

Lady Bird Reservoir

2019 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 Lady Bird Reservoir were surveyed in 2017 and 2019 using electrofishing. Historical data are presented with the 2017 and 2019 data for comparison. Aquatic vegetation was monitored by annual surveys. This report summarizes results of the surveys and contains a fisheries management plan for the reservoir based on those findings.

- **Reservoir Description:** Lady Bird Reservoir is a stable-level, 469-acre impoundment of the Colorado River located in the city of Austin, Travis County, Texas. Prior to 2007 the reservoir was named Town Lake. The reservoir runs through the mid-section of the city and was constructed in 1960 for purposes of flood control, municipal and industrial water supply, and recreation. The reservoir is owned and operated by the City of Austin. The reservoir lies within the Edwards Plateau ecological area and has a shoreline length of 18.3 miles and a drainage area of approximately 38,240 square miles. Some of the adjacent land has been developed into city parks. Other shoreline areas have been developed by private businesses.
- **Management History:** Important sportfish included Largemouth Bass and Common Carp. Largemouth Bass were managed under a 14-inch minimum length limit until September 1, 2000 when a 14- to 21-inch slot length limit was initiated. Florida Largemouth Bass were initially stocked in 1998 to improve Largemouth Bass growth potential.

Lady Bird Reservoir is a popular destination for trophy Common Carp anglers from around the country and from abroad because of the opportunity to catch 30- to 40-plus-pound carp. The reservoir holds the rod and reel state record for Common Carp at 43.75 pounds. In 2009, a harvest restriction was implemented to protect trophy-sized Common Carp; only one carp 33 inches or greater may be retained per day.

Lady Bird Reservoir holds the state record (rod and reel) for nine species of fish, which is more than any other public waterbody in Texas.

Low vegetative coverage has been characteristic of Lady Bird Reservoir.

- **Fish Community**
 - **Prey species:** Redbreast Sunfish, Bluegill, Gizzard Shad and Redear Sunfish were the predominant prey species. Catch rate for Redbreast Sunfish had increased since the previous survey, but Bluegill and Redear Sunfish had declined. Gizzard Shad abundance has declined since 2015.
 - **Common Carp:** Historical data indicates that Lady Bird Reservoir had a low-density carp population dominated by larger individuals and this is partially reflected in more recent data.
 - **Largemouth Bass:** Largemouth Bass abundance had declined since the previous two surveys, but was still moderate in 2019. The fish were in good condition, and displayed adequate growth. Population size structure was good.

Management Strategies: Based on current information, the reservoir should continue to be managed with existing regulations. Biennial aquatic vegetation surveys should be conducted to monitor for the potential establishment of the non-native species hydrilla, and for changes to the aquatic vegetation community that could be attributed to the emigration of Grass Carp from upstream Austin Reservoir. Continue collection of information on Grass Carp and Common Carp populations in collaboration with the Carp Anglers Group (CAG). Conduct a standard electrofishing survey in 2023. Access and habitat surveys will be conducted in 2023. Schedule a creel survey as time permits.

Introduction

This document is a summary of fisheries data collected from Lady Bird Reservoir in 2017 and 2019. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2017 and 2019 data for comparison.

Reservoir Description

Lady Bird Reservoir is a stable-level, 469-acre impoundment of the Colorado River located in the city of Austin, Travis County, Texas. Conservation level is 428 feet above mean sea level. The reservoir runs through the mid-section of the city and was constructed in 1960 for purposes of flood control, municipal and industrial water supply, and recreation. The reservoir is owned and operated by the City of Austin (COA). The reservoir lies within the Edwards Plateau ecological area and has a shoreline length of 18.3 miles and a drainage area of approximately 38,240 square miles. The reservoir is eutrophic with a mean TSI chl-*a* of 55.48, and a 10-year change of +5.9 (Texas Commission on Environmental Quality 2020). Barton Springs Creek in Austin is a small tributary of Lady Bird Reservoir and was the site of the first state fish hatchery in Texas. The facility was mandated by the Legislature and built for the propagation of Common Carp in 1881 (Thompson 1943).

Some of the land bordering the reservoir has been developed into city parks. Other shoreline areas have been developed by private businesses. The 10-mile Ann and Roy Butler Hike-and-Bike Trail, which follows the shoreline of the reservoir, is Austin's most recognized and popular recreational area with more than 1.5 million visits a year. The boardwalk portion of the trail was built in June 2014 allowing trail users to easily and safely circumnavigate the reservoir. The \$28 million project features 13,000 LED lights, seven viewing areas, ADA accessible pier, and a new trailhead restroom along the 7,250 feet boardwalk.

Habitat at time of sampling consisted primarily of natural shoreline (86.7%). Vegetation (primarily waterwillow and bulrush) covered approximately 4% of reservoir surface area. Other descriptive characteristics for Lady Bird Reservoir are in Table 1.

Angler Access

Boat access was adequate and consisted of three public boat ramps and a designated canoe/kayak access ramp in the COA Red Bud Park. The use of gasoline-powered motors was prohibited by city ordinance; however, the use of electric trolling motors was permitted.

Bank fishing access was good. The boardwalk is open from 5 am to midnight each day. Fishing is allowed on the rest areas, but not along the main trail of the boardwalk. In 2017, a wheelchair accessible fishing pier was built and incorporated into the boardwalk using funds raised by the CORE Health Foundation. Additional boat ramp characteristics are in Table 2.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Farooqi and De Jesus 2016) included:

1. Continue annual aquatic vegetation surveys.
Action: Aquatic vegetation surveys were conducted annually from 2016 to 2019.
2. Continue collecting catch rate information on Grass Carp during electrofishing surveys and from bycatch at the Austin Team Championship (ATC) Common Carp tournament.
Action: One Grass Carp was observed during the 2019 electrofishing survey. Grass Carp were captured at the ATC tournament; however, anglers have been reluctant to formally report them as they are not required for the tournament.

3. Conduct an additional electrofishing survey to monitor Grass Carp and Largemouth Bass populations in response to vegetation dynamics.
Action: An additional electrofishing survey was conducted in 2017.
4. Continue to work with the COA to provide input relative to safeguarding angling access on the boardwalk.
Action: Communication with the COA was maintained and there was no further initiatives limiting angler access to the boardwalk.
5. Continue collecting length-frequency information on Common Carp during standard electrofishing surveys and continue working with the Carp Anglers Group to access catch data at carp tournaments.
Action: Four Common Carp were caught during the standard electrofishing survey in 2019. Due to unknown factors, tournament catch data for the Austin Team Championship (ATC) was not made available from 2017 to 2019 and there was no tournament in 2020.
6. Cooperate with the COA to educate the public about invasive species through the use of print media, social media, and public engagements.
Action: Outreach efforts regarding invasive species included social media, print media, TV interviews, public presentations, and one-on-one interactions with constituents.

Harvest regulation history: Sportfish in Lady Bird Reservoir are currently managed with statewide regulations with the exception of Largemouth Bass and Common Carp (Table 3).

From 1985 to 1999, Largemouth Bass were managed with a 14-inch minimum length limit. A 14- to 21-inch slot length limit was implemented in 2000 to: increase abundance of bass greater than 14 inches in length; increase angler catches of bass greater than 14 inches in length; and, re-direct harvest at individuals less than 14 inches in length.

In 2009, a harvest restriction was implemented to protect trophy Common Carp; only one carp 33 inches or greater may be retained per day. There is no daily bag limit for carp less than 33 inches in length. The 33-inch maximum length limit was based on Gablehouse's (1984) designation for trophy carp.

Stocking history: Florida Largemouth Bass were stocked in 1998 and 2016 to improve the growth potential for Largemouth Bass. Largemouth Bass ShareLunker offspring were stocked in 2014. These fingerlings were derived from a 13-pound Largemouth Bass caught by an angler in Lady Bird Reservoir and submitted to the selective breeding program in 2014. Surplus Channel Catfish fry were stocked in 2018. The complete stocking history is in Table 4.

Vegetation/habitat management history: Prior to 2012, vegetative cover had been low in Lady Bird Reservoir (Magnelia and Bonds 2004, Magnelia and De Jesus 2008). Vegetation was restricted to shallow sediment flats adjacent to creek mouths, shoreline, or directly in creeks like Barton Springs Creek.

In 2013, dense growths of fanwort (*Cabomba caroliniana*) traversed the width of Lady Bird Reservoir at the confluence of Barton Springs Creek. Growth was less extensive in 2014 and 2015.

Austin Reservoir (directly upstream) had dense stands of the exotic plant hydrilla (*Hydrilla verticillata*; Magnelia and Bonds 2004) and the possible establishment of this aquatic plant in Lady Bird Reservoir was of concern, necessitating the need for annual aquatic vegetation monitoring. Floating hydrilla has often been observed in Lady Bird Reservoir, but has never become established (Magnelia and De Jesus 2008). This has not been an issue since September 2013 when hydrilla abundance declined to zero in Austin Reservoir.

Eurasian watermilfoil (*Myriophyllum spicatum*) has been the dominant non-native species, but abundance has declined since 2012 (8.8 acres). Giant cane (*Arundinaria gigantea*) was noted during the 2011, 2012, and 2015 surveys and is being managed by COA. Efforts have been taken by COA to establish native aquatic vegetation species via plantings throughout the reservoir.

Water Transfer: There are no inter-basin water diversion structures at Lady Bird Reservoir. The reservoir is the last in the chain of “Highland Lakes” on the Colorado River, receiving water directly from Austin Reservoir and discharging directly into the Colorado River.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Lady Bird Reservoir (TPWD unpublished). 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 2017).

Electrofishing – Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1 hour at 12, 5-min stations; Appendix A). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. Ages for Largemouth Bass were to be determined by a category-2 evaluation requiring otoliths from 13 randomly selected fish ranging in size from 13.0 to 14.9 inches. (TPWD, Inland Fisheries Division, unpublished manual revised 2017). However, only six fish were available in that size range.

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.

Habitat – A structural habitat and vegetation survey was conducted in 2019. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Results and Discussion

Habitat: In 2019, littoral zone structural habitat consisted primarily of natural shoreline (86.7%; Table 6; Appendix B). Total coverage estimate of all plant species in 2019 was 0.8% (4.0 acres). From 2016 to 2018 it was 0.6% (2.9 acres), 0.2% (1.0 acre), and 1.7% (8.0 acres) respectively (Table 7 and Appendix C). By comparison, total coverage ranged from 18.6% (82.7 acres) to 36.0% (162.5 acres) during the period 2012 to 2015 (Farooqi and De Jesus 2016). During the same period, the overall increase in vegetative cover was largely due to the expansion of fanwort which ranged from 17.0% (78.4 acres) to 33.9% (159.0 acres). Drought conditions that prevailed from 2011 to 2014 most likely created an environment in which fanwort could flourish. Since 2016, total aquatic vegetation coverage in this reservoir has significantly declined falling well short of that considered optimum for productive fisheries (Dibble et al. 1996, Durocher et al. 1984). The decline of fanwort was mainly due to scouring during flood events (Brent Bellinger pers. com.) In fact, fanwort was not recorded in 2016, 2017, and 2019.

Eurasian watermilfoil has steadily declined since 2012 (8.8 acres, 0.5 %) and has been absent since 2015 (Farooqi and De Jesus 2016). Hydrilla has never been established in Lady Bird Lake.

Prey species: Redbreast Sunfish, Bluegill, Gizzard Shad, and Redear Sunfish were the predominant prey species in 2019 (Appendix D). Although less abundant, other sunfish and Threadfin Shad provided additional forage.

Total CPUE of Gizzard Shad in 2019 (50.0/h) was similar to that obtained in 2017 (47.23/h) and less than in 2015 (193.0/h; Figure 1). The IOV for Gizzard Shad was 32, indicating that 32% of the population (≤ 8 inches) were vulnerable to existing predators. The IOV had improved since the 2017 survey (IOV = 2), but was lower than in 2015 (IOV = 46). Threadfin Shad were collected at a rate of 2.0/h in 2019, whereas 46.2/h and 68.6/h were caught in 2017 and 2015 respectively.

Redbreast Sunfish were the most abundant prey species caught in 2019. Total CPUE of Redbreast Sunfish in 2019 (217.0/h) was higher than in 2017 (171.1/h) and in 2015 (185.0/h). Overall, good catch rates and good population structure have been maintained in this reservoir for the last three surveys. Larger fish (up to 8 inches in length) continued to be present (PSD-P = 2), providing some good fishing opportunities for panfish anglers (Figure 2).

Bluegill catch rate had significantly declined compared to the previous two surveys. In 2019, total CPUE of Bluegill was 58.0/h, which was considerably less than in 2017 (269.5/h) and 2015 (253.0/h). The population consisted mainly of smaller fish but, there was some opportunity to harvest fish up to 6 inches in length.

Catch rates for Redear Sunfish have declined over the last three surveys. Total CPUE of Redear Sunfish in 2019 (33.0/h) was lower than in 2017 (58.0/h) and 2015 (93.0/h; Figure 4). Redear Sunfish up to 9 inches in length (PSD-M = 5) were caught, which along with the presence of large Redbreast Sunfish and Bluegill, and excellent bank fishing access, makes this lake a desirable destination for sunfish anglers. The state record Redear Sunfish was caught from Lady Bird Reservoir in 1997 and weighed 2.99 pounds.

Common Carp: Lady Bird Reservoir is renowned among carp anglers (in the United States and abroad) as one of the best trophy carp waters in the U.S. because of catches weighing greater than 40 pounds. Two carp tournaments at Lady Bird Reservoir in 2006 (ATC and Texas Carp Challenge) resulted in a direct expenditure of \$101,000 (TPWD, unpublished data). Tournament prize money is not normally high but, the TCC tournament winner received \$25,000 and the angler that broke the state record received \$250,000.

Common Carp electrofishing catch rate in 2019 was 4.0/h. By comparison, in 2015, the catch rate was 2.0/h and in 2011 it was 13.0/h (Figure 5; no length measurements were taken in 2019). In 2015, no carp above the maximum length (33 inches) were recorded, while in 2011 CPUE-33 was 1.0. Small carp (< 14 inches in length) were not present in any of the electrofishing and gill netting surveys between 2007 and 2019 (Farooqi and De Jesus 2016).

Electrofishing is generally less effective for sampling Common Carp, but tournament data can provide valuable information. Although requested, due to unknown factors no data was made available from the ATC tournament between 2017 and 2019 and the tournament was not held in 2020. No surveys specifically targeting Common Carp were conducted during the survey period.

Largemouth Bass: In 2019, the reservoir contained a low to moderate density Largemouth Bass population relative to bass populations in other central Texas reservoirs. The total catch rate of Largemouth Bass was 73.0/h in 2019 compared to catch rates of 81.6/h in 2017, and 171.0/h in 2015 (Figure 6). Electrofishing catch rate for Largemouth Bass 14 inches and longer (CPUE-14) was 26.0/h. This was similar to that obtained in 2017 (25.6/h), but was lower than in 2015 (56.0/h). The electrofishing CPUE of Largemouth Bass exceeding the upper end of the slot length limit (21 inches) had improved somewhat since 2015; CPUE-21 was 2.0/h in 2019 and 3.0/h in 2017 compared to 0.0/h in 2015 (Figure 6).

Compared to the 2015 data, the population size structure from 2017 to 2019 was verging on being characteristic of a lower density Largemouth Bass population with larger individuals (Figure 6) based on expected ranges from Gabelhouse (1984) for PSD (50 -80), PSD-P (30-60), and PSD-M (10-25). Overall, body condition was good, as mean relative weights of most size classes of bass exceeded 90 (Figure 6). Although the minimum sample size requirement for a Category 2 age and growth evaluation (n=13) was not met in 2019 (n=6), the data that was collected reflects that of previous surveys (Farooqi and De Jesus 2016) which showed that on average, Largemouth Bass in Lady Bird Reservoir reached 14 inches between ages 2 and 3 (Figure 7), and this is about average compared to values for the Edwards Plateau ecological area (Prentice 1987). Genetic evaluation was not required in 2019. However, during the previous three evaluations Florida Largemouth Bass influence was relatively constant, ranging from

61.9% to 68.0% (Farooqi and De Jesus 2016). The reservoir was last stocked with Florida Largemouth Bass in 2016 and ShareLunker Largemouth Bass in 2014.

Fisheries Management Plan for Lady Bird Reservoir, Texas

Prepared – July 2020

ISSUE 1: The recent decline of vegetation in Lady Bird Reservoir has largely been due to a reduction in the abundance of fanwort cause by scouring during flood events (Brent Bellinger pers. com). Eurasian watermilfoil has not been recorded since 2015 and hydrilla has never been established. Based on these findings, the frequency of aquatic vegetation surveys can be reduced without compromising the integrity of monitoring efforts.

MANAGEMENT STRATEGIES

1. Conduct biennial aquatic vegetation surveys.
2. Continue collecting catch rate information on Grass Carp (escapees from Austin Reservoir) from bycatch at the ATC Common Carp tournament by working with CAG to reduce non-reporting.

ISSUE 2: Bank fishing access at Lady Bird Reservoir is excellent and has been enhanced by designated fishing areas on the newly constructed boardwalk. However, the safety aspect of angling in close proximity to other users on the boardwalk has been raised, prompting the COA to hold public meetings to discuss whether or not fishing should continue on the boardwalk.

MANAGEMENT STRATEGY

1. Continue to work with the COA to provide input relative to safeguarding angling access on the boardwalk. Add more habitat/fish attractors in the vicinity of the fishing areas of the boardwalk.

ISSUE 3: Catch-and-release fishing for Common Carp is a popular activity on this reservoir and the annual ATC tournament attracts many out-of-state anglers. Data is needed to adequately manage the fishery.

MANAGEMENT STRATEGY

1. Continue working with CAG to access future catch data from the ATC Common Carp tournament and missing data from 2017-2019.

ISSUE 4: 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. If applicable, 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 (2020–2024)

Sport fish, forage fish, and other important fishes

Sport fishes in Lady Bird Reservoir include Largemouth Bass, Guadalupe Bass, Channel Catfish, Flathead Catfish, Crappie, White Bass, and Common Carp. Known important forage species include Bluegill, Redbreast Sunfish, Redear Sunfish, and Gizzard Shad.

Underutilized or low-density fisheries

Crappie: No trap netting has been conducted for crappie since 1999 (0.0/nn) because of historically low catch rates. A creel survey in 2002 did not capture directed effort for this species and no catches were documented. Sampling this population is not a priority for 2020-2024.

Channel Catfish: Channel Catfish were stocked in Lady Bird Reservoir three times in the late 1960s, and in 2000 and 2001. Subsequent gill net surveys were unable to detect an increase in relative abundance. Channel Catfish accounted for 6.6% of the directed fishing effort in the last creel survey conducted on the reservoir (2002), but no catches were documented. The supplemental Channel Catfish stocking strategy was abandoned in 2004. Channel Catfish gill netting catch per unit effort (CPUE) in 2003, 2004, 2008, and 2012 were 0.6, 0.4, 1.0, and 0.4/nn respectively. Sampling this population is not a priority for 2020-2024.

Flathead Catfish: Flathead catfish are present in low abundance based on gill netting surveys. Flathead Catfish CPUE in 1999, 2003, 2008, and 2012 were 0.3, 0.4, 0.6, and 0.6/nn respectively. A creel survey in 2002 did not capture directed effort for this species and no catches were documented. Sampling this population is not a priority for 2020-2024.

White Bass: White Bass are present in very low abundance based on gill netting surveys. None were caught in 1999, 2003, and 2011, and a CPUE of 0.2/nn was obtained in 2007. A creel survey in 2002 did not capture directed effort for this species and no catches were documented. Sampling this population is not a priority for 2020-2024.

Guadalupe Bass:

Catch per unit effort in 2003, 2007, and 2011 were 7.0, 2.0, and 0.0/h respectively. This species does not provide a significant fishery. Sampling this population is not a priority for 2020 – 2024. We will still monitor presence/absence with practical effort estimates from electrofishing surveys.

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Largemouth Bass are the most popular sport fish in Lady Bird Reservoir. Largemouth Bass accounted for 66.7% of the directed fishing effort in the last creel survey (2002), and 5,264 were caught at a rate of 0.96/h. A ShareLunker weighing 13.0 lbs. was caught from Lady Bird Lake in 2014. A Largemouth Bass weighing 13.5 lbs. was captured in 2015, but it was not submitted to the ShareLunker program. The popularity and growing reputation for quality Largemouth Bass fishing at this reservoir in Austin warrant sampling time and effort. Largemouth Bass are managed with a 14- to 21-inch slot regulation. Electrofishing trend data on CPUE, size structure, and body condition since 2006 indicates a very stable population. Sampling every 4 years will provide adequate data to manage this fishery. A minimum of 12 randomly selected 5-min electrofishing sites will be sampled in 2023, but sampling will continue at random sites until 50 stock-size fish are collected and the RSE of CPUE-S is ≤ 25 (the anticipated effort to meet both sampling objectives is 12-15 stations with 80% confidence). Exclusive of the original 12 random stations, three additional random stations will be pre-determined in the event some extra sampling is necessary. If failure to achieve either objective has occurred after one night of sampling and objectives can be attained with 6-12 additional random stations, another night of effort will be expended. As time permits, schedule a creel survey to get the a more up to date status of the fishery.

Bluegill, Redbreast Sunfish, Redear Sunfish, and Gizzard Shad: Bluegill, Redbreast Sunfish, Redear Sunfish and Gizzard Shad are the primary forage at Lady Bird Reservoir. Like Largemouth Bass, trend data on CPUE and size structure of Bluegill, Redbreast Sunfish and Gizzard Shad have been collected biennially since 1996 and indicate that variations in abundance and population characteristics of forage species can be adequately monitored by sampling every 4 years. Continuation of sampling, as per Largemouth Bass above, will allow for monitoring of large-scale changes in Bluegill, Redbreast Sunfish, and Gizzard Shad relative abundance and size structure. Sampling effort based on achieving sampling objectives for Largemouth Bass will result in sufficient numbers of Bluegill, Redbreast Sunfish, Redear Sunfish and Gizzard Shad for size structure estimation (PSD and IOV; 50 stock-size fish minimum at 5-12 stations with 80% confidence), but not for relative abundance estimates ($RSE \leq 25$ of CPUE-Total (CPUE-T); anticipated effort is 25-30 stations). At the sampling effort needed to achieve sampling objectives for Largemouth Bass, the expected RSE for CPUE-T is 30 for Bluegill, Redbreast Sunfish, Redear Sunfish, and 35 for Gizzard Shad. No additional effort will be expended to achieve an $RSE=25$ for CPUE of Bluegill, Redbreast Sunfish, and Gizzard Shad. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density. Relative weight of Largemouth Bass ≥ 8 " TL will be determined from their length/weight data (maximum of 10 randomly-selected fish weighed and measured per inch class).

Common Carp

Common Carp accounted for 9.4% of the directed fishing effort in the last creel survey (2002), and was the second most sought-after species at Lady Bird Lake (excluding the 13.5% of effort targeting "any species/no preference"). Basic monitoring of this fishery is warranted. However, electrofishing is ineffective at adequately sampling the carp population. Instead, data gathered from the annual ATC tournament at Lady Bird Reservoir, should provide larger sample sizes, and greater information on catch rates, size structure, and body condition. This is a total-weight competition i.e., all sizes of captured carp are included in the data. Since 2012, length and certified weights of individual Common Carp captured at the ATC have been provided by CAG except for 2017 to 2019. In 2020 the tournament was cancelled. The available data suggest that Lady Bird Reservoir has a low-density Common Carp population dominated by larger individuals. Continue working with CAG to access missing catch data from 2017 to 2019, and subsequent data from future ATC tournaments.

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Tables and Figures

Table 1. Characteristics of Lady Bird Reservoir, Texas.

Characteristic	Description
Year constructed	1960
Controlling authority	City of Austin
County	Travis
Reservoir type	Retired power cooling/recreational
Shoreline Development Index	4.1
Conductivity	492 μ S/cm

Table 2. Boat ramp characteristics for Lady Bird Reservoir, Texas, October 2019. This is a stable-level Reservoir (conservation level is 428 feet above mean sea level).

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft.)	Condition
Festival Beach	30.248383 -97.727817	Y	8	N/A	Good
I-35 near Holiday Inn	30.251413 -97.736140	Y	12	N/A	Good

Table 3. Harvest regulations for Lady Bird Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Carp, Common	No limit	33-inch maximum*
Bass, Largemouth	5	14- to 21-inch slot**
Bass: Spotted, Guadalupe	5 (in any combination)	No limit
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

* Only one fish 33 inches or greater may be retained.

** Only one fish over 21 inches may be retained.

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

Species	Year	Number	Life Stage	Mean TL (in)
Atlantic Croaker	1975	<u>250</u>		2.0
	Total	250		
Channel Catfish	1966	400	UNK	0.0
	1967	2,400	AFGL	7.9
	1969	27,100	AFGL	7.9
	2000	29,988	AFGL	4.9
	2001	24,974	AFGL	10.1
	2012	322	ADL	11.1
	2018	<u>126,027</u>	FRY	0.8
	Total	211,211		
Coppernose Bluegill	1981	<u>5,000</u>	UNK	0.0
	Total	5,000		
Florida Largemouth Bass	1998	52,800	FGL	1.4
	1998	108,660	FRY	0.3
	2016	<u>47,352</u>	FGL	1.6
	Total	208,812		
Green Sunfish x Redear Sunfish	1966	300		0.0
	1969	<u>300</u>		0.0
	Total	600		
Kemp's Largemouth Bass	1984	15,980		3.0
	1987	6,300		1.0
	1988	<u>21,209</u>		1.0
	Total	43,489		
Largemouth Bass	1966	94,350	UNK	0.0
	1967	5,050	UNK	0.0
	1973	<u>8,000</u>	UNK	0.0
	Total	107,400		
Northern Pike	1974	2,984		0.0
	1975	3,389		0.0
	1976	10,400		0.0
	1981	<u>23,003</u>		0.0
	Total	39,776		
Palmetto Bass (Striped X White Bass hybrid)	1974	500	UNK	0.0
	1975	20,000	UNK	0.0
	1976	13,000	UNK	0.0
	1977	9,994	UNK	0.0
	1980	6,140	UNK	0.0
	1983	10,450	UNK	0.0

Species	Year	Number	Life Stage	Mean TL (in)
Palmetto Bass (cont.)	1984	11,900	FGL	2.0
	1986	<u>21,194</u>	FGL	2.0
Red Drum	Total	93,178		
	1975	<u>100</u>	UNK	0.0
Redear Sunfish	Total	100		
	1981	<u>2,000</u>		0.0
ShareLunker Largemouth Bass	Total	2,000		
	2014	<u>11,174</u>	FGL	2.0
Smallmouth Bass	Total	11,174		
	1975	301	UNK	0.0
	1978	<u>15,000</u>	UNK	0.0
Spotted Bass	Total	15,301		
	1974	<u>14,400</u>		0.0
Striped Bass	Total	14,400		
	1977	108,475	UNK	0.0
	1978	340	UNK	0.0
	1983	<u>5,317</u>	UNK	0.0
Walleye	Total	114,132		
	1974	2,500	FRY	0.2
	1975	<u>1,011,500</u>	FRY	0.2
	Total	1,014,000		

Table 1. Objective-based sampling plan components for Lady Bird Reservoir, Texas 2019–2020.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Abundance	CPUE – stock	RSE – stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Age-and-growth	Age at 14 inches	$N = 13, 13.0 - 14.9$ inches
	Condition	W_r	10 fish/inch group (max)
Redbreast Sunfish ^a	Abundance	CPUE – total	RSE ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
Bluegill ^a	Abundance	CPUE – total	RSE ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
Redear Sunfish ^a	Abundance	CPUE – total	RSE ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
Gizzard Shad ^a	Abundance	CPUE – total	RSE ≤ 25
	Size structure	Length frequency	$N \geq 50$ stock
	Prey availability	IOV	$N \geq 50$ stock
Common Carp ^a	Abundance	CPUE – total	RSE ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock

^a No additional effort will be expended to achieve an RSE ≤ 25 for CPUE and $N \geq 50$ stock of Redbreast Sunfish, Bluegill, Redear Sunfish, Gizzard Shad, and Common Carp if not reached from designated Largemouth Bass sampling effort. Instead, Largemouth Bass body condition can provide information on sunfish and Gizzard Shad abundance, vulnerability, or both relative to predator density.

Table 2. Survey of structural habitat types, Lady Bird Reservoir, Texas, 2019.

Habitat type	Estimate	% of total
Natural Shoreline	15.8 miles	86.7
Natural Shoreline/Piers/Docks	1.3 miles	7.2
Gravel Shoreline	0.1 miles	0.5
Rock Bluff	0.6 miles	3.2
Bulkhead/Piers/Docks	0.3 miles	1.5
Bulkhead	0.2 Miles	0.9

Table 7. Survey of aquatic vegetation, Lady Bird Reservoir, Texas, 2016 – 2019. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2016	2017	2018	2019
Native submersed	0.0 (0.0)	0.0 (0.0)	5.1 (1.1)	0.0 (0.0)
Native floating-leaved	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Native emergent	2.9 (0.6)	1.0 (0.2)	2.9 (0.6)	4.0 (0.8)
Non-native	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)

Gizzard Shad

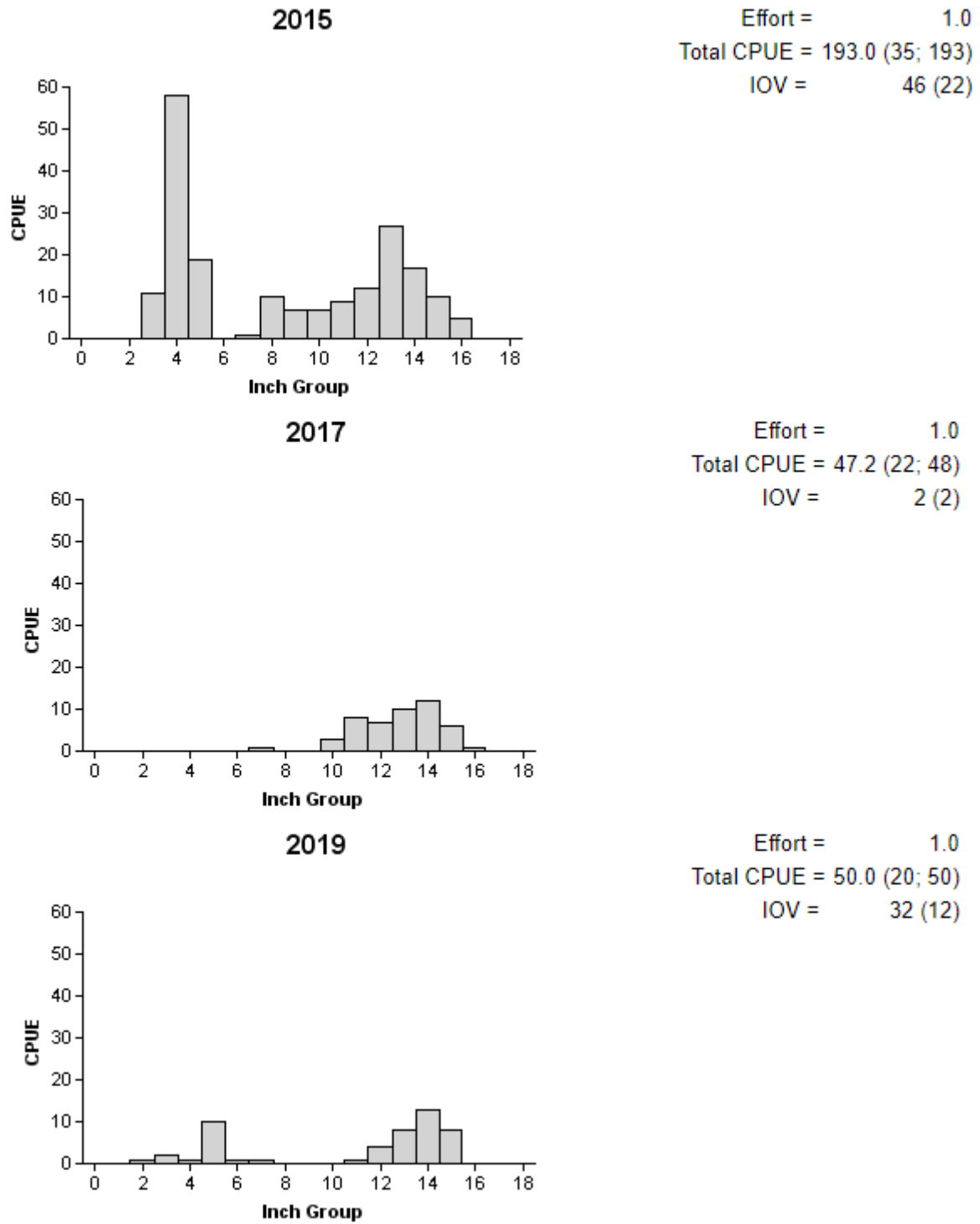


Figure 1. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lady Bird Reservoir, Texas, 2015, 2017 and 2019.

Redbreast Sunfish

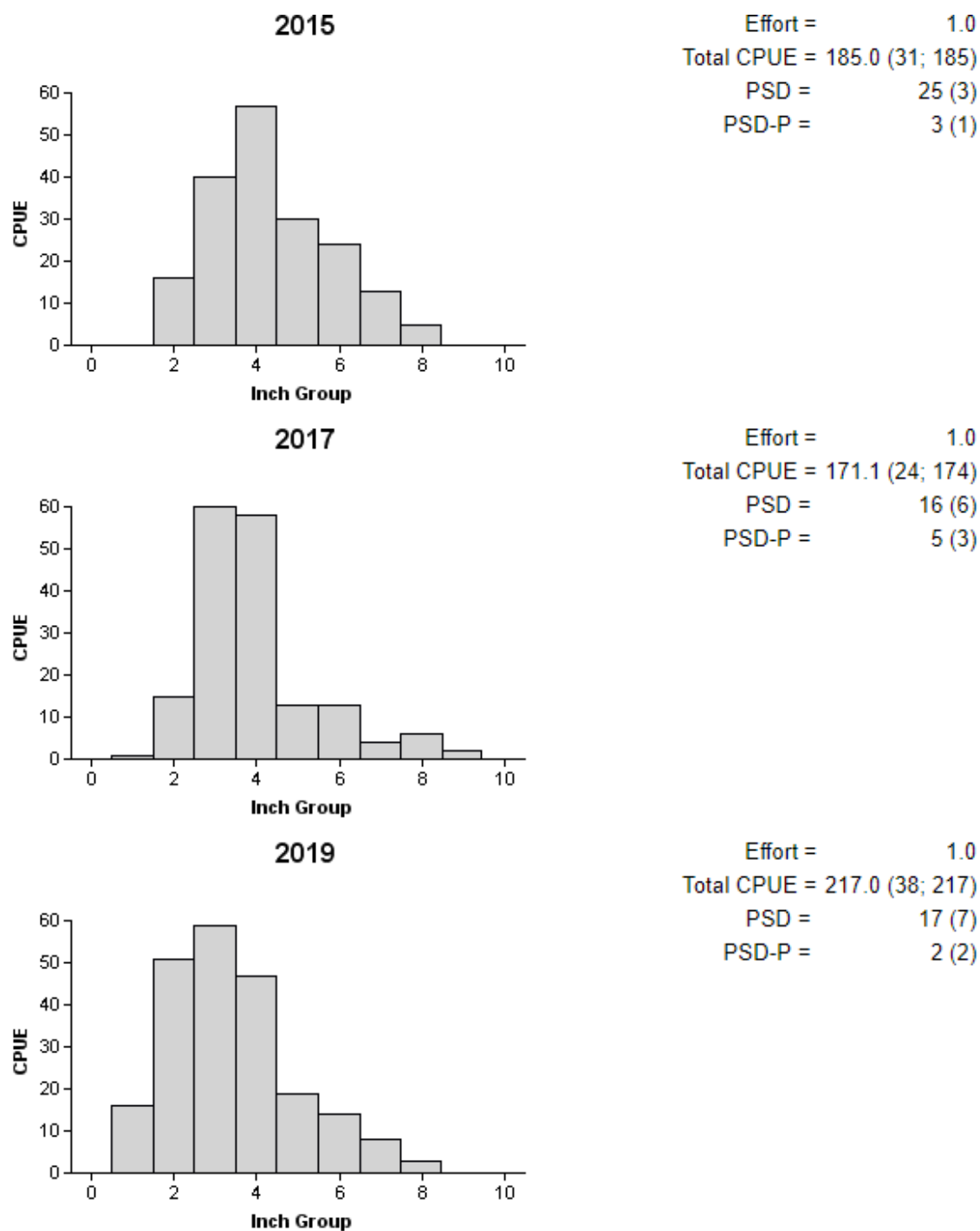


Figure 2. Number of Redbreast Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lady Bird Reservoir, Texas, 2015, 2017 and 2019.

Bluegill

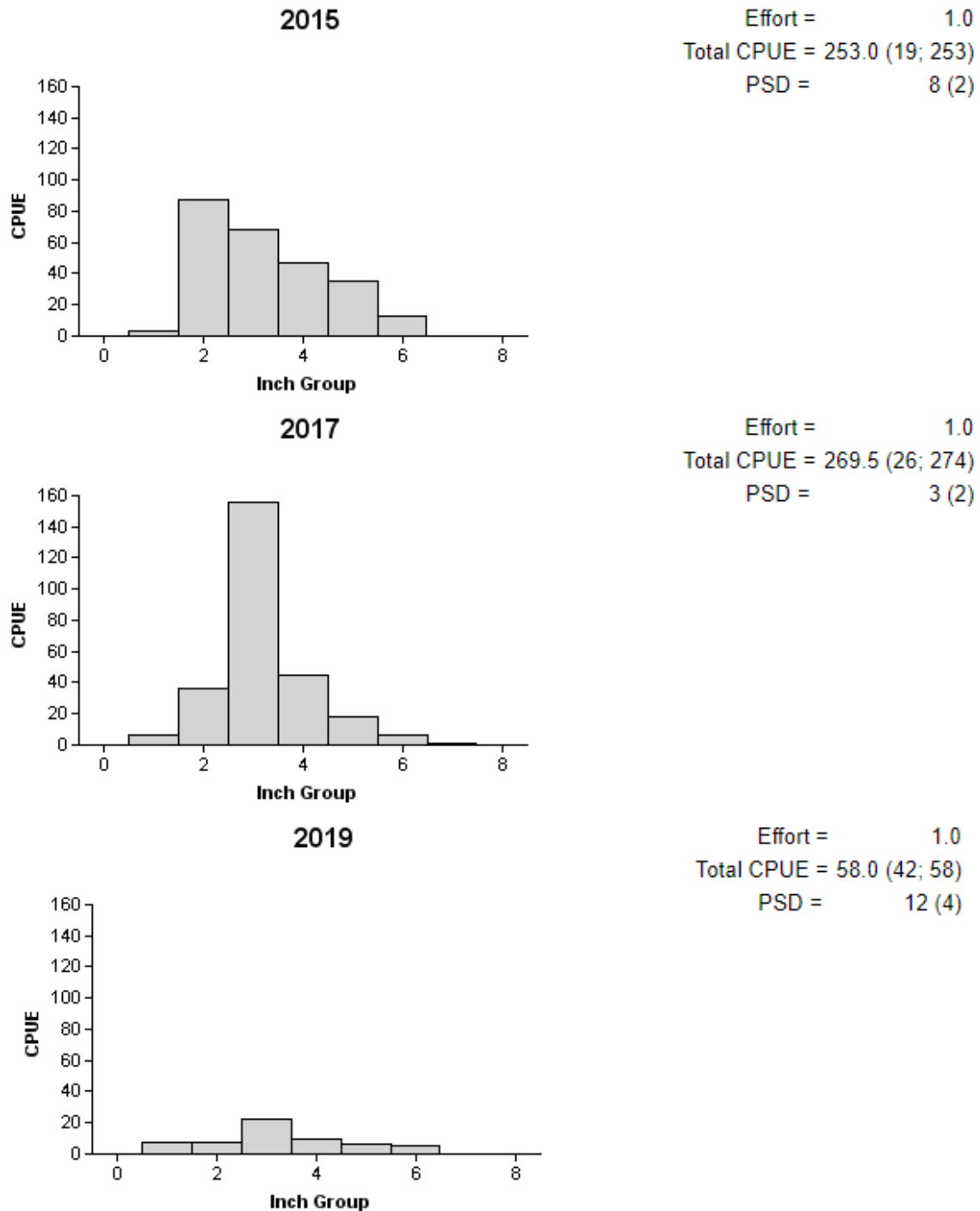


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lady Bird Reservoir, Texas, 2015, 2017 and 2019.

Redear Sunfish

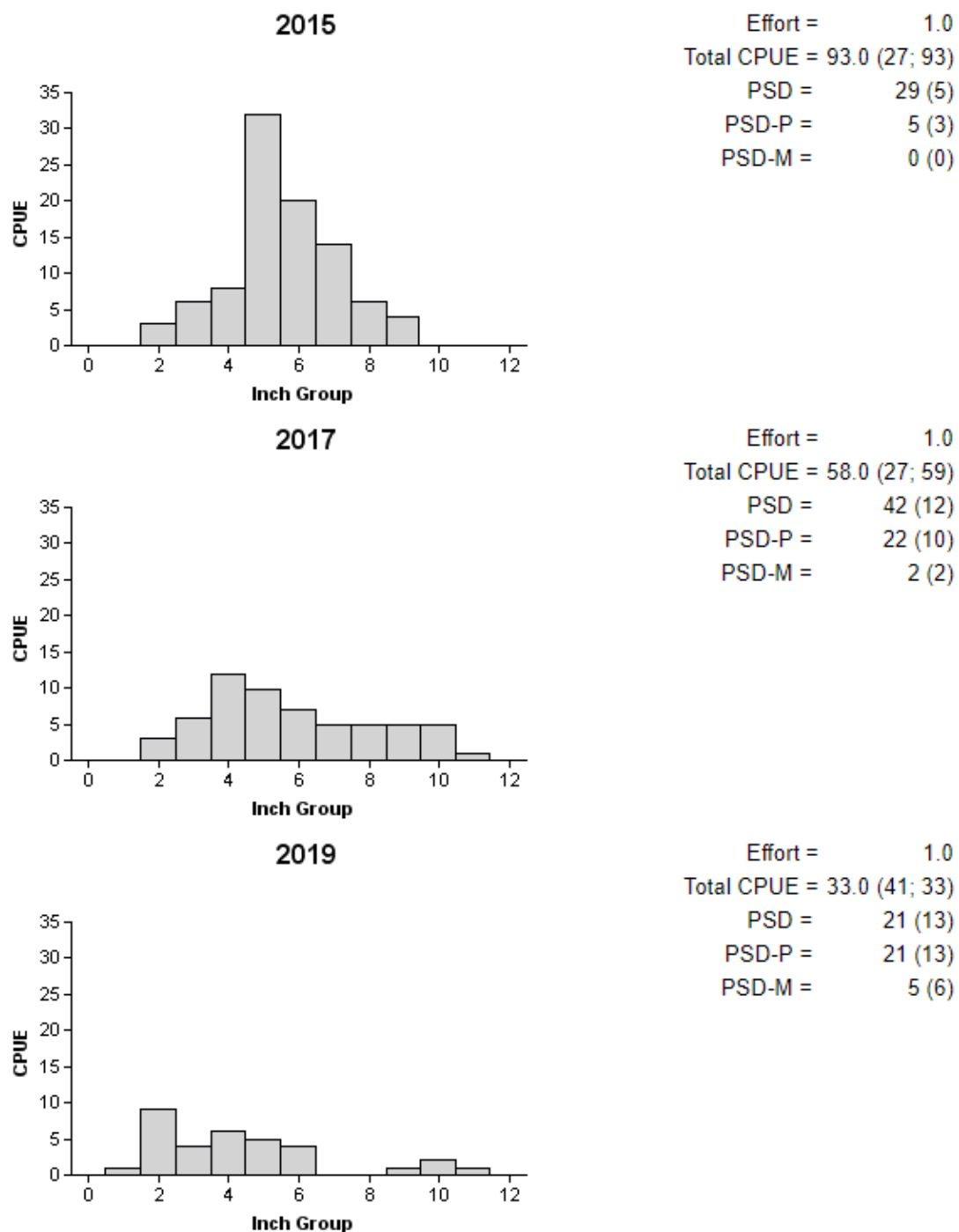


Figure 4. Number of Redear Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lady Bird Reservoir, Texas, 2015, 2017 and 2019.

Common Carp

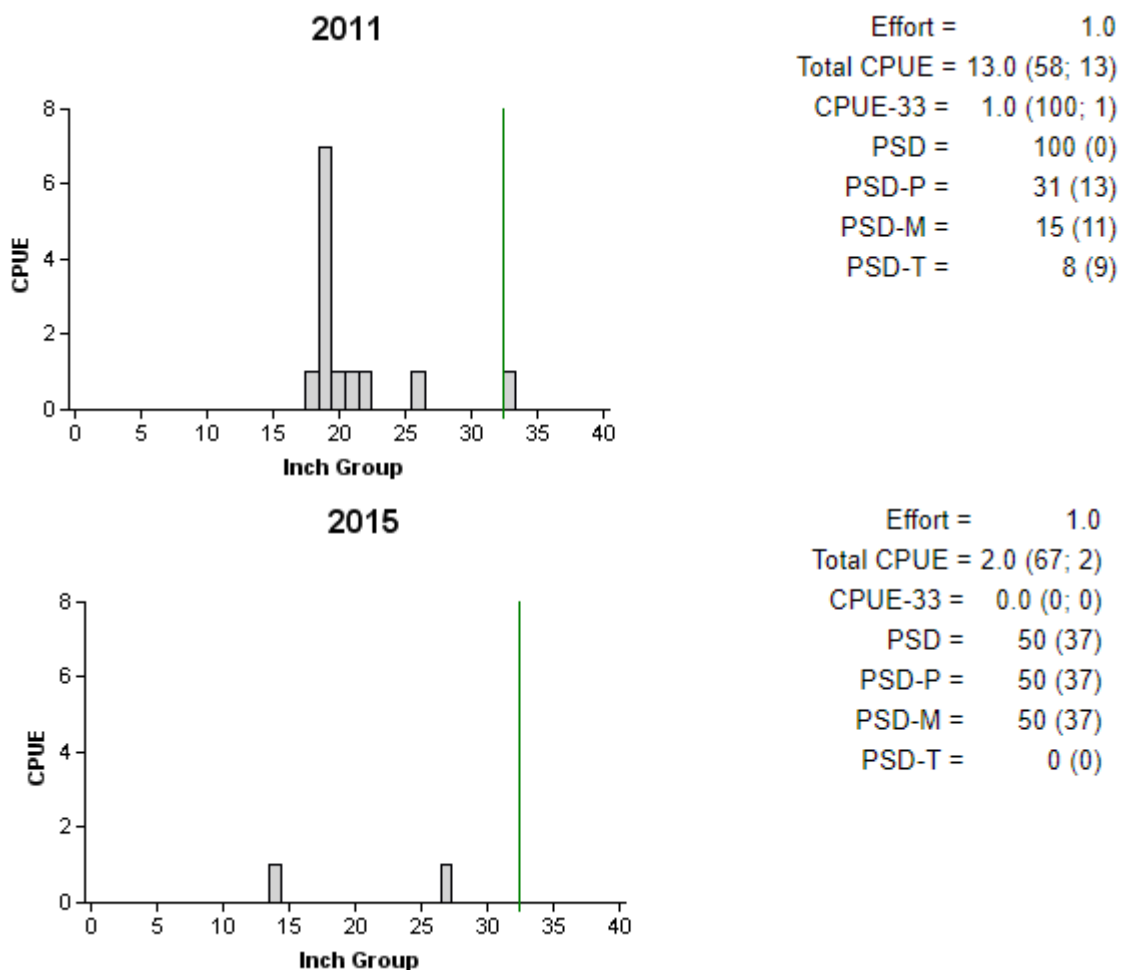


Figure 5. Number of Common Carp caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for electrofishing surveys, 2011 and 2015, Lady Bird Reservoir, Texas. Vertical line represents the 33-inch maximum length limit introduced in 2009 (only one fish ≥ 33 inches can be retained).

Largemouth Bass

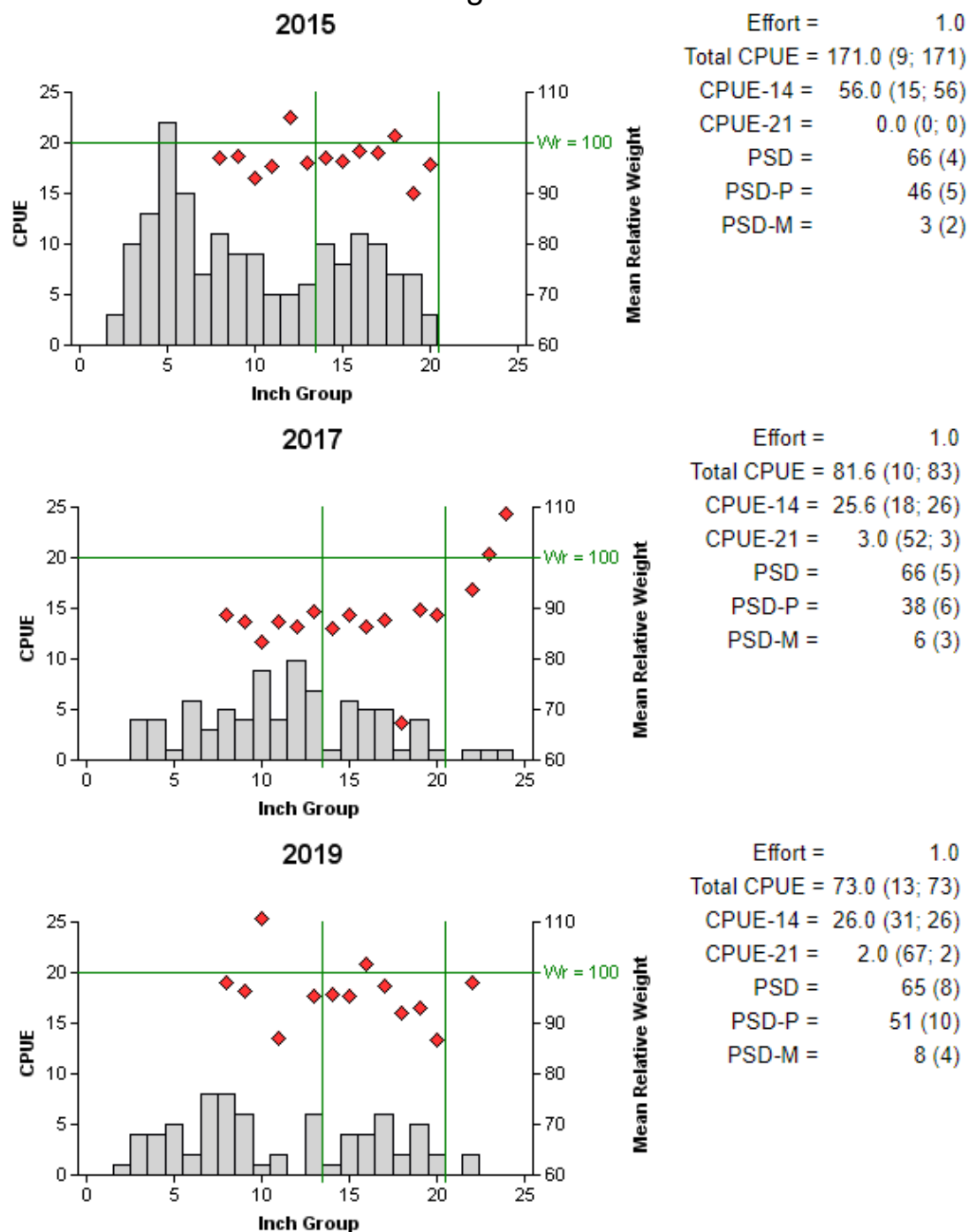


Figure 6. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lady Bird Reservoir, Texas, 2015, 2017 and 2019. Vertical lines represent slot length limit at the time of sampling. The horizontal line represents optimum relative weight.

Largemouth Bass

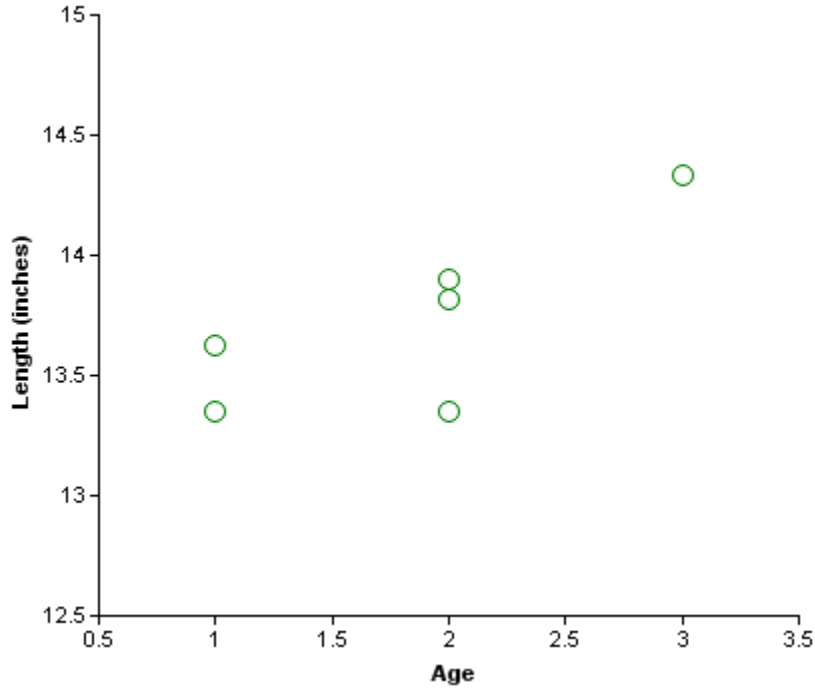


Figure 7. Length at age for Largemouth Bass (n=6) collected by electrofishing at Lady Bird Reservoir, Texas, October 2019.

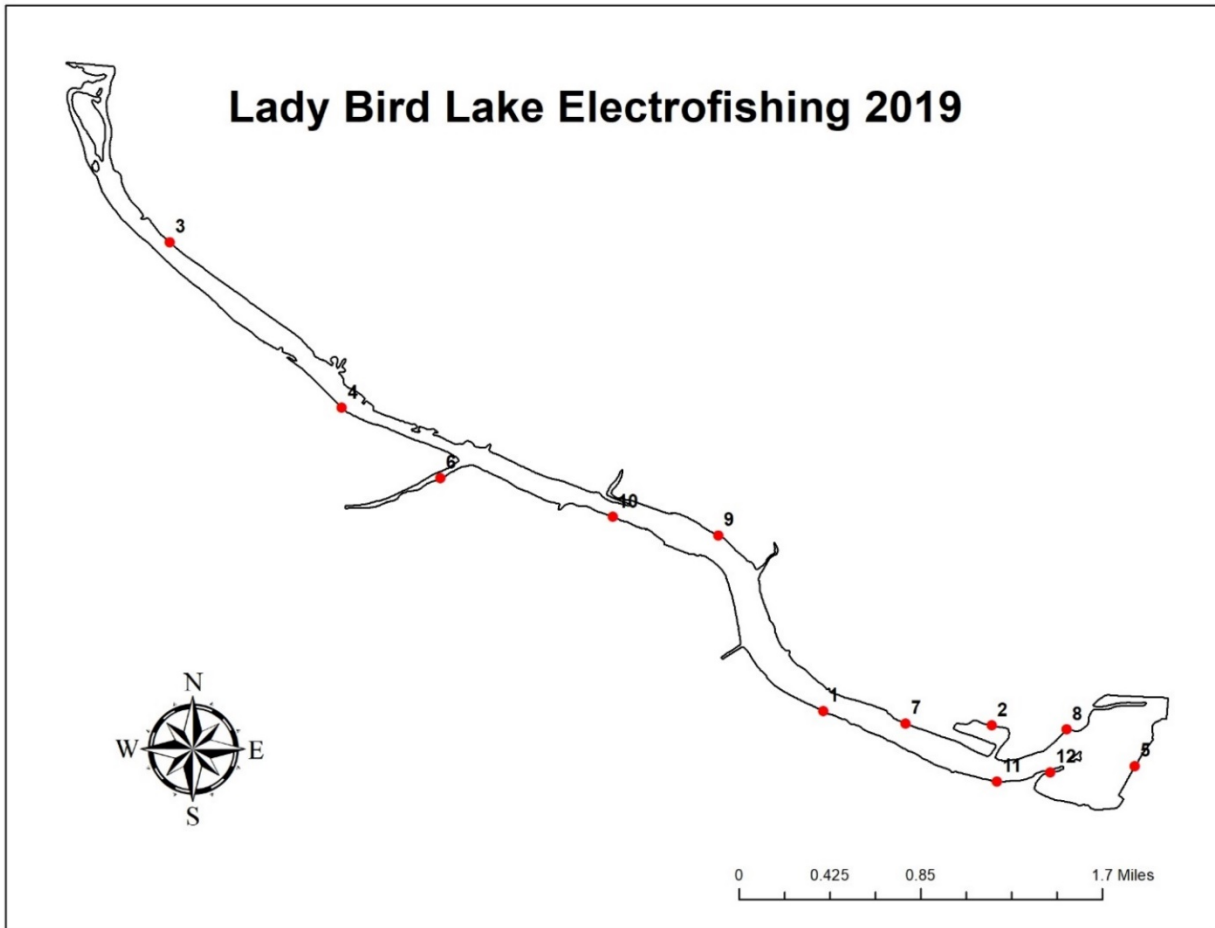
Proposed Sampling Schedule

Table 8. Proposed sampling schedule for Lady Bird Reservoir, Texas. Survey period is June through May. Electrofishing surveys are conducted in the fall or spring as indicated. Standard survey denoted by S and additional survey denoted by A.

	Survey year			
	2020-2021	2021-2022	2022-2023	2023-2024
Angler Access				S
Structural Habitat				S
Vegetation		A		S
Electrofishing – Fall				S
Electrofishing – Spring				
Electrofishing – Low frequency				
Trap netting				
Gill netting				
Baited tandem hoop netting				
Creel survey				
Report				S

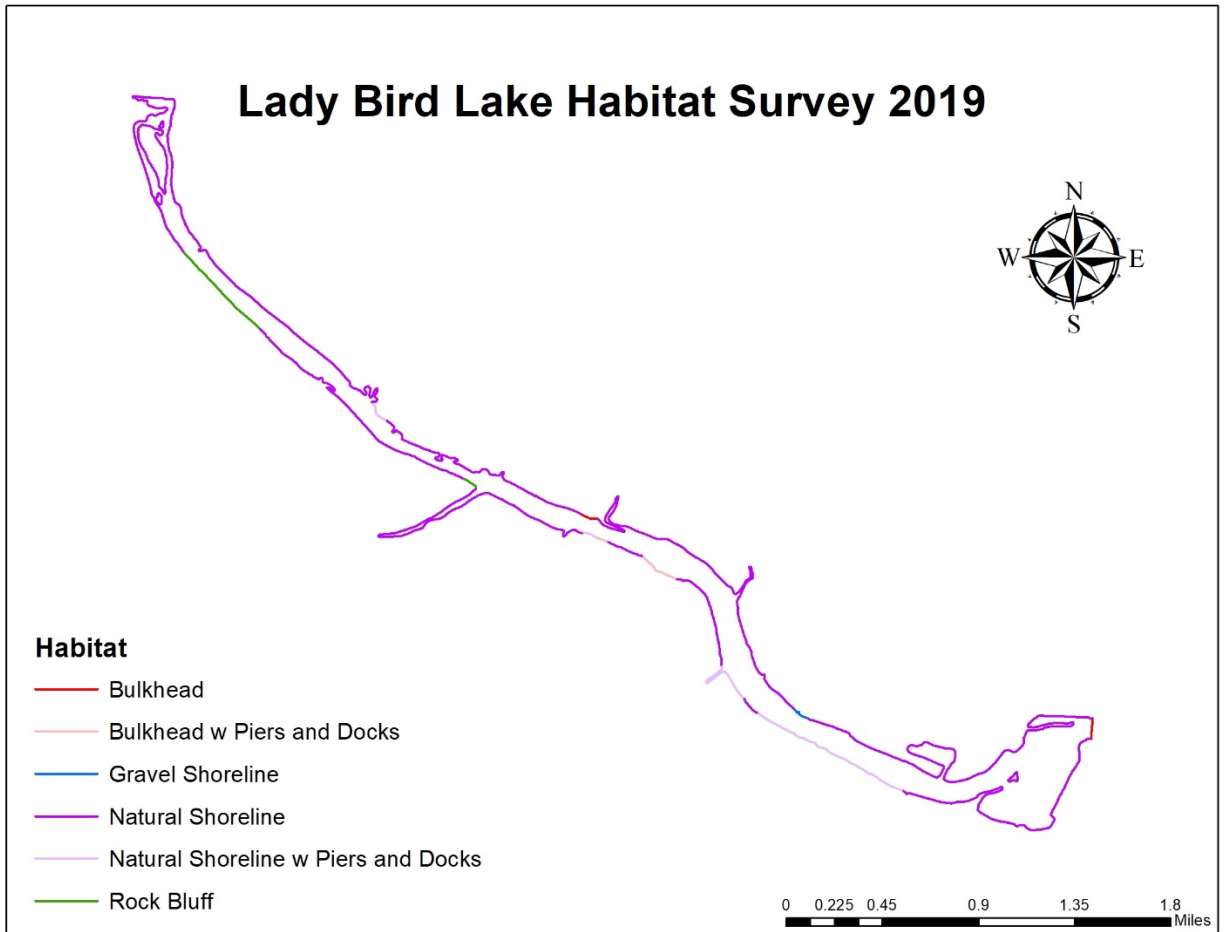
APPENDIX A – Map of sampling locations

Location of fall electrofishing sampling sites, Lady Bird Reservoir, Texas, 2019. This is a stable-level reservoir (428 ft. above mean sea level).



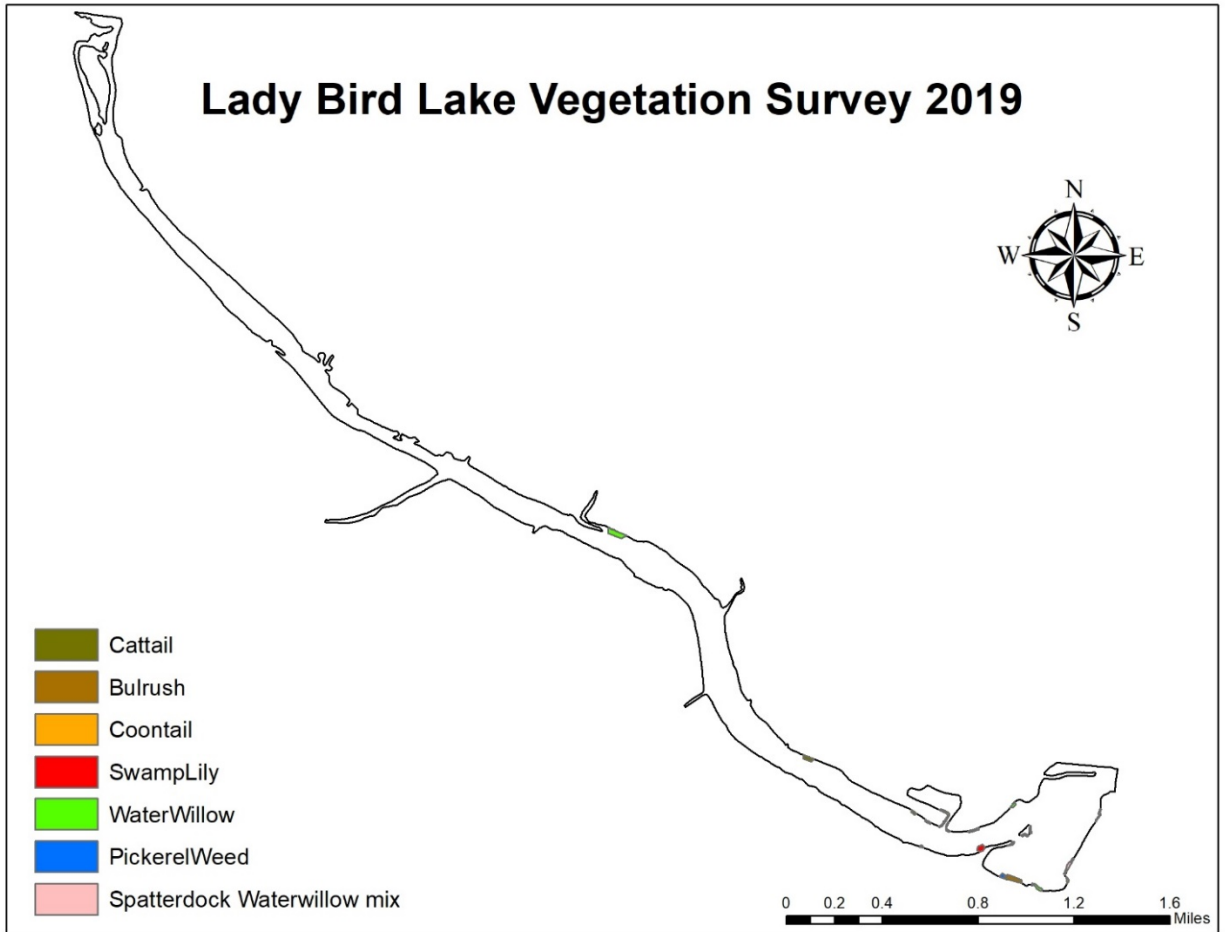
APPENDIX B – Map of structural habitat

Structural habitat survey map for Lady Bird Reservoir, Texas, August 2019.



APPENDIX C – Map of vegetation survey

Aquatic vegetation survey coverage map for Lady Bird Reservoir, Texas, August 2019.



APPENDIX D – Catch rate of all targeted species from all gears

Number (N) and catch rate (CPUE; RSE in parentheses) of all target species collected from all gear types from Lady Bird Reservoir, Texas, 2019. Sampling effort was 1 hour for electrofishing.

Species	Electrofishing	
	N	CPUE
Gizzard Shad	50	50.0 (20)
Threadfin Shad	2	2.0 (100)
Longnose Dace	7	7.0 (100)
Common Carp	4	4.0 (56)
Redbreast Sunfish	217	217.0 (38)
Green Sunfish	1	1.0 (100)
Warmouth	2	2.0 (67)
Bluegill	58	58.0 (42)
Longear Sunfish	26	26.0 (48)
Redear Sunfish	33	33.0 (41)
Redspotted Sunfish	12	12.0 (46)
Largemouth Bass	73	73.0 (13)
Logperch	5	5.0 (69)
Rio Grande Cichlid	5	5.0 (55)
Triploid Grass Carp	1	1.0 (100)



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