (34)	\$215,739 (42)	\$254,802 (31)

Gizzard Shad

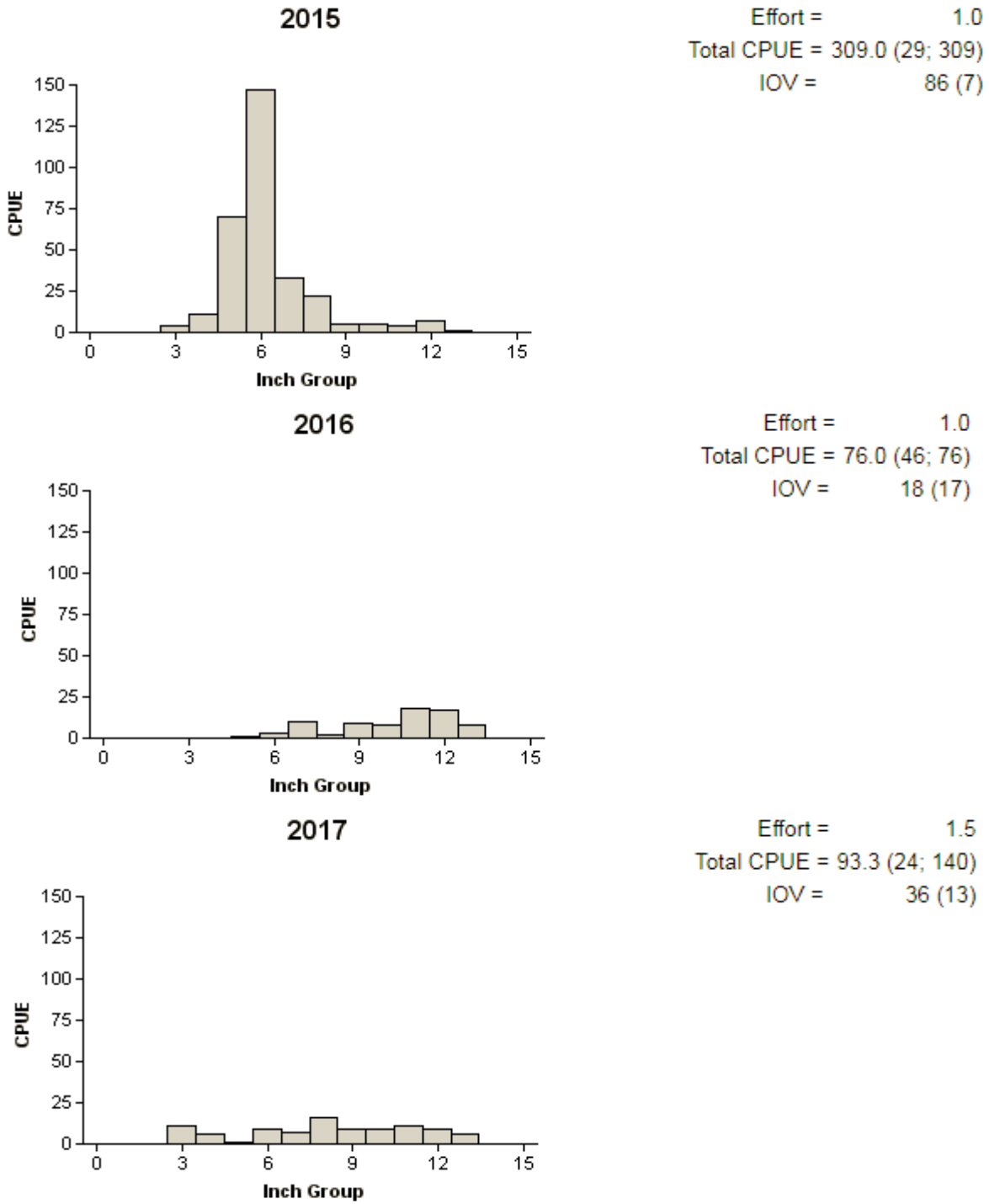


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys Alan Henry Reservoir, Texas, 2015, 2016, and 2017.

Bluegill

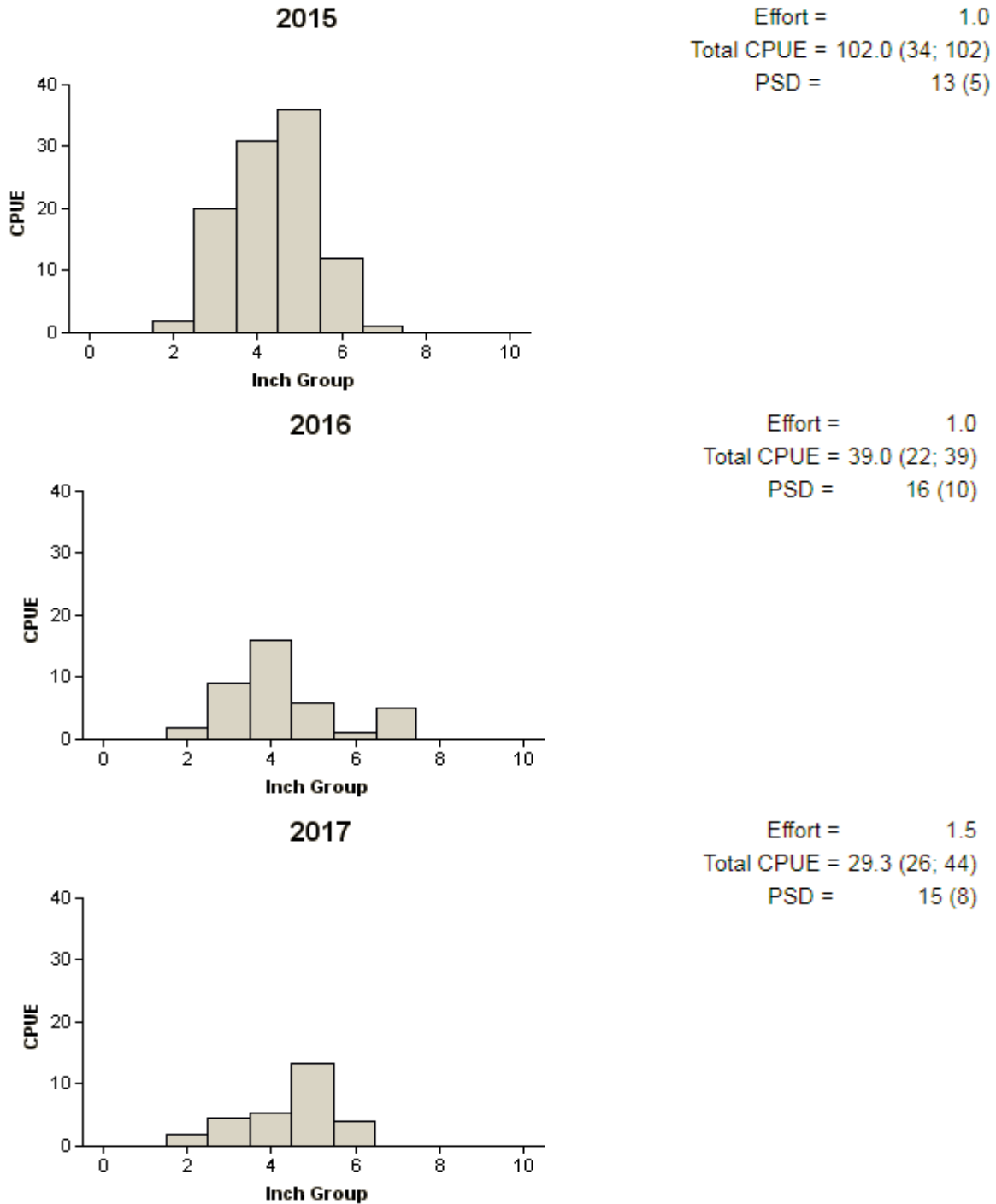


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2015, 2016, and 2017.

Blue Catfish

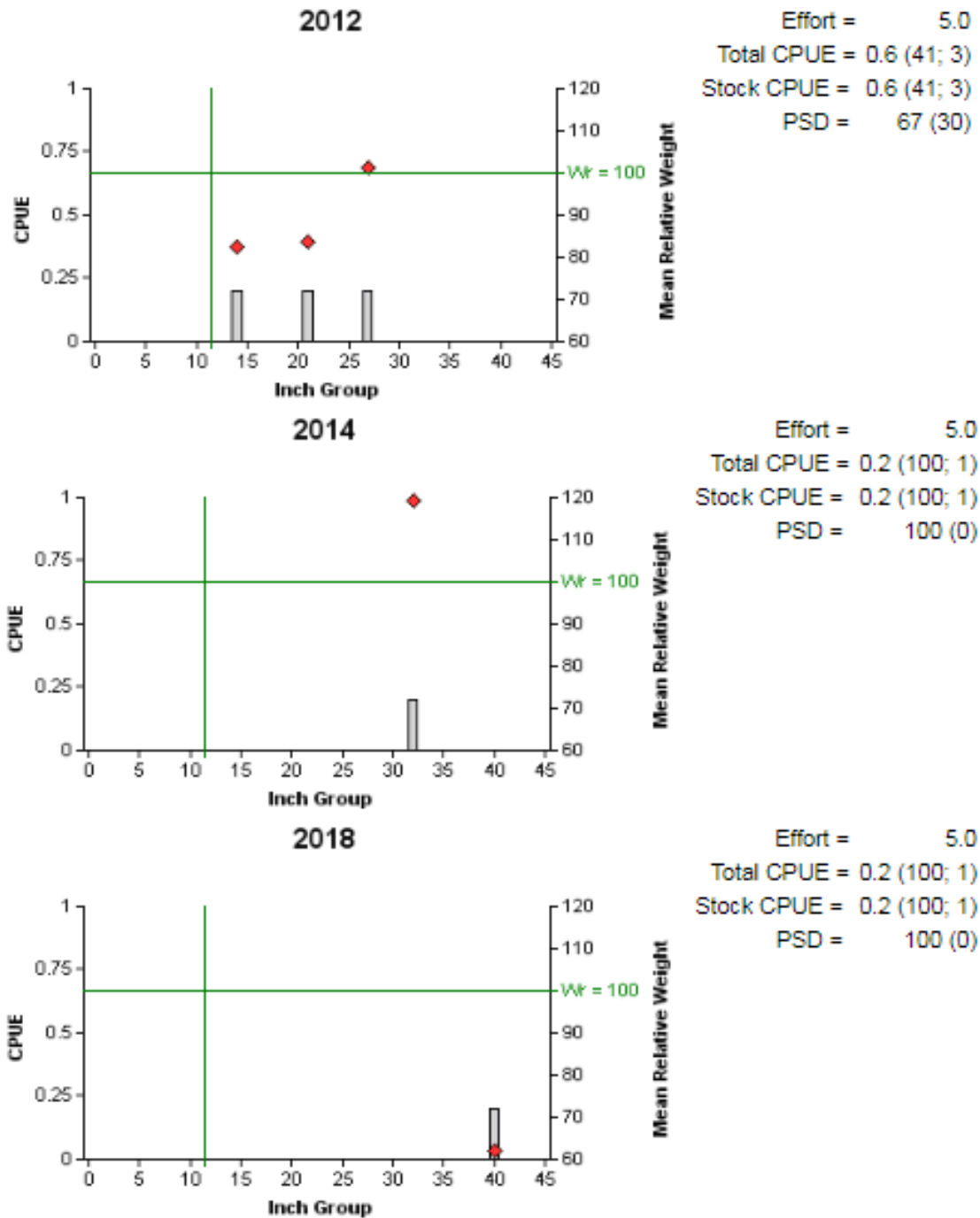


Figure 4. Number of Blue Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Alan Henry Reservoir, Texas, 2012, 2014, and 2018. Vertical line represents 12-inch minimum length limit and horizontal line represents relative weight of 100.

Channel Catfish

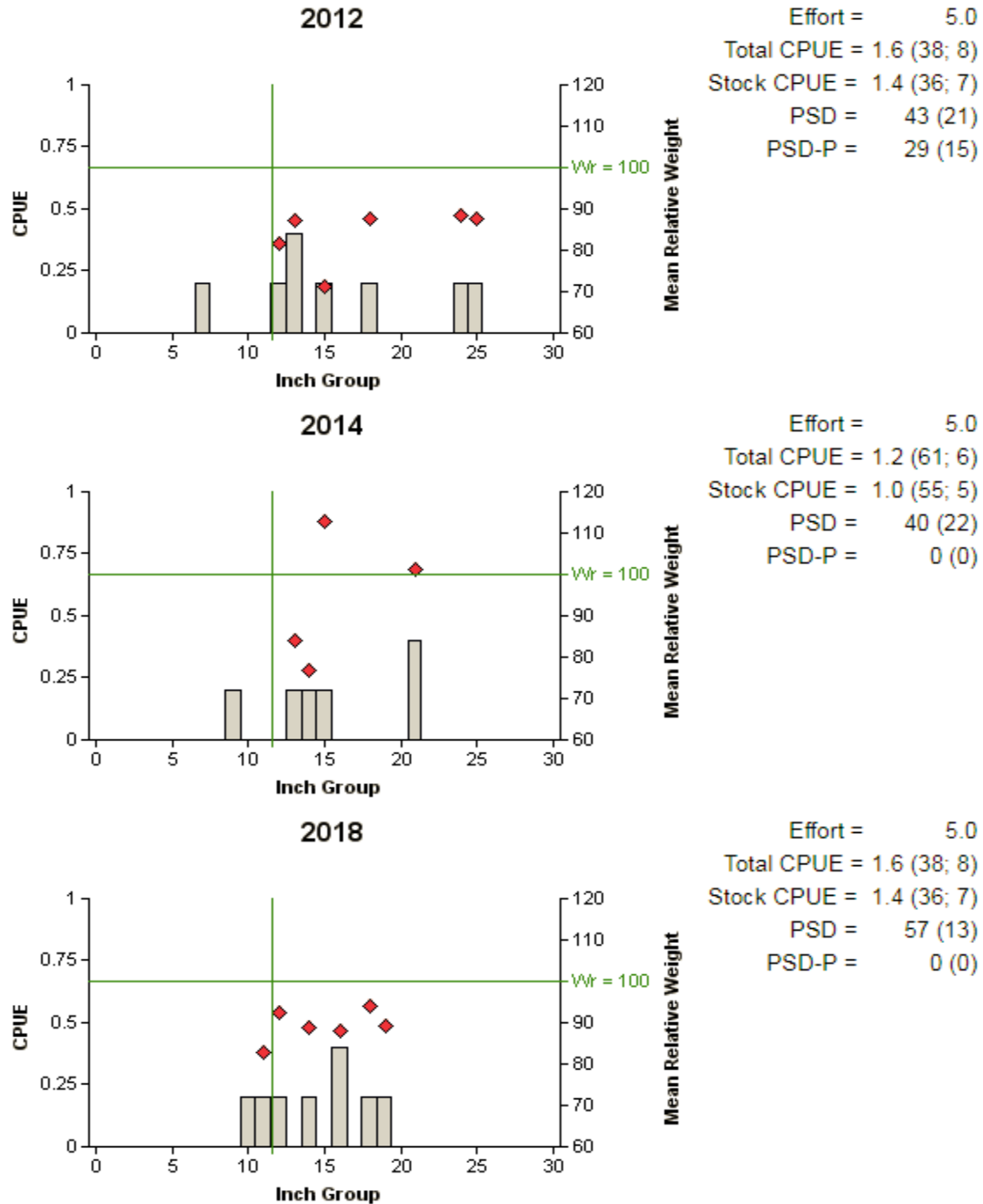


Figure 5. Number of Channel Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Alan Henry Reservoir, Texas, 2012, 2014, and 2018. Vertical line represents 12-inch minimum length limit and horizontal line represents relative weight of 100.

Table 9. Creel survey statistics for Channel Catfish at Alan Henry Reservoir, Texas. Survey period was March 1 through May 31 for 2009, 2011, 2013, and 2015; 2018 survey period was April 1 through June 30. Total catch per hour is for anglers targeting Channel Catfish and total harvest is the estimated number of Channel Catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year				
	2009	2011	2013	2015	2018
Surface area (acres)	2,753.3	2,766.7	2,176.9	2,190.0	2,401.1
Directed effort (h)	1,652 (39)	332 (66)	361 (77)	507 (66)	571 (64)
Directed effort/acre	0.6 (39)	0.1 (66)	0.1 (77)	0.2 (66)	0.2 (64)
Total catch per hour	0.1 (71)	0.36 (89)	0.44 (108)	0.00 (0)	0.12 (119)
Total catch	471 (131)	185 (196)	310 (185)	29 (575)	263 (71)
Total harvest	253 (82)	134 (127)	136 (103)	29 (575)	263 (71)
Harvest/acre	0.10 (82)	0.06 (127)	0.04 (103)	0.01 (575)	0.11 (71)
Percent legal released	41.4	20.0	20.0	0.0	0.0

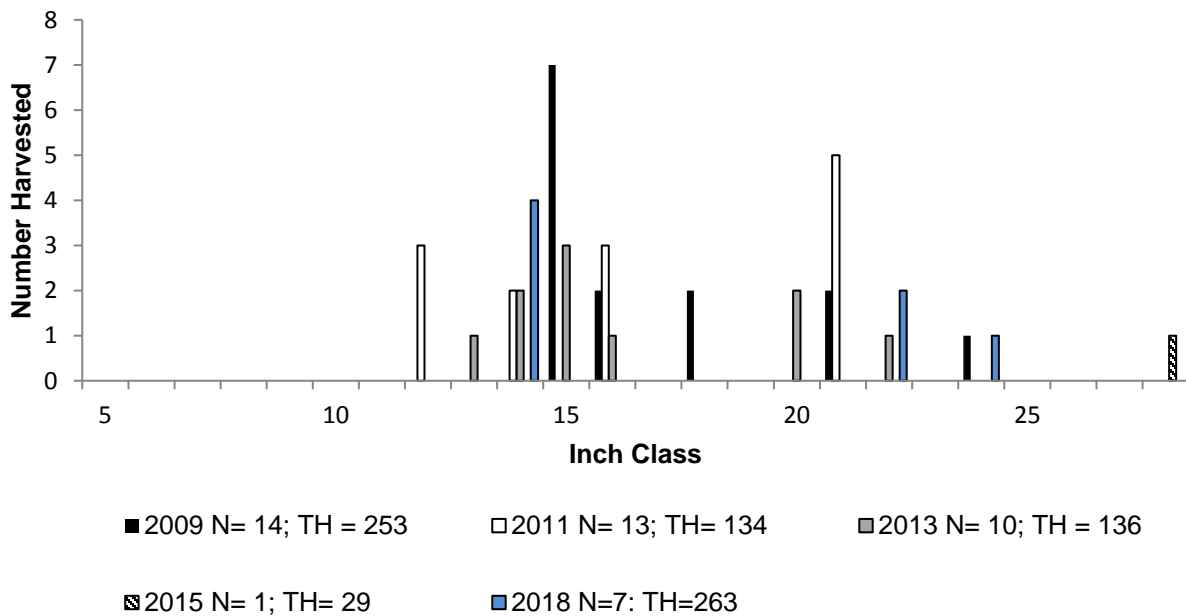


Figure 6. Length frequency of harvested Channel Catfish observed during creel surveys at Alan Henry Reservoir, Texas. Survey period was March 1 through May 31 for 2009, 2011, 2013, and 2015; 2018 survey period was April 1 through June 30, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

Alabama Bass

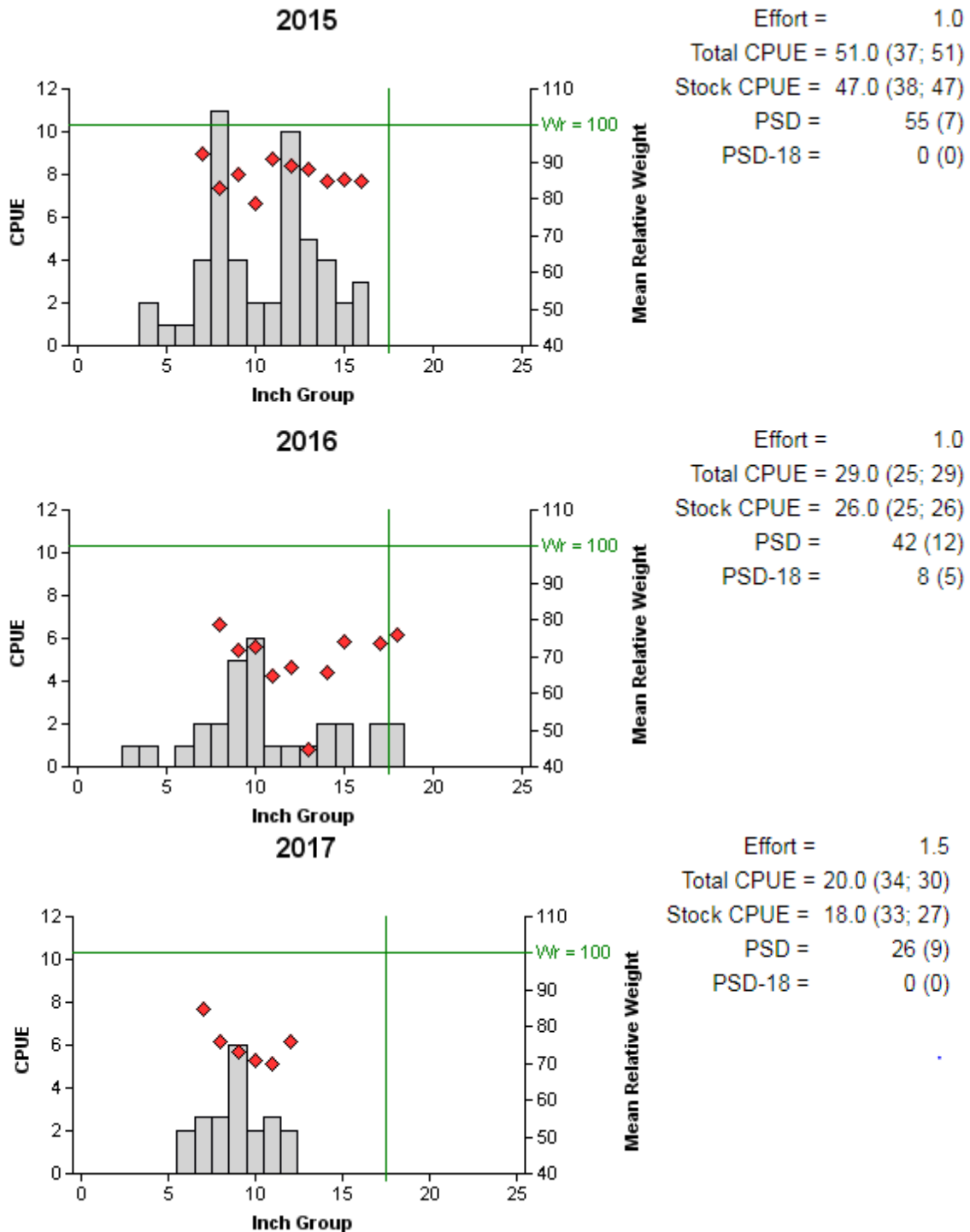


Figure 7. Number of Alabama Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2015, 2016, and 2017. Vertical line indicates 18-inch length limit, and horizontal line represents relative weight of 100.

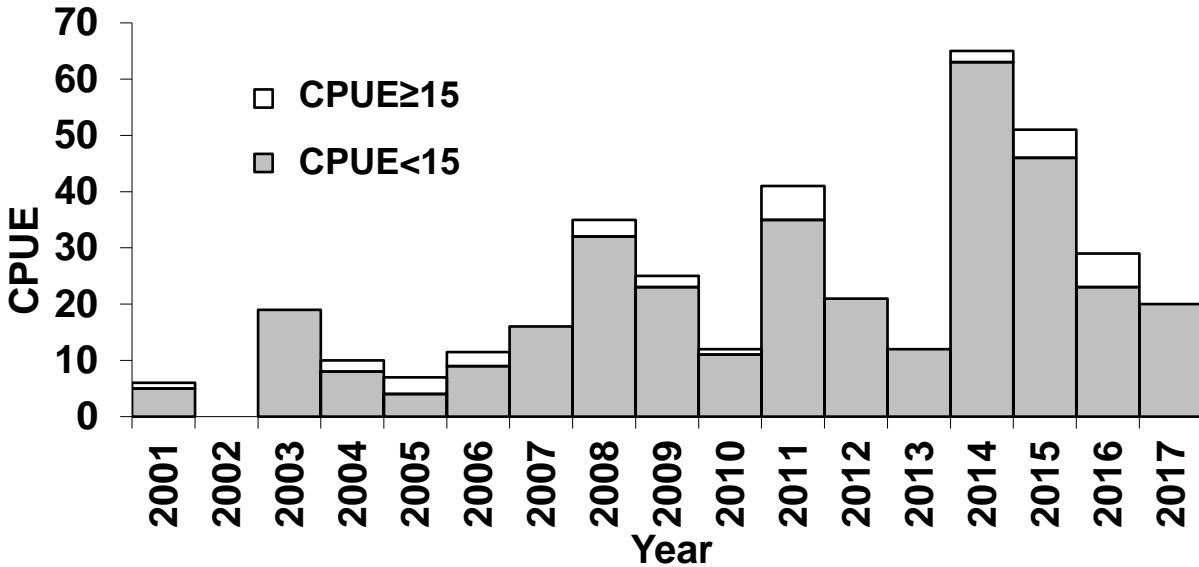


Figure 8. Number of Alabama Bass less than 15 inches caught per hour (CPUE<15, gray bars) and number of Alabama Bass greater than or equal to 15 inches caught per hour (CPUE-15, white bars) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2001 – 2017.

Table 10. Creel survey statistics for Alabama Bass at Alan Henry Reservoir, Texas. Survey period was March 1 through May 31 for 2009, 2011, 2013, and 2015; 2018 survey period was April 1 through June 30. 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 Statistic	Year				
	2009	2011	2013	2015	2018
Surface area (acres)	2,753.3	2,766.7	2,176.9	2,190.0	2,401.1
Directed effort (h)	74 (191)	133 (100)	70 (167)	253 (93)	0
Directed effort/acre	0.03 (191)	0.05 (100)	0.02 (167)	0.11 (93)	0
Total catch per hour	0.00 (0)	0.45 (0)	0.00 (0)	0.42 (0)	0
Total catch	4,772 (39)	9,468 (26)	13,625 (29)	6,492 (31)	9,754 (36)
Total harvest	75 (90)	198 (86)	313 (17)	616 (35)	118 (58)
Harvest/acre	0.03 (90)	0.07 (86)	0.01 (17)	0.28 (35)	0.05 (58)
Percent legal released*			97.7	90.5	98.8

*Alabama Bass harvest regulation changed from 18-inch minimum length to no minimum length on September 1, 2011.

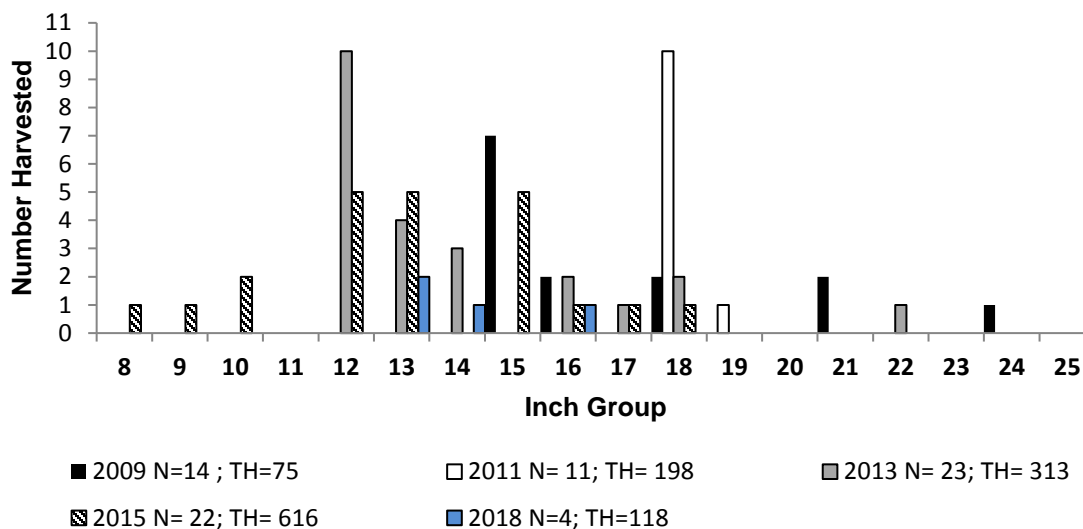


Figure 9. Length frequency of harvested Alabama Bass observed during creel surveys at Alan Henry Reservoir, Texas, March 1 through May 31, 2009, 2011, 2013, 2015, and April 1 through June 30, 2018, all anglers combined. N is the number of harvested Alabama Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

Largemouth Bass

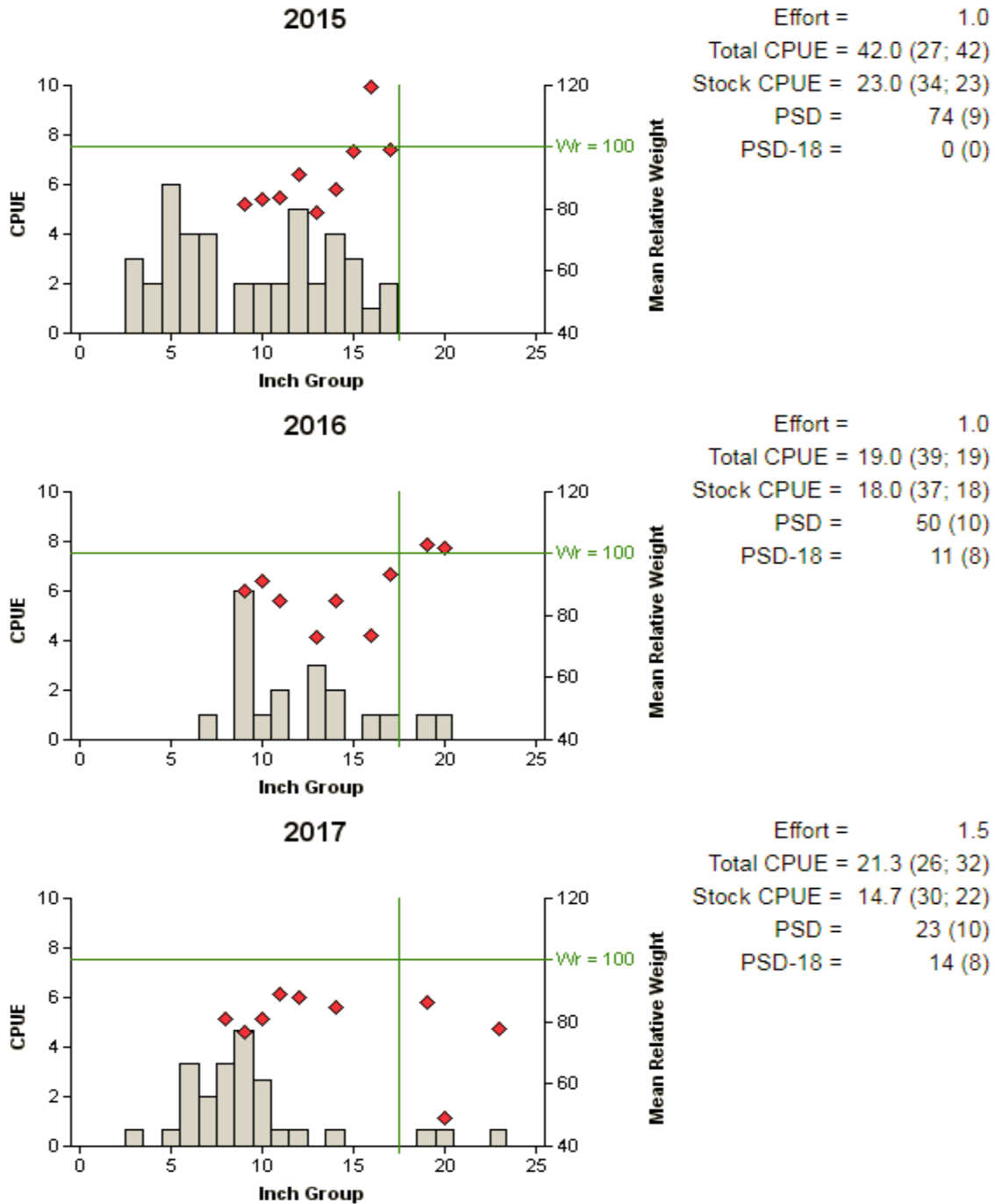


Figure 7. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2015, 2016, and 2017. Vertical line represents 18-inch length limit and horizontal line represents relative weight of 100.

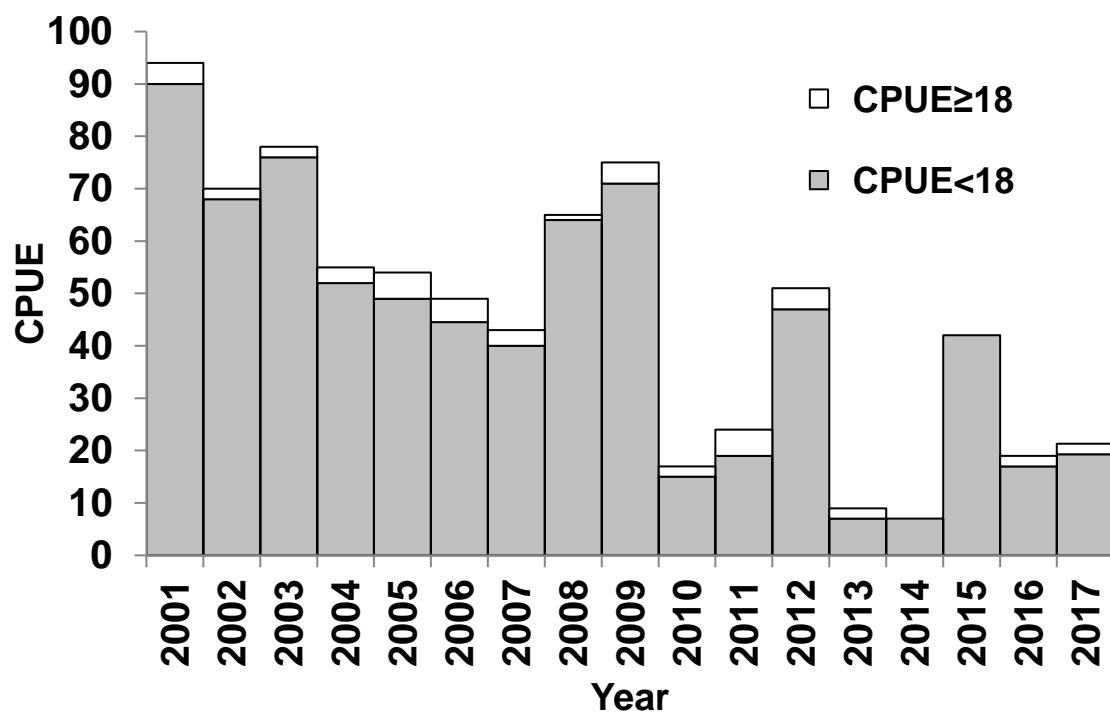


Figure 8. Number of Largemouth Bass less than 18 inches caught per hour (CPUE<18, bars) and number of Largemouth Bass greater than or equal to 18 inches caught per hour (CPUE-18, white bars) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2001–2017.

Table 11. Creel survey statistics for Largemouth Bass at Alan Henry Reservoir, Texas. Survey period for 2009, 2011, 2013, and 2015 was March 1 to May 31; 2018 survey period was April 1 through June 30. Catch rate is for all anglers targeting Largemouth Bass and black bass. Relative standard errors (RSE) are in parentheses.

Statistic	2009	2011	2013	2015	2018
Surface area (acres)	2753.3	2766.7	2176.9	2190.0	2,401.1
Directed effort (%)					
Black basses	31.4	36.7	39.7	52.0	36.5
Largemouth Bass	36.9	42.3	25.6	12.0	28.3
% Total	68.3	79.0	65.3	64.0	64.8
Directed effort (h)					
Largemouth Bass	20,948 (20)	12,382 (23)	8,681 (30)	2,780 (37)	8,142 (25)
black bass	17,832 (21)	10,762 (23)	13,456 (28)	12,079 (28)	10,480 (24)
Directed effort/acre					
Largemouth Bass	7.3 (20)	4.5 (23)	4.0 (30)	1.3 (37)	3.4 (25)
black bass	6.5 (21)	3.9 (23)	6.2 (28)	5.5 (28)	4.4 (24)
Total catch per hour	0.39 (13)	0.34 (14)	0.16 (27)	0.17 (53)	0.32 (25)
Total catch	17,931 (27)	8,019 (22)	6,667 (31)	1,614 (44)	5,921 (37)
Total Harvest	771 (32)	1,231 (33)	187 (53)	171 (50)	174 (70)
Harvest/acre	0.3 (32)	0.44 (33)	0.06 (53)	0.08 (50)	0.07 (70)
Percent legal released	76.1	32.0	66.1	45.2	75.3

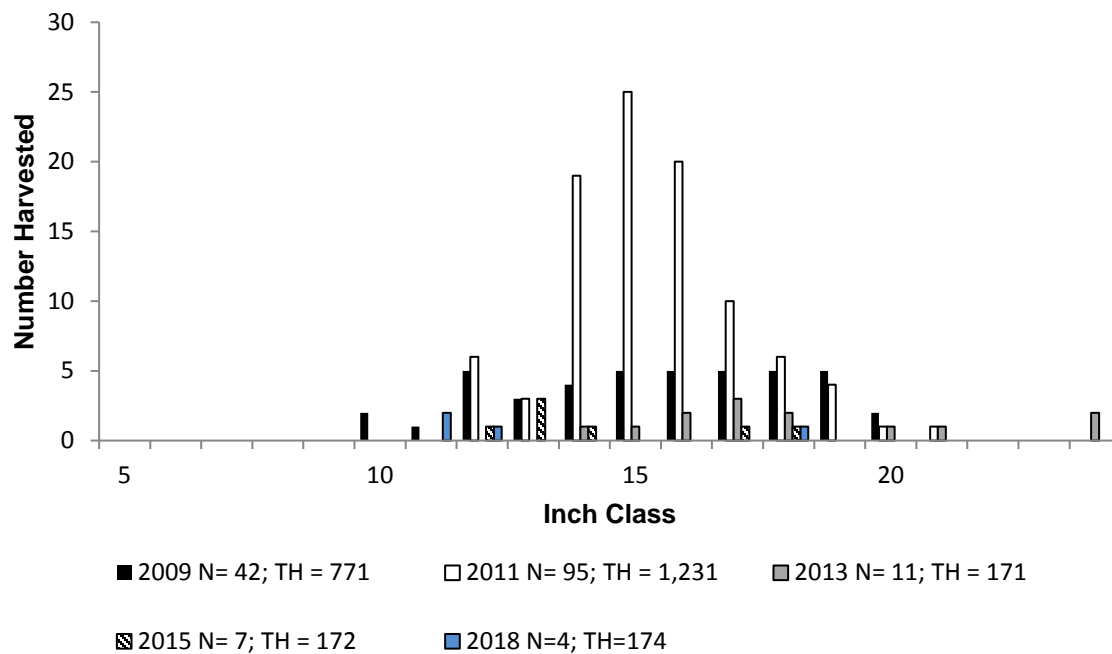


Figure 9. Length frequency of harvested Largemouth Bass observed during creel surveys at Alan Henry Reservoir, Texas, March 1 through May31, 2009, 2011, 2013, 2015, and April 1 through June 30, 2018, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the estimated harvest for the creel period.

White Crappie

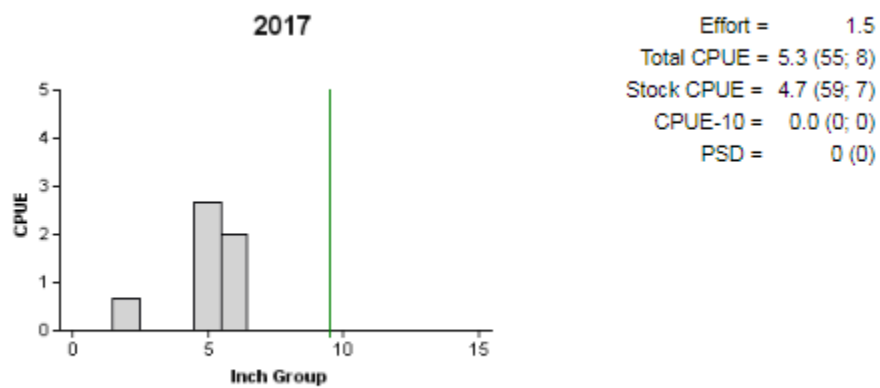


Figure 10. Number of White Crappie caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2017. Vertical line represents 10-inch minimum length limit.

Table 12. Creel survey statistics for White Crappie at Alan Henry Reservoir, Texas. Survey period was March 1 to May 31 for 2009, 2011, 2013, and 2015; survey period for 2018 was April 1 through June 30. Total catch per hour is for anglers targeting White Crappie and total harvest is the estimated number of White Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year				
	2009	2011	2013	2015	2018
Surface area (acres)	2753.3	2766.7	2176.9	2190.0	2,401.1
Directed effort (h)	7,628 (23)	3,186 (28)	7,111 (28)	6,136 (33)	2,768 (34)
Directed effort/acre	2.65 (23)	1.11 (28)	2.47 (28)	2.80 (33)	1.14 (34)
Total catch per hour	0.30 (42)	0.41 (20)	0.27 (32)	0.23 (61)	0.13 (53)
Total catch	4,700 (33)	2,308 (35)	2,958 (37)	1780 (46)	716 (109)
Total harvest	1,520 (35)	836 (41)	1,115 (51)	444 (45)	264 (58)
Harvest/acre	0.53 (35)	0.29 (41)	0.39 (51)	0.20 (45)	0.11 (58)
Percent legal released	7.5	15.9	19.8	13.8	35.3

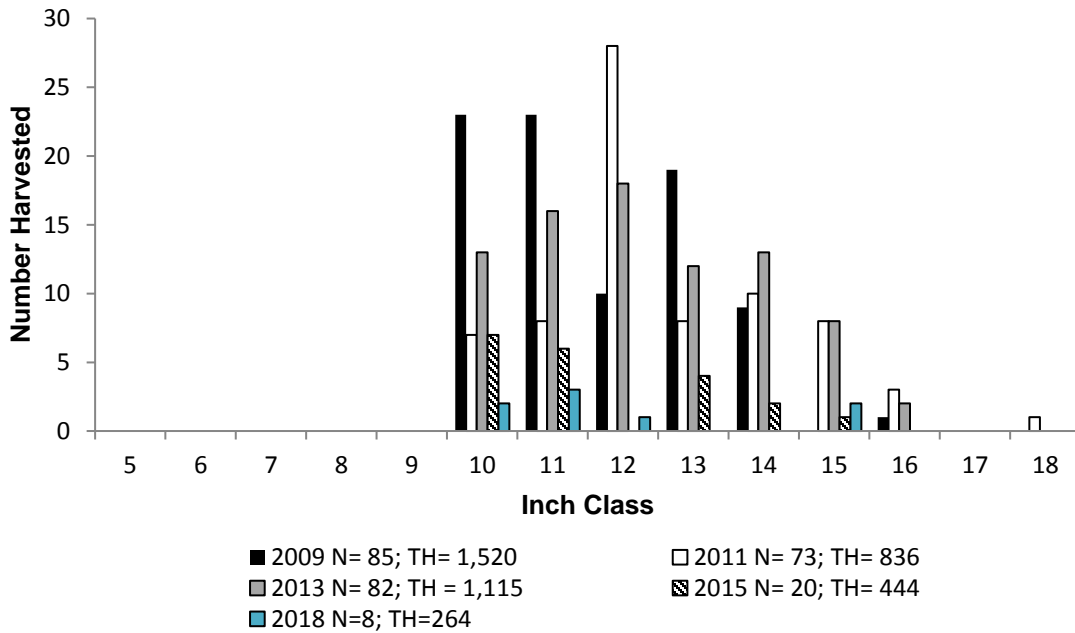


Figure 11. Length frequency of harvested White Crappie observed during creel surveys at Alan Henry Reservoir, Texas. Survey period was March 1 to May 31 for 2009, 2011, 2013, and 2015; survey period

for 2018 was April 1 through June 30, 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 13. 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. Standard survey denoted by S and additional survey denoted by A.

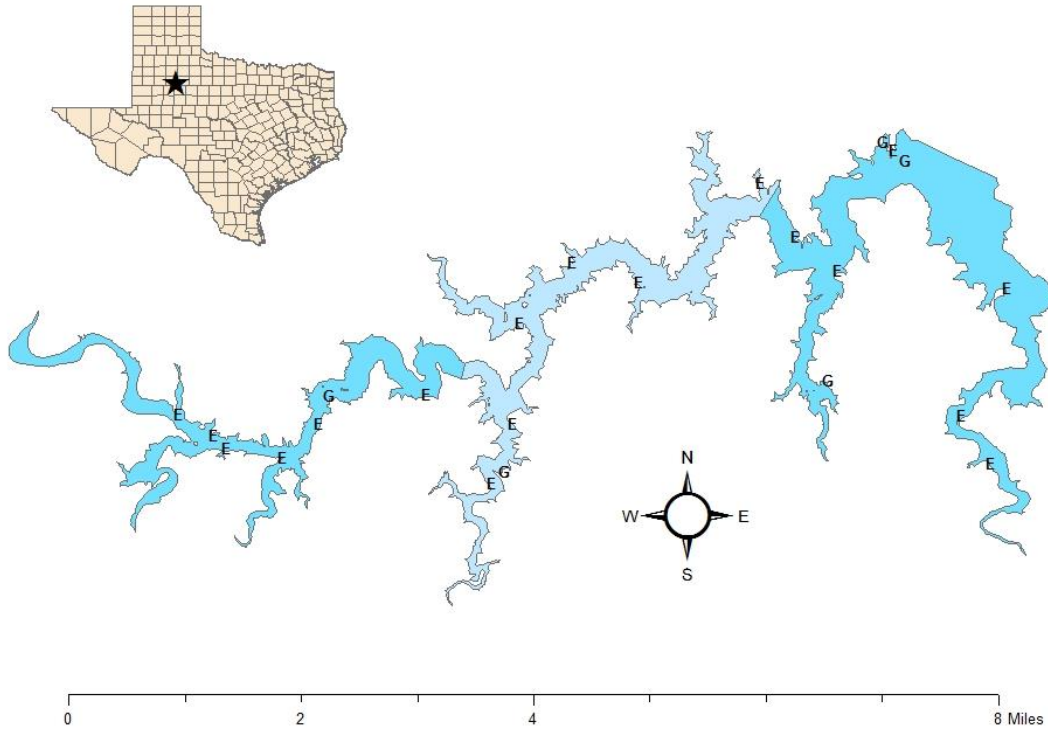
	Survey year			
	2018-2019	2019-2020	2020-2021	2021-2022
Angler Access				S
Structural Habitat				S
Vegetation				S
Electrofishing – Fall	A	A	A	S
Electrofishing – Spring				
Electrofishing – Low frequency				
Trap netting			A	
Gill netting				
Baited tandem hoop netting		A		
Creel survey			S	
Report				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 Alan Henry Reservoir, Texas, 2017-2018. Sampling effort was 5 net nights for gill netting and 1.5 hour for electrofishing.

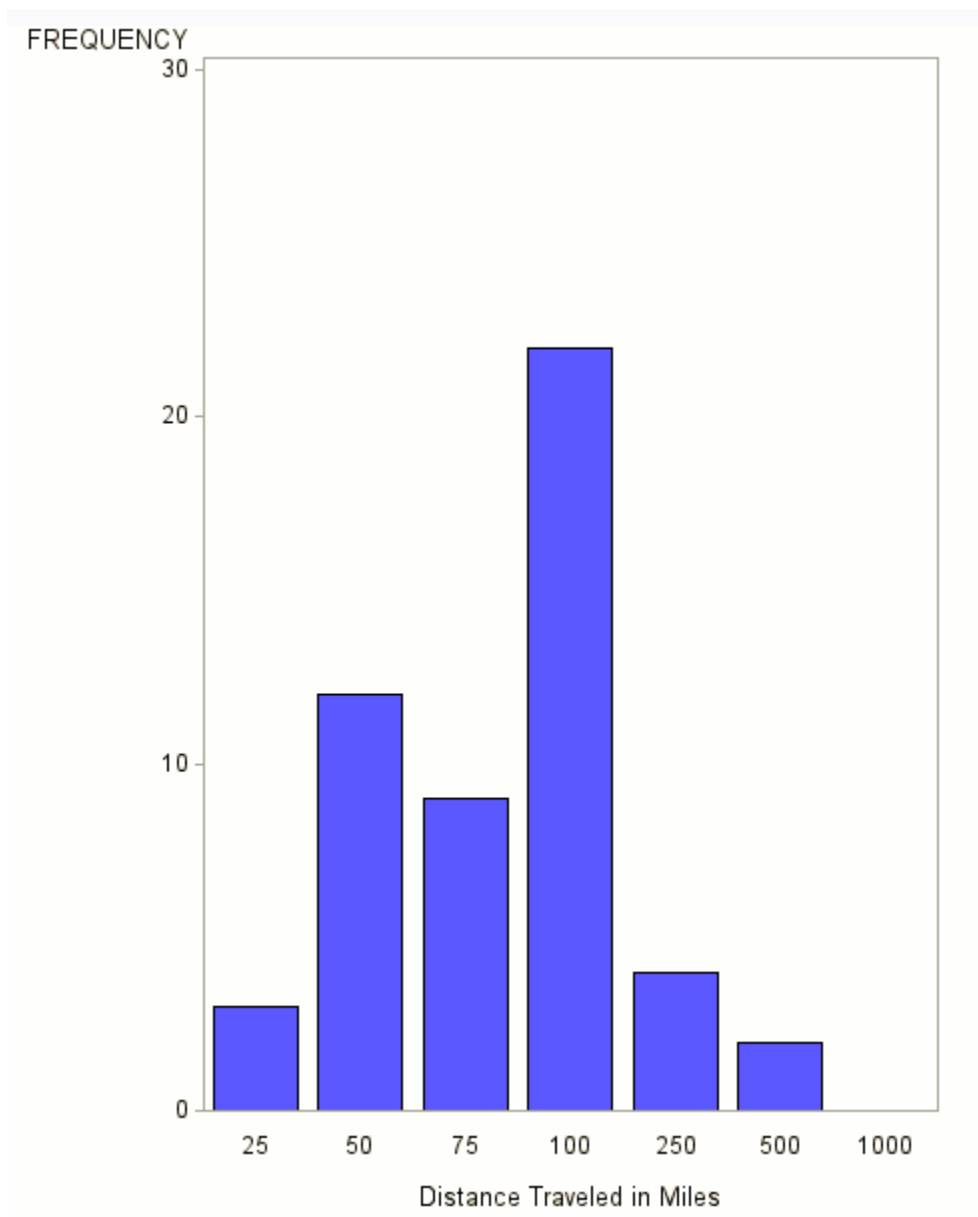
Species	Gill Netting		Electrofishing	
	N	CPUE	N	CPUE
Longnose Gar	6	1.2 (67)	8	5.3 (100)
Gizzard Shad	22	4.4 (37)	140	93.3 (24)
Common Carp	1	0.2 (37)	17	11.3 (46)
River Carpsucker	7	1.4 (62)		
Blue Catfish	1	0.2 (100)		
Channel Catfish	8	1.6 (38)	4	2.7 (69)
Flathead Catfish	1	0.2 (100)	2	1.3 (100)
Green Sunfish			13	8.7 (35)
Bluegill			44	29.3 (26)
Longear Sunfish			6	4.0 (100)
Largemouth Bass			32	21.3 (26)
White Crappie	9	1.8 (75)	8	5.3 (55)
Freshwater Drum	2	0.4 (100)	2	1.3 (69)
Alabama Bass	3	0.6 (67)	30	20.0 (34)

APPENDIX B – Map of sampling locations



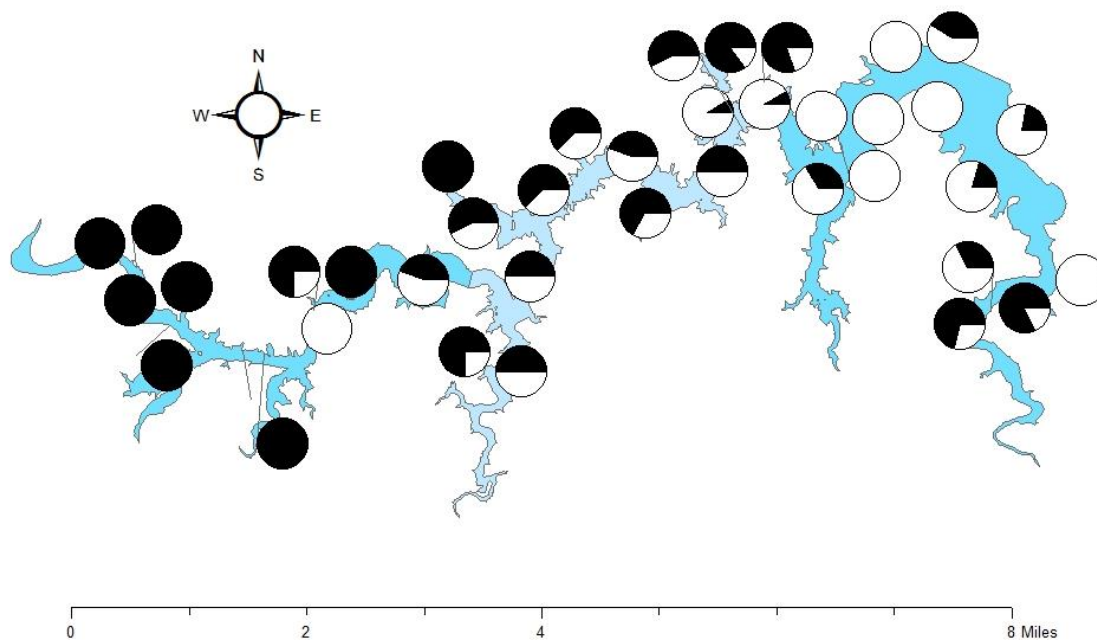
Location of sampling sites, Alan Henry Reservoir, Texas, 2017-2018. Gill net and electrofishing stations are indicated by G and E, respectively. For electrofishing survey, the reservoir was divided into thirds, and six stations were randomly selected for each third. Water level was 2216.5 ft MSL (approximately six feet below full pool) at time of sampling.

APPENDIX C – reporting of creel ZIP code data

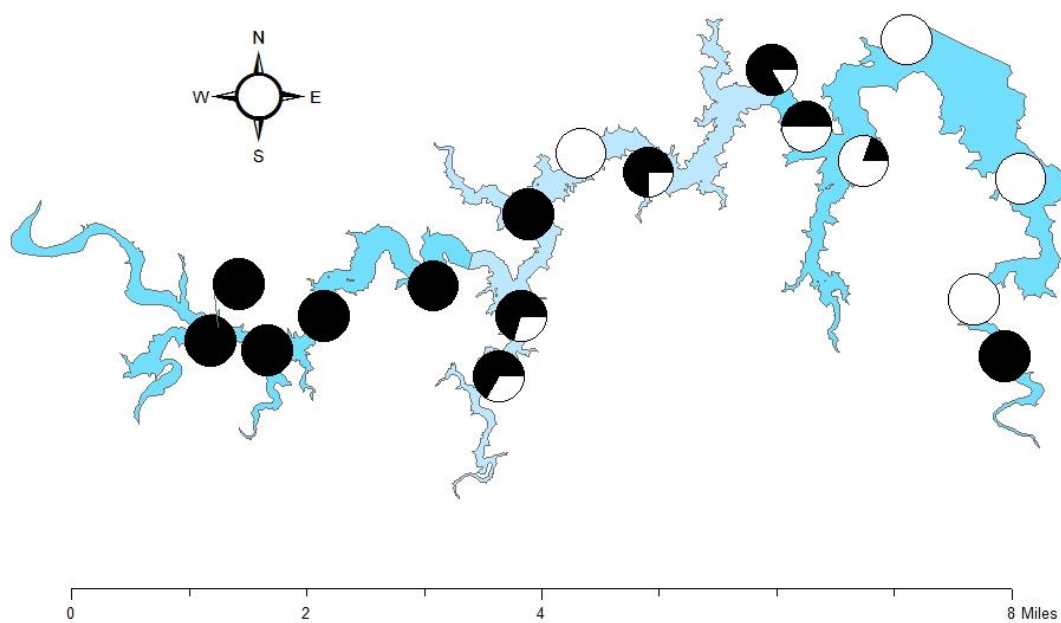


Frequency of anglers that traveled various distances (miles) to Alan Henry Reservoir, Texas, as determined from the March 1, 2015 through May 31, 2015 creel survey.

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.

Appendix D continued:

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.



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