Bastrop Reservoir

2018 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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Survey and Management Summary

Fish populations in Bastrop Reservoir were surveyed in 2018 using electrofishing and tandem hoop netting. Historical data are presented with the 2018 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

Reservoir Description: Bastrop Reservoir is a stable-level 906-acre impoundment of Spicer Creek, a tributary of the Colorado River, and is located northeast of the City of Bastrop, Bastrop County, Texas. The dam was constructed in 1965 to supply water for cooling a natural-gas-fired power plant operated by the Lower Colorado River Authority (LCRA). The reservoir has a shoreline development index of 10.5 and lies within a unique ecological area known as the Lost Pines, a 70 square mile area of the Post Oak Savannah ecological area comprised of loblolly pine forests.

Management History: Important sport fish include Largemouth Bass and Channel Catfish. Florida Largemouth Bass were last stocked in Bastrop Reservoir in 1992 to increase Florida Largemouth Bass genetic influence. A 14- to 21-inch slot length limit and a 5-fish daily bag limit (one greater than 21 inches) for Largemouth Bass was implemented in 1993.

Fish Community

- **Prey species:** Bluegill was the dominant prey species, with Gizzard Shad, Threadfin Shad, and other sunfish species available as forage.
- **Channel Catfish:** The Channel Catfish population continued to have few fish available to anglers, resulting in poor fishing success. However, abundance and other population characteristics improved in 2018.
- **Largemouth Bass:** Largemouth Bass were abundant, especially below the slot limit. Individuals within the slot limit were less abundant. None were found over the slot limit.

Management Strategies: The reservoir should continue to be managed under current regulations. The harvest of Largemouth Bass less than 14 inches in length is promoted when possible. Consider an alternative Largemouth Bass regulation that could address the overabundance of smaller fish. Aquatic plant coverage is monitored annually. Inform the public about the negative impacts of aquatic invasive species. Conduct a year-long creel survey in 2020-2021, tandem hoop netting in summer 2022, and electrofishing in fall 2022.

Introduction

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

Reservoir Description

Bastrop Reservoir is a stable-level 906-acre impoundment of Spicer Creek, a tributary of the Colorado River, and is located northeast of the City of Bastrop, Bastrop County, Texas. The dam was constructed in 1965 to supply water for cooling a natural-gas-fired power plant operated by the Lower Colorado River Authority (LCRA). The reservoir has a shoreline development index of 10.5 and lies within a unique ecological area known as the Lost Pines, a 70 square mile area of the Post Oak Savannah ecological area comprised of loblolly pine forests. Bastrop Reservoir was eutrophic with a mean TSI chl-*a* of 63.5, (Texas Commission on Environmental Quality 2018). Habitat at time of sampling consisted mainly of standing timber, native submerged aquatic vegetation, primarily eel grass, and non-native hydrilla. Other descriptive characteristics for Bastrop Reservoir are listed in Table 1.

Angler Access

At the time of survey, Bastrop Reservoir had two public boat ramps and no private boat ramps. The two public ramps, North Shore Park and South Shore Park were controlled by the LCRA and required entrance fees. Additional boat ramp characteristics are in Table 2. Public bank access included a fishing pier and dock located in each park. A fish-cleaning station is also available at the South Shore Park.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (De Jesus and Farooqi 2015) included:

1. Promote the harvest of sub-slot bass on Bastrop Reservoir using signage at the boat ramps, and continue to manage the fishery under existing regulations.

   Action: Although signage has not been installed yet, sub-slot harvest has been promoted through interactions with anglers and park staff. As a result, the Texas Tournament Zone (TTZ) organized a tournament designed to harvest sub-slot bass.

2. Conduct an additional tandem hoop netting survey in summer 2016 to replicate our effort during the recommended sampling season.

   Action: Tandem hoop netting was conducted in the summer of 2016 and 2018.

3. Continue annual aquatic vegetation monitoring.

   Action: Aquatic vegetation surveys were conducted annually from 2015 to 2018.

4. Continue to engage partners and the public about the negative impacts of aquatic invasive species using print media, social media, and public engagements.

Action: Outreach efforts have included social media, print media, public presentations, and one-on-one interactions with constituents. To reduce the potential spread of zebra mussels boaters are required to “clean, drain, and dry” their vessel and associated equipment.

Harvest regulation history: Sport fish in Bastrop Reservoir have been managed with statewide regulations, except for a special slot length limit regulation for Largemouth Bass. The 14- to 21-inch slot-length limit (with only one being harvestable over 21 inches) was implemented in 1993 to improve the population size structure. Current regulations are found in Table 3.

Stocking history: Bastrop Reservoir has not required stocking with any species since 1997, when Channel Catfish were stocked to supplement the population. Florida Largemouth Bass were introduced starting in 1983 to increase Florida Largemouth Bass genetic influence. The complete stocking history is in Table 4.

Vegetation/habitat management history: Bastrop Reservoir has had a diverse and dynamic submersed aquatic vegetation community history. Aquatic plants offered excellent fish habitat and consistently met optimal levels for maintaining fish production for phylophitic species (Durocher et al. 1984, Dibble et al. 1996). The exotic species Hydrilla has been present in the reservoir and has been monitored closely with annual surveys to prevent operational issues at the power plant. Other exotics, Eurasian water milfoil and slender naiad remained present in the reservoir; though haven't presented operational concerns.

Water transfer: There are no inter-basin water diversion structures at Bastrop Reservoir.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Bastrop Reservoir (TPWD unpublished). Primary components of the OBS plan are listed in Table 5. All survey sites (Appendix A) 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). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing.

Tandem hoop nets – Channel Catfish were collected using 18 tandem hoop-net series at 18 stations. Nets were baited with soap and deployed for 2-night soak durations. CPUE for tandem hoop netting was recorded as the number of fish caught per tandem hoop net series (fish/series).

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 statistics.

Habitat – A structural habitat survey was conducted in 2014. Vegetation surveys were conducted annually from 2015 to 2018. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Results and Discussion

Habitat: A structural habitat survey was last conducted in 2014. The habitat consisted primarily of natural shoreline (Table 6) with emergent native aquatic vegetation (Table 7). Native vegetation covered about 6% of the reservoir's surface area compared to 21.9% coverage by non-native vegetation (Table 7). Non-native Hydrilla has been steadily expanding in coverage from 3.5 acres in 2015 to 199.0 acres in 2018. By contrast, native submerged aquatic vegetation has been steadily decreasing since 2015 from 189.2 acres to 55.0 acres. Other native species were present in the system as well as non-native species. Non-native Eurasian water milfoil *Myriophyllum spicatum* ranged from 21.6 to 27.1 acres from 2015 to 2017, but was not detected in 2018.

Prey species: Gizzard Shad, Threadfin Shad, and Bluegill electrofishing catch rates were 56.0/h, 13.0/h, and 130.0/h, respectively. Index of Vulnerability was very low, indicating that 2% of Gizzard Shad were vulnerable to existing predators. Gizzard Shad electrofishing CPUE has been consistently low in recent surveys (Figure 1). In 2018 the majority of Gizzard Shad were in the 10- to 15-inch range. Threadfin Shad catch rate was low in 2018 (13.0/h) and in 2014 (1.0/h). Total CPUE of Bluegill in 2018 was 130.0/h and has been in decline in recent surveys; CPUE was 177/h in 2014, 302/h in 2010 (and 290/h in 2008). Bluegill size structure continued to be dominated by smaller individuals, < 5 inches (Figure 2).

Channel Catfish: Bastrop Reservoir has supported a Channel Catfish fishery for years and has been promoted as a prime catfish destination in the district. Gill netting total catch rate for Channel Catfish in 2003, 2007 and 2011 was 9.4/nn, 7.6/nn and 4.4/nn, respectively; with a historical average total catch rate of 6.5/nn since 1998 (De Jesus and Magnelia 2011). However, a declining trend was noticeable. In addition, some anglers expressed concern about low catch rates. Since 2014-2015, Channel Catfish have been sampled using hoop nets instead of gill nets. Hoop nets have been shown to be an effective means of targeting Channel Catfish and also allows for live release (Cunningham and Cofer 2000 and Wallace et

al., 2011). We believe hoop netting would give a more accurate representation of the Channel Catfish population. The total 2015 catch rate for Channel Catfish was 0.2 fish per series; while stock-size catch rate was 0.1 fish per series. This represented a total of three fish caught over 17 tandem series of two nights and did not meet the objective of collecting a minimum of 50 stock-size (≥11 inches) Channel Catfish for an RSE of 25 with 9 tandem sets. In 2015, the hoop nets were set in the spring for logistical reasons, so seasonal sampling error might have underrepresented the Channel Catfish population. However, the results were similar in 2016 when the nets were set under optimal conditions in summer (Figure 3). We were unable to determine if the observed results in 2016 were representative of the population. Thus, sampling with hoop nets continued in 2018. We collected 40 stock-size fish with an RSE of 28 which was deemed an acceptable level of abundance and precision. Stock CPUE was 2.2 fish per series and CPUE-12 was 2.1. We will continue with hoop netting to more fully evaluate this technique for Channel Catfish in Bastrop Reservoir. Body condition was sub-optimal, as relative weights (W_r) for most length classes fell below 90 (Figure 3).

Largemouth Bass: The electrofishing catch rate of stock-length Largemouth Bass in 2018 was high (133.0/h), as was the case in 2016 (208.0/h) and 2014 (122.0/h) surveys (Figure 3). Since 2014, population size structure has shifted to a greater number of fish below the slot, and fewer, smaller fish within the slot. In 2018, PSD was 39 compared to 60 and 77 in 2016 and 2014 respectively. The catch rate of Largemouth Bass greater than 14 inches (CPUE14) decreased to 21/h in 2018 whereas it was 63/h in 2016 and 75/h in 2014 (Figure 3). Bass above 21-inches in length have been in low abundance (DeJesus and Farooqi 2015) as only one fish (24-inch Largemouth Bass sampled in 2016) was sampled from 2010 to 2018. It is expected that slow growth within the slot length limit makes it rare to see individuals live long enough to surpass the upper slot length of 21 inches. While trophy-size fish are seldom reported or sampled, this fishery has maintained itself as a quality-size, high-catch fishery. While body condition in 2014 was good for the majority of fish (W_r ranged from 94 to 102), it has been gradually declining since then. By 2018, body condition (W_r) was low, ranging from 73 to 87 (Figure 3). The last three surveys have documented high stock-length CPUEs for Largemouth Bass, a steady decline in the number of slot-length fish, low IOV for Gizzard Shad, and a decline in Threadfin Shad CPUE. In addition, the practice of catch-and-release fishing among bass anglers is strong and recommended large-scale harvest of sub-slot fish to help improve population structure has been minimal. Consideration of an alternative harvest regulation (such as a 16-inch maximum) may be appropriate to see if improvement of size structure is feasible. Genetic analysis was not performed in 2018, but historically, Florida Largemouth Bass influence has remained relatively constant as Florida alleles have ranged from 74 to 86%, despite no Florida Largemouth Bass stockings since 1992 (De Jesus and Farooqi 2015).

Fisheries Management Plan for Bastrop Reservoir, Texas

Prepared – July 2019

ISSUE 1: Largemouth Bass growth within the slot has been historically poor, with few fish in older age classes exceeding 18 inches in length. There was only one bass collected during electrofishing surveys since 1998 that exceeded 21 inches in length. The reservoir is showing signs of a crowded Largemouth Bass population.

MANAGEMENT STRATEGIES

1. Conduct a year-long creel survey in 2020-2021 to determine angler harvest preferences and catch characteristics for Largemouth Bass.
2. Conduct an additional fall bass-only electrofishing survey in 2021 to monitor population characteristics.
3. Conduct a category-3 age-and-growth survey in 2021 to determine growth rates with better precision than typical category-2 surveys.
4. Consider changing harvest regulations for Largemouth Bass if predicated by the creel survey, electrofishing survey, and age-and-growth survey data during the next report cycle. Use predictive modeling to assess potential outcomes.
5. Continue to promote harvest of sub-slot bass when possible, collaborating with partners such as TTZ.

ISSUE 2: Hydrilla has expanded significantly since 2015 to cover 22% of the reservoir area. This plant can potentially affect power plant operations if it grows out of control around the intake area. The plant is monitored annually as a Tier II maintenance effort.

MANAGEMENT STRATEGIES

1. Communicate with the LCRA to discuss the current situation and assist with management, if necessary.
2. Continue to monitor aquatic vegetation on an annual basis to monitor the community.

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches, and plugging engine cooling systems. Giant salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

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

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 (2019–2023)

Sport fish, forage fish, and other important fishes

Sport fishes in Bastrop Reservoir include Largemouth Bass and Channel Catfish. Known important forage species include Bluegill, Redear Sunfish, Gizzard Shad and Threadfin Shad.

Negligible fisheries

White Crappie: White Crappie were stocked in Bastrop reservoir in 1992 and are present, but population abundance is very low, based on poor captures in historic trap netting surveys. A creel survey in 2004 did not identify directed effort for this species, revealing little interest by anglers to pursue this species at Bastrop reservoir. Sampling for White Crappie is not a priority for the 2019-2023 sampling period.

Blue Catfish: Blue Catfish were stocked in Bastrop Reservoir from 1969 to 1971 and are expected to be present in low abundance. Anecdotal catch reports for this species by anglers in recent years are the only evidence of their existence in the lake. Water conditions at this power plant reservoir do not provide the typical habitat features of lakes where Blue Catfish flourish. Our gill netting surveys since 2006 have failed to collect Blue Catfish specimens. Sampling for Blue Catfish is not a priority for the 2019-2023 sampling period.

Flathead Catfish: Flathead Catfish were present in low abundance, based on gill netting surveys conducted between 1998 and 2011. During this time, CPUE total averaged 0.8 fish/nn, and ranged between 0.2 and 2.0 fish/nn. A creel survey in 2004 did not identify directed effort for this species, revealing little interest by anglers to pursue this species at Bastrop reservoir. Sampling for Flathead Catfish is not a priority for the 2019-2023 sampling period.

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Largemouth Bass are the most popular sport fish in Bastrop Reservoir based on a 2004 creel survey. The popularity and reputation for quality Largemouth Bass fishing at this reservoir warrant sampling time and effort. Results from a 2004 creel survey showed directed angling effort for Largemouth Bass to be 17 hours/acre and accounted for 69% of the total directed effort. Largemouth Bass are managed with a 14- to 21-inch slot regulation. While few fish grow past the slot, this lake is known for quality fish and good angling catch rates (0.77/h in 2004). Trend data on CPUE, size structure, and body condition have been collected biennially since 2002 with fall nighttime electrofishing. The population exhibits good relative abundance, and anglers are anecdotally somewhat satisfied with the

fishing. Most were satisfied with the restrictive harvest regulation in the 2004 creel survey. However, monitoring surveys ever since have revealed a decline in population characteristics. 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 fall 2022, 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. A bass-only survey will be conducted in fall 2021, which could be used to supplement a category-3 age-and-growth survey the same fall to collect a target of 200 fish between 5.9 inches and 19.7 inches (10 per inch-group). A year-long creel survey in 2021-2022 will be conducted to gather Largemouth Bass catch characteristics and angler opinions.

Channel Catfish: The 2004 creel survey indicated Channel Catfish angling comprised >3.7% of total angling effort (second to Largemouth Bass). Gill netting total CPUE ranged from 4.4 to 9.4 fish/nn (6.6 fish/nn average) from 2001 to 2011, providing only an average of 32 stock-size and larger fish per survey. We would like to collect information allowing us to monitor size structure and body condition with greater precision. Hoop nets have been shown to be an effective means of targeting Channel Catfish and also allows for live release (Cunningham and Cofer, 2000 and Wallace et al., 2011). We switched from standard gill nets, set overnight to tandem hoop nets set for two nights starting in 2015. We anticipate that setting a minimum of nine tandem hoop nets, with a soak time of two nights, will achieve our sampling objective (50 Channel Catfish ≥11 inches; RSE of CPUE-S ≤ 0.25). A minimum of nine randomly selected tandem hoop netting sites will be sampled in summer 2022, 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 nine stations with 75% confidence). Exclusive of the original nine random stations, nine additional random stations will be pre-determined in the event additional sampling is necessary. If failure to achieve either objective has occurred after one soak session, and objectives can be attained with up to nine additional random stations, another soak session of effort will be expended.

Sunfish and Threadfin Shad: Bluegill, Redear Sunfish, Redbreast Sunfish, Threadfin Shad, and Gizzard Shadwell are the primary forage at Bastrop Reservoir. Like Largemouth Bass, trend data on CPUE and size structure of these sunfish have been collected biennially since 1996. Abundance of Threadfin Shad will also be measured as a function of CPUE during those surveys. Continuation of sampling, as per Largemouth Bass above, will allow for monitoring of large-scale changes in sunfish relative abundance and size structure. Sampling effort based on achieving sampling objectives for Largemouth Bass will result in sufficient numbers of sunfish for size structure estimation (PSD and IOV; 50 fish minimum at 12 randomly selected 5-min electrofishing sites with 80% confidence) but not for relative abundance estimates (RSE ≤ 25 of CPUE-Total; 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 sunfish species combined. No additional effort will be expended to achieve an RSE of 25 for CPUE of sunfish. 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 fish weighed and measured per inch class).

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Tables and Figures

Table 1. Characteristics of Bastrop Reservoir, Texas.

Characteristic	Description
Year constructed	1965
Controlling authority	Lower Colorado River Authority
County	Bastrop
Reservoir type	Power plant cooling reservoir
Shoreline Development Index	10.5
Conductivity	972 µS/cm

Table 2. Boat ramp characteristics for Bastrop Reservoir, Texas, September 2014. Reservoir elevation at time of survey was 450 feet above mean sea level. This is a stable-level reservoir. Satellite imagery indicated there were no changes in boat ramp characteristics since 2014.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
North Shore Park	30.16571 -97.28069	Y	54	443	Good
South Shore Park	30.14109 -97.28503	Y	36	443	Good; some aquatic vegetation encroaching

Table 3. Harvest regulations for Bastrop Reservoir.

Species	Bag limit	Length limit
Flathead Catfish	5	18-inch minimum
Catfish: Channel and Blue	25	12-inch minimum
Bass: Largemouth	5*	14- to 21-inch slot
Crappie: White and Black Crappie, their hybrids and subspecies	25	10-inch minimum

*Only one may be over 21 inches

Table 4. Stocking history for Bastrop, 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)
Black Crappie x White Crappie	1993	90,400	FRY	0.9
	1994	110,753	FRY	0.9
	1995	103,738	FRY	0.9
	Total	304,891		
Blue Catfish	1969	4,425	UNK	UNK
	1970	4,615	UNK	UNK
	1971	4,644	UNK	UNK
	Total	13,684		
Channel Catfish	1969	5,517	AFGL	7.9
	1970	4,683	AFGL	7.9
	1971	4,610	AFGL	7.9
	1982	500	UNK	UNK
	1990	6,208	ADL	11.2
	1997	8,300	AFGL	7.0
	Total	29,818		
Florida Largemouth Bass	1983	41,713	FGL	2.0
	1984	17,056	FGL	3.0
	1990	90,551	FRY	0.8
	1991	771	ADL	9.0
	1991	90,872	FGL	1.3
	1992	59,509	FGL	1.1
	1992	31,101	FRY	0.9
	Total	331,573		
Green Sunfish x Redear Sunfish	1972	1,980	UNK	UNK
	Total	1,980		
Kemp's Largemouth Bass	1985	46,314	FGL	1.0
	1986	45,400	FGL	1.0

Table 4. Stocking history for Bastrop, 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)
	Total	91,714		
Palmetto Bass (Striped X White Bass hybrid)	1972	1,800	FGL	1.5
	1973	9,760	FGL	1.5
	1974	10,400	UNK	UNK
	1975	9,086	UNK	UNK
	Total	31,046		
Peacock Bass	1978	519	UNK	UNK
	1979	3,234	UNK	UNK
	Total	3,753		
White Crappie	1992	94,577	FRY	0.6
	Total	94,577		

Table 5. Objective-based sampling plan components for Bastrop Reservoir, Texas 2018–2019.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Abundance	CPUE–Stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Condition	W_r	10 fish/inch group (max)
Bluegill [a]	Abundance	CPUE–Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
Gizzard Shad [a]	Abundance	CPUE–Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
	Prey availability	IOV	N ≥ 50
Tandem hoop netting			
Channel Catfish	Abundance	CPUE–stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Condition	W_r	10 fish/inch group (max)

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

Table 6. Survey of structural habitat types, Bastrop Reservoir, Texas, 2014. Shoreline habitat type units are in miles and standing timber is acres. A survey was not completed in 2018, but a review of satellite imagery indicated that very little had changed since 2014.

Habitat type	Estimate	% of total
Bulkhead	1.68 miles	10.0
Bulkhead with boat docks	0.18 miles	1.0
Natural	14.64 miles	84.0
Natural with boat docks	0.02 miles	< 1.0
Rocky	0.87 miles	5.0
Rocky with boat docks	0.03 miles	< 1.0
Standing timber	21.00 acres	2.0

Table 7. Survey of aquatic vegetation, Bastrop Reservoir, Texas, 2015–2018. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2015	2016	2017	2018
Native submersed	189.2 (21.8)	157.9 (17.4)	123.4 (13.6)	55.0 (6.1)
Native floating-leaved	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.0 (0.1)
Native emergent*	7.0 (< 1.0)	7.0 (< 1.0)	7.0 (< 1.0)	7.0 (< 1.0)
Non-native				
Hydrilla (Tier II)**	3.5 (0.4)	66.0 (7.3)	114.0 (12.6)	199.0 (21.9)
Eurasian watermilfoil (Tier III)**	21.6 (2.5)	26.3 (2.9)	27.1 (2.9)	0.0 (0.0)

* Bulrush coverage changes little over time at Bastrop Reservoir.

**Tier II is Maintenance Response, Tier III is Watch Status.

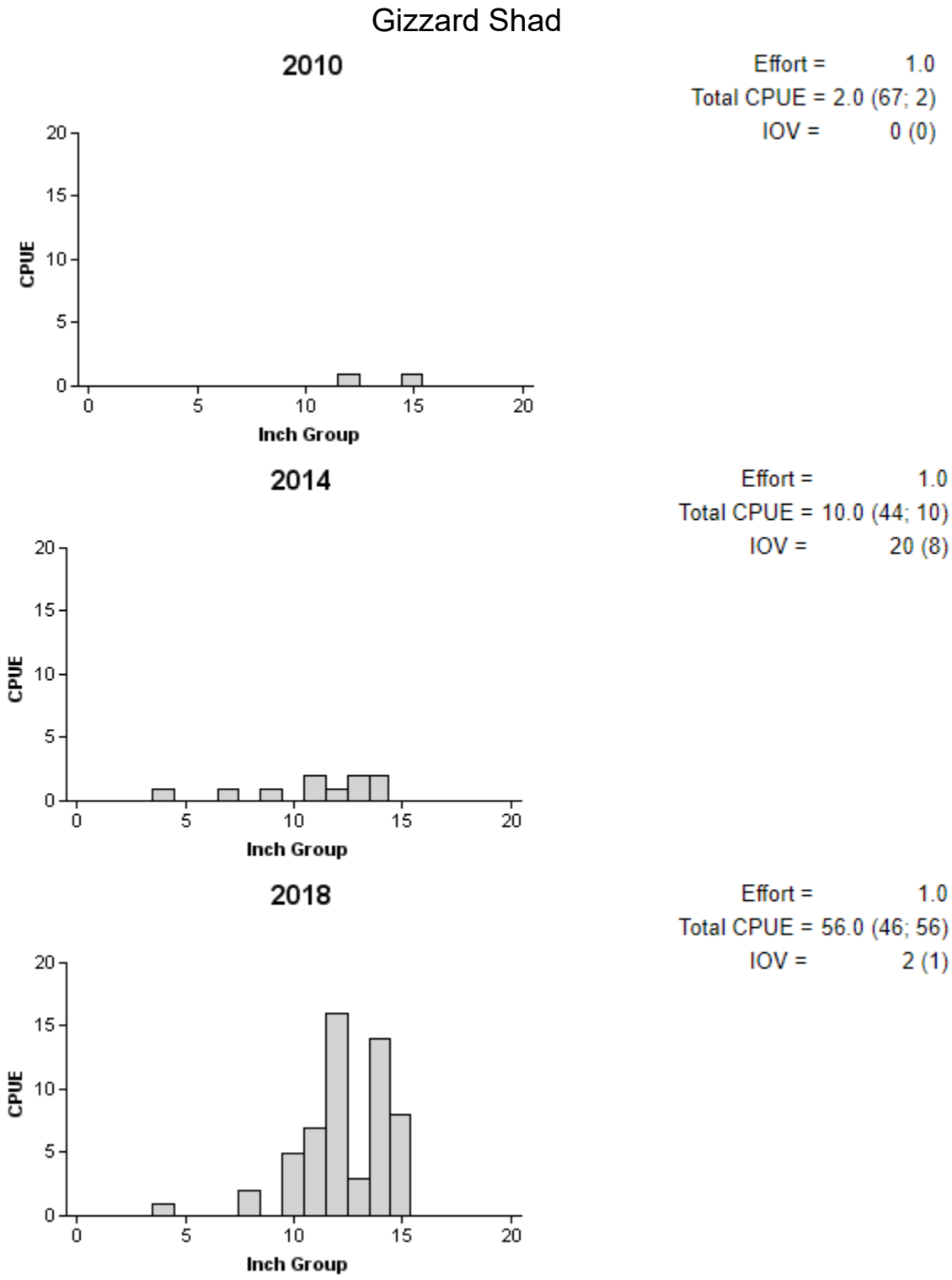


Figure 1. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Bastrop Reservoir, Texas, 2010, 2014, and 2018.

Bluegill

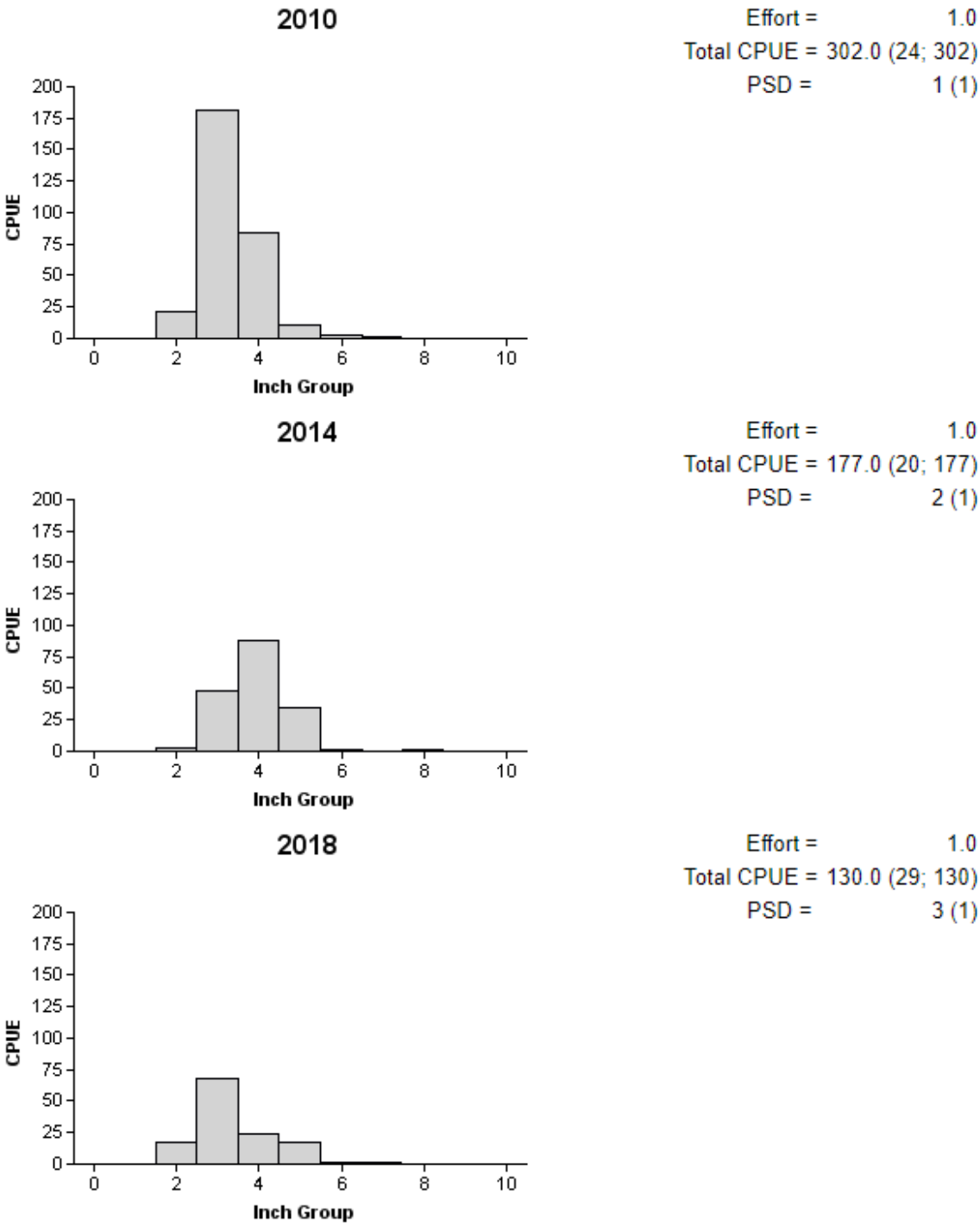


Figure 2. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Bastrop Reservoir, Texas, 2010, 2014, and 2018.

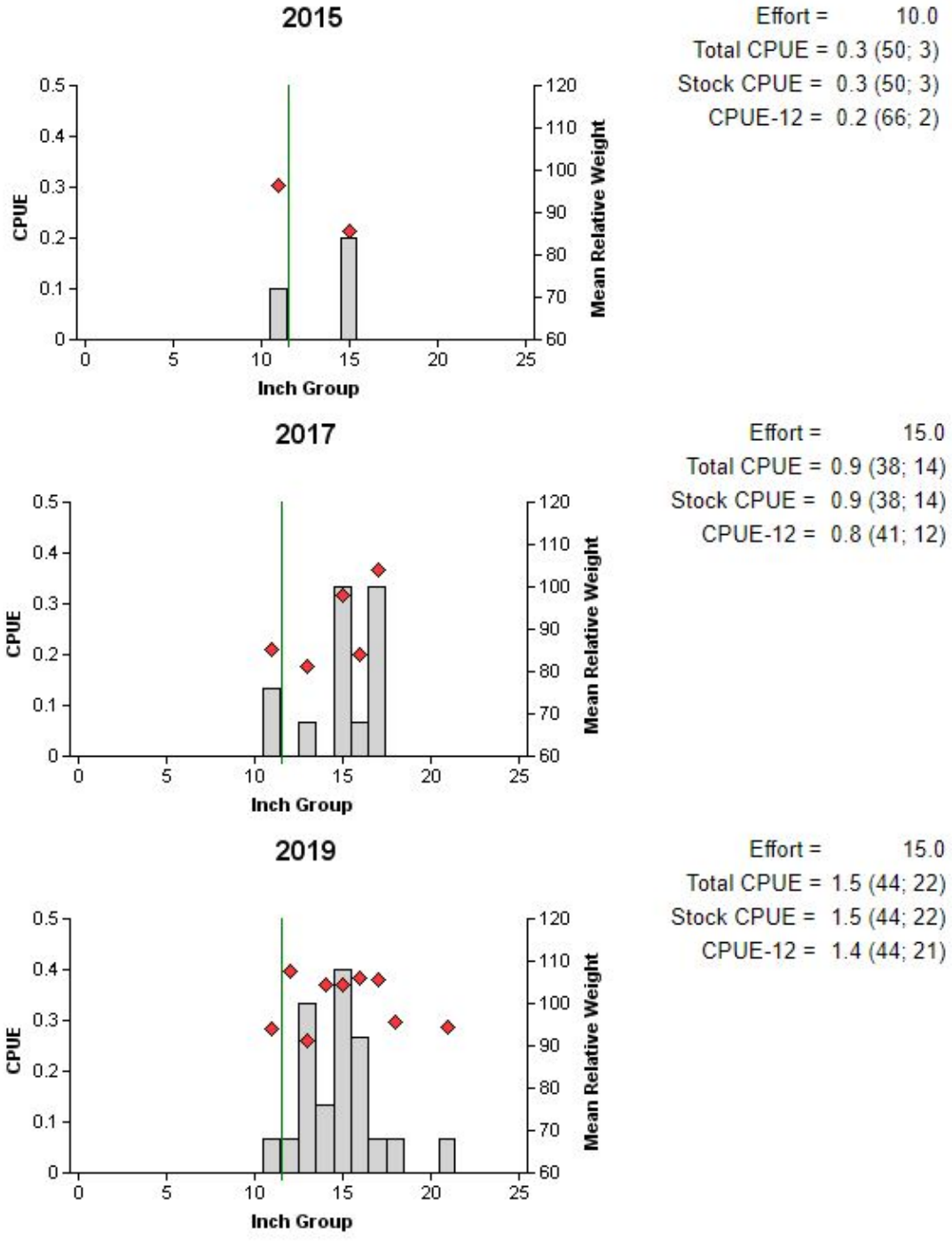


Figure 3. Number of Channel Catfish caught per hoop net series (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for tandem hoop net surveys, Bastrop Reservoir, Texas, 2015 (spring), 2016 (summer) and 2018 (summer).

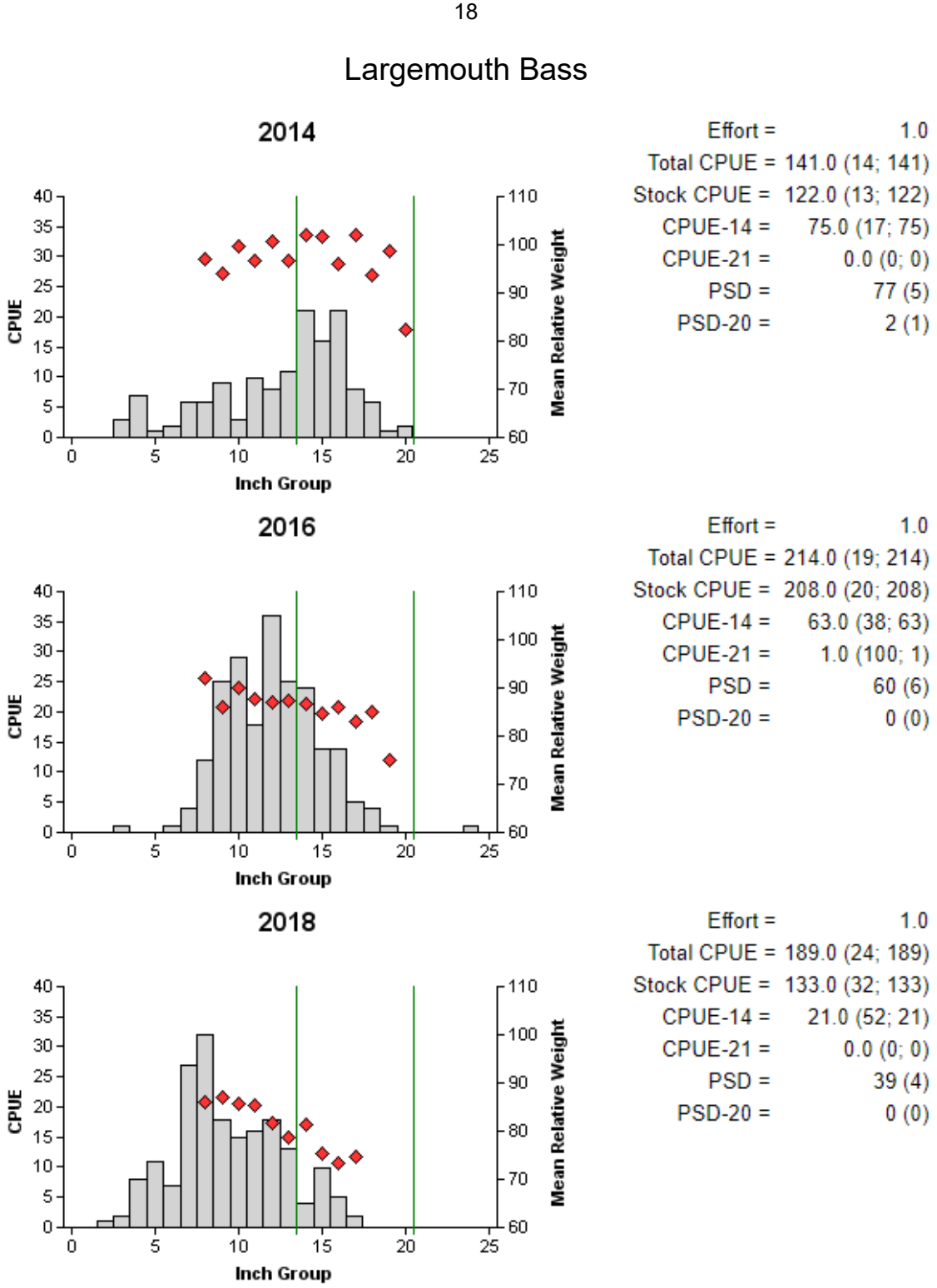


Figure 4. Figure 4. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Bastrop Reservoir, Texas, 2014, 2016, and 2018. Slot length limit indicated by vertical lines.

Proposed Sampling Schedule

Table 8. Proposed sampling schedule for Bastrop Reservoir, Texas. Survey period is June through May. Baited tandem hoop netting surveys are conducted in the early summer, while electrofishing surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

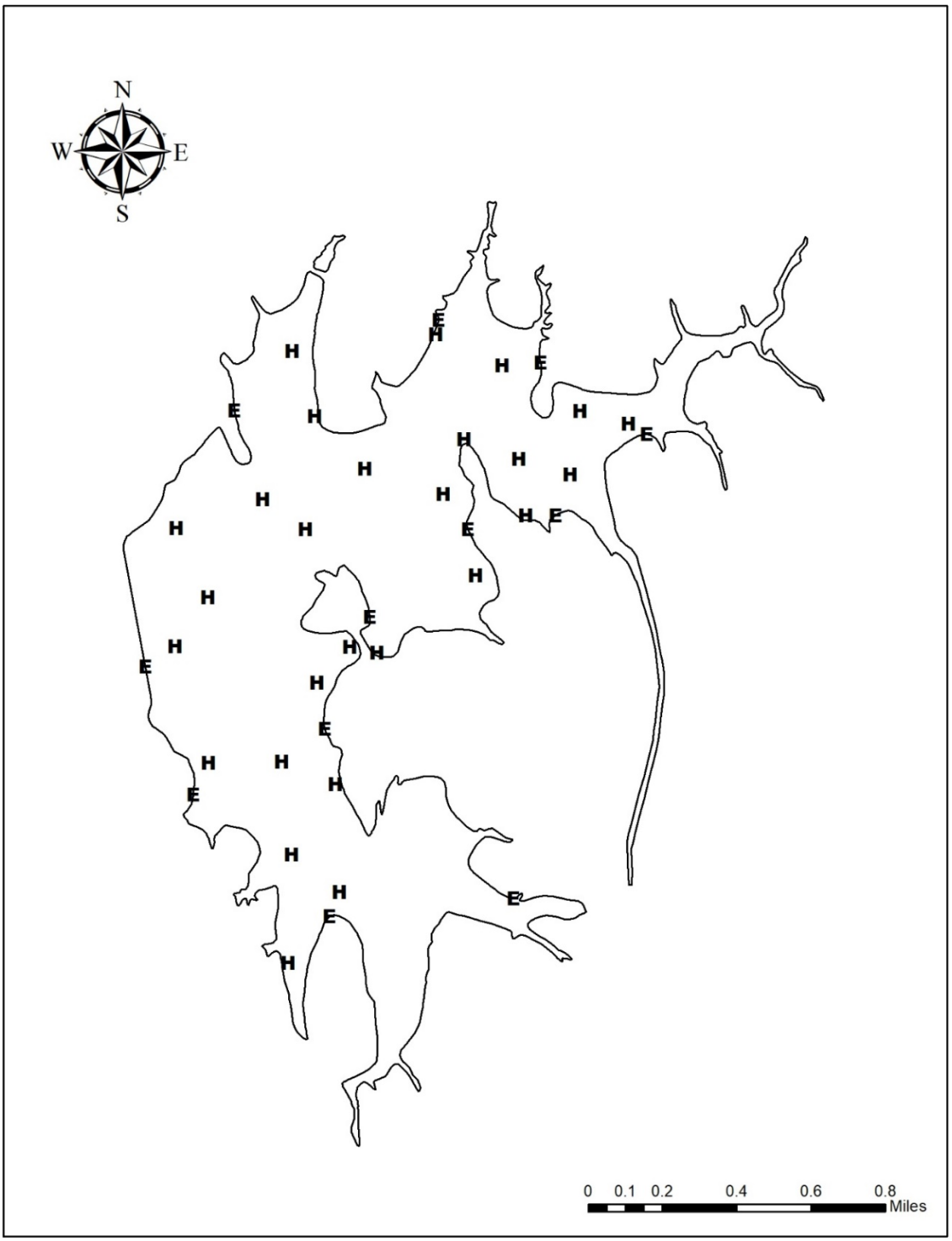
	Survey year			
	2019-2020	2020-2021	2021-2022	2022-2023
Angler Access				S
Structural Habitat				S
Vegetation	A	A	A	S
Electrofishing – Fall		A		S
Baited tandem hoop netting				S
Creel survey		S		
Report				S

APPENDIX A

	Electrofishing		Hoop Netting	
Species	CPUE	N	CPUE	N
Gizzard Shad	56.0	56 (46)		
Threadfin Shad	13.0	13 (29)		
Channel Catfish			2.8	51 (32)
Redbreast Sunfish	3.0	3 (72)		
Bluegill	130.0	130 (29)		
Redear Sunfish	20.0	20 (26)		
Red Spotted Sunfish	6.0	6 (72)		
Largemouth Bass	189.0	189 (24)		

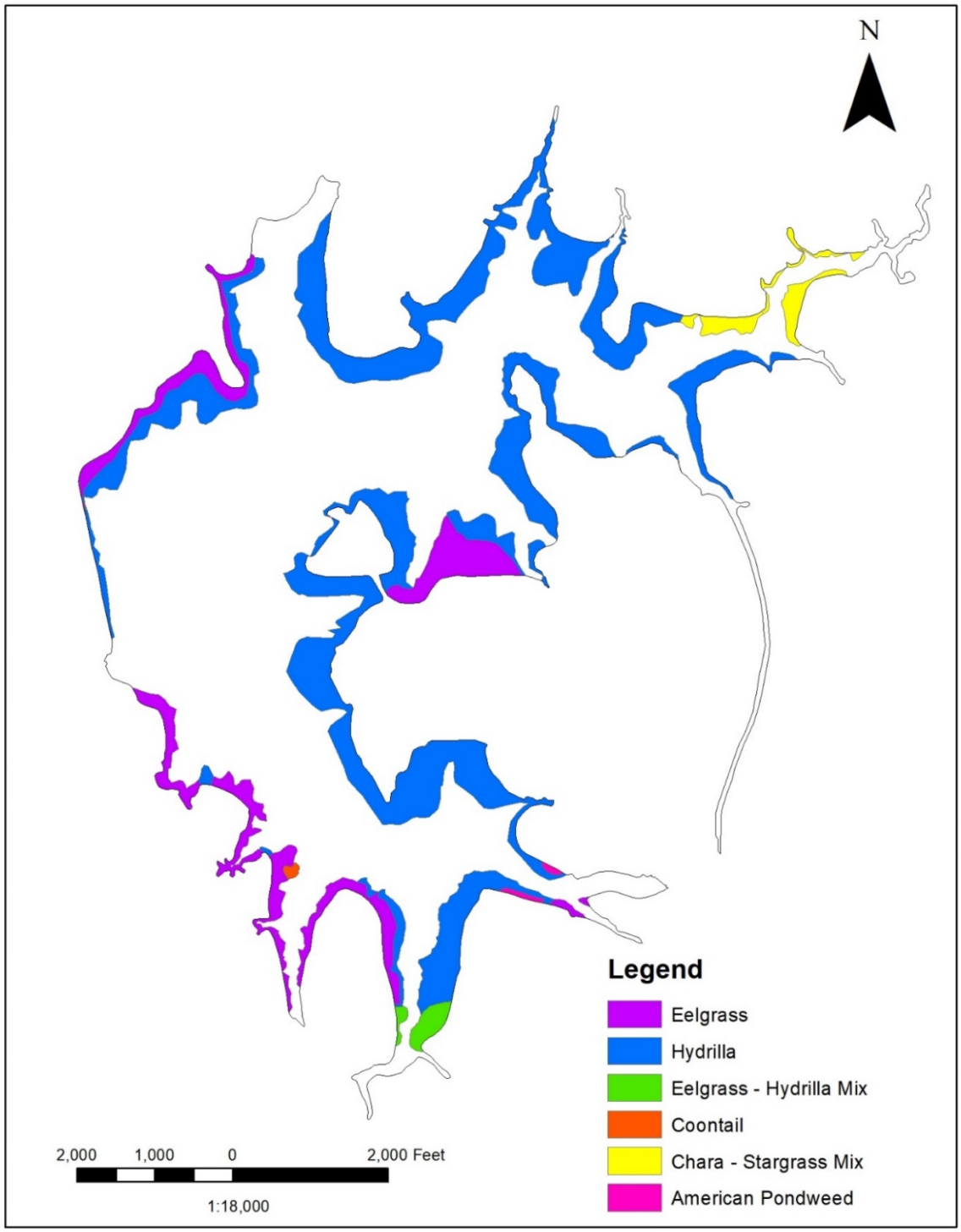
Number (N) and catch rate (CPUE, RSE in parentheses) of all target species collected from all gear types from Bastrop Reservoir, Texas, 2018. Sampling effort was 18 tandem series for hoop netting and 1 hour for electrofishing.

APPENDIX B



Location of sampling sites, Bastrop Reservoir, Texas, 2018. Hoop net and electrofishing stations are indicated by H and E, respectively. Water level was near full pool at time of sampling.

APPENDIX C



Aquatic vegetation survey coverage map for Bastrop Reservoir, Texas, September 2018.

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