Houston County Reservoir

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 Houston County Reservoir were surveyed in 2021-2022 using fall and spring electrofishing. Anglers were surveyed from March through May 2022 with a creel survey. Historical data are presented with the 2021-2022 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: Houston County Reservoir is a 1,523-acre impoundment on Little Elkhart Creek within the Trinity River basin approximately 10 miles northwest of Crockett, Texas. Houston County Reservoir was constructed in 1966 for municipal and industrial purposes and is managed by Houston County Water Conservation and Improvement District #1. Water level fluctuations average 2-3 feet annually. Habitat consists of standing timber, boat docks, and limited amounts of aquatic vegetation. Most of the land around the reservoir is used for timber production, agriculture, and residential use.

Management History: Important sport fish include Largemouth Bass and crappies. All sport fishes except Largemouth Bass are managed under statewide regulations. Largemouth Bass are regulated by a 14- to 21-inch slot limit and a 5-fish daily bag limit. Florida Largemouth Bass were introduced in the mid-1970s and stocked four times from 2003 to 2010. Florida Largemouth Bass were subsequentially stocked annually from 2018 - 2020. Lone Star Bass which are 2nd generation offspring of pure Florida strain ShareLunker Largemouth Bass that have proven the ability to grow $\geq$ 13 pounds were stocked in 2022. Hydrilla coverage in 2009 exceeded 25% of the reservoir surface area. In 2011, hydrilla was eradicated with herbicide and 745 Triploid Grass Carp were stocked for long-term control. Hydrilla was not observed from 2013 to 2019, but trace amounts returned in 2020 and 2021. Water hyacinth coverage reached a maximum of 15 acres in 2015, but annual herbicide treatments have minimized coverage to 5 acres or less since 2018. Giant salvinia was first observed in 2019. A containment boom was installed to limit plant expansion and herbicide treatments have limited coverage to less than one acre.

Fish Community

- **Prey species:** Primary prey species included Threadfin Shad, Gizzard Shad and Bluegill. Electrofishing catch of Gizzard Shad was lower than the previous survey, and most fish were too large to function as prey. Bluegill catch was moderate, with most fish < 5 inches in length and available as prey. Threadfin Shad were extremely abundant and provided ample forage.
- **Channel Catfish:** Historically, Channel Catfish and Flathead Catfish were present in the reservoir, but abundances were low. Gill net surveys were discontinued in 2018. Few anglers target catfish (no fishing effort observed in 2022).
- **White Bass:** Past surveys indicate White Bass were present in the reservoir, but abundance was low. Creel surveys indicate no anglers target White Bass.
- **Black basses:** Spotted Bass electrofishing catch rates have ranged from 38.0 to 76.0/h over the last three surveys, but few fish were > 12 inches in length. Largemouth Bass were abundant with stable and desirable size structure. In 2022, 77% of anglers targeted black basses. Directed angler effort increased in 2022 (5.7 h/acre), but average angler catch rate decreased (0.4/h). All legal-length black basses were released. In 2022, a total of 70 fish $\geq$ 4 pounds were estimated as caught (16 fish $\geq$ 7 pounds).
- **Crappies:** Historically, few crappie were collected in trap net surveys. Sampling was discontinued in 2017. In 2022, the crappie fishery was the second most popular (20% of total angler effort). Directed effort, angler catch rate, and harvest increased from the previous creel survey in 2018.

Management Strategies: Continue to manage Largemouth Bass with a 14- to 21-inch slot-length limit to maintain angling quality. Collect angler opinion data regarding a potential change to a 16-inch maximum length limit. If angler opinion is supportive, develop a regulation change proposal in 2023. Collect angler catch of trophy Largemouth Bass to justify annual Lone Star Bass stockings to maximize trophy fish abundance.

Introduction

This document is a summary of fisheries data collected from Houston County Reservoir in 2021-2022. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2021-2022 data for comparison.

Reservoir Description

Houston County Reservoir is a 1,523-acre impoundment on Little Elkhart Creek within the Trinity River Basin located approximately 10 miles northwest of Crockett, Texas. Houston County Reservoir was constructed in 1966 for municipal and industrial purposes, and it is managed by Houston County Water Conservation and Improvement District #1. Houston County Reservoir was eutrophic with a mean TSI chl-*a* of 56.9, which was similar to previous years (Texas Commission on Environmental Quality 2020). Habitat at time of sampling consisted of standing timber, boat docks, and limited aquatic vegetation. Water level is typically stable, with annual fluctuations of approximately two feet (Figure 1). Other descriptive characteristics for Houston County Reservoir are shown in Table 1.

Angler Access

Houston County Reservoir has two public access areas (Public Ramp and Crockett Family Resort). Both sites have boat ramps in excellent condition. Additional boat ramp characteristics are in Table 2. Shoreline access is limited to the public access areas and the dam.

Management History

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

1. Document catch of trophy Largemouth Bass.

   Action: Trophy Largemouth Bass were documented with the help of local tournament organizers and marina owners. The Houston County Lake Tournaments organization (N = 386 members) conducts several bass tournaments per month. Participants provided picture evidence of 36 fish > 8 pounds caught from 2015 to 2020, including a 12.4-pound fish weighed at Crockett Family Resort in 2016. A 14.1-pound fish was caught in 2019 and documented in regional media. In 2019, Crockett Family Resort certified a total of 30 fish > 8 pounds, including a 13.1-pound fish. In 2022 an angler submitted a fish weighing 13.3 pounds to the TPWD ShareLunker Program.

2. Conduct annual stockings of Florida Largemouth Bass (FLMB) to maximize trophy opportunities for anglers.

   Action: FLMB were stocked annually from 2018 to 2020. In 2021, fish were requested but not stocked due to limited hatchery production.

3. Conduct annual vegetation surveys to monitor hydrilla and water hyacinth coverage.

   Action: Aquatic vegetation surveys were conducted annually from 2018 to 2021.

4. Deploy artificial fish attractors to compensate for the lack of aquatic vegetation and increase angling success.

   Action: Fish attractors were deployed in 2019 at two locations within the reservoir.

Harvest regulation history: Since 1988, Largemouth Bass have been regulated by a 14- to 21-inch slot limit and a 5-fish daily bag limit. All other sport fishes are managed under the current statewide regulations. Current regulations are found in Table 3.

Stocking history: Florida Largemouth Bass were introduced in the mid-1970s and stocked four times from 2003 to 2010. During 2018 to 2021, FLMB were stocked each year except 2021 (insufficient hatchery production). Lone Star Bass were stocked in 2022. In 2011, Triploid Grass Carp (TGC) were stocked to eradicate hydrilla. The complete stocking history is presented in Table 4.

Vegetation/habitat management history: Historically, hydrilla coverage exceeded 400 acres (> 25% of reservoir surface area), prompting complaints from lakeside homeowners. In 2011, hydrilla was eradicated via a reservoir-wide herbicide treatment and a TGC stocking (745 fish). Water hyacinth had been present in trace amounts in the upper end of the reservoir. In 2015, coverage expanded to 15 acres, initiating herbicide treatments. Annual treatments of approximately 10 acres have occurred since 2015. In 2019, giant salvinia was first observed and a containment boom was installed to limit spread. Annual herbicide treatments have limited giant salvinia coverage to less than one surface acre. Artificial fish attractors were deployed in 2019 at two locations within the reservoir (six individual structures per site) to compensate for lack of vegetation and increase angling success.

Water transfer Houston County Reservoir is primarily used for municipal and industrial water supply for the cities of Crockett, Latexo, and Grapeland. Pump stations managed by the Houston County Water Conservation and Improvement District #1 service water to the neighboring cities. No interbasin water transfers exist.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Houston County Reservoir (Driscoll and Ashe 2018). Primary components of the OBS plan are listed in Table 5. All survey sites were randomly selected, and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 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. Ages for Largemouth Bass were determined using otoliths from 11 randomly selected fish (range 13.0 to 14.9 inches).

Statistics – Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of Vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE and creel statistics.

Creel survey – An access-point creel survey was conducted from March through May 2022. Angler interviews were conducted on 5 weekend days and 4 weekdays 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 – Vegetation surveys were conducted from 2018 to 2021 to monitor hydrilla, water hyacinth, and giant salvinia coverages. 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: During 2020 and 2021, limited amounts of pondweed, eelgrass, and hydrilla returned (Table 6), likely due to reduced herbivory associated with natural mortality of TGC. A structural habitat survey in 2012 described the shoreline as 54% natural, 41% bulkheaded with boat docks, and 5% with riprap (Homer and Webb 2013). Homer and Webb (2013) also estimated that standing timber comprised 54% of the reservoir surface area.

Creel: Similar to 2006 and 2018, directed angling effort was highest for black basses (77%), followed by anglers fishing for crappies (20%) (Table 7). In 2006, 15% of total effort was directed at sunfishes, but no directed effort was observed in 2018 or 2022. In 2022, total angling effort (11,316 h) and direct expenditures ($93,736) increased from 2018 (7,741h; $41,879) but was lower than 2006 (14,423h; $114,857) (Table 8).

Prey species: Primary prey species included Threadfin Shad, Gizzard Shad, and Bluegill. Threadfin Shad were highly abundant in 2021; electrofishing catch rate was 4,708/h (Appendix A). Catch rates of Gizzard Shad were moderate and ranged from 74.0 to 132.0/h (Figure 2). During 2021, Index of Vulnerability (IOV) was low (1) and reduced when compared to previous years. During the last three surveys, catch rate of Bluegill was high but varied from 414.0/h to 915.0/h and most were $\leq$ 5 inches in length (Figure 3). No anglers were observed targeting sunfishes in 2018 and 2022 (Tables 7 and 9).

Catfishes: Historically, Channel Catfish and Flathead Catfish abundance has been low with little directed angling effort. Beginning in 2018, no directed catfish sampling was conducted. During 2022, no anglers targeted catfishes (Table 7) and no harvest was observed (Table 10).

White Bass: Historical catch of White Bass in gill net surveys was low. Sampling was discontinued in 2018. Creel surveys indicate that no anglers target White Bass.

Black basses: Prior to 2012, fall electrofishing catch rates of Spotted Bass were historically low (< 20.0/h). During the last three surveys, catch rates increased and ranged from 38.0 to 76.0/h (Figure 4). Size structure was poor as most fish were $\leq$ 12 inches in length. Increased Spotted Bass abundance is likely related to the eradication of submerged aquatic vegetation initiated in 2011.

Fall electrofishing catch rates from the previous three surveys reflect an abundant and stable Largemouth Bass population (range = 123.0/h to 155.0/h) (Figure 5). Catch rates of stock-sized Largemouth Bass in 2021 (77.0/h) decreased from 2017 (100.0/h) but was similar to 2012 (83.0/h). Size structure was adequate as PSD ranged from 55 to 58 across all three surveys. Growth and body condition was acceptable. Largemouth Bass average age at 14 inches (13.0 to 14.9 inches) was 2.8 years (N = 11; range = 2 – 4 years) and relative weights were above 80 for most size classes. Although spring electrofishing catch rates declined in 2022 (2018 = 153.0/h; 2020 = 210.0/h; 2022 = 101.0/h) (Figure 6), sampling efficiency was likely reduced due to a nearly two feet rise in water level just prior to the survey, resulting in increased turbidity. However, catch of fish $\geq$ 21 inches was similar to the 2020 survey and was greater than the 2018 survey (2022=5.0/h; 2020=6.0/h; 2018=1.0/h). Overall size structure was excellent with PSD ranging from 65 to 80.

In 2022, directed fishing effort for black basses (5.7 h/acre) increased from 2018 (4.4 h/acre) but was lower than 2006 (6.9 h/acre) (Table 11). Angler catch rate in 2022 was 0.4/h, which was similar to 2006 (0.4/h) but lower than 2018 (0.7/h). In 2006 and 2018, total harvest was low and similar ($\leq$ 250 fish); no harvest was observed in 2022. In 2022, an estimated 64 fish $\geq$ 4 pounds were caught (16 fish $\geq$ 7 pounds). Anglers have submitted four Largemouth Bass $\geq$ 13 pounds to the TPWD ShareLunker Program, including a 13.34-pound fish in 2022. Tournament anglers comprised 38% of the total black bass angling effort. Tournament anglers we encountered utilized a paper format in which fish were measured and weighed on the water and immediately released.

Crappies: Historically, trap nets were not effective at capturing crappie at Houston County

Reservoir and were discontinued in 2017. Creel survey statistics reflect an abundant crappie population. In 2022, the crappie fishery was the second most popular (20% of total angler effort; Table 7). Directed effort (1.5 h/acre) and total harvest (4,933 fish) increased when compared to 2006 and 2018 (Table 12). Angler catch rate in 2022 (1.4/h) was similar to 2018 (1.1/h) but lower than 2006 (2.7/h).

Fisheries Management Plan for Houston County Reservoir, Texas

Prepared – July 2022

ISSUE 1: Creel surveys indicate most angling effort at Houston County Reservoir is for Largemouth Bass. Electrofishing data indicate the 14- to 21-inch slot-length limit is producing desirable results. Density of 14- to 21-inch fish is relatively high, growth rates are adequate, and recruitment of fish into the protective slot length limit is high and stable. However, anglers indicate that catch of trophy Largemouth Bass ($\geq$ 8 pounds) has declined in recent years. A 16-inch maximum length limit has been successful and popular at several other district fisheries and could increase trophy bass abundance at Houston County Reservoir. However, bass tournaments are relatively popular and angler opinion is unknown.

MANAGEMENT STRATEGIES

1. Continue to manage Largemouth Bass harvest with a 14- to 21-inch slot-length limit.
2. Document angler opinion regarding a potential change to a 16-inch maximum length limit. Data were collected during the March through May angler creel survey in 2022. Additional data will be collected with assistance from TPWD Game Wardens through December 2022. If angler opinion is favorable, develop a regulation change proposal in 2023.
3. Continue collecting angler catch of trophy Largemouth Bass from the TPWD ShareLunker Program, Houston County Lake Tournaments Facebook group, and Crockett Family Resort to justify Lone Star Bass stockings.
4. Continue annual stockings of Lone Star Bass, which are 2nd generation offspring of pure ShareLunker Largemouth Bass that have proven to be able to grow $\geq$ 13 pounds.

ISSUE 2: Hydrilla coverage in Houston County Reservoir had exceeded 25% in the past and prompted complaints from lakeside homeowners. Although hydrilla was eradicated in 2011 via a herbicide treatment and TGC stocking, trace amounts were observed in 2020 and 2021. Although hydrilla is desired to improve Largemouth Bass recruitment and abundance, increases in coverage will likely cause complaints from lakeside residents.

MANAGEMENT STRATEGIES

1. If hydrilla coverage initiates public complaints, meet with water district officials, angling public, and lakeside homeowners to develop an integrated aquatic vegetation management plan that balances all user interests.
2. Permit lakeside homeowners to conduct herbicide treatments (at homeowner expense) adjacent to their property.

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 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. Contact and educate marina owners about invasive species and provide them with posters and literature so that they can in turn educate their customers.
3. Educate the public about invasive species using media and the internet.
4. Discuss invasive species when presenting to constituent and user groups.
5. Document existing and future inter-basin water transfers to facilitate potential invasive species responses.

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

Sport fish, forage fish, and other important fishes

Sport fishes in Houston County Reservoir include Largemouth Bass, Spotted Bass, crappies, Channel Catfish, Flathead Catfish, and White Bass. Important forage species include Bluegill, Threadfin Shad, and Gizzard Shad. The proposed sampling schedule to meet the following OBS Plan can be found in Table 13.

Low-density fisheries

Historically, few anglers target catfishes and White Bass, and population abundances have been low. Beginning in 2018, directed sampling was discontinued for catfish and White Bass, but both fisheries will be monitored via spring quarter creel surveys (2026, and every four years thereafter).

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Largemouth Bass are the most popular sport fish in Houston County Reservoir, accounting for approximately 80% of the annual angling effort. Since 1988, Largemouth Bass have been managed with a 14- to 21-inch slot length limit. Since 2004, trend data on CPUE, size structure, and body condition have been collected every four years with fall electrofishing and every two years with spring electrofishing. The population is abundant, recruitment rates have been high and steady, and size structure has been desirable and stable. Continuation of trend data with nighttime electrofishing in the fall (2025, and every four years thereafter) and spring (biennially, 2024 and 2026) will allow for determination of any large-scale changes in the Largemouth Bass population. The minimum of 12 randomly selected 5-min electrofishing sites will be sampled, but the anticipated effort to meet sampling objectives (N = 50 stock-size fish; RSE-S $\leq$ 25) is 5-8 stations with 80% confidence.

The Largemouth Bass fishery (i.e., angling effort, catch rates, size distribution of catch and harvest) will be monitored with a spring quarter access point creel survey in 2026 (5 weekend and 4 week days) and every four years thereafter. In addition, angler catch of trophy Largemouth Bass (> 8 pounds) will be collected from the TPWD ShareLunker Program, Houston County Lake Tournaments Facebook group, and Crockett Family Resort to document trends of trophy bass abundance and justify Lone Star Bass stockings.

Average age of Largemouth Bass between 13.0 and 14.9 inches (Category 2; N = 13) will be estimated in 2025, and every four years thereafter.

Crappies: The crappie fishery accounts for approximately 10% of the annual angling effort. Historically, trap netting resulted in low catch rates and sampling was discontinued in 2017. Spring quarter creel surveys (per Largemouth Bass sampling above) will be used to monitor the crappie fishery and make inferences about the population.

Prey species: Bluegill, Threadfin Shad, and Gizzard Shad are the primary forage at Houston County Reservoir. Fall electrofishing every four years, sampling the minimum of 12 random sites, will likely result in sufficient numbers of Bluegill and Gizzard Shad to achieve sampling objectives (N = 50 stock-size fish). Largemouth Bass body condition (fish $\geq$ 8” TL) will be used to provide additional information on forage abundance and vulnerability.

Habitat: Hydrilla has exceeded 25% of the reservoir surface area in the past, prompting complaints from lakeside homeowners. Water hyacinth coverage has expanded to 10-15 acres during some years and giant salvinia was discovered in 2019. Both plants require annual herbicide treatments. Aquatic vegetation will be monitored annually to document trends in abundance and recommend appropriate management strategies.

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Tables and Figures

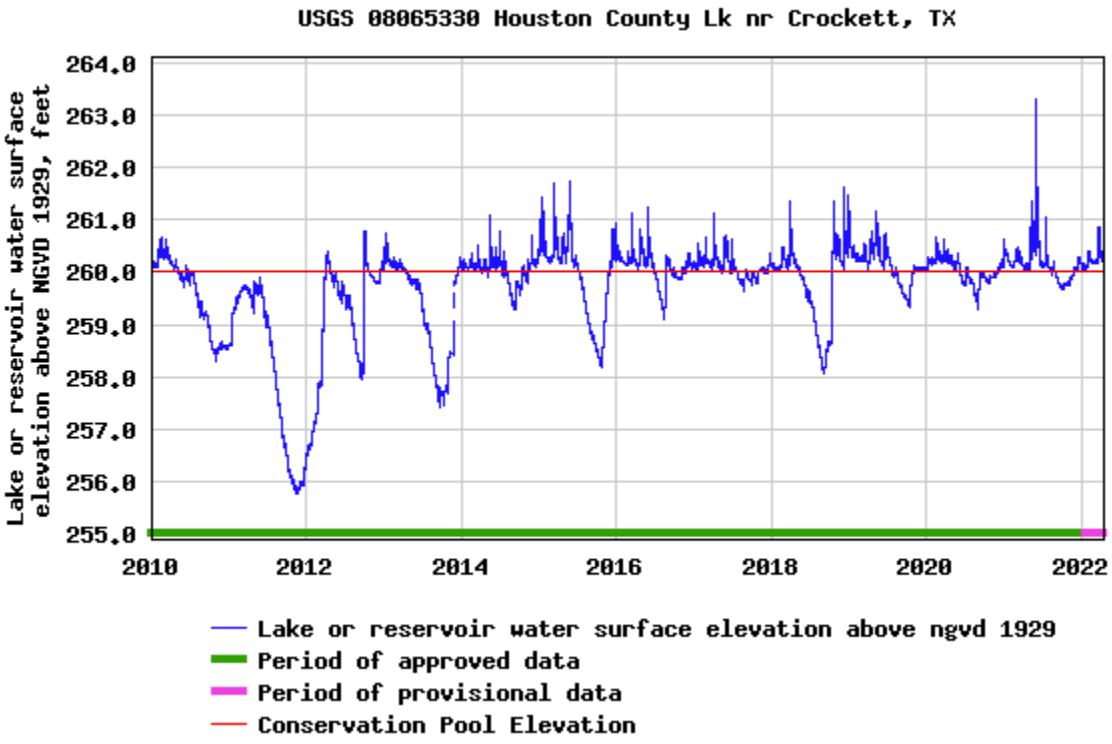


Figure 1. Daily water level elevations in feet above mean sea level recorded for Houston County Reservoir, Texas.

Table 1. Characteristics of Houston County Reservoir, Texas.

Characteristic	Description
Year constructed	1966
Controlling authority	Houston County Water Conservation and Improvement District No. 1
County	Houston
Reservoir type	Tributary
Shoreline Development Index	4.60
Conductivity	120 µS/cm

Table 2. Boat ramp characteristics for Houston County Reservoir, Texas, April 2022. Reservoir elevation at time of survey was 260 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Public Ramp	31.40992 -95.60438	Y	30	253	Excellent
Crockett Family Resort	31.41162 -95.57852	Y	30	255	Excellent

Table 3. Harvest regulations for Houston County Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination; only 10 can be ≥ 20 inches)	None
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Largemouth	5[a] (only 1 > 21 inches)	14- to 21-inch slot
Bass, Spotted	5[a]	None
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

[a]Daily bag for Largemouth Bass and Spotted Bass = 5 fish in any combination.

Table 4. Stocking history of Houston County Reservoir, Texas. Size categories are FRY = <1 inch; FGL = 1-3 inches; AFGL = 8 inches; ADL = adult; UNK = unknown.

Species	Year	Number	Size
Black Crappie	1967	2,000	UNK
Channel Catfish	1967	5,000	AFGL
	1973	26,221	AFGL
	1986	75,112	AFGL
	Total	106,333	
Triploid Grass Carp	2011	745	AFGL
Florida Largemouth Bass	1974	56,000	FGL
	1974	18,000	FRY
	1976	75,000	FRY
	1977	75,000	FRY
	2003	131,707	FGL
	2004	136,645	FGL
	2008	134,373	FGL
	2010	135,370	FGL
	2018	133,816	FGL
	2019	28,433	FGL
	2020	374	ADL
	2020	27,808	FGL
	Total	952,526	
Lone Star Bass [a]	2022	25,149	FGL
Green x Redear Sunfish	1967	2,000	UNK
	1971	8,000	UNK
	Total	10,000	
Kemp's Largemouth Bass [b]	1985	34,735	FGL
	1986	62,630	FGL
	Total	97,365	
Northern Pike	1972	200	UNK
Palmetto Bass	1979	14,500	UNK

[a] Lone Star Bass are 2nd generation offspring of pure Florida strain ShareLunker Largemouth Bass that have proven to be able to grow $\geq$ 13 pounds.

[b] Kemp's Largemouth Bass are 1st generation offspring of Florida strain and Northern strain Largemouth Bass.

Table 5. Objective-based sampling plan components for Houston County Reservoir, Texas 2021–2022.

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
	Age-and-growth	Age at 14 inches	N = 13, 13.0 – 14.9 inches
	Condition	W_r	10 fish/inch group (max)
Bluegill [a]	Abundance	CPUE – Total	
	Size structure	PSD, length frequency	N ≥ 50
Gizzard Shad [a]	Abundance	CPUE – Total	
	Size structure	PSD, length frequency	N ≥ 50
	Prey availability	IOV	N ≥ 50
Threadfin Shad [a]	Abundance	CPUE – Total	
Creel survey			
All sport fish	Trend information on angler utilization	Angler effort, CPUE, total harvest and size composition	

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

Table 6. Survey of aquatic vegetation, Houston County Reservoir, Texas, 2017–2021. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Species	2017	2018	2019	2020	2021
Arrowhead					Trace
Bladderwort					4 (<1)
Eelgrass					Trace
Giant cutgrass	2 (<1)			1 (<1)	3 (<1)
Pondweed *spp.*				Trace	2 (<1)
Spikerush	Trace			Trace	Trace
Water primrose					1 (<1)
Giant salvinia (Tier II)*				Trace	1 (<1)
Hydrilla (Tier III)*				Trace	Trace
Torpedograss (Tier III)*	4 (<1)			4 (<1)	2 (<1)
Water hyacinth (Tier II)*		5 (<1)		1 (<1)	1 (<1)

*Response tiers for potentially invasive non-native species. Tier II is Maintenance; Tier III is Watch Status.

Table 7. Percent directed angler effort by species for Houston County Reservoir, Texas, 2006, 2018, and 2022. Survey periods were from 1 March through 31 May.

Species	2006	2018	2022
Catfishes	0.0	1.3	0.0
Sunfishes	14.9	0.0	0.0
Black basses	73.0	85.9	77.1
Crappies	10.6	12.8	19.7
Anything	1.4	0.0	3.2

Table 8. Total fishing effort (h) for all species and total directed expenditures at Houston County Reservoir, Texas, 2006, 2018, and 2022. Survey periods were from 1 March through 31 May. Relative standard error is in parentheses.

Creel statistic	2006	2018	2022
Total fishing effort	14,423 (32)	7,741 (35)	11,316 (27)
Total directed expenditures	$114,857 (72)	$41,879 (55)	$93,736 (46)

Gizzard Shad

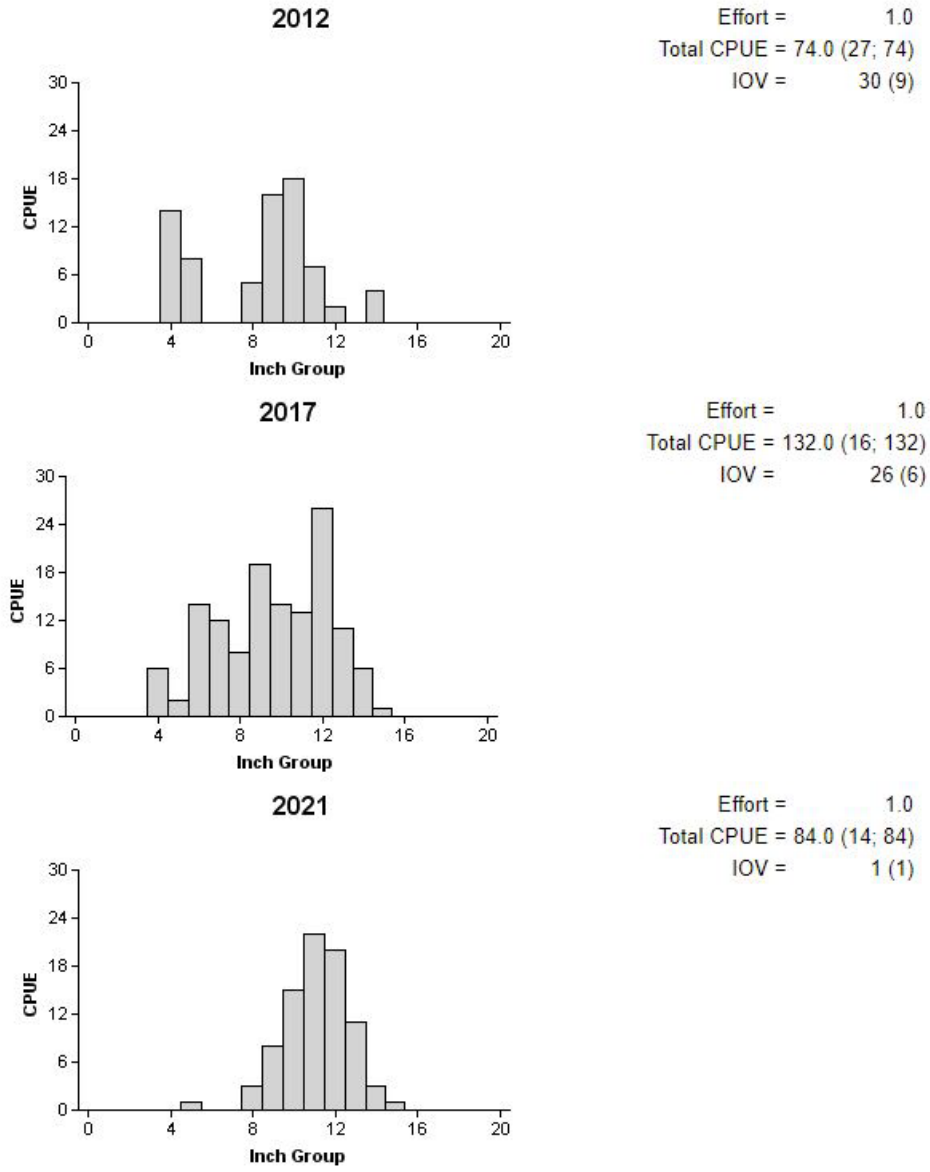


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Houston County Reservoir, Texas, 2012, 2017, and 2021.

Bluegill

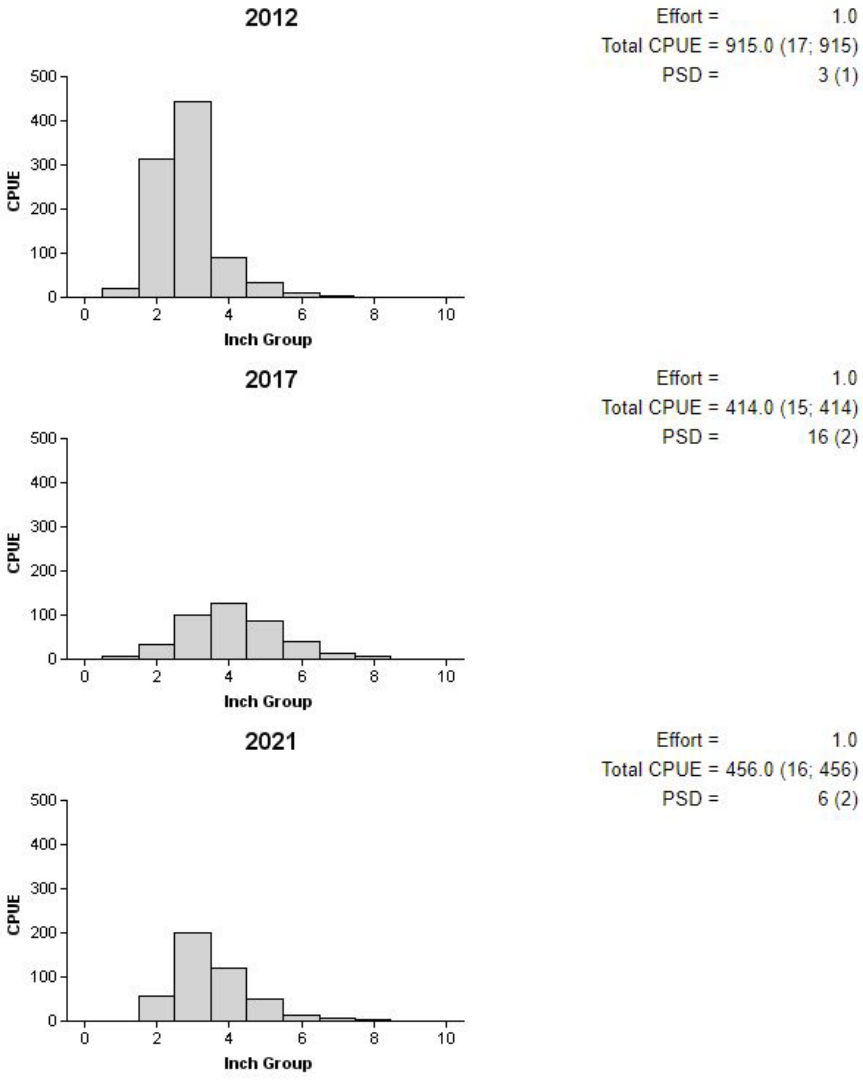


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Houston County Reservoir, Texas, 2012, 2017, and 2021.

Sunfishes

Table 9. Creel survey statistics for sunfishes at Houston County Reservoir, Texas, from March through May 2006, 2018, and 2022. Total catch per hour is for anglers targeting sunfishes and total harvest is the estimated number of sunfishes harvested by all anglers. Relative standard errors (RSE) are in parentheses .

Creel survey statistic	Year		
	2006	2018	2022
Surface area (acres)	1,523	1,523	1,523
Directed effort (h)	2,148.09 (62)	0.00	0.00
Directed effort/acre	1.41 (62)	0.00	0.00
Total catch per hour	2.86 (81)		
Total harvest	7,097 (69)	0.00	0.00
Harvest/acre	4.66 (69)	0.00	0.00
Percent legal released	0.0		

Catfishes

Table 10. Creel survey statistics for catfishes for Houston County Reservoir, Texas from March through May 2006, 2018, and 2022. Total catch per hour is for anglers targeting catfishes and total harvest is the estimated number of catfishes harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2006	2018	2022
Surface area (acres)	1,523	1,523	1,523
Directed effort (h)	0.00	97.73 (139)	0.00
Directed effort/acre	0.00	0.06 (139)	0.00
Total catch per hour		0.25 (.)	
Total harvest	0.00	36 (329)	0.00
Harvest/acre	0.00	0.02 (329)	0.00
Percent legal released		51.7	

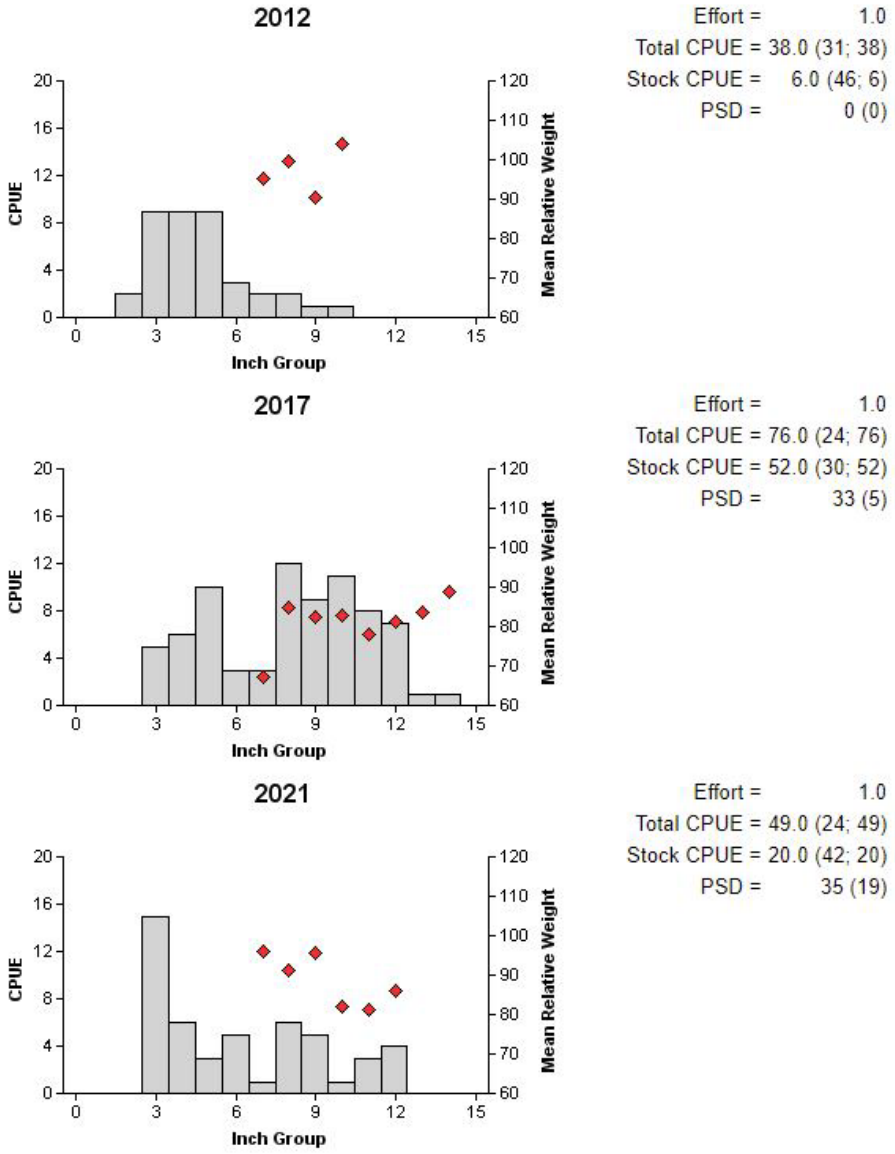


Figure 4. Number of Spotted Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing survey, Houston County Reservoir, Texas, 2012, 2017, and 2021.

Largemouth Bass

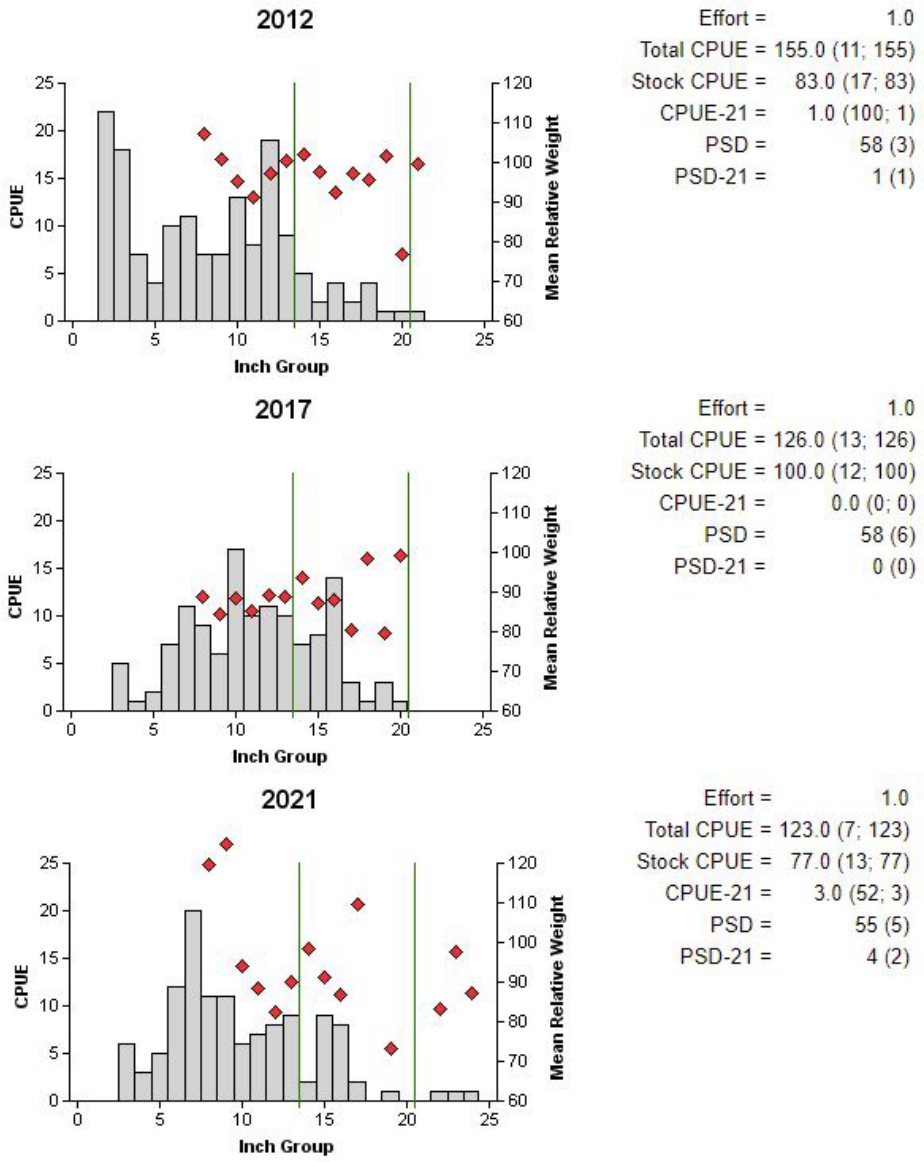


Figure 5. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Houston County Reservoir, Texas, 2012, 2017, and 2021. Vertical lines indicate slot-length limit.

Largemouth Bass

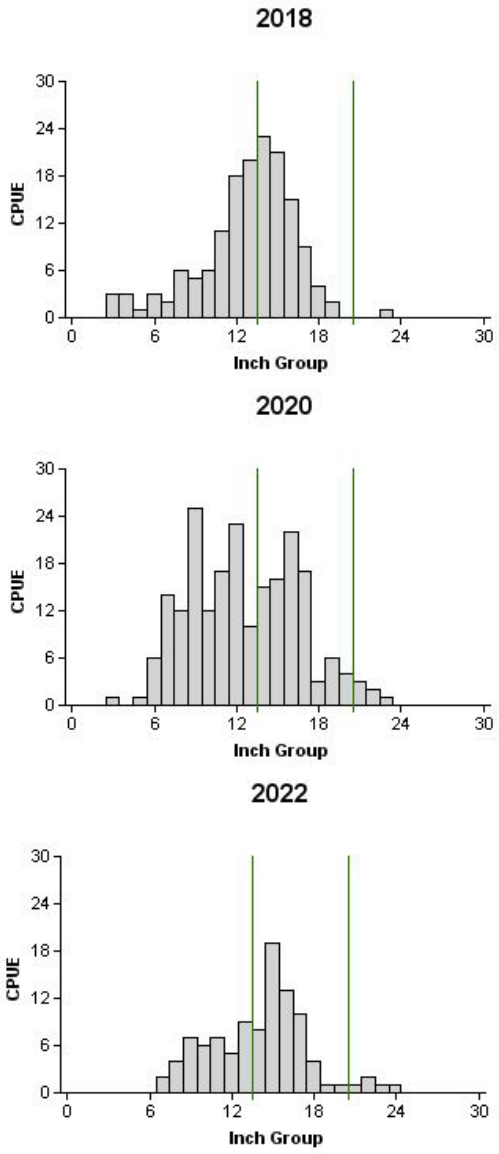


Figure 6. Number of Largemouth Bass caught per hour (CPUE, bars), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring electrofishing surveys, Houston County Reservoir, Texas, 2018, 2020, and 2022. Vertical lines indicate slot-length limit.

Black Basses

Table 11. Creel survey statistics for black basses at Houston County Reservoir, Texas, March through May 2006, 2018, and 2022. Catch rate is for all anglers targeting black basses. 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 caught by weight category is for all anglers. Relative standard errors (RSE) are in parentheses.

Statistic	2006	2018	2022
Surface area (acres)	1,523	1,523	1,523
Directed angling effort (h)			
Tournament	0	0	3,308 (34)
Non-tournament	10,536 (35)	6,652 (35)	5,419 (30)
All black bass anglers combined	10,536 (35)	6,652 (35)	8,727 (27)
Angling effort/acre	6.9 (35)	4.4 (35)	5.7 (27)
Catch rate (number/h)	0.4 (33)	0.7 (19)	0.4 (17)
Harvest			
Non-tournament harvest	118 (145)	250 (111)	0
Harvest/acre	0.1 (145)	0.2 (111)	0
Tournament weigh-in and release	0	0	0[a]
Release by weight			
< 4.0 lbs		5,806 (42)	1,746 (49)
≥ 4–6.9 lbs		323 (75)	64 (81)
≥ 7–9.9 lbs		46 (175)	16 (139)
≥ 10 lbs		0	0
Percent legal released (non-tournament)	93.8	94.0	100.0

[a] Tournament anglers encountered utilized a paper format in which fish were measured and weighed on the water and immediately released.

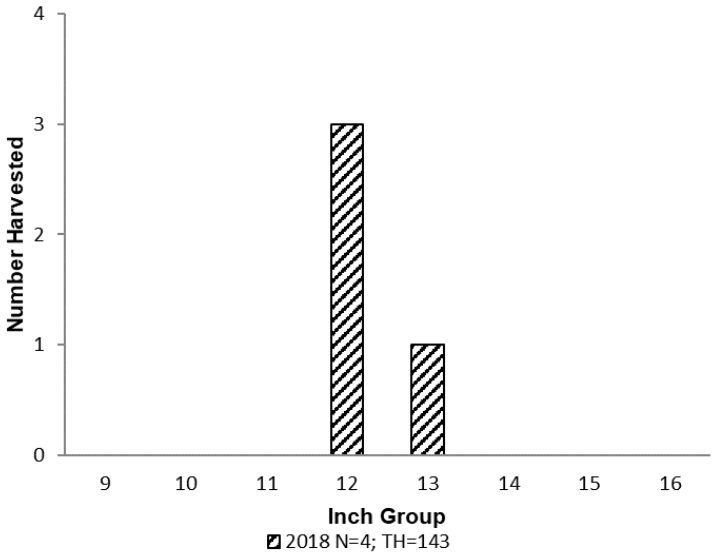


Figure 7. Length frequency of harvested Spotted Bass observed during creel surveys at Houston County Reservoir, Texas, March through May 2018, all anglers combined. N is the number of harvested Spotted Bass observed during creel surveys, and TH is the estimated non-tournament harvest for the creel period. No harvested fish were observed in 2006 and 2022.

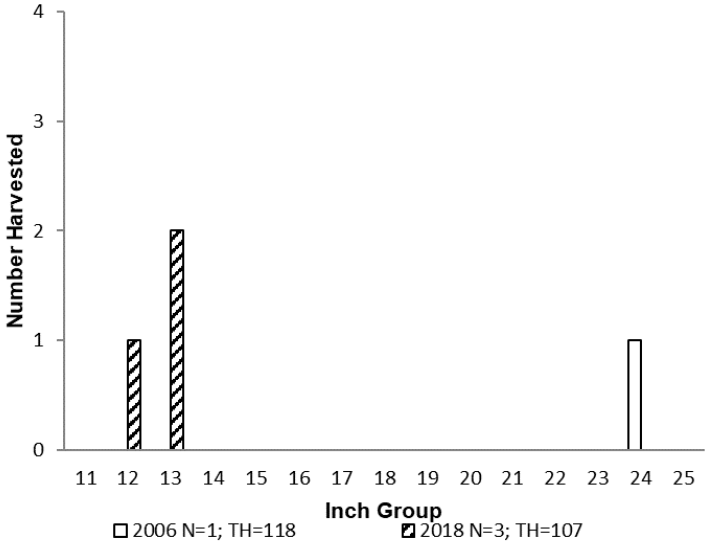


Figure 8. Length frequency of harvested Largemouth Bass observed during creel surveys at Houston County Reservoir, Texas, March through May 2006 and 2018, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the estimated non-tournament harvest for the creel period. No harvested fish were observed in 2022.

Crappies

Table 12. Creel survey statistics for crappies at Houston County Reservoir, Texas, from March through May 2006, 2018, and 2022. Total catch per hour is for anglers targeting crappies and total harvest is the estimated number of crappies harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2006	2018	2022
Surface area (acres)	1,523	1,523	1,523
Directed effort (h)	1,523.35 (72)	991.60 (53)	2,227.18 (39)
Directed effort/acre	1.01 (72)	0.65 (53)	1.46 (39)
Total catch per hour	2.73 (77)	1.08 (76)	1.39 (35)
Total harvest	2,957 (95)	1,574 (78)	4,933 (55)
Harvest/acre	1.94 (95)	1.03 (78)	3.24 (73)
Percent legal released	3.4	0.0	0.0

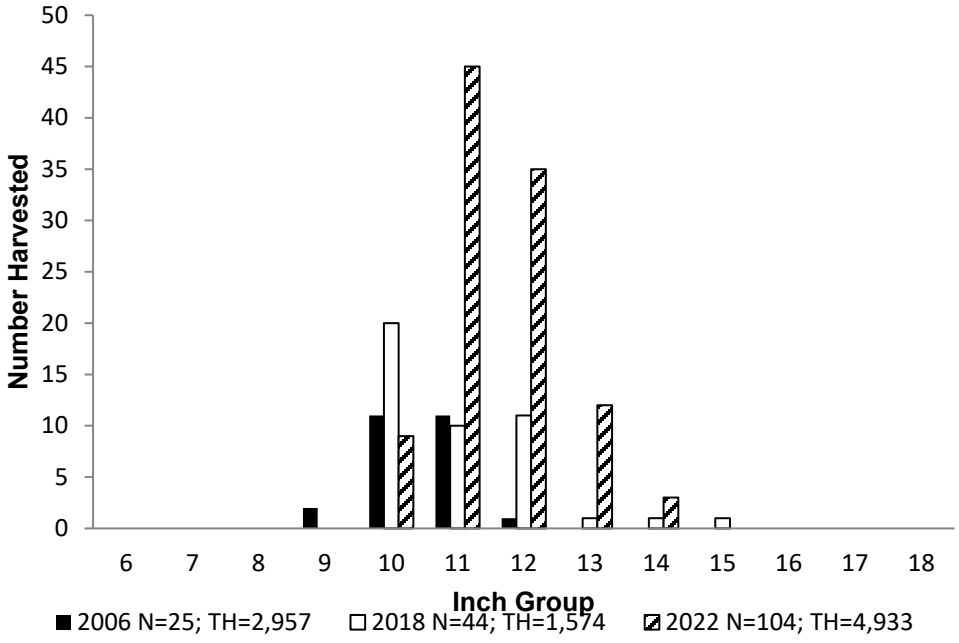


Figure 9. Length frequency of harvested crappies observed during creel surveys at Houston County Reservoir, Texas, March through May 2006, 2018, and 2022, all anglers combined. N is the number of harvested crappies observed during creel surveys, and TH is the total estimated harvest for the creel period.

Proposed Sampling Schedule

Table 13. Proposed sampling schedule for Houston County Reservoir, Texas. Survey period is June through May. Electrofishing surveys are conducted in the fall and the spring.

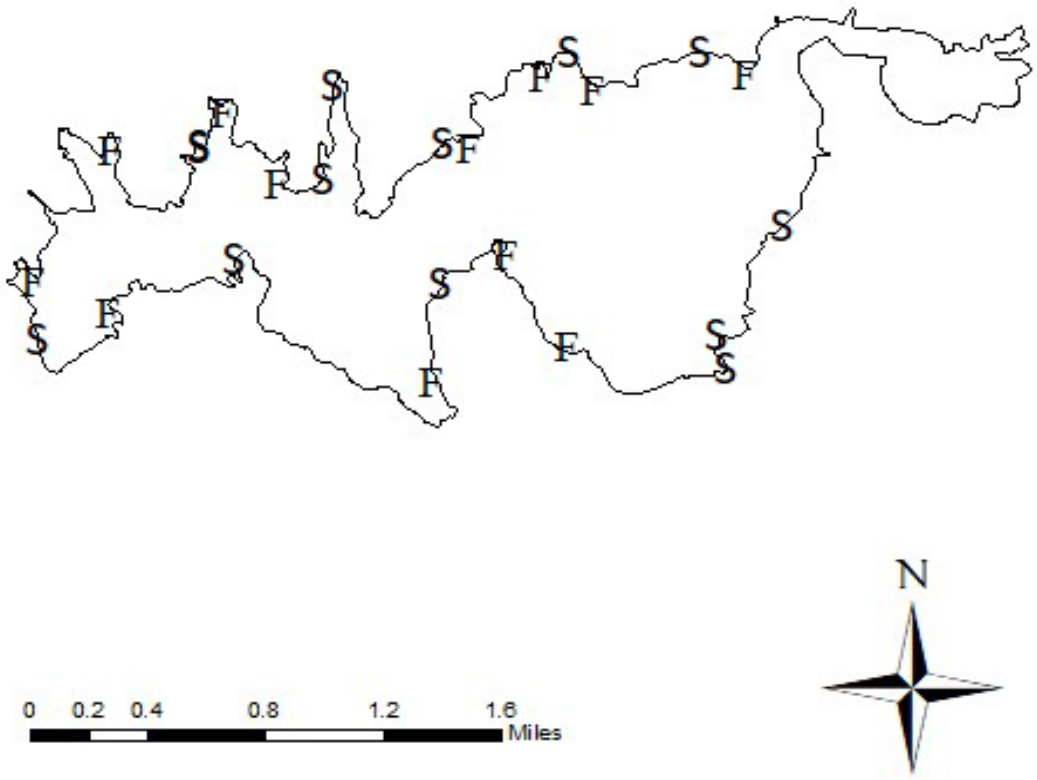
	Survey year			
	2022-2023	2023-2024	2024-2025	2025-2026
Angler Access				X
Vegetation	X	X	X	X
Electrofishing – Fall				X
Electrofishing – Spring		X		X
Creel survey				X
Report				X

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 all gear types from Houston County Reservoir, Texas, 2021-2022. Sampling effort was 1 hour for electrofishing.

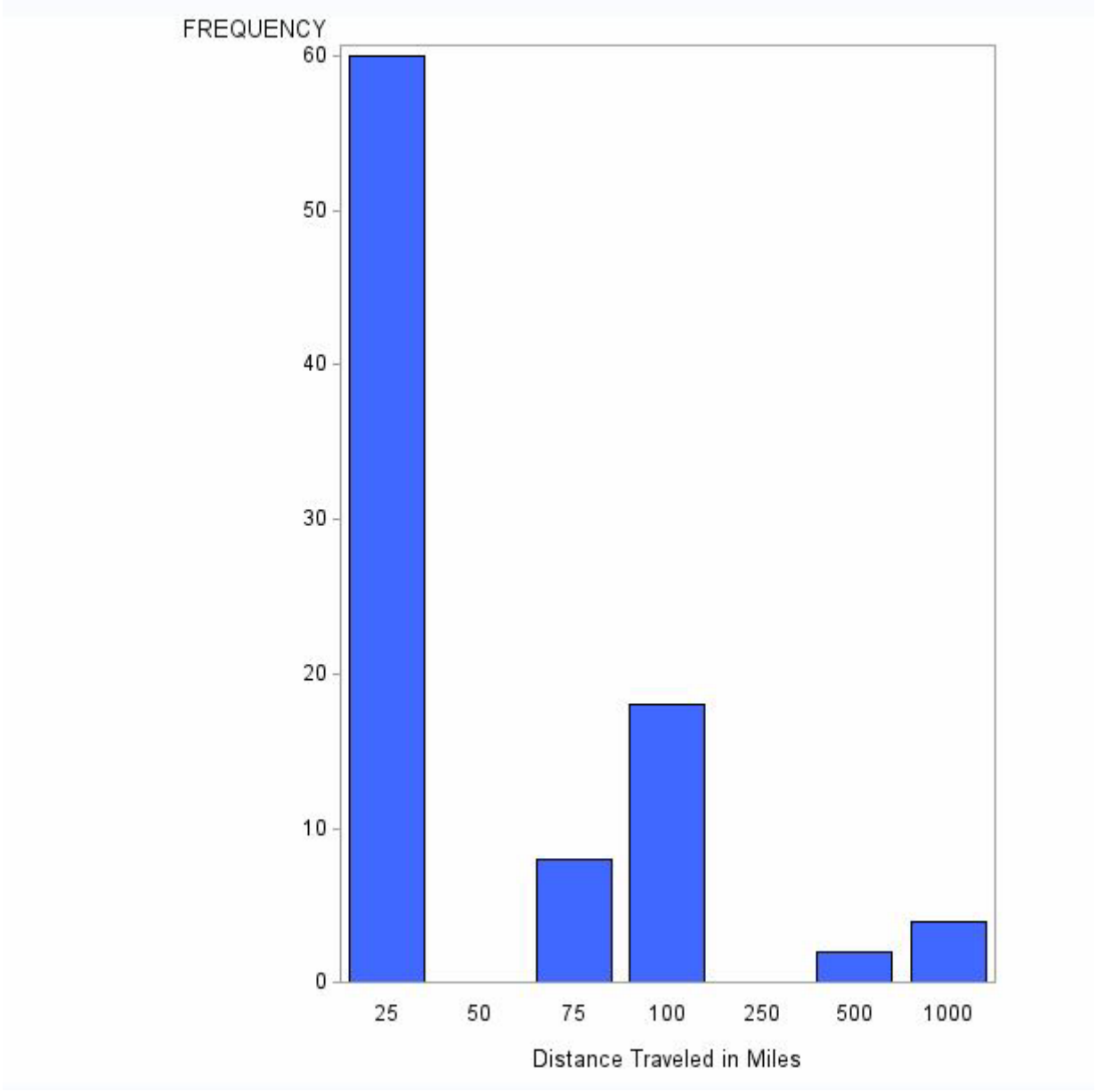
Species	Fall Electrofishing		Spring Electrofishing	
	N	CPUE	N	CPUE
Gizzard Shad	84	84.0 (14)		
Threadfin Shad	4,708	4,708.0 (34)		
Warmouth	4	4.0 (77)		
Bluegill	456	456.0 (16)		
Longear Sunfish	38	38.0 (37)		
Redear Sunfish	49	49.0 (34)		
Redspotted Sunfish	2	2.0 (100)		
Spotted Bass	49	49.0 (24)		
Largemouth Bass	123	123.0 (7)	101	101.0 (11)

APPENDIX B – Map of sampling locations



Location of sampling sites, Houston County Reservoir, Texas, 2021-2022. Fall electrofishing and spring electrofishing stations are indicated by F and S, respectively. 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 Houston County Reservoir, Texas, as determined from the March through May 2022 creel survey.

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