

Lake Athens

2021 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 Athens were surveyed in 2021 using electrofishing. Anglers were surveyed from June 2020 – May 2021 with a creel survey. Historical data are presented with the 2020-2021 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 Athens is a 1,799-acre impoundment located on Flatt Creek in the Neches River Basin approximately 5 miles east of Athens, Texas. Primary water uses included municipal water supply and recreation. Water level has remained within 2.5 feet of conservation pool since 2014. Lake Athens has moderate to high productivity. Habitat features consisted of natural shoreline, submersed and emergent vegetation and boat docks.

Management History: Important sport fish include Channel Catfish, White Bass, Largemouth Bass, and crappie. The length limit for Largemouth Bass was changed in 1996 from the statewide 14-inch minimum length to a 14- to 21-inch slot-length limit. Giant salvinia and crested floating heart were identified in Lake Athens in early 2018 and is currently being managed by the Texas Parks and Wildlife Department Aquatic Habitat Enhancement (AHE) team. **Fish Community**

- **Prey species:** Threadfin Shad were present and provided the bulk of the reservoir's prey base. Electrofishing catch rate of Gizzard Shad was low and most were too large to be available as prey to most sport fish. Electrofishing catch rate of Bluegill was moderate and most were less than 6-inches long.
- **Channel Catfish:** Lake Athens contains a low-density Channel Catfish population and no directed sampling efforts were conducted for catfish; few anglers targeting catfish have been documented through prior creel surveys.
- **White Bass:** Lake Athens contains a low-density White Bass population and no directed sampling efforts were conducted for White Bass. While directed effort for White Bass was not documented during the 2020/2021 creel survey, anglers reported catching limited numbers of White Bass while targeting other species.
- **Largemouth bass:** Largemouth Bass were moderately abundant and displayed both a balanced size structure and desired body condition. Largemouth Bass growth to legal length was adequate (average age at 14 inches was 2.4 years). Largemouth Bass were the most popular species targeted, accounting for 93% of all angling effort.
- **Crappie:** Black Crappie were present in the reservoir and historically have provided a popular fishery. Crappies were the second-most-sought species during the 2020/2021 creel. A few White Crappie were documented during the 2020/2021 creel survey, but very few exist in the reservoir.

Management Strategies: Continue managing Largemouth Bass under the 14- to 21-inch protective slot and all other sportfish under statewide regulations. Monitor aquatic vegetation with annual vegetation surveys; adjust the permitted vegetation treatment footprint as needed, to maintain lake wide aquatic vegetation coverage at 15-25%. Stock Lone Star Bass to maintain the potential catch of trophy Largemouth.

Introduction

This document is a summary of fisheries data collected from Lake Athens in 2020-2021. 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 were collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2020-2021 data for comparison.

Reservoir Description

Lake Athens is a 1,799-acre impoundment constructed in 1962 on Flat Creek, a tributary of the Neches River. It is located in Henderson County approximately 5 miles east of Athens, Texas and is operated and controlled by the Athens Municipal Water Authority (AMWA). Primary water uses included municipal water supply and recreation. Lake Athens was eutrophic with a mean TSI cl-a of 51.54 (Texas Commission on Environment Quality 2020). Habitat at time of sampling consisted of natural shoreline and submersed and emergent vegetation. Abundant boat docks provide additional habitat for fish. Water level has remained within 2.5 feet of conservation pool since 2014 (Figure 1). Other descriptive characteristics for Lake Athens are in Table 1.

Angler Access

Lake Athens has one public boat ramp and no private boat ramps. Additional boat ramp characteristics are in Table 2. Shoreline access is limited to the boat ramp and marina property.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Ott and Norman 2018) included:

1. Stock Florida Largemouth Bass (FLMB) fingerlings when surplus fish are available to maximize trophy potential within the reservoir.

Action: Approximately 36,000 surplus FLMB fry were stocked in 2021.

2. Monitor lake-wide aquatic vegetation annually and work with controlling authority to approve aquatic vegetation treatment proposals (AVTP).

Action: Annual vegetation surveys have been conducted since 2017 and an average of 200 AVTP's submitted by waterfront landowners were approved each year to maintain recreational access. AVTP approval is restricted to immediate access needs (i.e., boat lane, swimming location) striking an appropriate balance with fish and aquatic community habitat needs.

3. Work with AHE team and the controlling authority to manage invasive species.

Action: Permanent containment booms have been placed on both sides of the boat ramp and spot herbicide treatments of giant salvinia are conducted annually west of the FM 2495 bridge.

Harvest regulation history: Largemouth Bass were managed with the statewide 14-inch minimum from 1985-1995. A 14- to 21-inch protective slot-length limit was implemented in 1996 to improve the population size structure and growth rates. All other sport fishes in Lake Athens are currently managed with statewide regulations (Table 3).

Stocking history: Channel Catfish were initially stocked in 1973 and FLMB were initially stocked in 1978. FLMB were stocked on an annual basis most years until 2014. A complete stocking history is found in Table 4.

Vegetation/habitat management history:

Lake Athens has historically contained a stable and diverse aquatic macrophyte community. Water hyacinth was identified in 2005 and was manually removed by TPWD and AMWA personnel. Alligatorweed flea beetles were released by TPWD in 2010 and 2014 for alligatorweed control. Enhanced fish habitat structures include twenty-two brush reefs that were deployed with the help of the Athens Bass Club in January 2013.

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 Athens (Ott and Norman 2018). 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 electrofishing (1.0 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.

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.

Creel survey – An annual access-point creel survey was conducted from June 2020 through May 2021. Angler interviews were conducted on 5 weekend days and 4 weekdays per quarter to assess angler use and fish catch/harvest statistics in accordance with the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Habitat – Comprehensive vegetation surveys were conducted annually from 2017-2021. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Water level – Source for water level data was the United States Geological Survey (USGS 2022).

Results and Discussion

Habitat: Diverse aquatic vegetation remained within Lake Athens; however, total coverage has declined in recent years. Since 2018, coverage steadily declined to 15% in 2020 and 9% in 2021. Percent coverage in 2021 was the lowest reported since 2009 (Bennett and Ott 2010). Coontail, pondweed, and eelgrass continued to be the most abundant species present (Table 6). The decline in vegetation in recent years is largely attributed to approved annual vegetation removal efforts from homeowners around the lake. Since 2018, TPWD has received an average of 200 AVTP applications each year to allow homeowners to improve access around their lake-front property. Treatment footprints have been adjusted periodically based on the results of the previous summer-time vegetation survey; most recently in 2022 (treatments restricted to 0.13 acre/property). The last structural habitat survey was conducted in 2001 and structural habitat has not significantly changed since (Bister and Ott 2002).

Invasive giant salvinia was first discovered in the reservoir in 2018 and treatment efforts commenced immediately upon detection. Despite rapid removal efforts giant salvinia has persisted in isolated pockets since 2018. An average of two acres have been treated each year west of the FM 2495 bridge. A total of 4 containment booms (two on each side) have been placed around the public boat ramp to limit giant salvinia expansion outside of its current location. A trace amount of crested floating heart was also identified in 2019 near the boat ramp but has not been detected since the fall of 2020.

Creel: Lake Athens continued to support a popular Largemouth Bass fishery, accounting for 93% of the lake's total directed effort during 2020/2021 (Table 7). Crappie were the second-most targeted species, but only accounted for 3% of all directed effort by anglers. Lake Athens also contains an excellent sunfish population and supports a small fishery (2.5% of directed effort). Total angling effort (115,322 hours) increased from the 2017/2018 creel (78,365 hours) and anglers spent an estimated \$839,129 in direct expenditures, also an increase from the previous creel survey (\$557,300; Table 8).

Prey species: The 2021 fall electrofishing results indicated a potential shift in the primary prey base, as Threadfin Shad were very abundant (4,901/h) and sunfish catch rates declined. Electrofishing catch rates of Bluegill and Gizzard Shad were 189.0/h and 12.0/h, respectively. Index of Vulnerability (IOV) for Gizzard Shad remained poor and was similar to previous surveys (2013, 2017, 2021 IOV range: 0-11; Figure 2). Further, total CPUE of Gizzard Shad was comparable to the previous two surveys (27.0/h, 2013; 15.0/h, 2017) and indicated little contribution to the overall forage base. The Bluegill catch rate was substantially lower than the previous two surveys recorded in 2013 (489.0/h) and 2017 (610.0/h). Size structure continued to be dominated by small individuals (Figure 3). It is possible that the significant reduction (~10%) in aquatic vegetation coverage from 2018 to 2021 has directly impacted the sunfish population. This dynamic will be monitored closely over the next management cycle (2022-2026). Overall, survey results indicated an ample prey base (primarily Threadfin Shad) to support most sport fish populations.

Largemouth Bass: The 2021 Largemouth Bass electrofishing catch rate (114.0/h) was comparable to the previous two surveys (2015-CPUE: 116.0/h and 2017-CPUE: 136.0/h; Figure 4). Size structure was consistent over the past three surveys and suggested a balanced population (PSD range = 65 - 77). Body condition of Largemouth Bass was desirable for most size classes (W_r range = 85-115). While the overall prey base has seemingly shifted in recent years, the sustained adequate relative weights of Largemouth Bass suggest sport fish still have ample prey in the reservoir. Growth was moderate; average age at 14 inches (13.0 to 14.9 inches) was 2.4 years (N = 15; range = 2-3 years). Florida Largemouth Bass influence has remained relatively consistent; Florida alleles have ranged from 58-69% since 1998 (Table 9).

Directed fishing effort, catch per hour, and total harvest for Largemouth Bass were 106,764 h, 0.6fish/h, and 265 fish, respectively, over the last creel period (Table 10). Lake Athens is a popular tournament destination, despite the protected slot limit. Tournament anglers accounted for 28% of largemouth directed effort during the creel survey and 91% of all bass retained in livewells. Most fish weighed in at tournaments during the creel survey were 13 inches (65%; Figure 6). Approximately 92% (N=61,533) of Largemouth Bass caught and released were less than 4 lbs., while 8% (N=5,204) were between 4-7 lbs. An estimated 181 fish were caught between 7-10 lbs. and 53 over 10 lbs. (both < 1%). Anglers released an estimated 90% of legal fish caught. The majority (51%) of anglers interviewed during the most recent creel survey were local and traveled ≤ 50 miles to fish Lake Athens; few anglers traveled distances over 150 miles (5% traveled over 150 miles and 1% traveled over 900 miles, Appendix C).

Crappie: Black Crappie continued to provide a fishery on Lake Athens, accounting for 3% of the total directed fishing effort. Directed fishing effort, catch per hour, and total harvest for crappie was estimated at 3,617h, 1.8 fish/h, and 5,830 fish, respectively during the creel survey (Table 11). Harvested fish ranged in length from 10-15 inches (Figure 7).

Fisheries Management Plan for Lake Athens, Texas

Prepared – July 2022

ISSUE 1: Lake Athens has historically supported a high-density Largemouth Bass population, largely attributed to excellent littoral habitat around most of the reservoir. Since 2017, there has been a strong push by lake-front owners to remove vegetation around their property. This push led to the creation of a vegetation management manual that details how, when, and how much vegetation each homeowner can remove each year. While this strategy has brought enough compromise to our angling constituents and homeowners to maintain the quality resources within the reservoir, there are signs that vegetation is declining beyond desirable coverage.

MANAGEMENT STRATEGY

1. Continue to conduct an annual comprehensive vegetation survey in the peak of the growing season to calculate total aquatic vegetation coverage in the reservoir.
2. Work with the controlling authority to adjust the vegetation management manual as needed, based on survey results, to prevent further declines in vegetation coverage.
3. Provide technical guidance to homeowners developing vegetation treatment plans
4. Work with herbicide applicators to ensure approved treatment footprints are not exceeded
5. Provide updates to the treatment process to angling constituents, controlling authority and property owners, as necessary.

ISSUE 2: Giant salvinia has remained present in the reservoir and can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. The financial costs of controlling and/or eradicating these species are significant. Additionally, the Lake Athens watershed is potentially susceptible to the introduction of invasive invertebrates including zebra mussels. 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.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Coordinate with AHE team on giant salvinia control.
3. Continue to work with marina owners and provide them with signs, posters, literature, etc. so that they can in turn educate their customers.
4. Educate the public about invasive species through social media, presentations and news releases, when appropriate.
5. Investigate reports of unusual or unknown aquatic plants in Lake Athens by anglers and homeowners at the earliest possible opportunity.
6. Document existing and future inter-basin water transfers to facilitate potential invasive species responses.

ISSUE 3 The Largemouth Bass fishery in Lake Athens remains popular among anglers and was the most sought-after fish species (93% directed effort) during the most recent creel survey. The lake has produced three TPWD Legacy ShareLunker entries, most recently in 2014. Supplemental reporting of trophy Largemouth Bass over 8 pounds through the ShareLunker program provides strong evidence of the trophy potential of the reservoir with over 70 fish over 8 pounds reported by the program from 2018–2022. Tournament results provide additional evidence of trophy-sized fish caught. Given the adequate growth and abundant forage, stocking Florida Largemouth Bass is likely to increase trophy abundance. Additionally, spring electrofishing surveys generally provide a better overall picture of size structure within a reservoir compared to fall surveys, specifically for larger fish. Collecting spring trend data will provide additional insight into the trophy Largemouth Bass population in the reservoir.

MANAGEMENT STRATEGIES

1. Stock Lone Star Bass fingerlings, which are 2nd generation offspring of pure Florida strain ShareLunker Largemouth Bass that have proven to be able to grow to ≥ 13 pounds, at a rate of 1,000/km shoreline biennially.
2. Promote TPWD ShareLunker program to continue to improve supplemental reporting of trophy Largemouth Bass catches within the reservoir.

Objective-Based Sampling Plan and Schedule (2022–2026)

Sport fish, forage fish and other important fishes

Sport fish in Lake Athens include Largemouth Bass, crappie, Channel Catfish and White Bass. Important forage species include Threadfin Shad, sunfish and to a lesser extent, Gizzard Shad.

Low-density fisheries

White Bass and Channel Catfish have historically been present in the reservoir however gill net surveys produced low and variable catch rates. The historical data suggests it would take > 50 net nights to estimate size structure or relative abundance with 80% confidence. Large-scale changes for both species will be monitored with an annual creel survey during 2024/2025.

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 2005. Inferences about the crappie population and identification of potential applied management actions will be made from data collected with creel surveys in 2024/2025

Largemouth Bass: Largemouth Bass are the most popular sport fish in Lake Athens and receive high angling pressure (59.3 angling hours/acre). Due to the importance of this fishery, Largemouth Bass trend data on relative abundance, size structure, body condition, and growth (CPUE, PSD, W_r , average age at 14") will continue to be monitored with biennial nighttime electrofishing, alternating between spring (2023) and fall (2025) surveys. The spring sampling should result in a more accurate size structure estimate, as fall surveys have been typically dominated by fish < 12 inches in length; anecdotal evidence and creel survey data indicate quality bass are present in the reservoir. Historical fall 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 2025 survey for age and growth analysis.

Prey Species: Threadfin Shad, sunfish and to a lesser extent Gizzard Shad are important prey species in Lake Athens. Long-term trend data is desired for these populations to evaluate their relative abundance (CPUE) and size structure (PSD). Relative weights of the Largemouth Bass population, along with size structure of Bluegill and the IOV of Gizzard Shad, will be used to gauge prey fish availability for sport fishes from electrofishing sampling conducted in fall 2025. No sampling objectives will be set for prey species.

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Tables and Figures

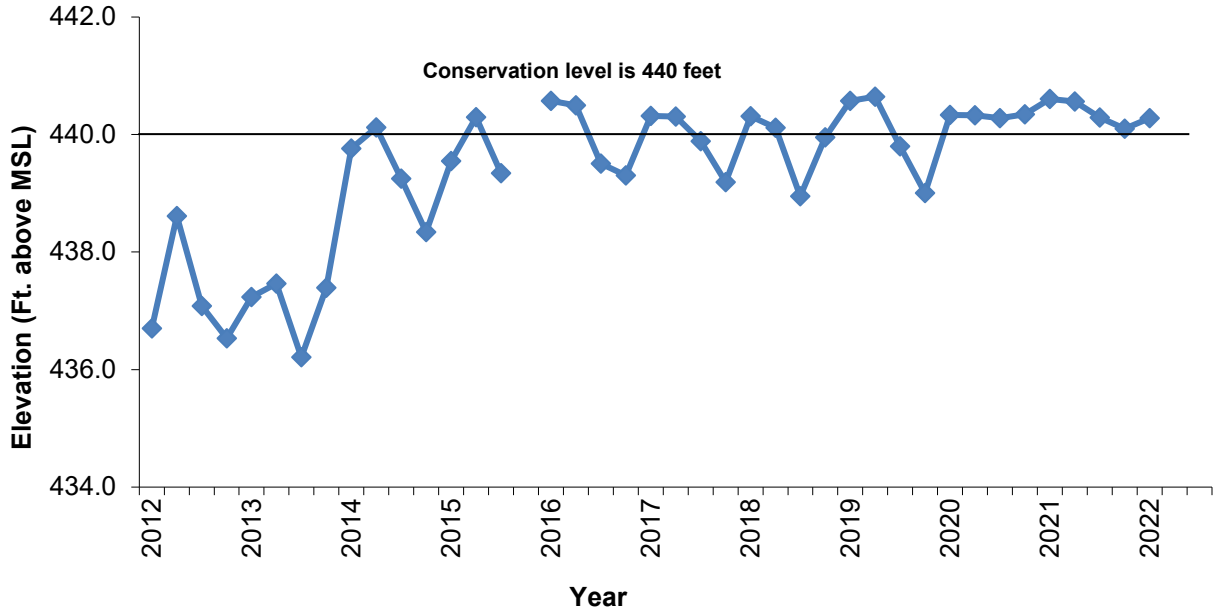


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Lake Athens, Texas.

Table 1. Characteristics of Lake Athens, Texas.

Characteristic	Description
Year constructed	1962
Controlling authority	Athens Municipal Water Authority
County	Henderson
Reservoir type	Tributary
Shoreline Development Index	1.8
Conductivity	80 μ S/cm

Table 2. Boat ramp characteristics for Lake Athens, Texas July, 2021. Reservoir elevation at time of survey was 440 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Marina	32.21609 -95.76980	Y	60	432.0	Excellent, no access issues

Table 3. Harvest regulations for Lake Athens, 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, White	25	10-inch minimum
Bass, Largemouth	5 ^b	14-to-21-inch protective slot
Crappie: White and Black crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

^a Only 10 combined Blue and Channel Catfish \geq 20 inches may be retained per day.

^b Only one fish may be greater than 21 inches.

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

Species	Year	Number	Size
Blue Catfish	1987	15,117	FGL
Channel Catfish	1973	5,500	FGL
Largemouth Bass	1982	25	ADL
Florida Largemouth Bass	1978	6,000	FGL
	1982	627	ADL
	1993	149,670	FGL
	1995	190	ADL
	1996	91,934	FGL
	1997	155,184	FGL
	1998	151,055	FGL
	1999	31	ADL
	2000	253	ADL
	2003	10,041	FGL
	2004	76,955	FGL
	2004	292,159	FRY
	2005	90,022	FGL
	2005	87,643	FRY
	2008	91,196	FGL
	2009	46,063	FRY
	2009	180,524	FGL
	2010	31,200	FRY
	2011	690,740	FRY
	2011	15	ADL
2012	183,130	FGL	
2012	109,809	FRY	
2014	849,667	FRY	
2021	36,713	FRY	
Total		3,330,821	
ShareLunker Largemouth	2014	18,588	FGL
Walleye	1978	6,000,050	FRY
	1979	4,581,680	FRY
	1980	6,688,000	FRY
	Total	17,269,730	

Table 5. Objective-based sampling plan components for Lake Athens, Texas 2021–2022.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Relative 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
Bluegill ^a	Relative Abundance	CPUE–Total	
	Size structure	PSD, length frequency	$N \geq 50$
Gizzard Shad ^a	Relative Abundance	CPUE–Total	
	Prey availability	IOV	$N \geq 50$
Threadfin Shad ^a	Relative Abundance	CPUE-Total	
<i>Creel Survey</i>			
Largemouth Bass, Catfish, Crappie and White Bass	Angler trend information	Angler effort, CPUE, harvest and size structure	

^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 aquatic vegetation, Lake Athens, Texas, 2017–2021. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Year	2017	2018	2020	2021
Reservoir area during survey	1,790	1,701	1,799	1,799
Pondweed	57 (3)	69 (4)	54 (3)	38 (2)
Coontail	109 (6)	148 (9)	99 (6)	46 (3)
Eelgrass	53 (3)	61 (4)	41 (2)	30 (2)
Chara	19 (1)	0	0	6 (<1)
American lotus	117 (7)	72 (4)	35 (2)	17 (1)
White waterlily	3 (<1)	trace	21 (1)	21 (1)
Water shield	0	trace	0	0
Giant cutgrass	2 (<1)	9 (<1)	7 (<1)	5 (<1)
Water primrose	0	0	1 (<1)	0
Bushy pondweed	0	0	3 (<1)	0
Waterwillow	1 (<1)	1 (<1)	0	0
Alligator weed (Tier III) *	5 (<1)	trace	0	0
Hydrilla (Tier III) *	1 (<1)	Trace	Trace	trace
Giant salvinia (Tier II)**	0	present	present	present
Total (% coverage)	368 (21)	360 (21)	261 (15)	163 (9)

* Tier II is Maintenance, Tier III is Watch Status

**Giant Salvinia has been present since 2018. Most of the coverage exists behind giant cutgrass and is not measured during summer-time comprehensive survey.

Table 7. Percent directed angler effort by species for Lake Athens, Texas, 2017 through 2021. Survey period was June 1 through May 31.

Species	2017/2018	2020/2021
Catfish	0.1	0.1
Sunfish	0.4	2.5
Largemouth Bass	93.1	92.6
Crappie	3.8	3.1
Anything	2.6	1.7

Table 8. Total fishing effort (h) for all species and total directed expenditures at Lake Athens, Texas, 2017 through 2021. Survey period was June 1 through May 31. Relative standard error is in parentheses.

Creel statistic	2017/2018	2020/2021
Total fishing effort	78,365 (15)	115,322 (12)
Total directed expenditures	\$ 557,300 (32)	\$839,129 (24)

Gizzard Shad

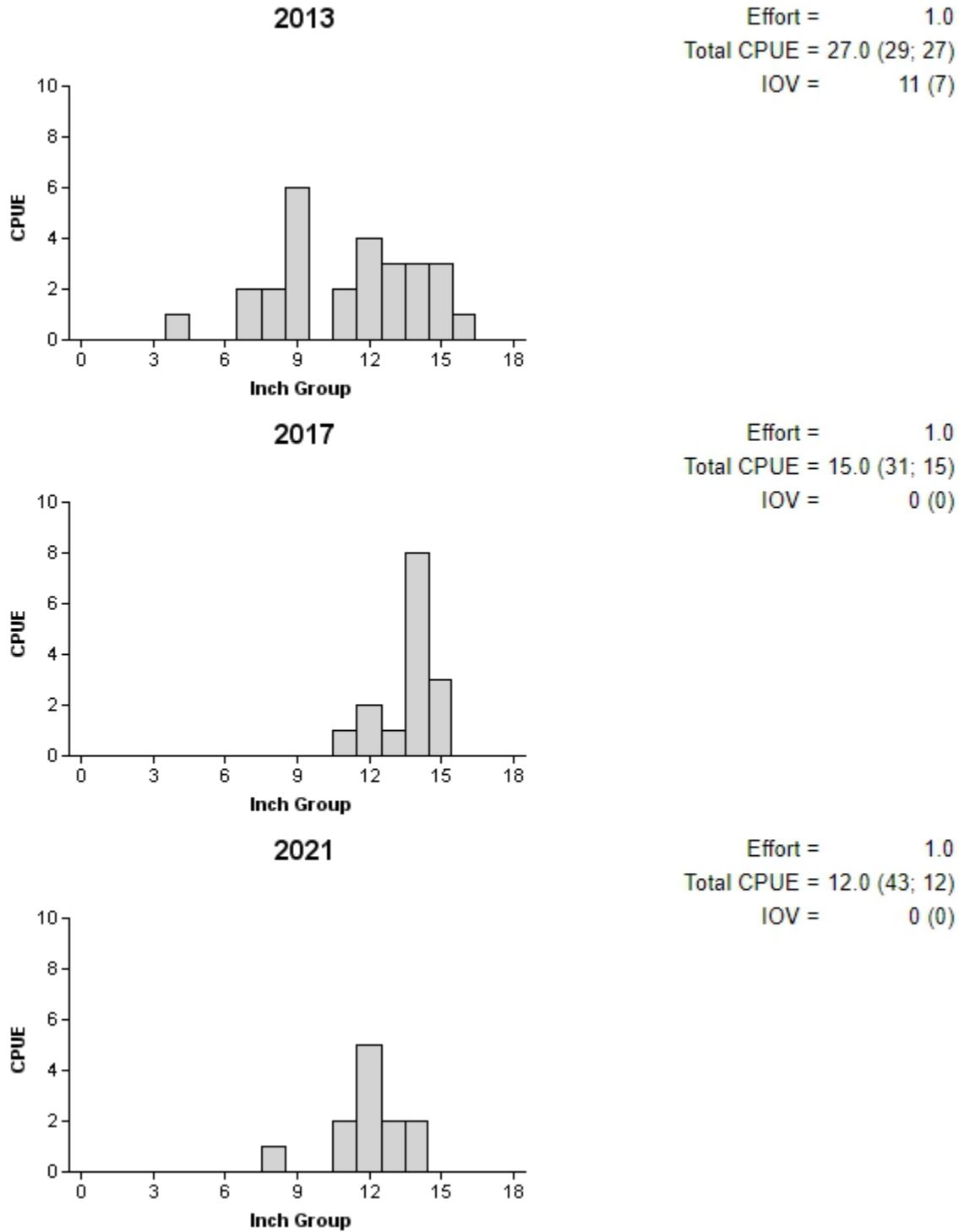


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Athens, Texas, 2013, 2017 and 2021.

Bluegill

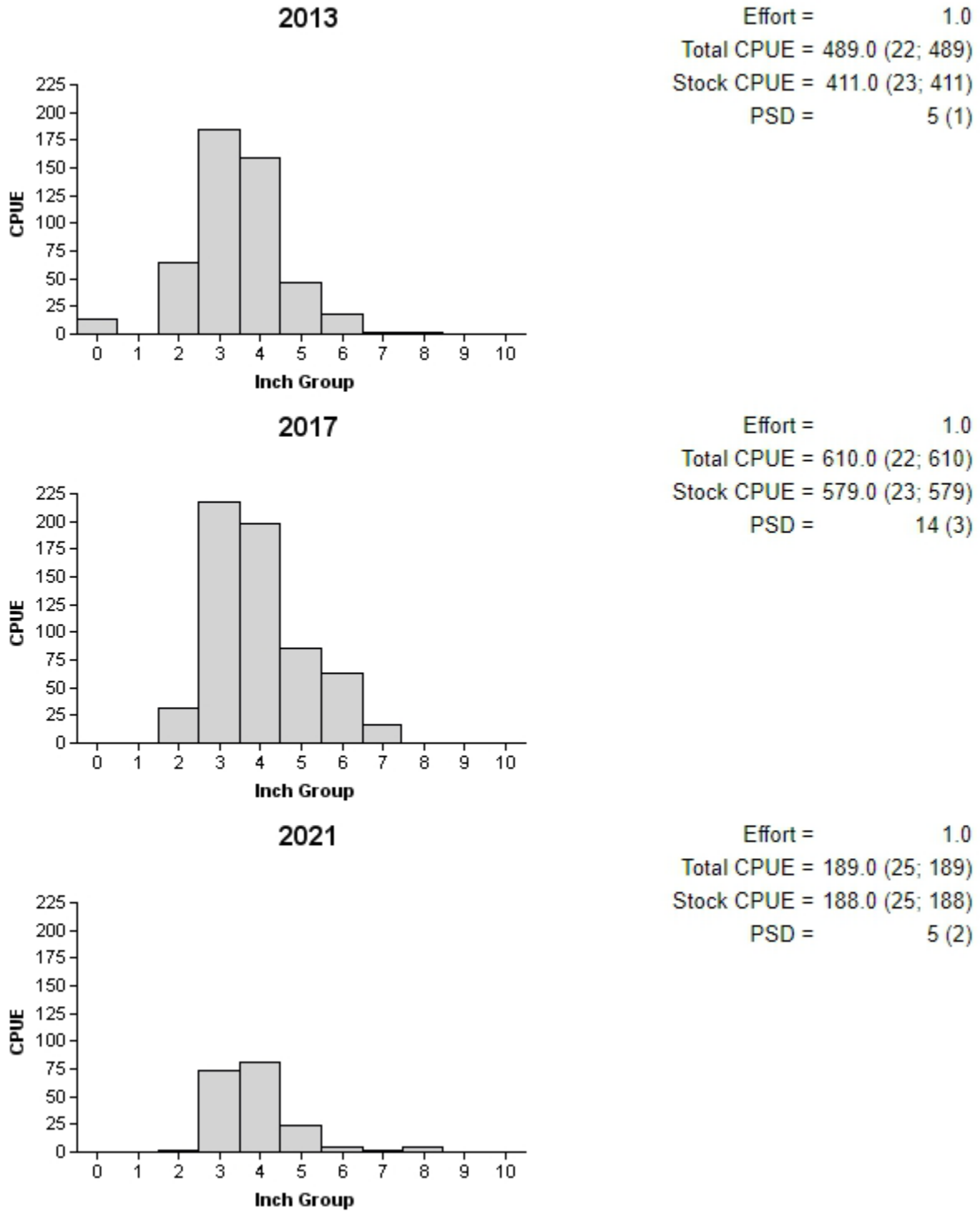


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Athens, Texas, 2013, 2017 and 2021.

Largemouth Bass

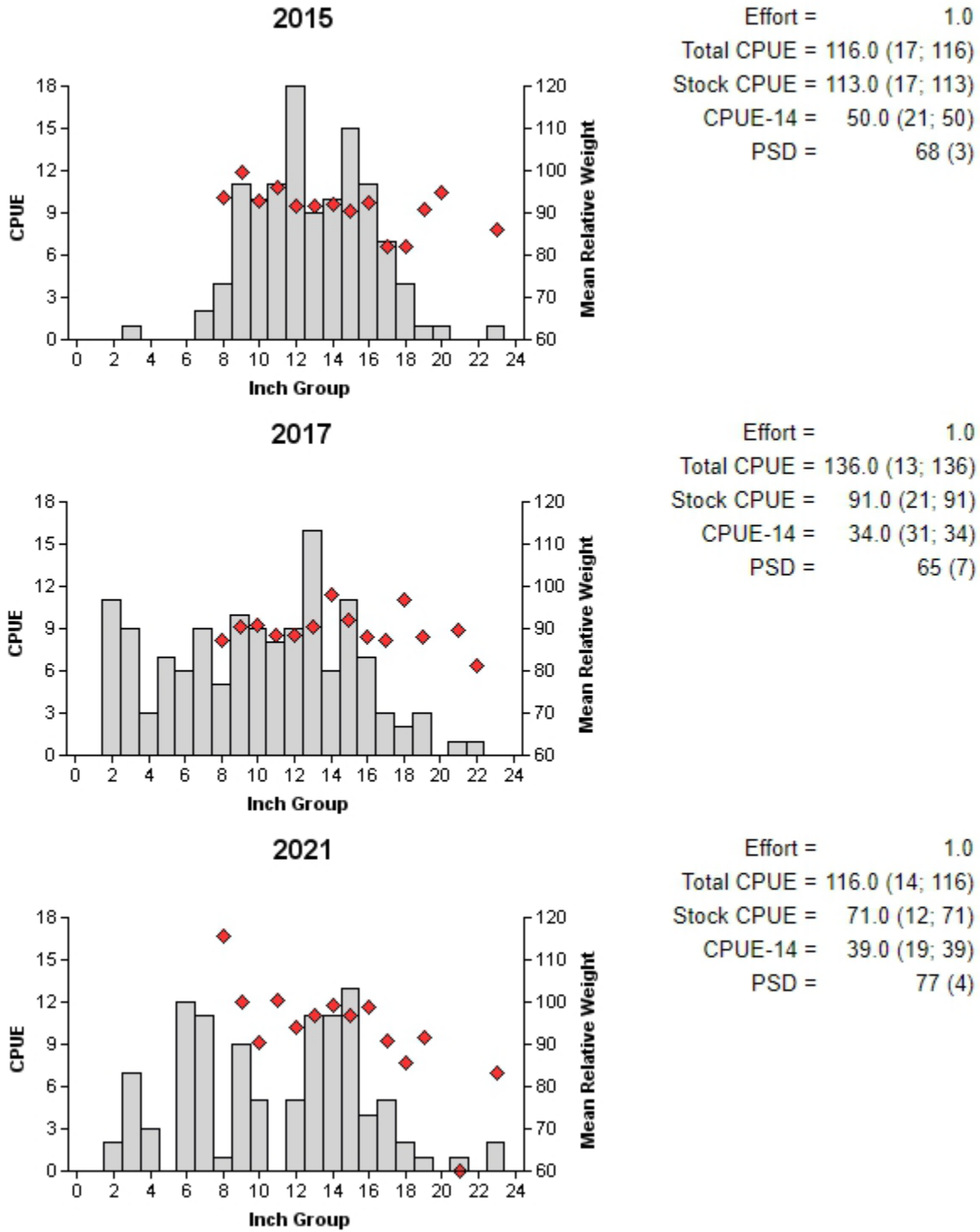


Figure 4. Number of Largemouth Bass caught per hour (CPUE), mean relative weights (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Athens, Texas, 2015, 2017 and 2021.

Table 9. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Lake Athens, 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.

Year	Sample size	Number of fish				NLMB	% FLMB alleles	% FLMB
		FLMB	F1	Fx	Combined intergrades			
1998	13	4	a	a	9	0	69.0	30.8
2001	30	4	a	a	26	0	59.0	13.3
2003	30	4	a	a	25	1	58.0	13.3
2009	26	0	a	a	26	0	68.0	0.0
2013	30	1	0	29	29	0	68.0	3.0
2021	30	0	0	30	30	0	62.0	0.0

^aAnalysis did not separate F1 from Fx hybrids

Table 10. Creel survey statistics for Largemouth Bass at Lake Athens, Texas, 2017 through 2021. Survey period was June 1 through May 31. Catch rate is for all anglers targeting Largemouth Bass. Harvest is partitioned by the estimated number of fish harvested by non-tournament anglers and the number of fish retained by tournament anglers for weigh-in and release. The estimated number of fish released by weight category is for anglers targeting Largemouth Bass. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	2017/2018	2020/2021
Surface area (acres)	1,799	1,799
Directed angling effort (h)		
Tournament	7,664 (33)	29,662 (16)
Non-tournament	65,264 (17)	77,102 (12)
All black bass anglers combined	72,928 (16)	106,764 (13)
Angling effort/acre	40.5 (17)	59.3 (13)
Catch rate (number/h)	0.6 (30)	0.6 (13)
Harvest		
Non-tournament harvest	286 (84)	265 (59)
Harvest/acre	0.2 (84)	0.1 (59)
Tournament weigh-in and release	0 (NA)	2,765 (40)
Release by weight		
<4.0 lbs.	66,085 (47)	61,533 (30)
4.0-6.9 lbs.	3,574 (67)	5,204 (41)
7.0-9.9 lbs.	276 (108)	181 (122)
≥10.0 lbs.	81 (234)	53 (192)
Percent legal released	99	90

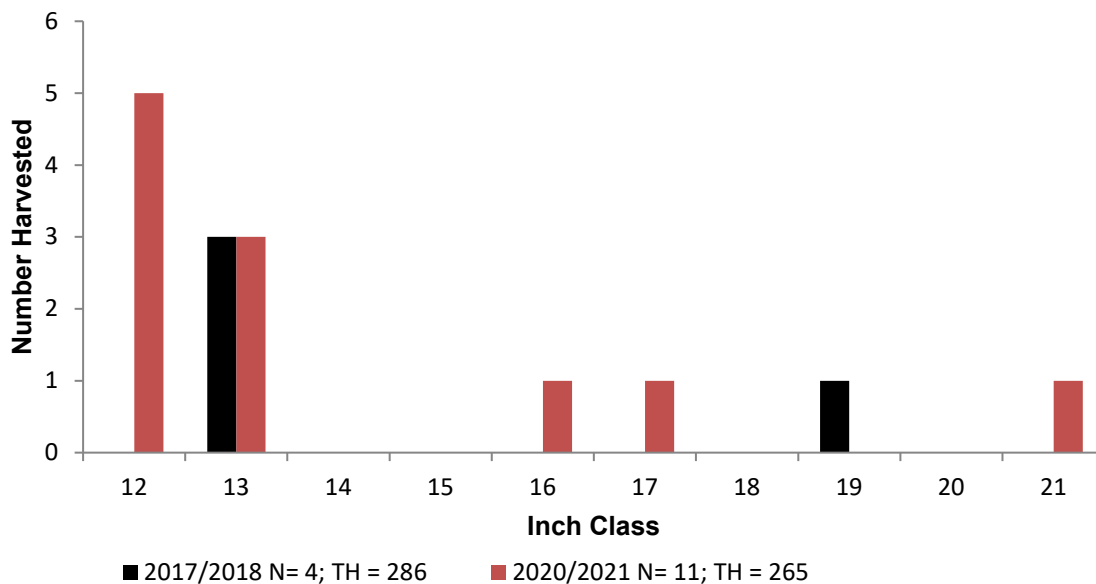


Figure 5. Length frequency of harvested Largemouth Bass observed during creel surveys at Lake Athens, Texas, June through May, 2017/2018 and 2020/2021, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

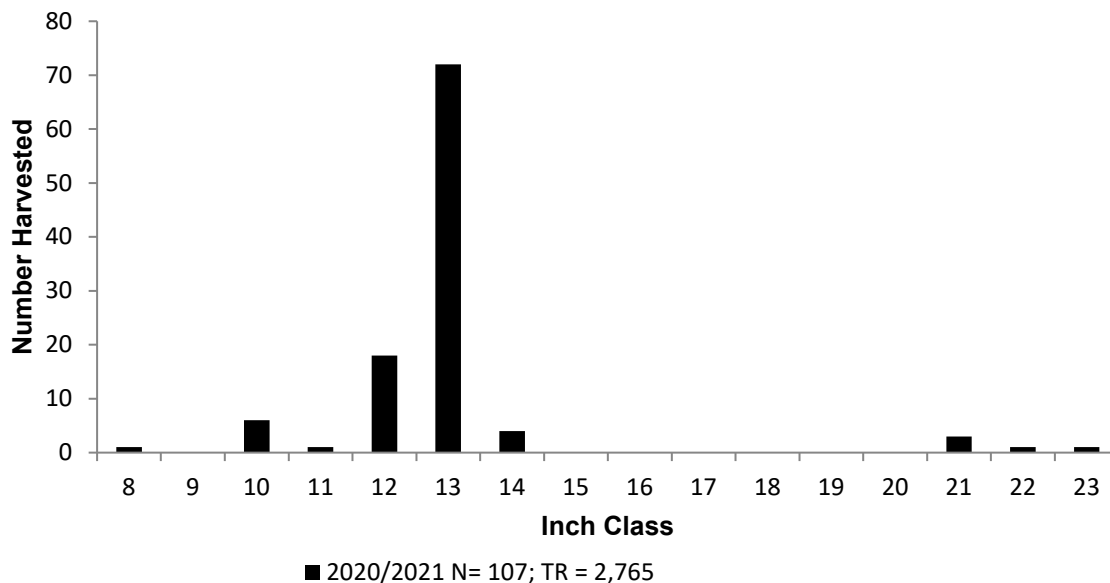


Figure 6. Length frequency of tournament-retained and released Largemouth Bass observed during creel survey at Lake Athens, Texas, June through May, 2020/2021, all anglers combined. N is the number of tournament livewell-retained Largemouth Bass observed during creel surveys, and TR is the total estimated livewell-retained fish for the creel period.

Crappie

Table 11. Creel survey statistics for Crappie at Lake Athens, Texas, June through May, 2017/2018 and 2020/2021. Total catch per hour is for anglers targeting crappie and total harvest is the estimated number of crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	2017/2018	2020/2021
Surface area (acres)	1,799	1,799
Directed effort (h)	2,946 (47)	3,617 (32)
Directed effort/acre	1.6 (47)	2.0 (32)
Total catch per hour	1.6 (25)	1.8 (52)
Total harvest	8,038 (86)	5,830 (52)
Harvest/acre	4.5 (86)	3.2 (52)
Percent legal released	3	0

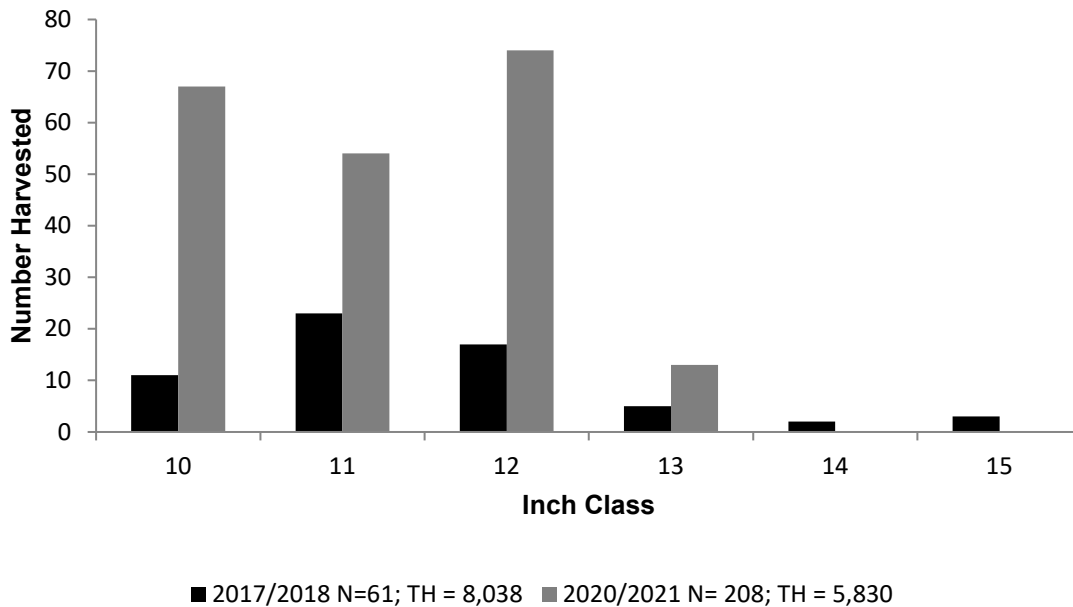


Figure 7. Length frequency of harvested Black and White Crappie observed during creel surveys at Lake Athens, Texas, June through May, 2017/2018 and 2020/2021, all anglers combined. N is the number of harvested crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Proposed Sampling Schedule

Table 12. Proposed sampling schedule for Lake Athens, Texas. Survey period is June through May. Standard electrofishing surveys are conducted in the fall while supplemental electrofishing surveys are conducted in the spring.

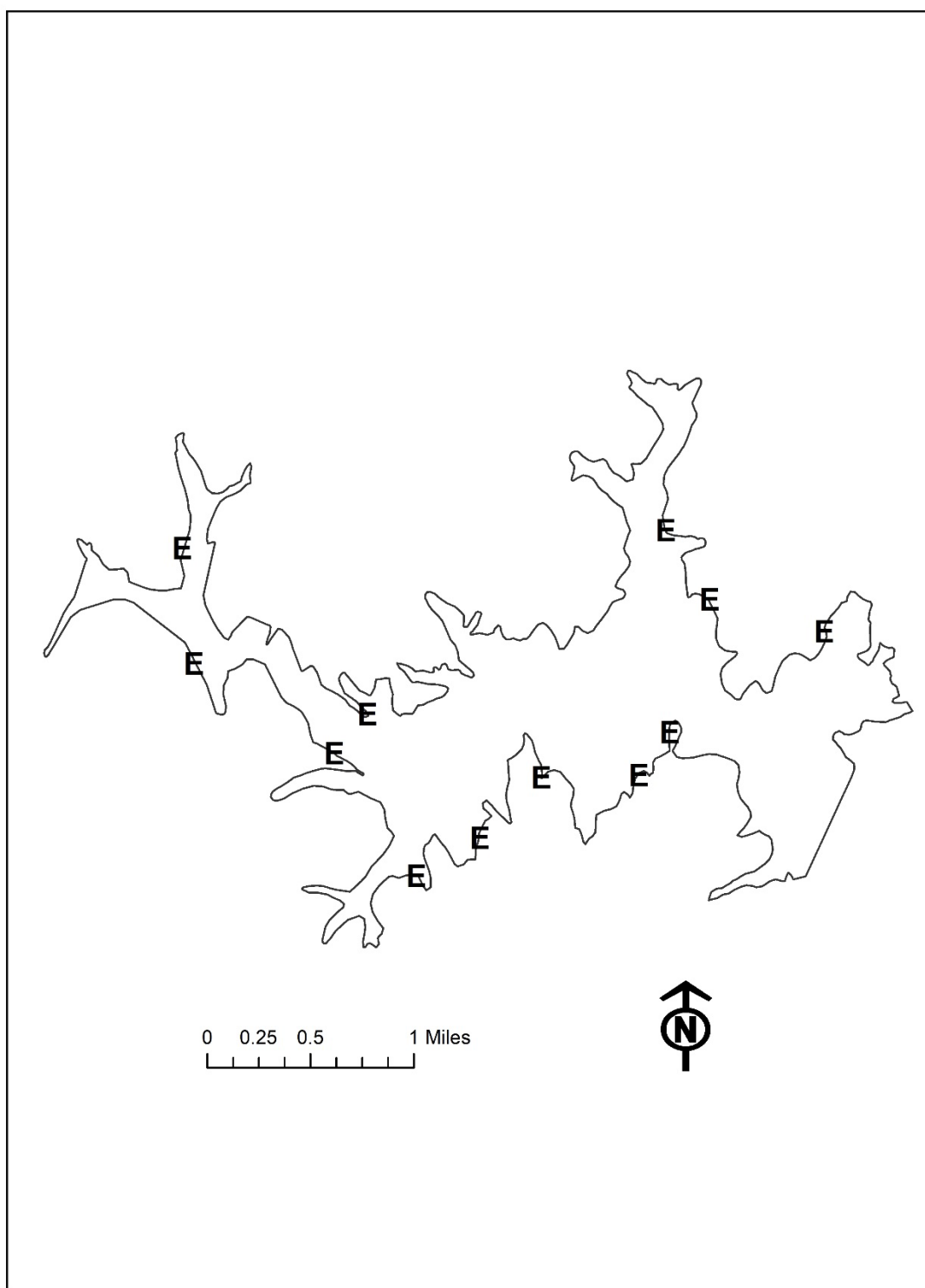
	Survey year			
	2022-2023	2023-2024	2024-2025	2025-2026
Angler access				X
Vegetation	X	X	X	X
Electrofishing - Fall				X
Electrofishing - Spring (bass only)	X			X
Creel survey			X	
Report				X

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 Electrofishing, Lake Athens, Texas, 2021. Sampling effort was 1 hour of electrofishing.

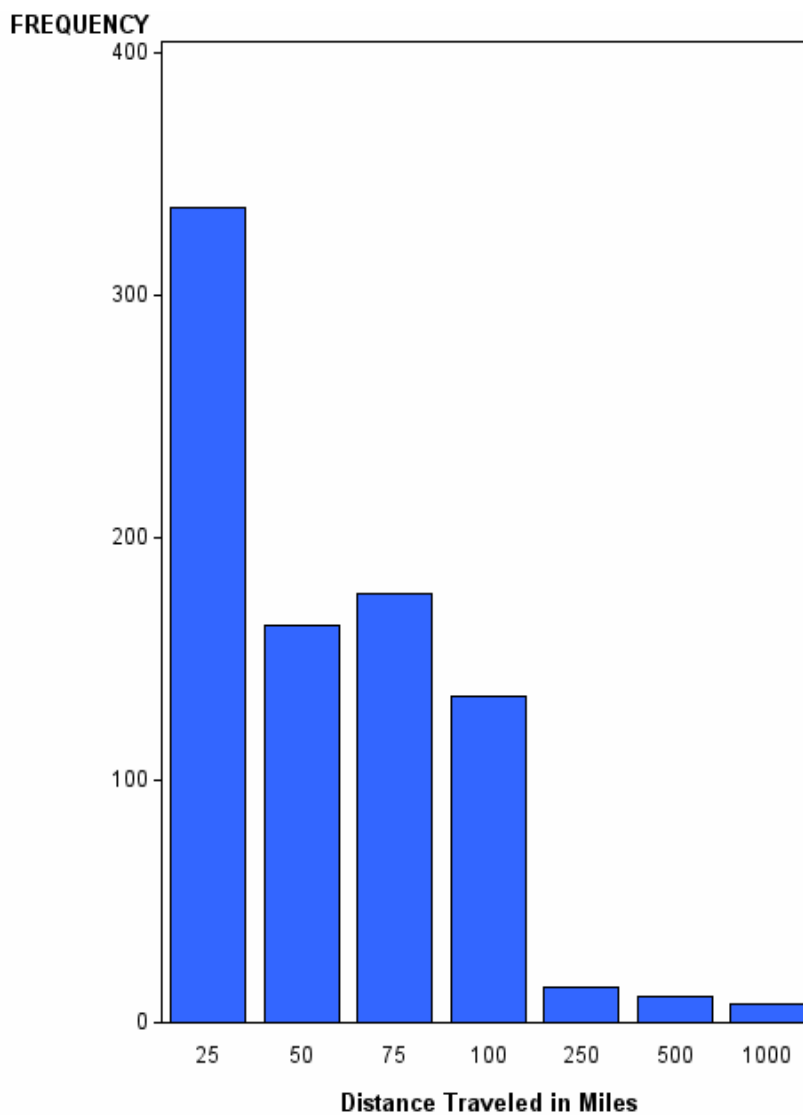
Species	N	CPUE
Gizzard Shad	43	12.0 (43)
Threadfin Shad	4901	4901.0 (15)
Redbreast Sunfish	29	29.0 (82)
Bluegill	189	189.0 (25)
Redear Sunfish	19	19.0 (32)
Warmouth	1	1.0 (100)
Largemouth Bass	116	116.0 (14)

APPENDIX B – Map of sampling locations



Location of sampling sites, Lake Athens, Texas, 2021. Electrofishing stations are indicated by an E. Water level was near full pool at time of sampling.

APPENDIX C – reporting of creel ZIP code data



Frequency of anglers that traveled various distances (miles) to Lake Athens, Texas, as determined from the June 2020 through May 2021 creel survey.



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