Lake Hawkins

2023 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-5

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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Survey and Management Summary

Fish populations in Lake Hawkins were surveyed in 2021 and 2023 using electrofishing. Historical data are presented with the 2021-2023 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 Hawkins is a 634-acre impoundment located on Little Sand Creek in the Sabine River Basin approximately 5 miles northwest of Hawkins, Texas. Primary water uses include flood control and recreation. Habitat features consist of natural shoreline, standing timber, and submerged and floating aquatic vegetation. Coontail was the predominant aquatic vegetation present in the reservoir in 2023.

Management History: Important sport fish include Largemouth Bass and crappie. Florida Largemouth Bass were initially stocked in 1975 and last stocked in 2010 to improve the trophy potential of the reservoir. Grass Carp were stocked in 2006, 2011 and 2014 to control hydrilla nuisance.

Fish Community

- **Prey species:** Threadfin Shad were present in the reservoir in relatively low abundance. Electrofishing catch rate of Bluegill was moderate and most were less than 6-inches long. Collectively, sunfish were the primary forage in the reservoir. Quality Redear Sunfish were present in the reservoir and could provide a quality sunfish fishery.
- **Catfishes:** Channel Catfish were stocked most recently in 1992, 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 1.9 years).
- **Crappie:** Black Crappie historically occurred in low abundance and very few were collected during population surveys. Black Crappie accounted for 14% of directed angling effort during the last (spring 2020) creel survey.

Management Strategies: Collect available online tournament data to monitor frequency of Largemouth Bass ≥ 5 pounds, caught. Stock Lone Star Bass to increase the potential catch of trophy Largemouth Bass. Conduct annual vegetation surveys to monitor coverage and distribution of hydrilla and Eurasian watermilfoil and make appropriate management recommendations based on survey findings. 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 Hawkins in 2021-2023. 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 2021-2023 data for comparison.

Reservoir Description

Lake Hawkins is a 634-acre impoundment constructed in 1962 on Little Sandy Creek, a tributary of the Sabine River. It is located in Wood County approximately 5 miles northwest of Hawkins, Texas and is operated and controlled by Wood County. Primary water uses are flood control and recreation. Lake Hawkins is mesotrophic with a mean TSI chl-*a* of 46.94 (Texas Commission on Environment Quality 2022). Habitat at time of sampling consisted of natural shoreline and both native and non-native submersed and emergent vegetation. Abundant boat docks and patches of standing timber provide additional habitat for fish. Other descriptive characteristics for Lake Hawkins are in Table 1.

Angler Access

Lake Hawkins has four public boat ramps and no private boat ramps. Additional boat ramp characteristics are in Table 2. Shoreline access is available at all boat ramps and within the county-operated park near the dam.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Norman 2020) included:

1. Conduct a category 3 age and growth sample (5 fish per 10 mm) to calculate mean length-at-age for Largemouth Bass <500 mm.

   Action: Category 3 analysis was not conducted due to limited staff; age-and-growth priorities were shifted to category 2.

2. Collect available data on Largemouth Bass over 8 lbs. caught by anglers to help justify future stockings of Florida Largemouth Bass.

   Action: Tournament data was collected to monitor average big-bass weight from available tournament data.

3. Conduct comprehensive vegetation survey ever year to monitor total vegetation coverage.

   Action: Comprehensive surveys were conducted annually from 2019-2023.

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

Stocking history: Channel Catfish were introduced in 1967 and stocked again in 1981,1982, and 1992. Florida Largemouth Bass (FLMB) were initially introduced in 1975 and stocked again in 1990 and 2010. Blue Catfish were stocked in 1982. Smallmouth Bass were stocked five times between 1987 and 1991, but the population did not develop. Triploid Grass Carp were stocked by Wood County in 2006, 2011, and 2014 as a part of a management plan to help manage hydrilla. A complete stocking history is found in Table 4.

Vegetation/habitat management history: Lake Hawkins has historically harbored a rich diversity of native aquatic plants. Hydrilla and Eurasian watermilfoil have been documented in Lake Hawkins for over 15 years. Hydrilla reached its historic level (482 acres) in 2006, covering approximately 76% of the reservoir surface area. To reduce hydrilla coverage, the controlling authority stocked 1,000 Triploid Grass Carp in May 2006 and applied Sonar herbicide in April 2007. Annual vegetation surveys conducted from 2008 through 2015 monitored the distribution of hydrilla in Lake Hawkins by tracking the percentage of sample stations where hydrilla was observed (Bennett and Storey 2016).Additional stockings of Triploid Grass Carp occurred in fall 2011 (N = 200) and in the fall of 2014 (N = 100).

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 Hawkins (Norman 2020). 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 2022).

Common names of fishes and their hybrids in this report are used following Page et al. (2023) with an exception for Largemouth Bass. While we recognize recent changes to black bass names, Texas reservoirs contain a mix of Florida Bass, Largemouth Bass, and their intergrade offspring. Therefore, Largemouth Bass is used in this report for simplicity as well as consistency with previous reports.

Electrofishing – Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1.5 hours at 18, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. Ages for Largemouth Bass were determined using otoliths from 12 randomly selected fish (range 13.3 to 14.6 inches). Electrofishing in 2023 was conducted using both Smith-Root Apex and GPP 5.0 electrofishers. Both units performed similar; differences in catch rates were not detected.

Genetics – Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2022). Micro-satellite DNA analysis was used to determine genetic composition of individual fish since 2005. Electrophoresis analysis was used prior to 2005.

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 Neumann et al. (2012). 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 – Comprehensive vegetation surveys were conducted annually from 2019-2023 Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2022).

Results and Discussion

Habitat: Vegetation coverage increased from the 2020 management report, reaching a maximum coverage of 41% in 2022. The majority of this increase was attributed to abundant coontail on the north end of the reservoir, and an increase in Eurasian watermilfoil in the lower two-thirds of the reservoir. A vegetation management plan was developed in the winter of 2022 to create a boat lane through the dense coontail and selectively reduce milfoil abundance. Herbicide applications were conducted by TPWD Aquatic Habitat Enhancement (AHE) team in May 2023. Following treatments, the comprehensive

vegetation survey conducted in August revealed a diverse mix of native and nonnative vegetation was still present, covering approximately 30% (190 acres) of the reservoir's surface. Aquatic vegetation coverage between 10% and 40% of reservoir surface area is ideal to sustain quality Largemouth Bass fisheries (Durocher et al. 1984Submersed vegetation including coontail, variable leaf milfoil and Eurasian watermilfoil accounted for the majority (87%) of coverage (Table 6). Hydrilla was observed in trace amounts during the 2023 survey. The results from the 2023 vegetation survey suggest that selective herbicide applications can be successful in reducing overabundant vegetation on Lake Hawkins, while still maintaining beneficial vegetation coverage (20-30%). The last structural habitat survey was conducted in 2015 (Storey and Bennett 2016); structural habitat has not significantly changed since that survey.

Prey species: Sunfishes remain the primary prey base in Lake Hawkins, and to a lesser extent Threadfin and Gizzard Shad. Catch rate and Index of Vulnerability remained low for Gizzard Shad (CPUE=5.3; IOV=0). The 2023 Electrofishing catch rates of Redbreast Sunfish, Bluegill and Redear Sunfish were 26.7/h, 304.7/h and 78.7/h, respectively (Figures 1-3). Most Bluegill were less than 6 inches (PSD=4), while both Redear and Redbreast Sunfish over 8 inches were collected, suggesting the potential for a quality sunfish fishery. Shad abundance is likely limited by clear water, abundant vegetation, and moderate productivity.

Largemouth Bass: The 2023 Largemouth Bass fall electrofishing catch rate (59.3/h) declined from the 2019 survey (CPUE=74.6/h), but was comparable to previous surveys, suggesting a stable, but moderately abundant bass population (Figure 44). Size structure (PSD = 46) also declined from the 2019 survey, but was comparable to 2015. Body condition was good (Wr ≥ 90) for most size classes in 2023. The 2021 spring electrofishing survey indicated that 27% of stock-length fish were ≥ 15 inches (PSD-P=27; Figure 5). Growth was moderate but improved from previous surveys; average age at 14 inches (13.1 to 14.6 inches) was 1.9 years (N = 12; range = 1-4 years) in 2023. Despite quality habitat and stable recruitment, Largemouth Bass growth has historically been slow, and overall size has potentially been limited by the moderate productivity and low shad abundance in the reservoir. The combination of a sunfish-dominated prey base and abundant vegetation may negatively impact the foraging efficiency of Largemouth Bass. The average Florida Largemouth Bass allele influence from 1993-2023 has been 48% (41-44% since 2015; Table 8).

Fisheries Management Plan for Lake Hawkins, Texas

Prepared – July 2020

ISSUE 1: Despite quality littoral habitat and stable recruitment, the Largemouth Bass population consists primarily of smaller (< 18 inches) fish. Previous management reports suggested growth may be slow (3+ years to 14 inches) and limiting trophy fish potential, however, average growth to 14 inches was 1.9 years in 2023, suggesting growth is not consistently limiting trophy fish abundance. The 2020 creel survey indicated anglers release 87% of legal-length bass, suggesting harvest is not limiting larger fish abundance either. Stocking Lone Star Bass with the genetics to reach trophy size may increase the abundance of larger (> 8lbs) fish in the reservoir.

MANAGEMENT STRATEGY

1. Attempt to collect tournament data to document catches of larger fish (≥ 5 pounds) that are rarely documented with traditional sampling gear.
2. Stock Lone Star Bass at 1,000 fingerlings/shoreline km to improve the trophy potential in the reservoir.
3. Evaluate post stocking success (size structure improvement and genetic composition) with biennial electrofishing.

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 interbasin water transfers to facilitate potential invasive species responses.
5. Make management recommendations to Wood County if hydrilla or Eurasian watermilfoil increases to levels requiring control. Options for invasive species management could include stocking of additional Triploid Grass Carp or herbicide applications.
6. Provide progress reports on the status of hydrilla and Eurasian watermilfoil to the Wood County Commissioner and the Association of Lake Hawkins Property Owners as appropriate.

Objective-Based Sampling Plan and Schedule (2020–2024)

Sport fish, forage fish and other important fishes

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

Low-density fisheries

Crappie and Channel Catfish have historically been present in the reservoir; however, population surveys have produced low and variable catch rates. Historical data suggests it would take greater than 50 net nights to estimate size structure or relative abundance with 80% confidence. Creel data suggested minimal directed effort towards either species.

Survey objectives, fisheries metrics and sampling objectives

Largemouth Bass: Largemouth Bass are the most popular sport fish in Lake Hawkins (74% directed effort). Due to the popularity of this fishery, and potential Lone Star Bass stocking efforts in the future, 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 (2025) and fall (2027) surveys. Historical fall electrofishing data suggests that sampling objectives (RSE ≤ 25, N > 50 stock-size fish) can be met with 12-18 randomly selected 5-minute sampling sites. If Lone Star Bass are stocked between 2025 and 2027, fin clips will be taken from 30 individuals for genetic analysis during the fall 2027 survey. Otoliths will be removed from 13 specimens (13.0- 14.9 inches) during the 2027 survey for age and growth analysis.

Prey Species: Threadfin Shad and sunfish are important prey species in Lake Hawkins. 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 2027. No sampling objectives will be set for prey species.

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Tables and Figures

Table 1. Characteristics of Lake Hawkins, Texas.

Characteristic	Description
Year constructed	1962
Controlling authority	Wood County
County	Wood
Reservoir type	Tributary
Mean depth	15.0 ft.
Maximum depth	30.0 ft.
Shoreline Development Index	5.8
Conductivity	130 µS/cm
Secchi disc range	8-12 ft.

Table 2. Boat ramp characteristics for Lake Hawkins, Texas July 2023.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft.)	Condition
Park at Dam	32.61388 -95.25509	Y	100	370	Excellent, no access issues
Fish Hawke Point	32.62180 -95.25306	Y	50	369	Excellent, no access issues
North Ramp	32.63659 -95.26307	Y	5	369	Excellent, no access issues
CR 3497	32.62273 -95.24274	Y	15	369	Excellent, no access issues

Table 3. Harvest regulations for Lake Hawkins, Texas.

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

[a] Only 10 combined Blue and Channel Catfish ≥ 20 inches may be retained per day.

Table 4. Stocking history of Lake Hawkins, Texas. FRY = fry; FGL = fingerling; ADL = adult; UNK = unknown.

Species	Year	Number	Size
Blue Catfish	1982	56,154	FGL
Channel Catfish	1967	4,000	UNK
	1981	54,500	UNK
	1982	55,000	UNK
	1992	8,028	FGL
	Total	121,528	
Smallmouth Bass	1987	21,500	FGL
	1988	157,300	FRY
	1989	1,550	FGL
	1989	38,476	FRY
	1991	3,740	FGL
	Total	222,566	
Threadfin Shad	1991	500	ADL
Florida Largemouth Bass	1975	55,000	FGL
	1990	80,546	FRY
	2010	20,800	FGL
	Total	156,346	
Triploid Grass Carp	2006	1,000	ADL
	2011	200	ADL
	2014	100	ADL
	Total	1,300	

Table 5. Objective-based sampling plan components for Lake Hawkins, Texas 2019–2020.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Relative Abundance	CPUE–Stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Age-and-growth	Category 3	5 fish/10mm, <500mm
	Condition	W_r	10 fish/inch group (max)
	Genetics	% FLMB	N=30, any age
Bluegill [a]	Relative Abundance	CPUE–Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
Gizzard and Threadfin Shad	Presence/Absence		

[a] No additional effort was expended to achieve an RSE ≤ 25 for CPUE of sunfish not reached from designated Largemouth Bass sampling effort.

Table 6. Survey of aquatic vegetation, Lake Hawkins, Texas, 2017 and 2019. The 2017 survey was conducted via the Random Point Method and 2019 survey utilized the digital shapefile method. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation Type	2017	2019	2020	2021	2022	2023
Native emergent[a]		17 (3)	31 (5)	30 (5)	26 (4)	24 (4)
Submersed[b]		163 (26)	91 (14)	75 (12)	125 (20)	166 (26)
Non-native						
Eurasian watermilfoil (Tier III)*	25 (4)	21 (3)	43 (7)	78 (12)	143 (23)	trace
Hydrilla (Tier III)*	14 (2)				trace	trace

[a] Maidencane, spatterdock, water willow and white water lily
[b] Bladderwort, chara, coontail, variable leaf watermilfoil and pondweed
* Tier III is Watch Status

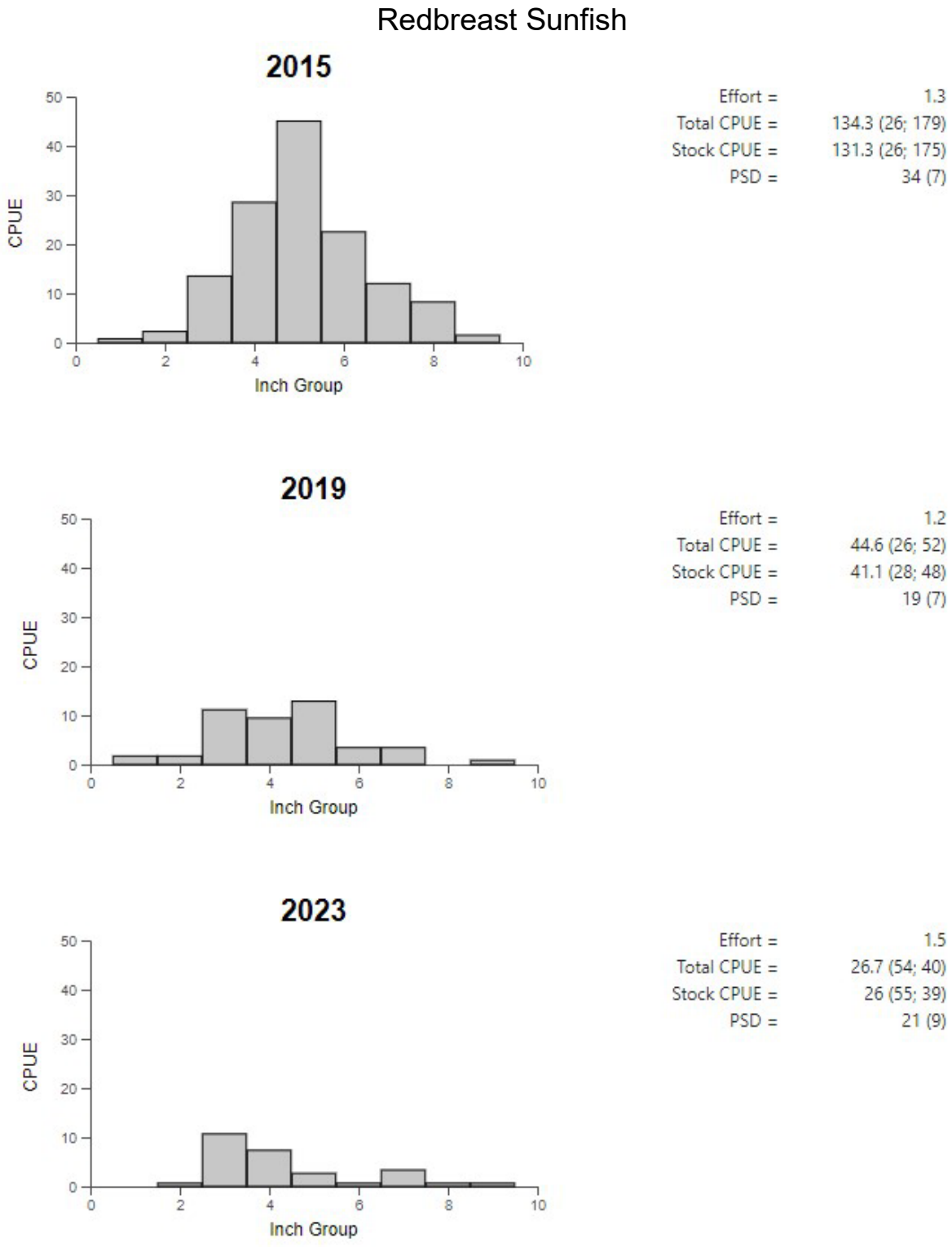


Figure 1. Number of Redbreast Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Hawkins, Texas, 2015, 2019, and 2023.

Bluegill

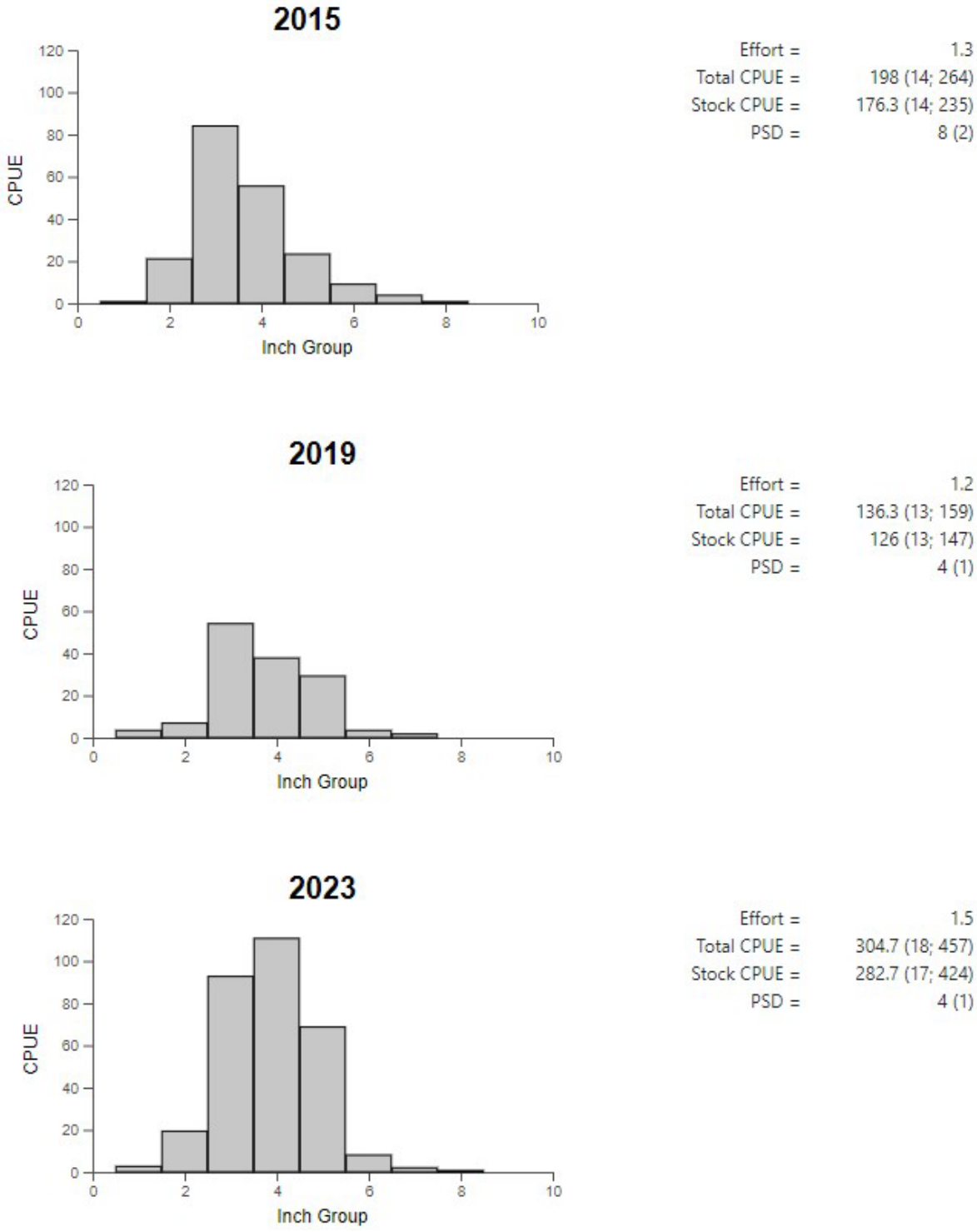


Figure 2. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Hawkins, Texas, 2015, 2019, and 2023.

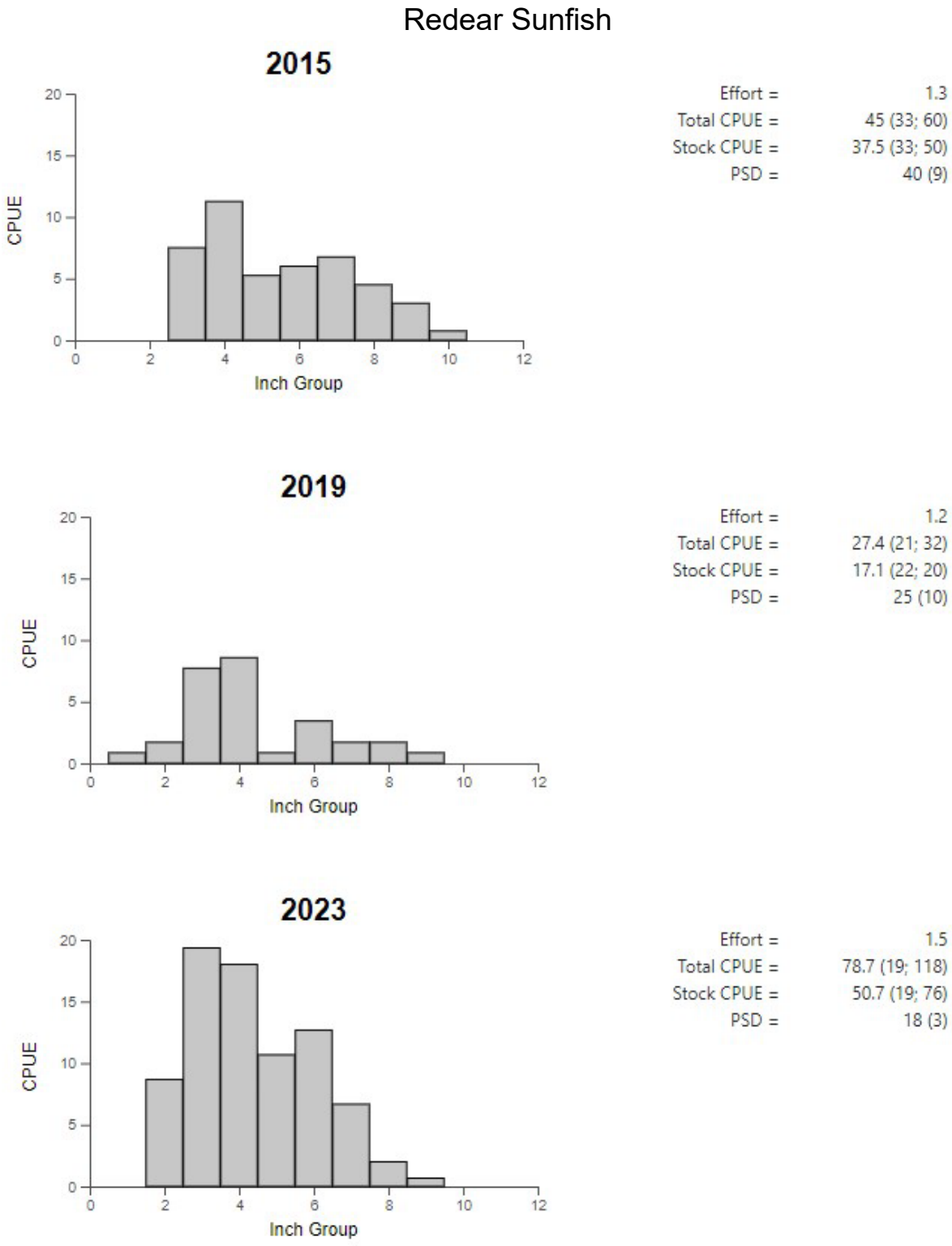


Figure 3. Number of Redear Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Hawkins, Texas, 2015, 2019, and 2023.

Largemouth Bass

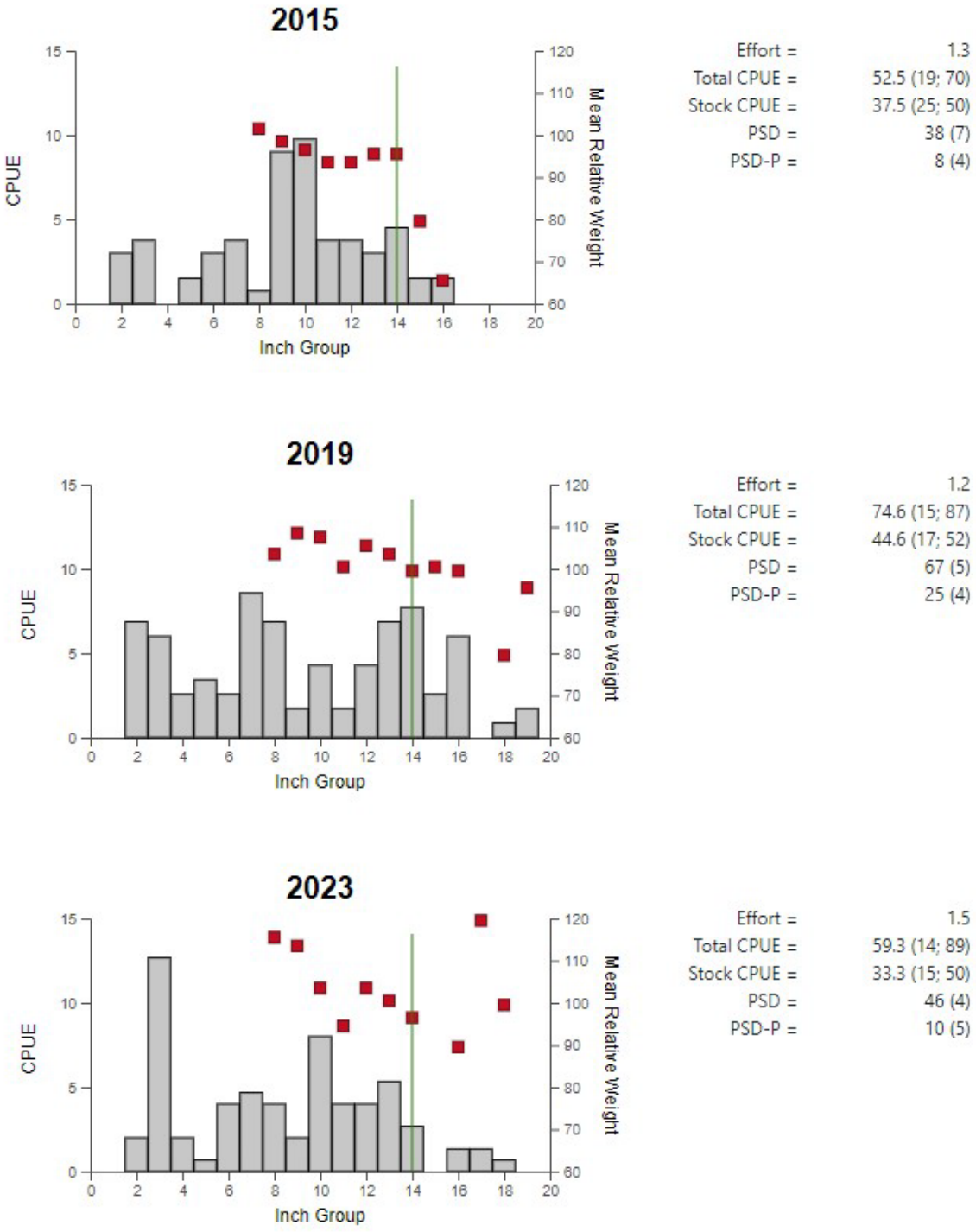


Figure 4. Number of Largemouth Bass caught per hour (CPUE), mean relative weights (squares), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Hawkins, Texas, 2015, 2019 and 2023. Vertical line indicates minimum length limit at time of survey

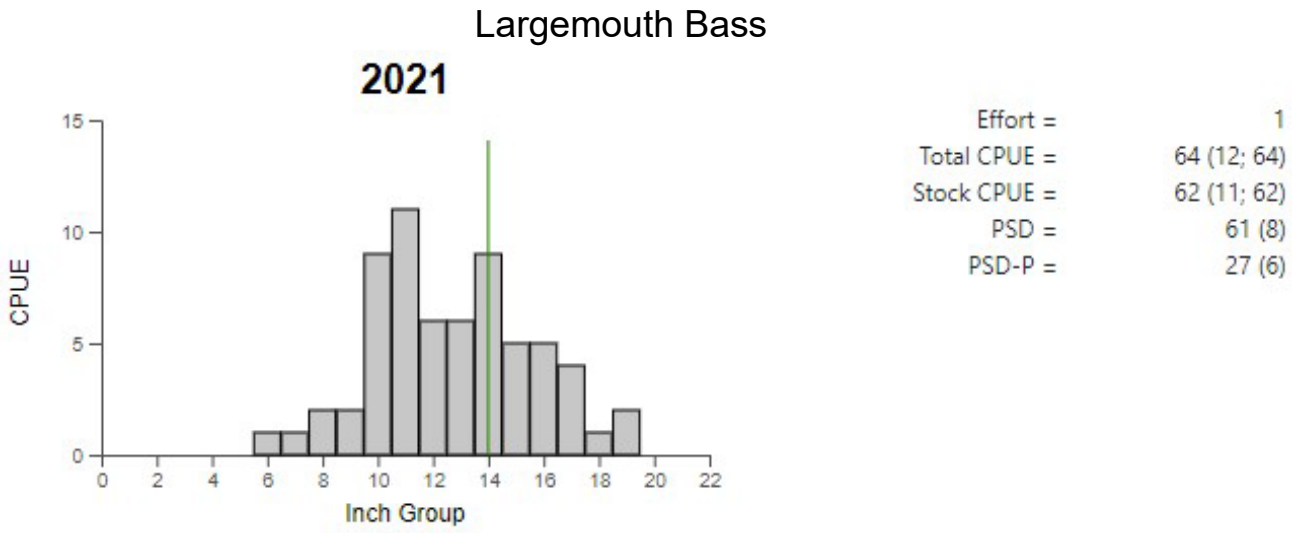


Figure 5. Number of Largemouth Bass caught per hour (CPUE), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring electrofishing survey, Lake Hawkins, Texas, 2021. Vertical line indicates minimum length limit at time of survey

Table 7. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Lake Hawkins, Texas. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, F1 = first generation hybrid between a FLMB and a NLMB, Fx = second or higher generation hybrid between a FLMB and a NLMB. Genetic composition was determined with micro-satellite DNA analysis.

		Number of fish						
Year	Sample size	FLMB	F1	Fx	Combined intergrades	NLMB	% FLMB alleles	% FLMB
1993	30	1	10	15	25	4	45.8	3.3
1996	25	2	7	15	22	1	45.0	8.0
1999	30	1	9	18	27	2	36.7	3.3
2003	30	4	7	17	24	2	50.0	13.3
2007	30	0	[a]	[a]	30	0	63.4	0.0
2011	27	3	0	24	24	0	54.0	11.0
2015	30	0	7	23	30	0	41.0	0.0
2023	30	0	7	23	30	0	44.0	0.0

[a] analysis did not separate F1 from Fx hybrids

Proposed Sampling Schedule

Table 8. Proposed sampling schedule for Lake Hawkins, Texas. Survey period is June through May. Standard surveys denoted by S and additional surveys denoted by A.

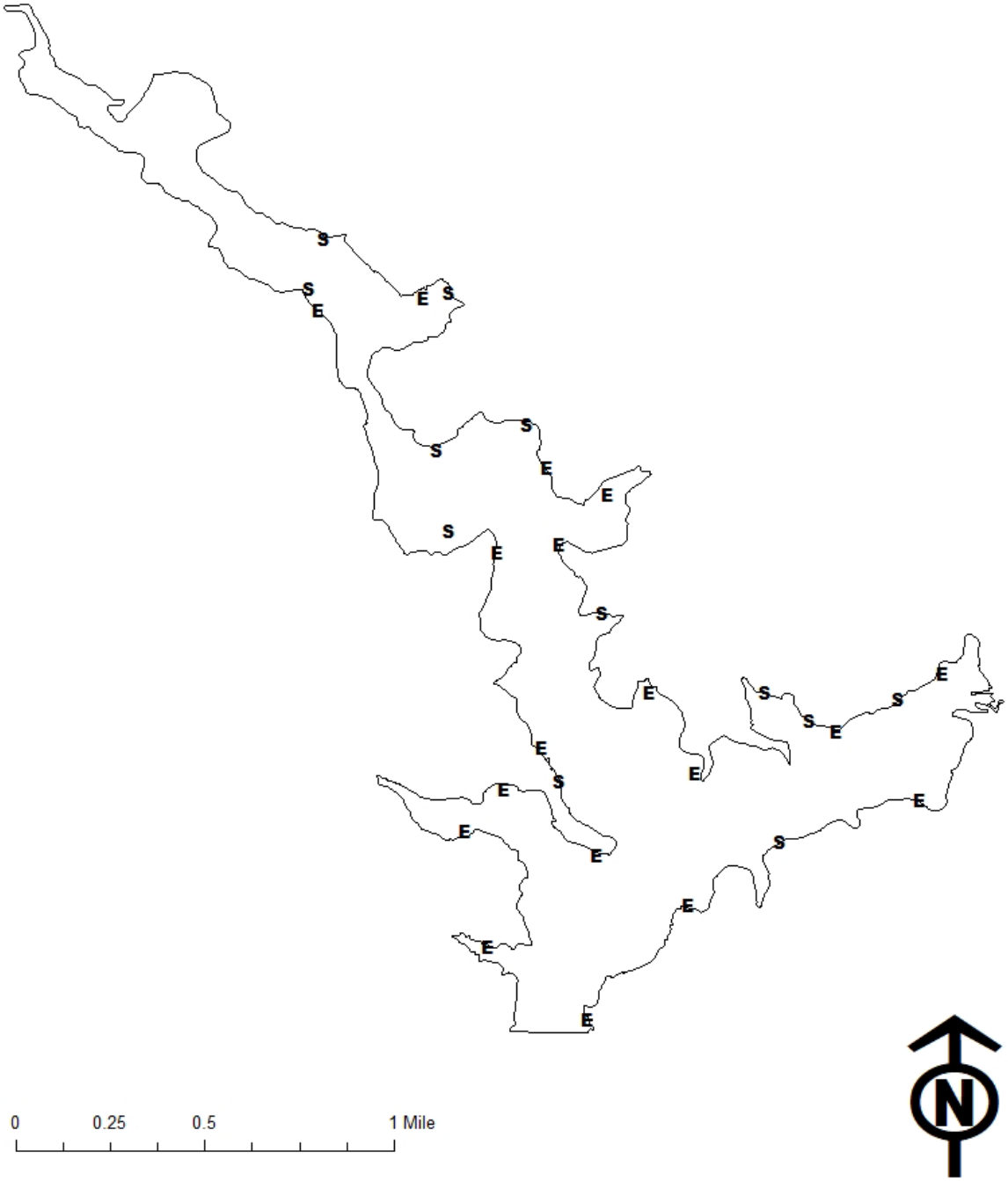
	Survey year			
	2024-2025	2025-2026	2026-2027	2027-2028
Angler Access				X
Vegetation	X	X	X	X
Electrofishing – Fall				X
Electrofishing – Spring (Bass Only)	X			
Report				X

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 all gear types from Lake Hawkins, Texas, 2023. Sampling effort was 1.5 hours of electrofishing.

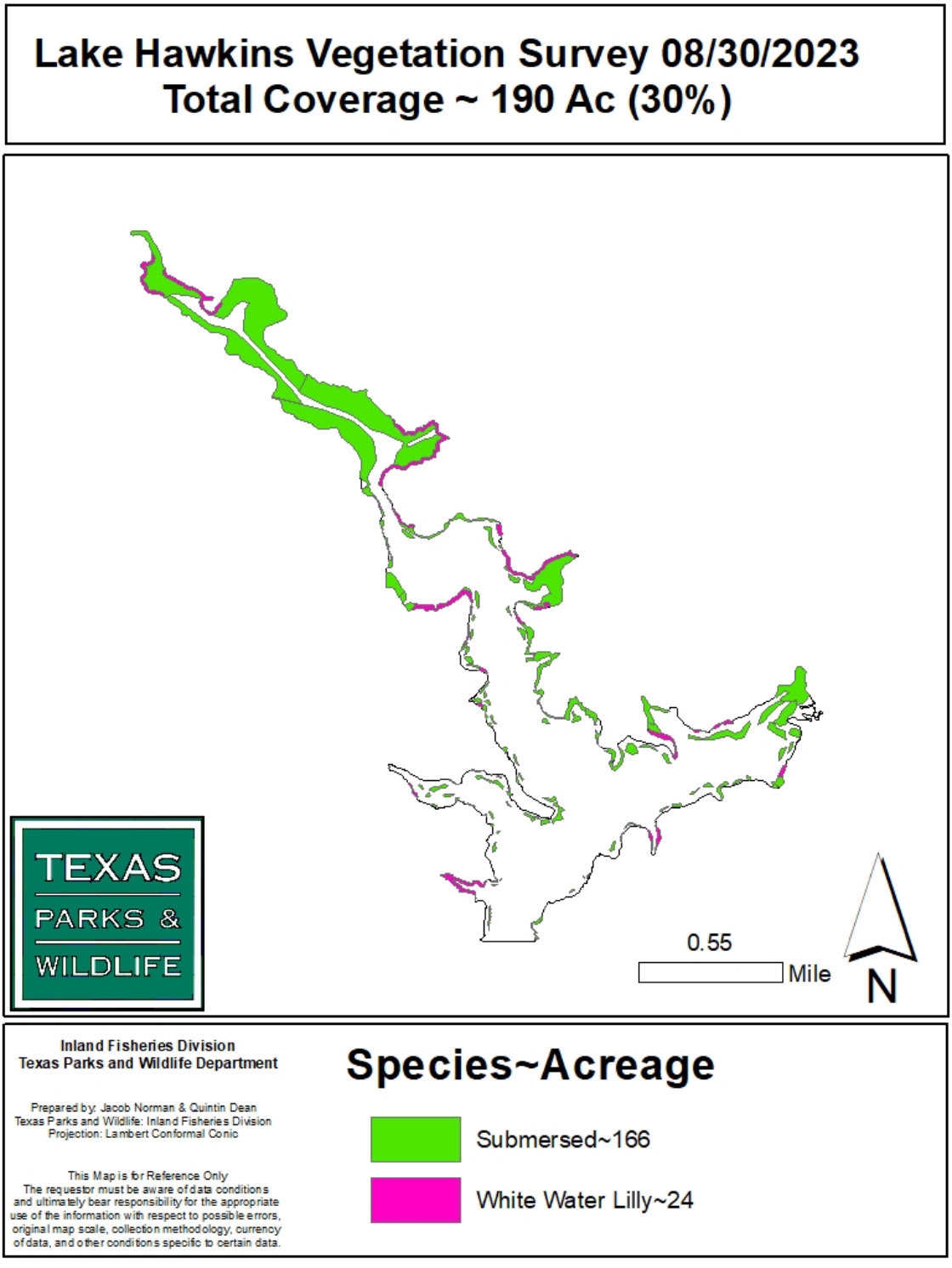
Species	N	CPUE
Gizzard Shad	8	5.33(66)
Threadfin Shad	232	154.67(23)
Redbreast Sunfish	40	26.67(54)
Bluegill	457	304.67(18)
Longear Sunfish	2	1.33(100)
Redear Sunfish	118	78.67(19)
Warmouth	25	16.67(39)
Dollar Sunfish	2	1.33(100)
Orangespotted Sunfish	13	8.67(45)
Redspotted Sunfish	12	8.00(38)
Largemouth Bass	89	59.33(14)

APPENDIX B – Map of sampling locations



Location of sampling sites, Lake Hawkins, Texas, 2021-2024. Fall electrofishing stations are indicated by E, spring electrofishing stations are indicated by S. Water level was near full pool at time of sampling.

APPENDIX C – 2023 Vegetation Map



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