

Lake Holbrook

2020 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 Lake Holbrook were surveyed in 2018 and 2020 using electrofishing. Historical data are presented with the 2018-2020 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: Lake Holbrook is a 650-acre impoundment located on Lankford Creek in the Sabine River Basin approximately 5 miles northwest of Mineola, Texas. Primary water uses include flood control and recreation. Habitat features consist of natural shoreline, standing timber, boat docks, and submerged and emergent vegetation. Coontail and cutgrass were the predominant aquatic vegetation present in the reservoir in 2020.

Management History: Important sport fish include Largemouth Bass and crappie. Florida Largemouth Bass were initially stocked in 1978 and last stocked in 2020 to improve the trophy potential of the reservoir. Efforts were made to establish native emergent vegetation in the reservoir to enhance littoral habitat and district staff worked with the Friends of Lake Holbrook Association to construct and deploy natural brush piles (last deployed in 2014).

Fish Community

- **Prey species:** Threadfin Shad were present in the reservoir. Electrofishing catch rate of Gizzard Shad was low. Electrofishing catch rate of Bluegill was high and most were less than 6-inches long. Collectively, sunfish and Threadfin Shad are the primary forage in the reservoir. The reservoir contains a quality population of Redear Sunfish greater than 6-inches.
- **Catfishes:** Channel Catfish were stocked most recently in 2018, but very few fish have been collected during population surveys or documented during creel surveys. Catfish recruitment is likely limited by Largemouth Bass predation.
- **Largemouth Bass:** Largemouth Bass were moderately abundant and displayed both a balanced size structure and good body condition. Largemouth Bass growth to legal length was moderate (average age at 14 inches was 2.1 years).
- **Crappie:** Black and White Crappie are present in the reservoir and anecdotal information suggests a quality fishery is still present. Traditional sampling methods produced inconsistent results and were discontinued in 2008. A creel survey will be conducted in 2024 to make future inferences on the crappie population.

Management Strategies: Begin stocking Florida Largemouth Bass fingerlings biennially at 1000/km of shoreline to increase the trophy potential in the reservoir. Inform the public about the negative impacts of aquatic invasive species and work with controlling authority as needed to provide technical guidance with aquatic nuisance species. Continue managing all sport fish under statewide harvest regulations.

Introduction

This document is a summary of fisheries data collected from Lake Holbrook in 2018-2020. 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 fish were collected, this report deals primarily with major sport fish and important prey species. Historical data are presented with the 2018-2020 data for comparison.

Reservoir Description

Lake Holbrook is a 650-acre impoundment constructed in 1962 on Lankford Creek, a tributary of the Sabine River. It is located in Wood County approximately 5 miles northwest of Mineola, Texas, and is operated and controlled by Wood County. Primary water uses are flood control and recreation. Lake Holbrook is eutrophic with a mean trophic state index (TSI, chl-*a*) of 56.02 (Texas Commission on Environmental Quality 2020). Habitat at time of sampling consisted of natural shoreline and both submersed and emergent vegetation. Abundant boat docks and patches of standing timber provide additional habitat for fish. Other descriptive characteristics for Lake Holbrook are in Table 1.

Angler Access

Lake Holbrook has three public boat ramps. Additional boat ramp characteristics are in Table 2. Shoreline access is available at all boat ramps and bridge crossing right-of-ways.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Storey and Cartabiano 2017) included:

1. Collect available data on Largemouth Bass over 8 lbs. caught by anglers to help justify future stockings of Florida Largemouth Bass (FLMB). Stock FLMB at 100/acre in 2019 and 2020.
Action: Tournament data was limited and no data was collected from anglers. FLMB fry were stocked in 2020.
2. Work with the Friends of Lake Holbrook Association (FOLHA) to purchase and install Georgia Cubes in the reservoir.
Action: Thirty Georgia cubes were deployed in 2018.
3. Monitor native vegetation planted inside enclosure cages in 2017 and consider introducing vegetation at more locations within the reservoir.
Action: By 2018 most vegetation had disappeared, likely from flooding, and no further plantings took place.

Harvest regulation history: Sport fish in Lake Holbrook are managed under statewide regulations (Table 3).

Stocking history: Florida Largemouth Bass were initially introduced in 1978 and stocked periodically from 1980-2020. Blue Catfish were stocked in 1982. Black Crappie, exhibiting the "black-stripe" trait, were purchased by the Lake Holbrook Association and stocked by TPWD staff in 2003. A complete stocking history is found in Table 4.

Vegetation/habitat management history: American water willow was initially introduced in 2006 and 2007 and plant colonies increased in coverage and spread to new areas throughout the reservoir (Storey and Bennett 2013). In 2013, American pondweed, Illinois pondweed, and waterstargrass were planted in wire enclosures at three sites for each species. Illinois pondweed initially displayed vigorous growth, and more was planted in 2016. District staff and volunteers from the Friends of Lake Holbrook Association assembled and deployed fish attractors consisting of natural brush in 2007 and 2008, bamboo structures in 2009, 2012 and 2014, and Georgia Cubes in 2018.

Water transfer: No interbasin transfers exist.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Lake Holbrook (Storey and Cartabiano 2017). Primary components of the OBS plan are listed in Table 5. 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 fall electrofishing (1.0 hours at 12, 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.

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 ($RSE = 100 \times SE$ of the estimate/estimate) was calculated for all CPUE and creel statistics.

Habitat – A comprehensive vegetation survey was conducted in 2020. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Results and Discussion

Habitat: A mixture of submersed and emergent vegetation covered approximately 6% (39 acres) of the reservoir surface area during the 2020 survey. The majority of vegetative habitat consisted of mixed stands of cattail, cutgrass, maidencane and water willow (Table 6). Coontail and pondweed were still present in the reservoir but decreased in abundance from the 2016 survey. District staff continued to work with FOLHA to increase offshore habitat in the reservoir; 30 Georgia-style pvc cubes were deployed in 2018. An updated map and coordinates of all offshore habitat can be found in Appendices C-D. The last structural habitat survey was conducted in 2012 (Storey and Bennett 2013).

Prey species: The primary prey base continued to be Threadfin Shad and sunfish. The 2020 Gizzard Shad electrofishing catch rate was low (89.0/h) but improved from the previous survey (2016; Figure 1). Overall, the majority of Gizzard Shad were large and approximately half were available to most sport fish as prey (IOV = 55). Bluegill remained abundant in 2020 (CPUE = 665.0/h) and catch rates increased each year over the last three surveys (Figure 2). The Bluegill size structure (PSD = 6) indicated most fish were small, comprising an important component of the forage base. The 2020 Redear Sunfish electrofishing catch rate (182.0/h) and size structure (PSD = 36) suggest quality sunfish are moderately abundant in the reservoir and the potential for a quality sunfish fishery exists (Figure 3).

Largemouth Bass: The 2020 Largemouth Bass electrofishing catch rate (150.0/h) was higher than the previous two surveys (2016 and 2018; Figure 4). While Largemouth Bass relative abundance improved in 2020, 89% of fish collected were under 14 inches. Size structure was similar over the past three surveys and suggested a balanced population (PSD range = 33 - 45). Body condition of Largemouth Bass was adequate ($W_r \geq 90$) for most size classes of fish. Growth was moderate; average age at 14 inches (13.2 to 14.9 inches) was 2.1 years (N = 12; range = 1-3 years).

Crappie: Black and White Crappie are present in the reservoir and anecdotal information suggests a quality fishery is still present. Traditional sampling methods produced inconsistent results and were discontinued in 2008. The 2017 OBS plan called for a baited tandem hoop net survey in the spring of 2021 as an alternative method to sample crappie. Due to variable results on previous hoop net crappie surveys and limited knowledge on size selectivity, the survey was not conducted. A creel survey will be conducted in 2024 to make future inferences on the crappie population.

Fisheries Management Plan for Lake Holbrook, Texas

Prepared – July 2020

ISSUE 1: Anecdotal tournament results, recent lake record (13.13 pounds; 2019), and creel data indicate Lake Holbrook has the potential to produce trophy Largemouth Bass. However, electrofishing data suggests the population consists primarily of small fish (89% of fish collected were < 14 inches). The prey base is excellent (abundant Threadfin Shad and sunfish) and fish reach legal length within 2.1 years on average. The most recent creel survey (2017) indicated 99% of legal-length fish were released. Given the adequate growth, abundant forage, and low harvest rates, stocking FLMB should increase trophy fish abundance.

MANAGEMENT STRATEGY

1. Stock FLMB fingerlings biennially at 1,000/km of shoreline to increase the trophy potential in the reservoir.
2. Improve ShareLunker signage at all popular access sites to promote the program. Use future ShareLunker entries to help justify stocking requests.
3. Work with FOLHA to improve deteriorated offshore habitat last deployed in 2014. Seek funding through CLP or HAAP to purchase artificial habitat.

ISSUE 2: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches, and plugging engine cooling systems. Giant salvinia and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Educate the public about invasive species through the use of media and the internet, when appropriate.
3. Make a speaking point about invasive species when presenting to constituent and user groups.
4. 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 (2021–2025)

Sport fish, forage fish and other important fishes

Sport fish in Lake Holbrook include Largemouth Bass, Channel Catfish, and crappie. Sunfish are the primary prey species.

Low-density fisheries

Channel Catfish and Spotted Bass have historically been present in the reservoir; population surveys have produced low and variable catch rates. Gill net surveys were discontinued in 2013 and no Spotted Bass were collected during the 2020 electrofishing survey. Creel data suggested minimal directed effort towards either species.

Survey objectives, fisheries metrics and sampling objectives

Crappie: Historical trap net data fluctuated among survey years; catch rates were very dependent upon sample location resulting in overall poor survey precision. Due to the unpredictability of trap net survey success and the large sample size required to reliably estimate crappie trend data (CPUE, PSD, W_r), trap net surveys were discontinued in 2008. Inferences about the crappie population and identification of potential applied management actions will be made from data collected with a creel survey in 2024.

Largemouth Bass: Largemouth Bass are the most popular sport fish in Lake Holbrook. Due to the importance and popularity of this fishery, Largemouth Bass trend data on relative abundance, size structure, body condition, and growth (CPUE, PSD, W_r , average age at 14 inches) will continue to be monitored with biennial nighttime electrofishing, alternating between spring (2021) and fall (2024) surveys. Historical electrofishing data suggests that sampling objectives ($RSE \leq 25$, $N > 50$) can be met with 12-18 randomly selected 5-minute sampling sites. Otoliths will be removed from 13 specimens (13.0- 14.9 inches), if available, during the 2024 survey for age and growth analysis and fin clips will be taken from 30 individuals for genetic analysis.

Prey Species: Threadfin Shad and sunfish are important prey species in Lake Holbrook. Long-term trend data is desired for these populations to evaluate their relative abundance (CPUE) and size structure (PSD for sunfishes). Relative weights of the Largemouth Bass population, along with size structure of Bluegill will be used to gauge prey fish availability for sport fishes from electrofishing sampling conducted in fall 2024. No sampling objectives will be set for prey species.

Literature Cited

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- DiCenzo, V. J., M. J. Maceina, and M. R. Stimpert. 1996. Relations between reservoir trophic state and Gizzard Shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.
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- Storey, K. and E. Cartabiano. 2017. Statewide freshwater fisheries monitoring and management program survey report for Lake Holbrook, 2016. Texas Parks and Wildlife Department, Federal Aid Report F-221-M-2, Austin. 34 pp.
- Texas Commission on Environmental Quality. 2020. Trophic classification of Texas reservoirs. 2020 Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d), Austin. 15 pp.

Tables and Figures

Table 1. Characteristics of Lake Holbrook, Texas.

| Characteristic | Description |
|-----------------------------|----------------|
| Year constructed | 1962 |
| Controlling authority | Wood County |
| County | Wood |
| Reservoir type | Tributary |
| Mean depth | 8.0 ft. |
| Maximum depth | 30.0 ft. |
| Shoreline Development Index | 4.96 |
| Conductivity | 155 μ S/cm |
| Secchi disc range | 4-6 ft. |

Table 2. Boat ramp characteristics for Lake Holbrook, Texas, July 2020. Elevation at time of survey was 363 feet above mean sea level.

| Boat ramp | Latitude Longitude (dd) | Public | Parking capacity (N) | Elevation at end of boat ramp (ft.) | Condition |
|-----------|----------------------------|--------|----------------------------|---|--------------------------------|
| CR 2260 | 32.690179 95.544251 | Y | 20 | 357.5 | Excellent, no access issues |
| CR 2298 | 32.699644 95.556130 | Y | 20 | 358.5 | Excellent, no access issues |
| CR 2275 | 32.713134 95.539590 | Y | 6 | 358.0 | Good, no access issues |

Table 3. Harvest regulations for Lake Holbrook, Texas.

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

^a Bag limit for Largemouth and Spotted Bass is 5 in the aggregate.

Table 4. Stocking history of Lake Holbrook, Texas. FRY = fry; FGL = fingerling; AFGL = advanced fingerling; ADL = adult.

| Species | Year | Number | Size |
|-------------------------|-------|---------|------|
| Blue Catfish | 1982 | 54,154 | FGL |
| Channel Catfish | 1992 | 10,526 | FGL |
| | 2018 | 2,534 | FGL |
| | Total | 13,060 | |
| Threadfin Shad | 2004 | 5,500 | ADL |
| Florida Largemouth Bass | 1978 | 1,085 | AFGL |
| | 1980 | 39,845 | FGL |
| | 1983 | 52,902 | FGL |
| | 1999 | 106,197 | FGL |
| | 2000 | 105,080 | FGL |
| | 2005 | 211 | ADL |
| | 2007 | 67,769 | FGL |
| | 2008 | 65,058 | FGL |
| | 2014 | 65,397 | FGL |
| | 2015 | 66,244 | FGL |
| | 2020 | 209,935 | FRY |
| | Total | 779,723 | |
| Black Crappie | 2003 | 10,800 | FGL |

Table 5. Objective-based sampling plan components for Lake Holbrook, Texas 2018–2020.

| Gear/target species | Survey objective | Metrics | Sampling objective |
|-----------------------------|--------------------|-----------------------|----------------------------|
| <i>Electrofishing</i> | | | |
| Largemouth Bass | Relative abundance | CPUE–Stock | RSE-Stock \leq 25 |
| | Size structure | PSD, length frequency | N \geq 50 stock |
| | Condition | W _r | 10 fish/inch group (max) |
| | Age-and-growth | Age at 14 inches | N = 13, 13.0 – 14.9 inches |
| Bluegill ^a | Relative abundance | CPUE–Total | |
| | Size structure | PSD, length frequency | N \geq 50 |
| Gizzard Shad ^a | Abundance | CPUE-Total | |
| | Size structure | IOV | N \geq 50 |
| Threadfin Shad ^a | Abundance | CPUE-Total | |
| <i>Hoop netting</i> | | | |
| Crappie ^b | Relative abundance | CPUE-stock | |
| | Size structure | PSD, length frequency | |

^a No additional effort will be expended to achieve an RSE \leq 25 for CPUE of Bluegill, Gizzard and Threadfin Shad if not reached from designated Largemouth Bass sampling effort.

^bExploratory survey, no sample objectives set.

Table 6. Survey of aquatic vegetation, Lake Holbrook, Texas, 2012, 2016 and 2020. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

| Vegetation type | 2012 | 2016 | 2020 |
|-----------------|----------|----------|-----------------------|
| Native emergent | 14.8 (2) | 13.8 (2) | 29.7 (5) ^a |
| Submersed | 2.5 (<1) | 16.5 (3) | 9.3 (1) ^b |
| Non-native | | | |
| Alligatorweed | 0.8 (<1) | | |

^a Cattail, cutgrass, maidencane, smartweed and water willow

^b Coontail and pondweed

Gizzard Shad

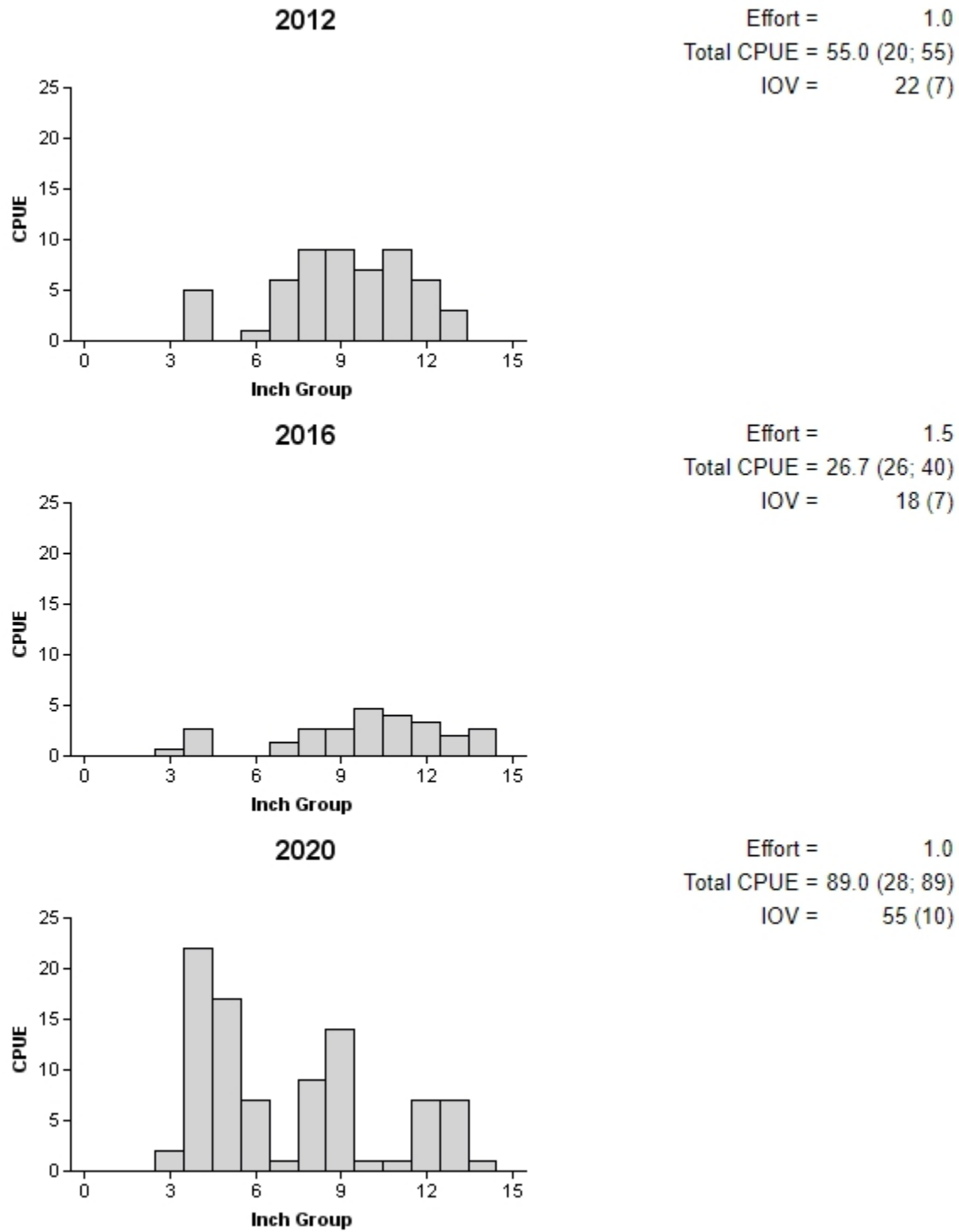


Figure 1. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Holbrook, Texas, 2012, 2016, and 2020.

Bluegill

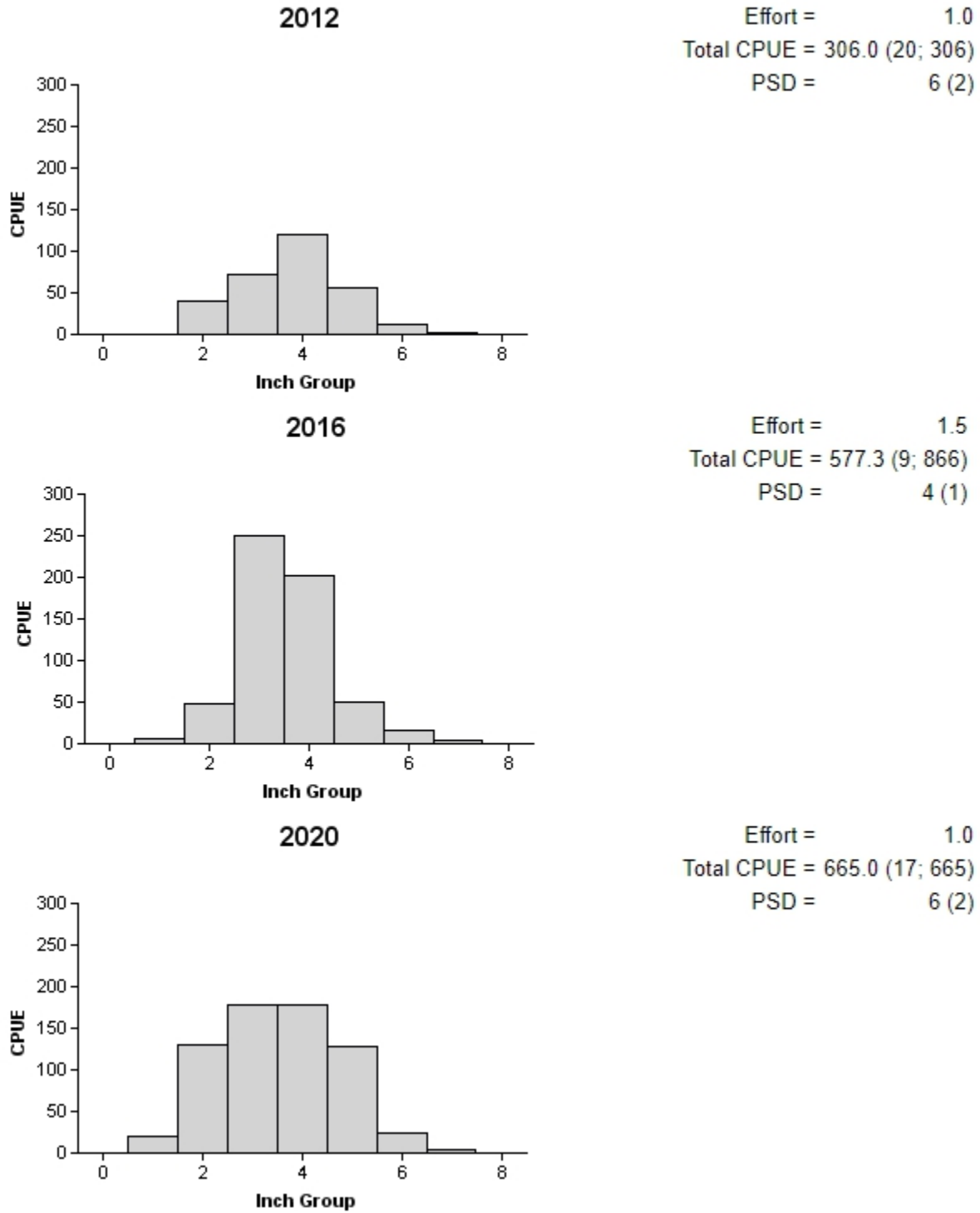


Figure 2. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Holbrook, Texas, 2012, 2016, and 2020.

Redear Sunfish

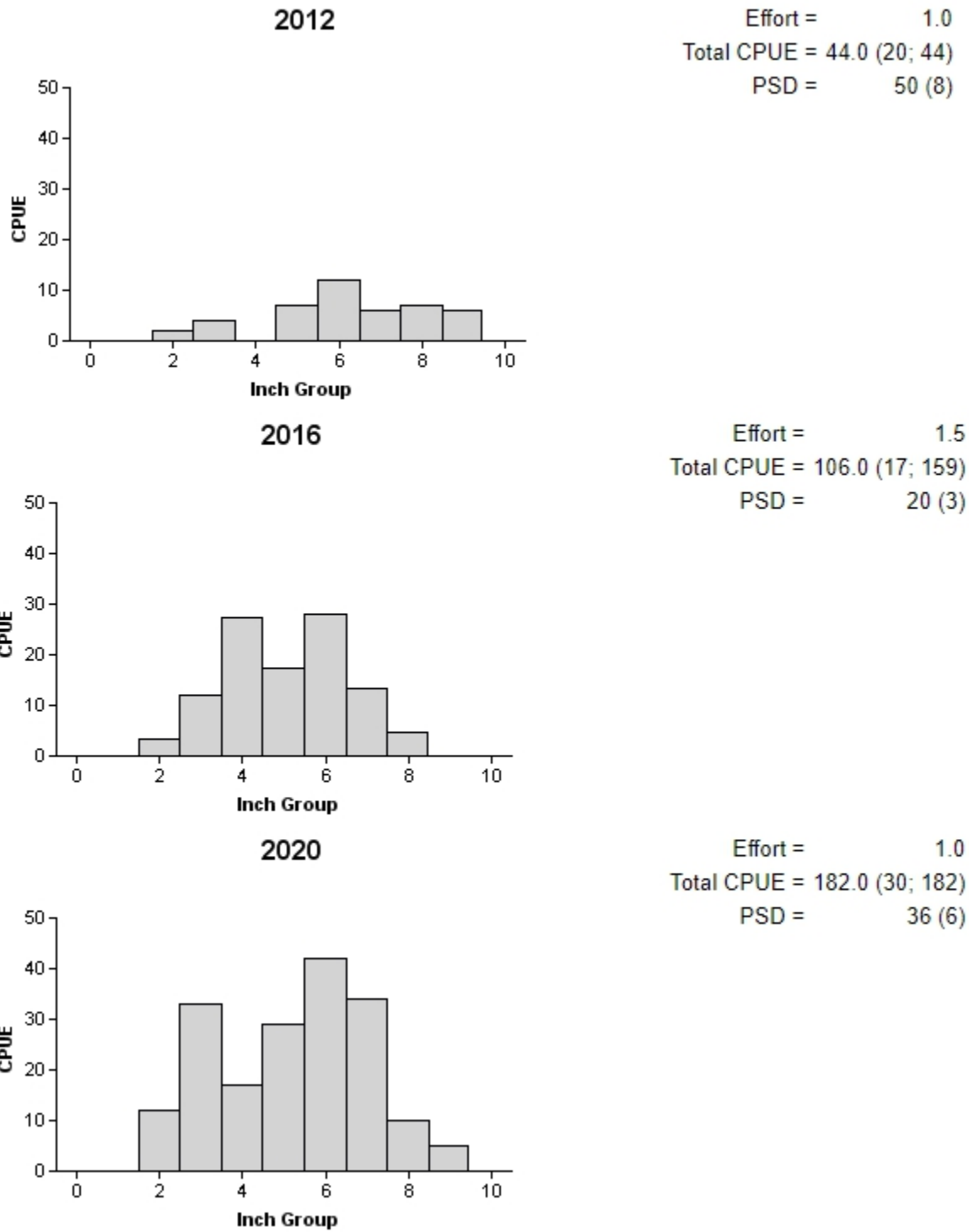


Figure 3. Number of Redear Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Holbrook, Texas, 2012, 2016, and 2020.

Largemouth Bass

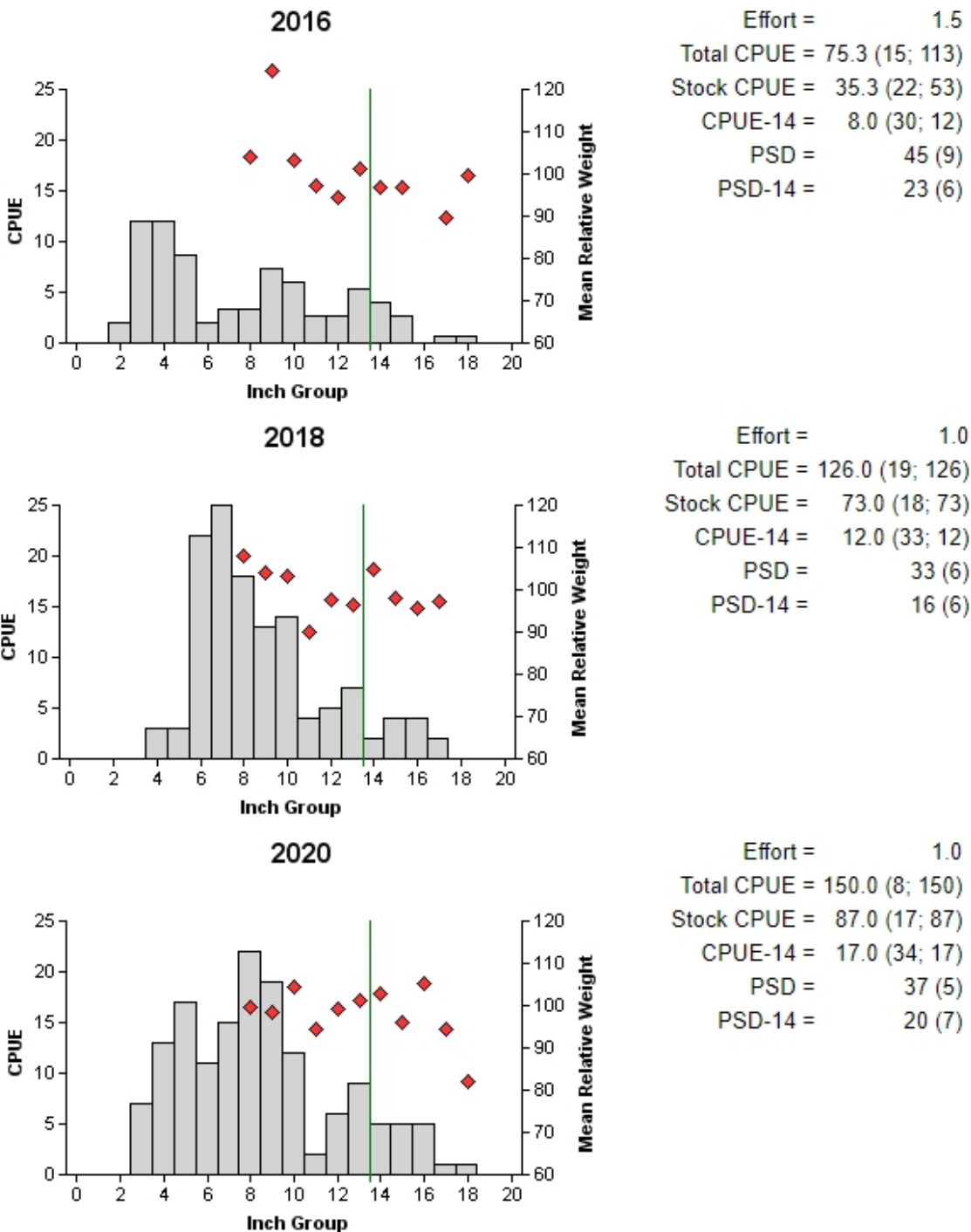


Figure 4. Number of Largemouth Bass caught per hour (CPUE), mean relative weights (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Holbrook, Texas, 2016, 2018 and 2020. Vertical line represents minimum length limit.

Proposed Sampling Schedule

Table 7. Proposed sampling schedule for Lake Holbrook, Texas. Survey period is June through May.

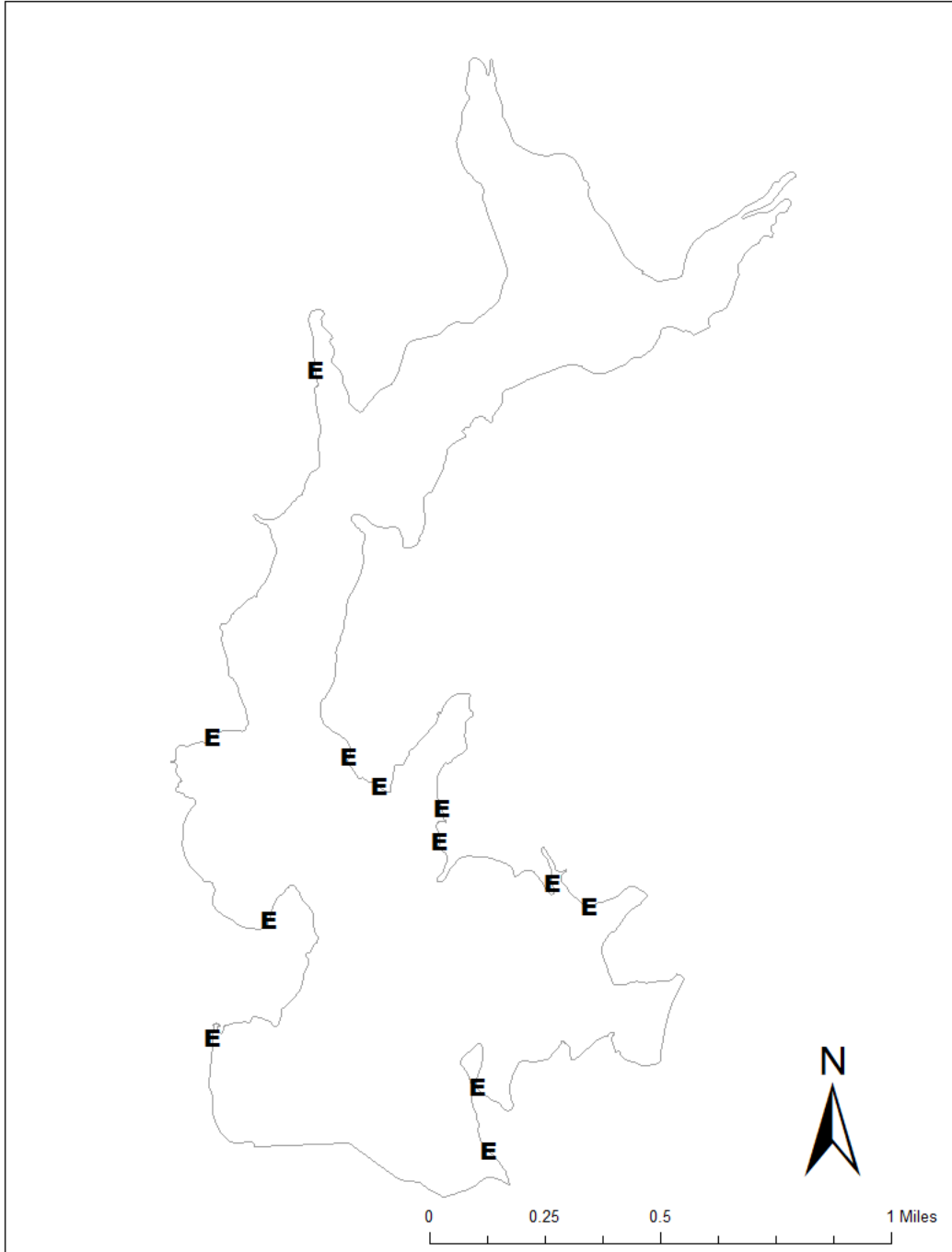
| | Survey year | | | |
|-------------------------------------|-------------|-----------|-----------|-----------|
| | 2021-2022 | 2022-2023 | 2023-2024 | 2024-2025 |
| Angler Access | | | | x |
| Vegetation | | | | x |
| Electrofishing – Fall | | | | x |
| Electrofishing – Spring (Bass Only) | x | | | |
| Creel Survey (Spring Quarter) | | | x | |
| Report | | | | x |

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

Number (N) and catch rate (CPUE) (RSE in parentheses) of all target species collected from fall electrofishing from Lake Holbrook, Texas, 2020. Sampling effort was 1.0 hour of electrofishing.

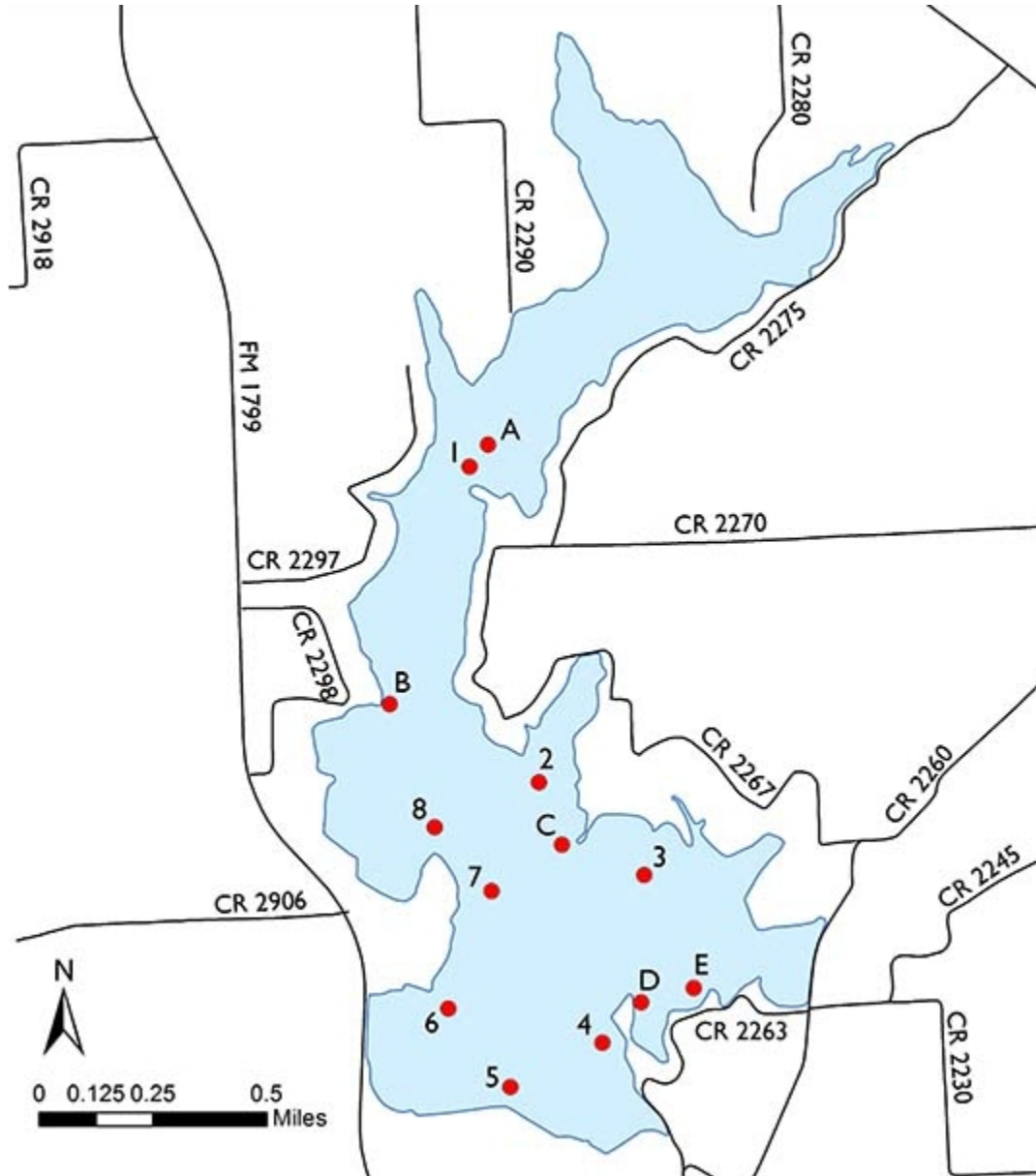
| Species | N | CPUE |
|-------------------|------|-------------|
| Gizzard Shad | 89 | 89.0 (28) |
| Threadfin Shad | 1358 | 1358.0 (51) |
| Redbreast Sunfish | 2 | 2.0 (100) |
| Bluegill | 665 | 665.0 (17) |
| Longear Sunfish | 95 | 95.0 (31) |
| Redear Sunfish | 182 | 182.0 (30) |
| Warmouth | 9 | 9.0 (55) |
| Largemouth Bass | 150 | 150.0 (8) |

APPENDIX B – Map of sampling locations



Location of sampling sites, Lake Holbrook, Texas, 2020. Electrofishing stations are indicated by E. Water level was near full pool at time of sampling.

APPENDIX C – Map of fish attractor locations



APPENDIX D – Fish attractor coordinates

| # | Latitude | Longitude | Type | Installed | Refurbished |
|---|-------------|--------------|----------|-----------|-------------|
| 1 | 32° 42.440' | -95° 33.162' | Bamboo | 2012 | 2014 |
| 2 | 32° 41.829' | -95° 33.033' | Bamboo | 2012 | 2014 |
| 3 | 32° 41.644' | -95° 32.803' | Bamboo | 2012 | 2014 |
| 4 | 32° 41.326' | -95° 32.914' | Bamboo | 2012 | 2014 |
| 5 | 32° 41.248' | -95° 33.126' | Bamboo | 2012 | 2014 |
| 6 | 32° 41.403' | -95° 33.260' | Bamboo | 2012 | 2014 |
| 7 | 32° 41.625' | -95° 33.151' | Bamboo | 2012 | 2014 |
| 8 | 32° 41.752' | -95° 33.274' | Bamboo | 2012 | 2014 |
| A | 32° 42.480' | -95° 33.118' | PVC cube | 2018 | |
| B | 32° 41.990' | -95° 33.364' | PVC cube | 2018 | |
| C | 32° 41.708' | -95° 32.986' | PVC cube | 2018 | |
| D | 32° 41.400' | -95° 32.821' | PVC cube | 2018 | |
| E | 32° 41.423' | -95° 32.700' | PVC cube | 2018 | |



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