

PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2015 Fisheries Management Survey Report

Lady Bird Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lady Bird Reservoir were surveyed in 2015 using electrofishing. Historical data are presented with the 2015 data for comparison. This report summarizes results of the survey 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 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. Prior to this more restrictive length limit, harvest may have been limited due to an imposed fish consumption advisory. 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 overseas 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 the State.

Prior to 2012, low vegetative coverage has been descriptive of Lady Bird Reservoir.

- **Fish Community**
 - **Prey species:** Bluegill, Gizzard Shad, Redbreast Sunfish, and Threadfin Shad were the predominant prey species. Catch rates had increased since the previous survey.
 - **Common Carp:** The data indicates that Lady Bird Reservoir had a low density carp population dominated by larger individuals and the fishery was performing well.
 - **Largemouth Bass:** Largemouth Bass were abundant, 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. Aquatic vegetation surveys should be conducted annually 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. Inform the public about the negative impacts of aquatic invasive species. Conduct a standard electrofishing survey in 2019 and an additional survey in 2017. Access and habitat surveys will be conducted in 2019.

INTRODUCTION

This document is a summary of fisheries data collected from Lady Bird Reservoir in 2015. 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 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 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 49.58, and a 10-year change of +13.22 (Texas Commission on Environmental Quality 2011). 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. With the completion of the boardwalk portion of the trail in June 2014, the 1.3-mile gap along the south shore has been closed 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 (Appendix A).

Habitat at time of sampling consisted primarily of natural shoreline (76.8%), and native submerged vegetation (approximately 21% 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 excellent. The boardwalk is open from 5 am to midnight each day, with a curfew between midnight and 5 am. Fishing is allowed on the rest areas, but not along the main trail of the boardwalk. The CORE Health Foundation raised approximately \$400,000 in donations to build a wheelchair accessible fishing pier on Lady Bird Reservoir. In, 2012 the original location of the proposed pier was moved from the north side of the lake to the south side of the lake to be incorporated with the boardwalk. No further progress has been made regarding the construction of the fishing pier. 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 2012) included:

1. Continue to monitor aquatic vegetation annually for potential impact of herbivory by Grass Carp emigrating from Austin Reservoir.
Action: Aquatic vegetation surveys were conducted annually from 2012 to 2015, and there was no evidence to show impact of Grass Carp in the main lake. However, during a

fish collection exercise in March 2016, in conjunction with the Texas Memorial Museum of the University of Texas at Austin, numerous Grass Carp were seen in Barton Springs Creek. Although the cause has not been established, the creek was devoid of vegetation at that time, whereas it was known to support dense stands of vegetation in 2013 and 2014 which prevented navigation. Vegetation may have also been impacted by scouring action during flash floods in Barton Springs Creek in 2015/2016.

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: Grass Carp were observed during a bass-only electrofishing survey in 2013 and one was captured during the 2015 survey. Grass Carp were reported captured at the ATC tournaments, however anglers have been reluctant to formally report them.
3. Continue annual aquatic vegetation surveys to document the presence of hydrilla and recommend immediate treatment to COA should stands of hydrilla be documented.
Action: Annual aquatic vegetation surveys were conducted from 2012 to 2015 and there was no evidence to show establishment of hydrilla.
4. Continue to encourage COA to build additional, and improve existing boat ramps; and, build at least one fishing pier.
Action: The COA was not ready for new access infrastructure, but would have it under future consideration. Fishing access has improved with the addition of the new boardwalk by COA; fishing is allowed on the rest areas.
5. Continue collecting length-frequency information on Common Carp during standard electrofishing surveys and continue working with CAG to access catch data at carp tournaments.
Action: Two Common Carp were caught during the standard electrofishing survey in 2015. Tournament catch data for the ATC was provided by CAG for 2013 to 2016.
6. Cooperate with the controlling authority 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, 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 minimum 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. ShareLunker offspring were stocked in 2014. 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 the 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 been less of 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 (8.8 acres) has declined since 2012. 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. Aquatic plants offered excellent fish habitat, especially for Largemouth Bass and sunfishes.

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 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 2015).

Electrofishing – Largemouth Bass, Sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1 hour at 12, 5-min stations; Appendix B). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. Ages for Largemouth Bass were determined by a category-2 evaluation using otoliths from 13 randomly-selected fish (range 13.0 to 14.9 inches) (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Genetics – Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015). Micro-satellite DNA analysis was used to determine genetic composition of individual fish from 2005 through 2015 and by electrophoresis for previous years.

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 2015. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Length and certified weights of Common Carp captured at the ATC tournament held at Lady Bird Reservoir were provided by CAG.

RESULTS AND DISCUSSION

Habitat: Littoral zone structural habitat consisted primarily of natural shoreline in 2015 (76.8%; Table 6; Appendix C).

Total coverage estimate of all plant species in 2011 was 6.9% (32.3 acres). By comparison, total coverage ranged from 18.6% (82.7 acres) to 36.0% (162.5 acres) during the period 2012 to 2015 (Table 7). The overall increase in vegetative cover since 2011 was largely due to the expansion of fanwort which ranged from 17.0% (78.4 acres) to 33.9% (159.0 acres) during the same period. Drought conditions that prevailed from 2011 to 2014 most likely created an environment in which fanwort could flourish. Eurasian watermilfoil has steadily declined since 2012 (8.8 acres, 0.5 %) and was absent in the 2015 survey (Appendix D).

Total aquatic vegetation coverage in this reservoir has increased to levels approaching that considered optimum for productive fisheries (Dibble et al. 1996, Durocher et al. 1984).

Prey species: Bluegill, Gizzard Shad, Redbreast Sunfish, and Threadfin Shad were the predominant prey species in 2015 (Appendix E).

The IOV for Gizzard Shad was 46, indicating that 46% of the Gizzard Shad population (≤ 8 inches) were vulnerable to existing predators. The IOV had improved since the 2011 survey (IOV = 11) and was at the same level as in 2007 (IOV = 46). Total CPUE of Gizzard Shad in 2015 (193.0/h) was higher than in the 2011 (84.0/h) and 2007 (69.0/h) surveys (Figure 1). Threadfin Shad were collected at the rate of 158.0/h in 2015, whereas none were caught in the 2011 and 2007 surveys.

Total CPUE of Redbreast Sunfish in 2015 (185.0/h) was higher than in 2011 (110.0/h) and similar to that obtained in 2007 (190.0/h). Larger fish (up to 8 inches in length) were still present, providing some good fishing opportunities for panfish anglers (Figure 2). A new water body record (rod and reel) for Redbreast Sunfish was established in 2013 (1.2 pounds, 11.0 inches).

Bluegill were the most abundant prey species caught in 2015. Total CPUE of Bluegill (253.0/h) had increased since 2011 (142.0/h) and the proportion of larger fish (up to 6 inches in length) had also increased since the previous two surveys (Figure 3).

Total CPUE of Redear Sunfish in 2015 (93.0/h) was higher than that obtained in 2011 (16.0/h) and 2007 (20.0/h; Figure 4). Redear Sunfish up to 9 inches in length 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 anglers' catches weighing greater than 40 pounds. Two carp tournaments held back-to-back at Lady Bird Reservoir in 2006 (ATC and Texas Carp Challenge (TCC)) resulted in a direct expenditure of \$101,000 (TPWD, unpublished data). Tournament prize money can be high. The TCC tournament winner received \$25,000 and the angler that broke the state record received \$250,000.

Common Carp electrofishing catch rate in fall 2015 was 2.0/h and the largest fish of the two captured was 27 inches long. By comparison, in fall 2011, the catch rate was 13.0/h and the bulk of the fish were between 18 to 22 inches in length with the largest fish being 33 inches long (Figure 5). Carp-only electrofishing in spring 2009 (specifically to collect spines for a research project originating in South Dakota) yielded a catch rate of 20.0/h and the size structure was dominated by larger fish up to 36 inches in length (Figure 5). The heaviest carp weighed 32.6 pounds. Smaller carp < 15 inches in length were not present in any of the electrofishing and gill net surveys between 2007 and 2015.

Data obtained from ATC tournament (which is a total-weight competition, i.e., all sizes of captured carp are included in the data) from 2012 to 2016 showed that average weight of carp was remarkably consistent between years and ranged from 18.4 pounds to 22.0 pounds; average weight was 19.9 pounds in 2016 (Appendix F). In 2016, total catch (129 fish) and total weight (2,577 pounds) was greater than it has been since 2010. From 2012 to 2016, the proportion of trophy carp (≥ 33 inches) has been high, ranging from 39.1% to 48.5% of the fish caught. These data suggest that Lady Bird Reservoir has a low density carp population dominated by larger individuals and that the fishery is performing well.

Largemouth Bass: In 2015, the reservoir contained a moderate-to-high density Largemouth Bass population relative to bass populations in other central Texas reservoirs. The total catch rate of Largemouth Bass was 171.0/h in 2015 compared to catch rates of 75.0/h in 2013, and 128.0/h in 2011 (Figure 6). Electrofishing catch rate for Largemouth Bass 14 inches and longer (CPUE-14) was 56.0/h. This was higher than the 2013 and 2011 surveys (26.0/h and 46.0/h respectively). The electrofishing CPUE of Largemouth Bass exceeding the upper end of the slot length limit (21 inches) was 0.0/h compared to previous catch rates of 4.0/h (2013) and 0.0/h (2011, Figure 6).

Population size structure was good; PSD was 66, which was within the range expected for a balanced population (Gabelhouse 1984). Overall, condition was good, as mean relative weights (W_r) exceeded 95 for most inch groups (Figure 6). On average, Largemouth Bass in Lady Bird Reservoir reached 14 inches between ages 2 and 3 (Figure 7) which is about average compared to values for the Edwards Plateau ecological area (Prentice 1987). Florida Largemouth Bass influence has remained relatively constant during the last three evaluations; Florida Largemouth Bass influence in 2015 was 68.0% (Table 8). The reservoir was last stocked with Florida Largemouth Bass in 2016 and ShareLunker Largemouth Bass in 2014.

Anecdotal information also indicates that the Largemouth bass fishery is performing very well. A new water body record (rod and reel) for Largemouth Bass was established in 2015 (13.5 pounds, 27.0 inches). The angler did not submit the fish to the ShareLunker program.

Fisheries management plan for Lady Bird Reservoir, Texas

Prepared – July 2016.

ISSUE 1: The recent expansion of vegetation in Lady Bird Reservoir has augmented Largemouth Bass fishing opportunities, making it one of the most popular bass fishing destinations in central Texas. Drought conditions likely drove this expansion. However, recent flood events may affect this plant community by either scouring out vegetation or aiding immigration of Grass Carp from Austin Reservoir.

MANAGEMENT STRATEGIES

1. Continue annual aquatic vegetation surveys.
2. Continue collecting catch rate information on Grass Carp during electrofishing surveys and from bycatch at the ATC Common Carp tournament by working with CAG to reduce non-reporting.
3. Conduct an additional electrofishing survey to monitor Grass Carp and Largemouth Bass populations in response to vegetation dynamics.

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 safe guarding angling access on the boardwalk.

ISSUE 3: Catch-and-release fishing for Common Carp is a popular activity on this reservoir. Additional trend data is needed to adequately manage the fishery.

MANAGEMENT STRATEGY

1. Continue collecting length-frequency information on Common Carp during standard electrofishing surveys and continue working with CAG to access catch data at carp tournaments.

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 for Lady Bird Reservoir

2016-2020

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.

Low density/negligible 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 2016-2020.

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 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 2016-2020.

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 2016-2020.

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 2016-2020.

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 2016 – 2020. 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. Trend data on CPUE, size structure, and body condition have been collected biennially since 2006 with fall nighttime electrofishing. Continuation of biennial trend data in this clear reservoir with night

electrofishing in the fall will allow for determination of any large-scale changes in the Largemouth Bass population. A minimum of 12 randomly selected 5-min electrofishing sites will be sampled in 2017 and 2019, 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.

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. 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 ≤ 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 $\geq 8"$ TL will be determined from their length/weight data (maximum of 10 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. The sampling objective will be to collect 50 stock-size fish with an RSE of CPUE-S ≤ 25 . No additional effort will be expended to achieve an RSE ≤ 25 for CPUE and $N \geq 50$ stock. Instead, tournament data will be utilized. Length-frequency information on Common Carp will be collected during electrofishing surveys for other species. However, because of the larger samples sizes available, information on catch rates, size structure, and body condition will best be obtained from tournament data gathered from the annual ATC at Lady Bird Reservoir. 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. To date, the data suggest that Lady Bird Reservoir has a low-density Common Carp population dominated by larger individuals.

Continue working with CAG to access catch data from the annual ATC.

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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 $\mu\text{S/cm}$

Table 2. Boat ramp characteristics for Lady Bird Reservoir, Texas, October, 2015. 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 of Lady Bird Reservoir, 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	UNK
	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	<u>322</u>	ADL	11.1
	Total	85,184		
Coppernose Bluegill	1981	<u>5,000</u>	UNK	UNK
	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		UNK
	1969	<u>300</u>		UNK
	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	UNK
	1967	5,050	UNK	UNK
	1973	<u>8,000</u>	UNK	UNK
	Total	107,400		

Species	Year	Number	Life Stage	Mean TL (in)
Northern Pike	1974	2,984		UNK
	1975	3,389		UNK
	1976	10,400		UNK
	1981	<u>23,003</u>		UNK
	Total	39,776		
Palmetto bass (Striped X White Bass hybrid)	1974	500	UNK	UNK
	1975	20,000	UNK	UNK
	1976	13,000	UNK	UNK
	1977	9,994	UNK	UNK
	1980	6,140	UNK	UNK
	1983	10,450	UNK	UNK
	1984	11,900	FGL	2.0
	1986	<u>21,194</u>	FGL	2.0
	Total	93,178		
Red Drum	1975	<u>100</u>	UNK	UNK
	Total	100		
Redear Sunfish	1981	<u>2,000</u>		UNK
	Total	2,000		
ShareLunker Largemouth Bass	2014	<u>11,174</u>	FGL	2.0
	Total	11,174		
Smallmouth Bass	1975	301	UNK	UNK
	1978	<u>15,000</u>	UNK	UNK
	Total	15,301		
Spotted Bass	1974	<u>14,400</u>		UNK
	Total	14,400		
Striped Bass	1977	108,475	UNK	UNK
	1978	340	UNK	UNK
	1983	<u>5,317</u>	UNK	UNK
	Total	114,132		
Walleye	1974	2,500	FRY	0.2
	1975	<u>1,011,500</u>	FRY	0.2
	Total	1,014,000		

Table 5. Objective-based sampling plan components for Lady Bird Reservoir, Texas 2015 – 2016.

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)
	Genetics	% FLMB	$N = 30$, any age
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 6. Survey of structural habitat types, Lady Bird Reservoir, Texas, 2015. Shoreline habitat type units are in miles.

Habitat type	Estimate	% of total
Natural Shoreline	14.1 miles	76.8
Rocky Shoreline	2.3 miles	12.7
Natural Shoreline/Piers/Docks	0.9 miles	5.2
Rock Bluff	0.9 miles	4.8
Bulkhead	0.1 acres	3.4

Table 7. Survey of aquatic vegetation, Lady Bird Reservoir, Texas, 2012 – 2015. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2012	2013	2014	2015
Native submersed	82.7 (17.6)	162.5 (34.7)	100.3 (21.0)	95.0 (20.3)
Native floating-leaved	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Native emergent	2.8 (0.5)	2.0 (0.4)	3.43 (0.7)	5.0 (1.0)
Non-native				
Eurasian watermilfoil (Tier III)*	8.8 (0.5)	4.5 (0.9)	4.1 (0.8)	0.0 (0.0)

* Tier III is Watch Status

Gizzard Shad

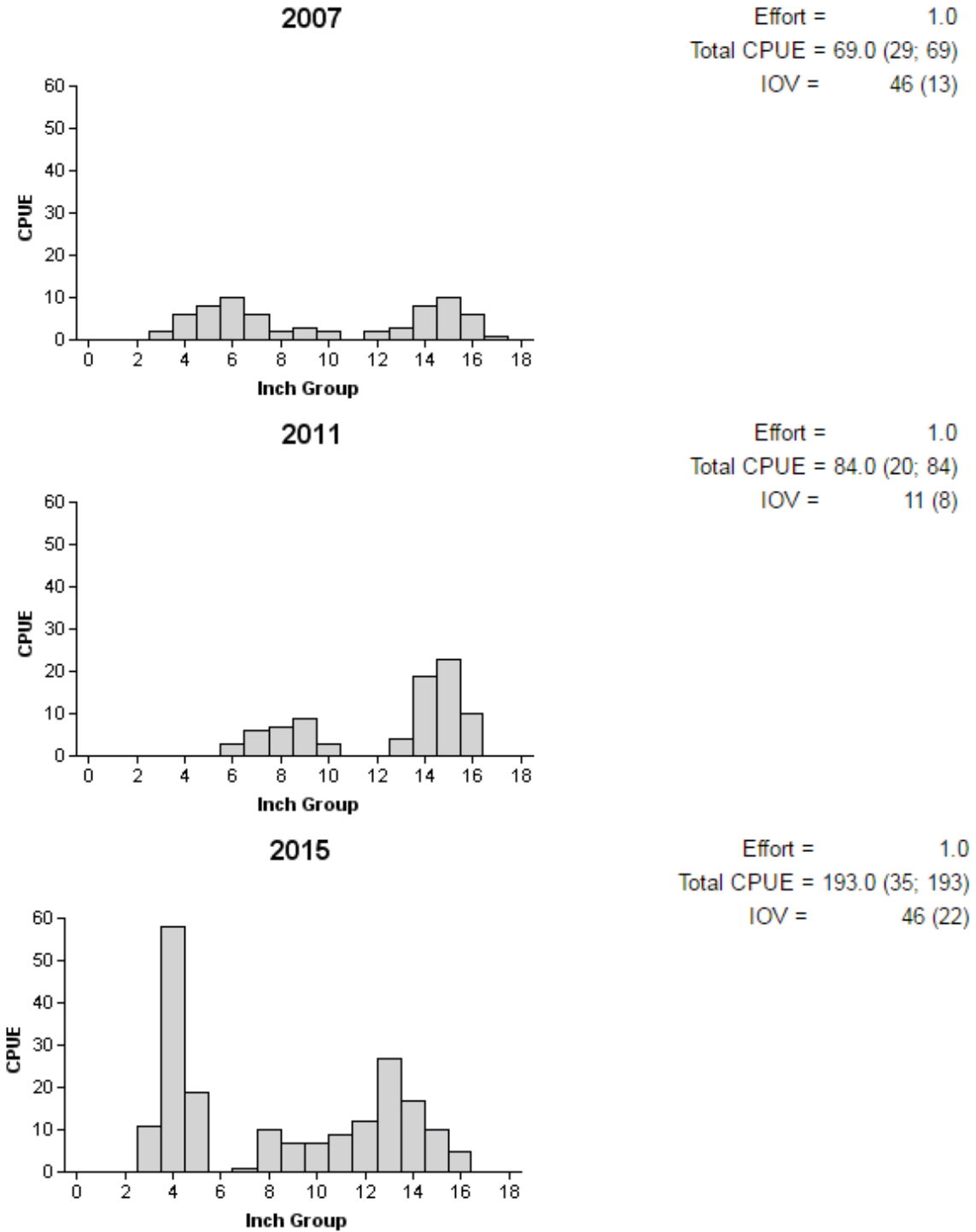


Figure 1. Number of Gizzard Shad caught per hour (CPUE) population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lady Bird Reservoir, Texas, 2007, 2011 and 2015.

Redbreast Sunfish

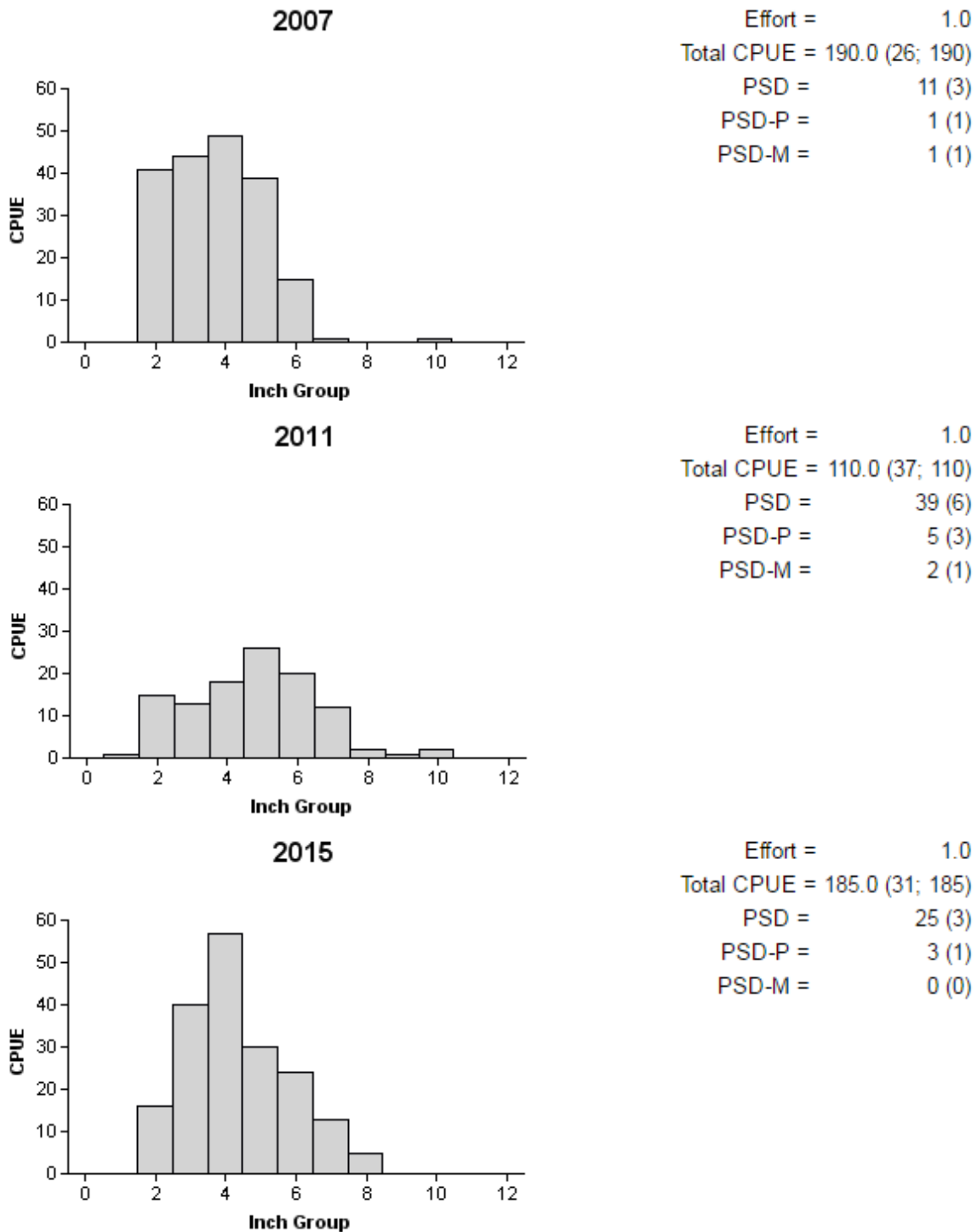


Figure 2. Number of Redbreast Sunfish caught per hour (CPUE) population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lady Bird Reservoir, Texas, 2007, 2011 and 2015.

Bluegill

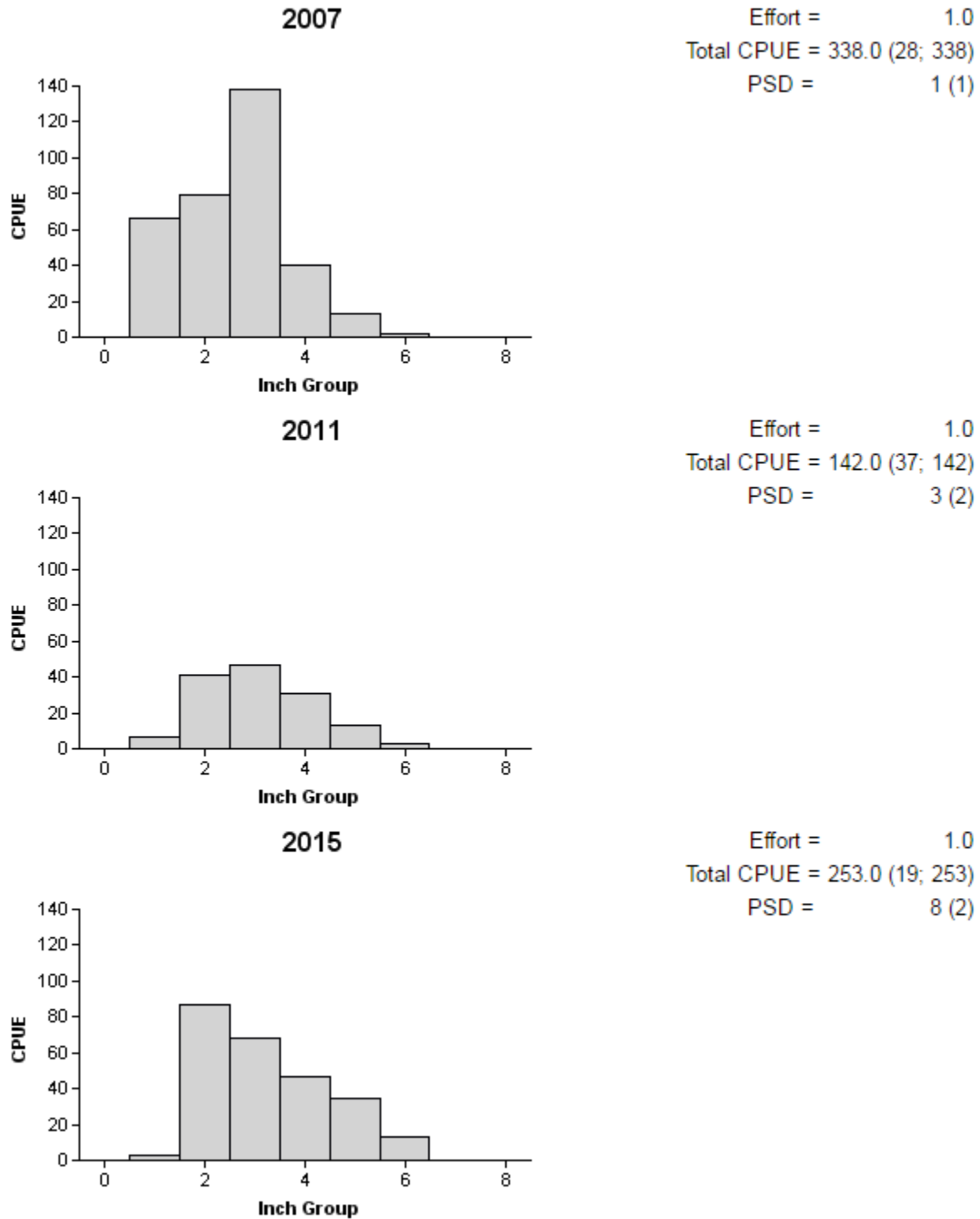


Figure 3. Number of Bluegill caught per hour (CPUE) population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lady Bird Reservoir, Texas, 2007, 2011 and 2015.

Redear Sunfish

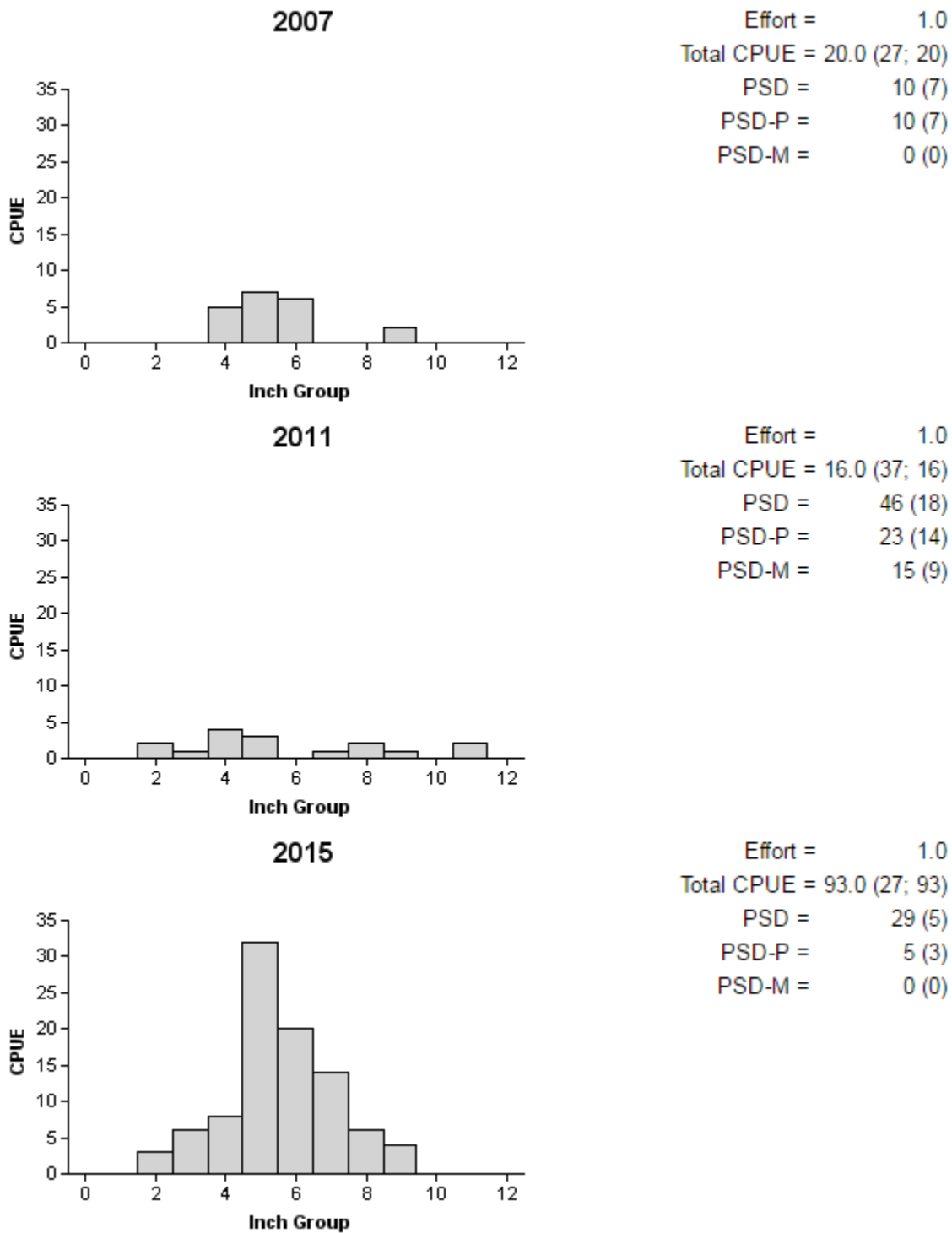


Figure 4. Number of Redear Sunfish caught per hour (CPUE) population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lady Bird Reservoir, Texas, 2007, 2011 and 2015.

Common Carp

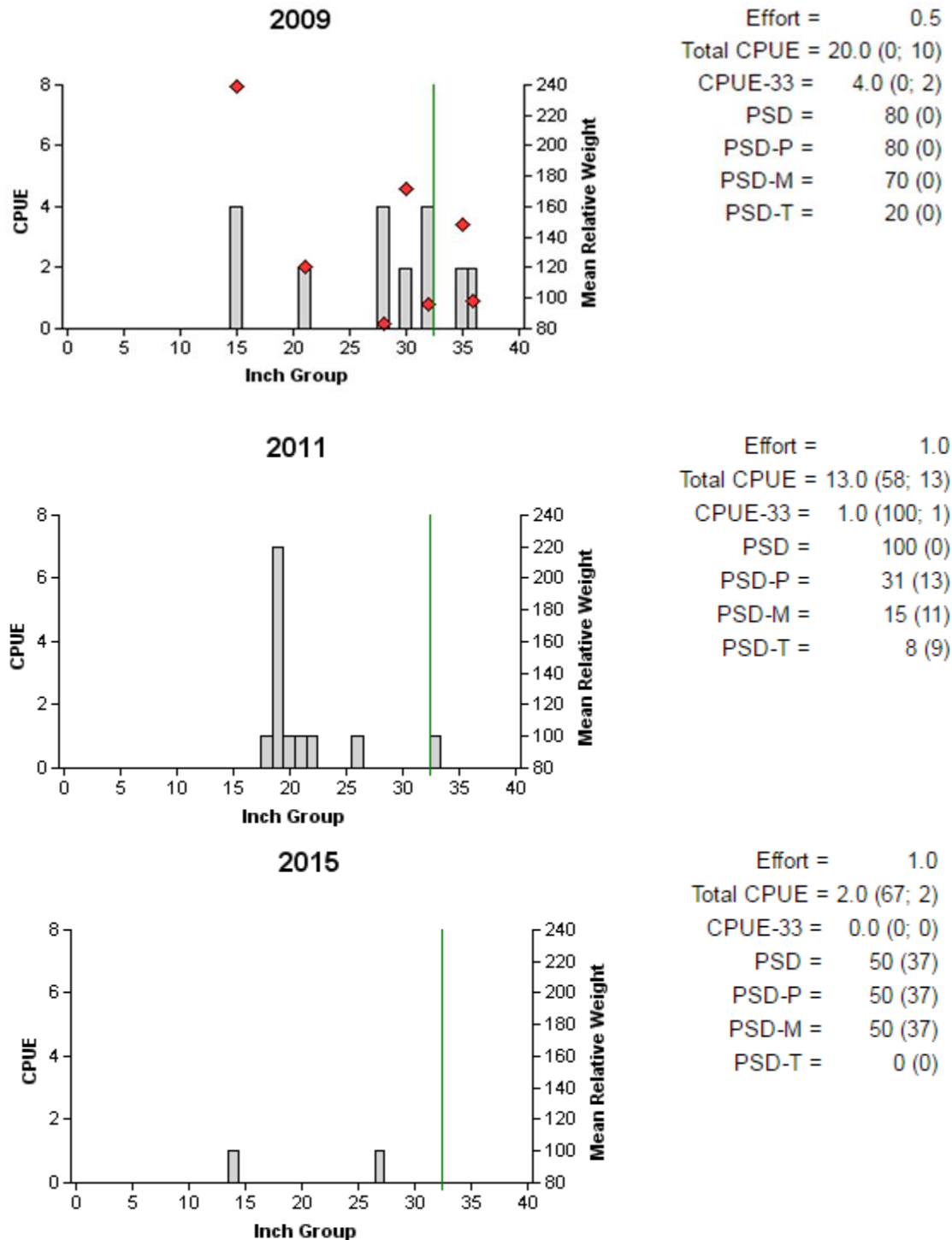


Figure 5. Number of Common Carp caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for electrofishing surveys, 2009 (spring), 2011, and 2015, Lady Bird Reservoir, Texas. Vertical line represents the 33-inch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

Largemouth Bass

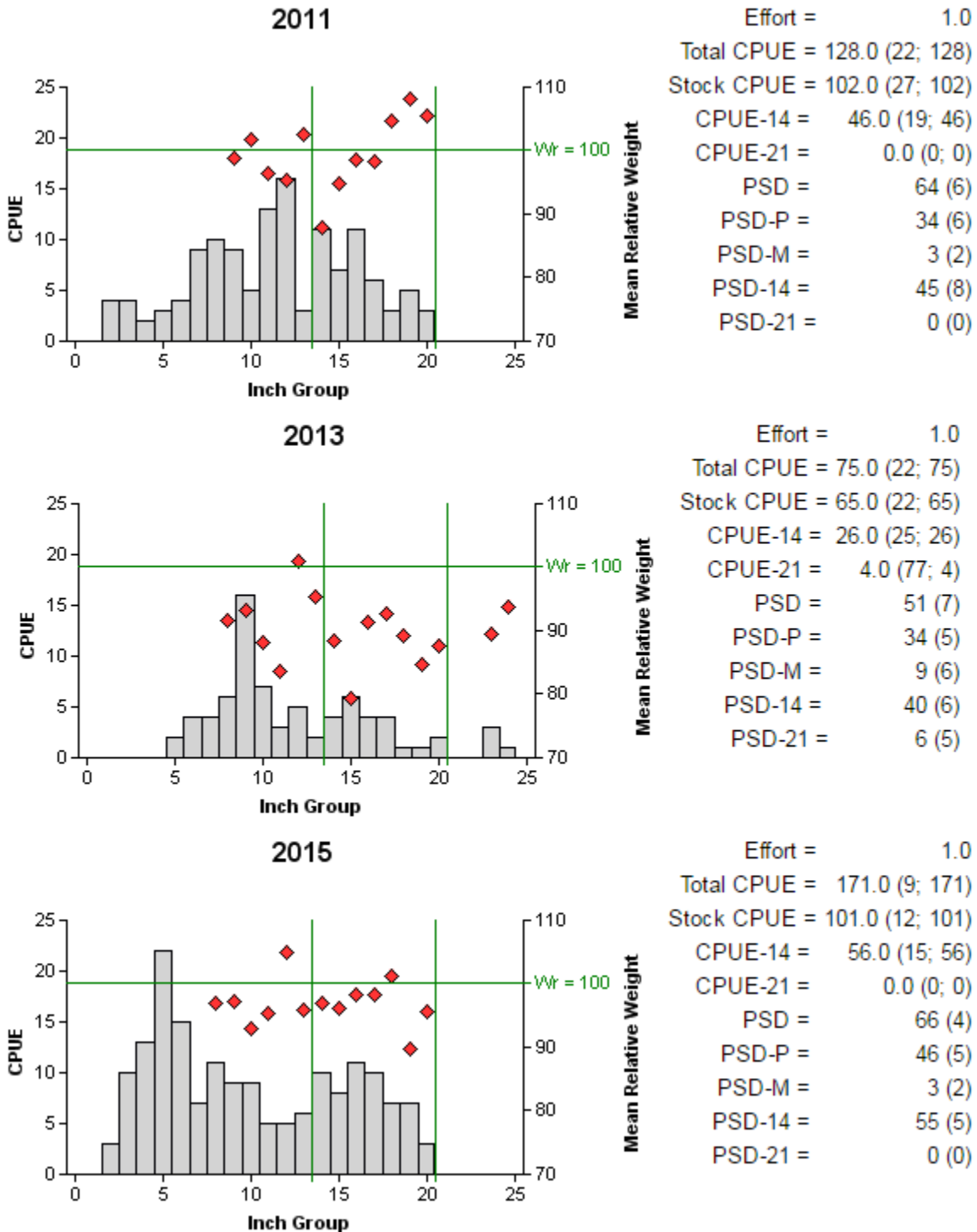


Figure 6. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lady Bird Reservoir, Texas, 2011, 2013 and 2015. Vertical lines represent slot length limit at the time of sampling.

Largemouth Bass

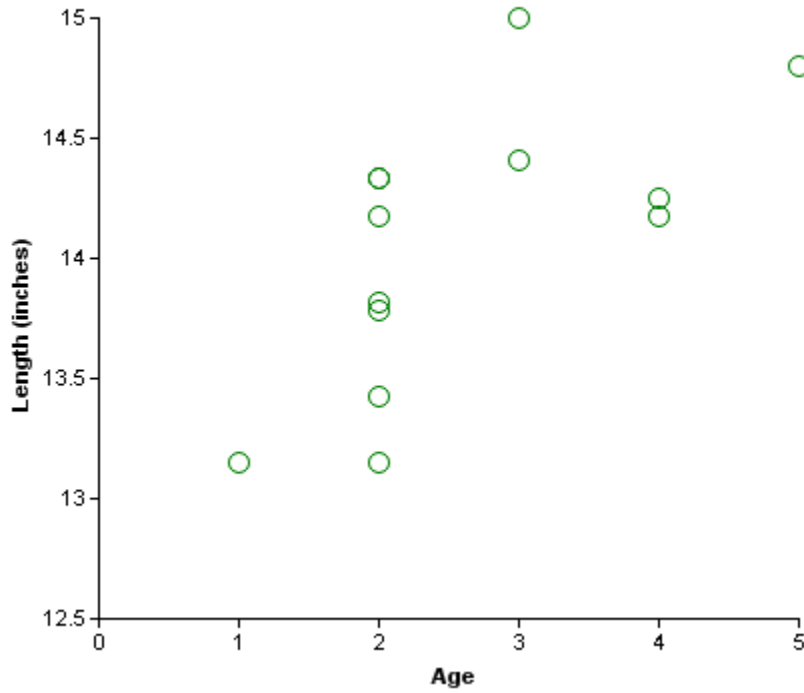


Figure 7. Length at age for Largemouth Bass (n=13) collected by electrofishing at Lady Bird Reservoir, Texas, November 2015.

Table 8. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Lady Bird Reservoir, Texas, 2003, 2007, and 2015. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

Year	Sample size	Number of fish			% FLMB alleles	% FLMB
		FLMB	Intergrade	NLMB		
2003	40	7	30	3	61.9	17.5
2007	30	1	29	0	62.8	3.3
2015	29	1	27	1	68.0	3.4

Table 9. Proposed sampling schedule for Lady Bird Reservoir, Texas. Survey period is June through May. Electrofishing surveys are conducted in the fall (except where noted). Standard survey denoted by S and additional survey denoted by A.

Survey year	Electrofishing Fall(Spring)	Trap net	Gill net	Habitat			Creel survey	Report
				Structural	Vegetation	Access		
2016-2017					A			
2017-2018	A				A			
2018-2019					A			
2019-2020	S			S	S	S		S

APPENDIX A

The Lady Bird Lake boardwalk (in orange) was completed in June 2014. The \$28 million project features 13,000 LED lights, 7 viewing areas, ADA accessible pier, and a new trailhead restroom along the 7,250 feet boardwalk.



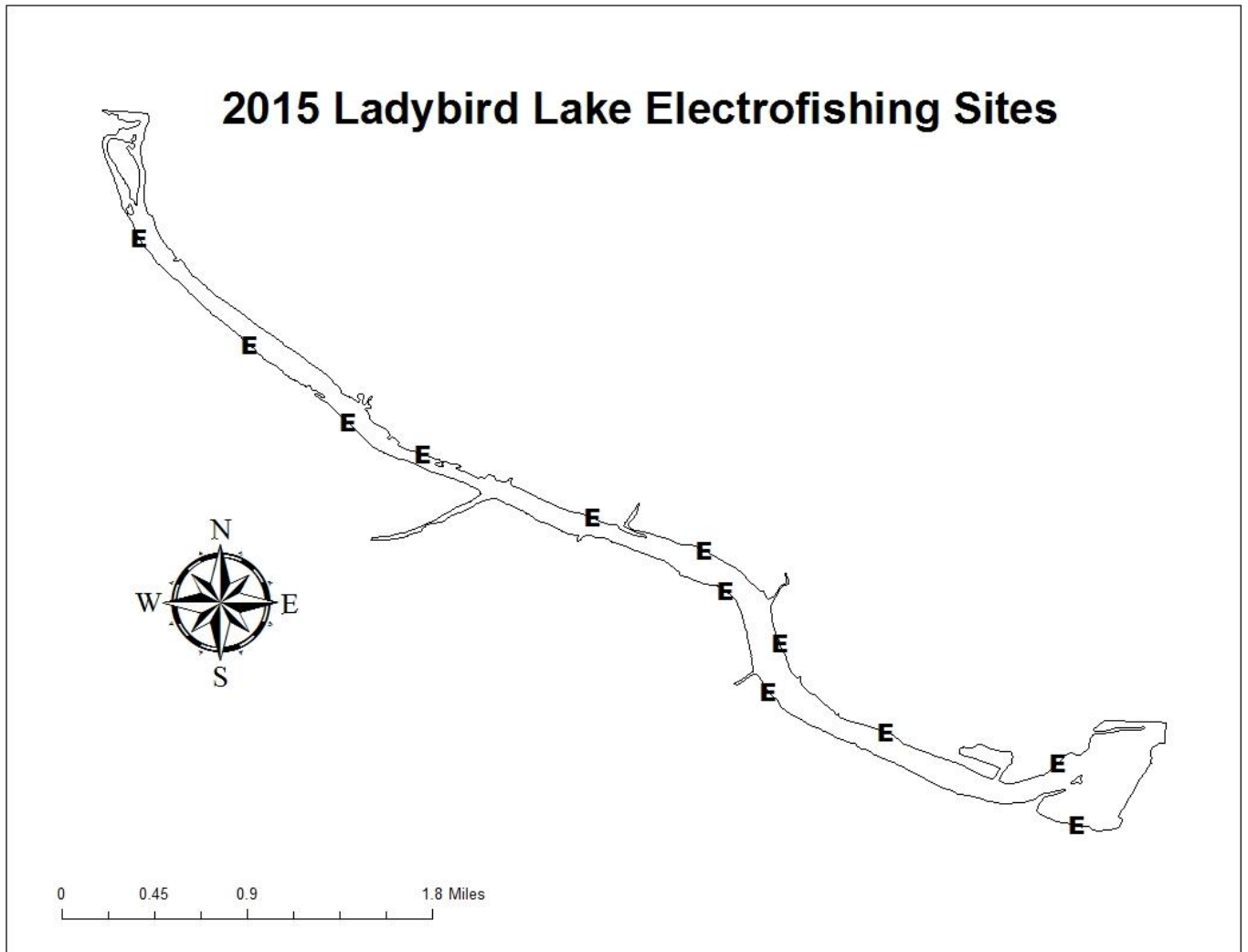
Source: City of Austin

Robert Calzada AMERICAN-STATESMAN



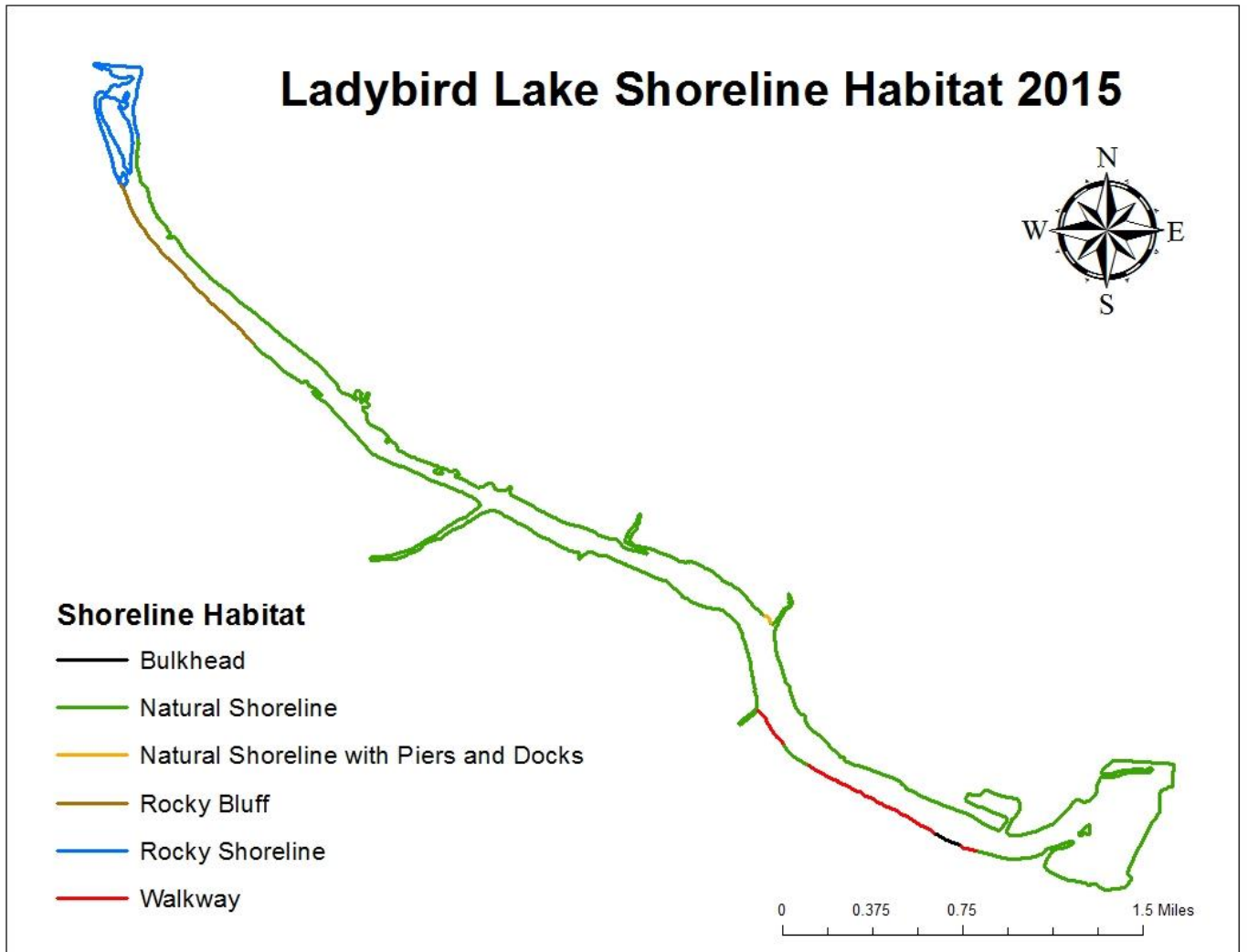
APPENDIX B

Location of sampling sites, Lady Bird Reservoir, Texas, 2015. Electrofishing stations are indicated by E. This is a stable-level reservoir (428 ft. above mean sea level).



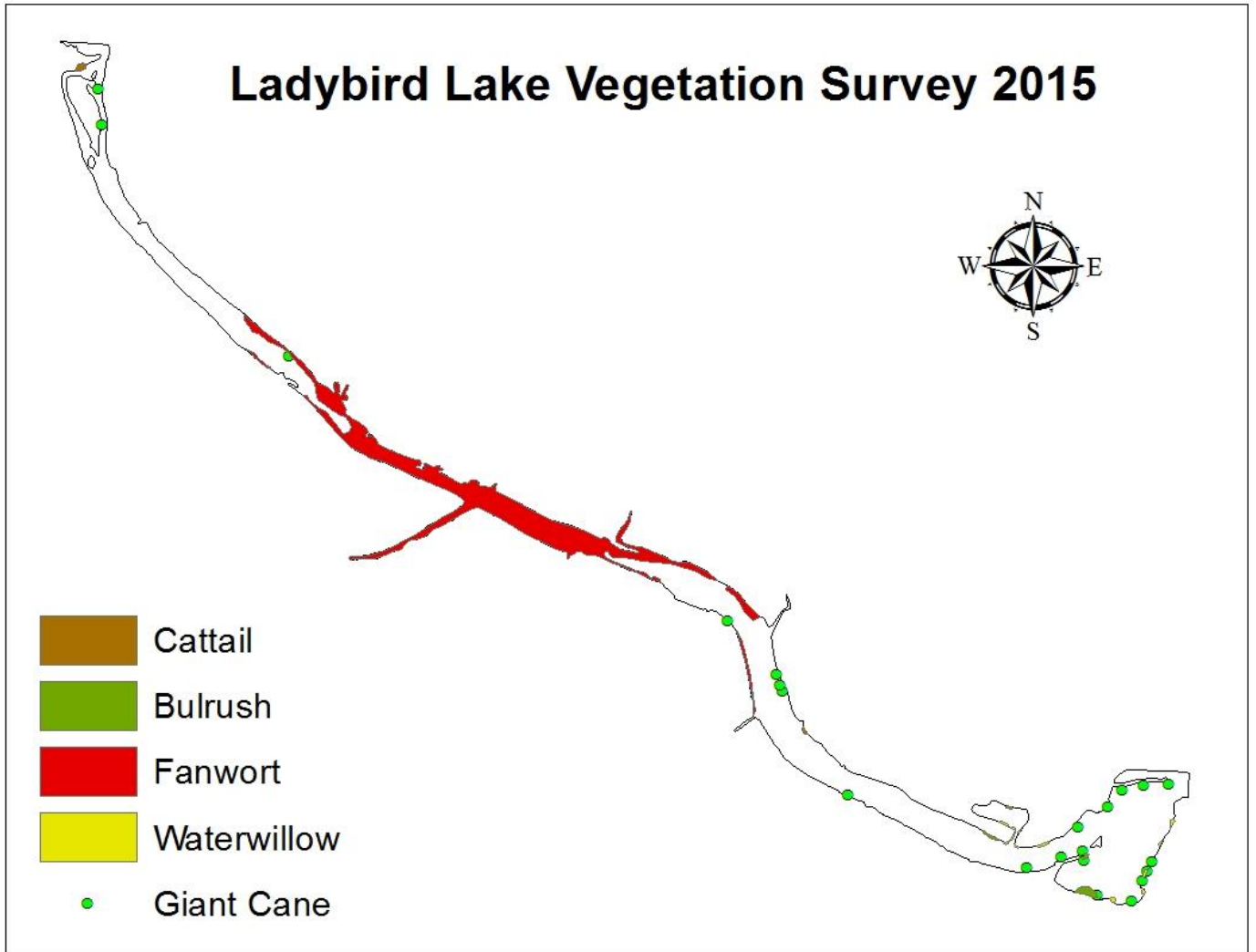
APPENDIX C

Structural habitat survey map for Lady Bird Reservoir, Texas, October 2015.



APPENDIX D

Aquatic vegetation survey coverage map for Lady Bird Reservoir, Texas, October 2015.



APPENDIX E

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Lady Bird Reservoir, Texas, 2015. Sampling effort was 1 hour for electrofishing.

Species	Electrofishing	
	N	CPUE
American Eel	2	2.0
Gizzard Shad	193	193.0
Threadfin Shad	158	158.0
Common Carp	2	2.0
Inland Silverside	10	10.0
Blacktail Shiner	1	1.0
Mexican Tetra	7	7.0
Redbreast Sunfish	185	185.0
Green Sunfish	1	1.0
Warmouth	11	11.0
Bluegill	253	253.0
Longear Sunfish	45	45.0
Redear Sunfish	93	93.0
Redspotted Sunfish	33	33.0
Largemouth Bass	171	171.0
Logperch	1	1.0
Rio Grande Cichlid	30	30.0
Triploid Grass Carp	1	1.0

APPENDIX F

Austin Team Championship Common Carp tournament statistics from 2008 to 2016, provided by the Carp Anglers Group.

Year	Total weight	Total # fish	0-9.9 lbs.	10-19.9 lbs.	20-29.9 lbs.	30-39.9 lbs.	> 40 lbs.	Average weight/fish	Percent >33 in
2008	2811	133	NA	NA	NA	NA	NA	21.14	NA
2009	2596	141	10	76	47	7	0	18.4	NA
2010	2270	103	NA	NA	NA	NA	NA	22.04	NA
2011	NA	NA	NA	NA	NA	NA	NA	NA	NA
2012	1688	79	2	35	36	7	0	21.37	43.0
2013	2393	112	12	37	48	15	0	21.37	48.2
2014	1913	92	5	47	35	4	2	20.8	39.1
2015	2135	101	1	46	44	10	0	21.14	48.5
2016	2577	129	7	61	45	14	0	19.98	41.8