

Houston County Reservoir

2017 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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Survey and Management Summary

Fish populations in Houston County Reservoir were surveyed in 2017-2018 using fall and spring electrofishing. Anglers were surveyed from March through May 2018 with a creel survey. Historical data are presented with the 2017-2018 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

Reservoir Description: Houston County Reservoir is a 1,523-acre impoundment of 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 emergent 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 harvest is 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 have been stocked numerous times; the most recent stocking occurred in 2010. Historically, hydrilla has been problematic in the reservoir. In 2009, coverage exceeded 25% of the reservoir surface area. In 2011, hydrilla was treated with herbicide and 745 triploid Grass Carp were stocked. No hydrilla has been observed since 2012. Water hyacinth coverage expanded to 15 acres in 2015, but annual herbicide treatments since 2015 have minimized coverage to trace amounts.

Fish Community

- **Prey species:** Primary prey species included Threadfin Shad, Bluegill, and Gizzard Shad. Electrofishing catch of Gizzard Shad was high when compared to previous surveys. Bluegill catch was moderate, with most fish < 5 inches in length and available as prey.
- **Catfishes:** Historically, Channel Catfish and Flathead Catfish were present in the reservoir, but abundances were relatively low. Gill net surveys were discontinued in 2018. Few anglers target catfish at Houston County Reservoir (1% of total fishing effort).
- **White Bass:** Past surveys indicate White Bass were present in the reservoir, but abundance was low. Gill net surveys were discontinued in 2018. Creel surveys indicate no anglers target White Bass.
- **Black basses:** Spotted Bass abundance increased over the last three surveys, but few fish were > 12 inches in length. Largemouth Bass were abundant with stable and desirable size structure. In 2018, 86% of anglers targeted black basses. Directed angler effort decreased in 2018 (4.4 h/acre), but average angler catch rate increased (0.7/h). Most legal-length black basses were released (94%). In 2018, a total of 369 fish \geq 4 pounds were estimated as caught (46 fish \geq 7 pounds).
- **Crappies:** Few crappie were collected in historical trap net surveys. Sampling was discontinued in 2017. In 2018, the crappie fishery was the second most popular (13% of total angler effort). Directed effort, angler catch rate, and harvest in 2018 were all lower than the previous creel survey (2006).

Management Strategies: Continue to manage Largemouth Bass harvest with a 14-21 inch slot limit to maintain angling quality. Collect angler catch of trophy Largemouth Bass to justify Florida Largemouth Bass stockings. Request annual stockings of Florida Largemouth Bass to maximize trophy fish abundance. Deploy plastic fish attractors to augment habitat and increase angling success.

Introduction

This document is a summary of fisheries data collected from Houston County Reservoir in 2017-2018. 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 2017-2018 data for comparison.

Reservoir Description

Houston County Reservoir is a 1,523-acre impoundment of 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 55.98, which was similar to previous years (Texas Commission on Environmental Quality 2018). Habitat at time of sampling consisted of standing timber, boat docks, and limited emergent shoreline vegetation. No submersed aquatic vegetation was present. 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 good 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 (Homer and Webb 2013) included:

1. Document catch of trophy Largemouth Bass.

Action: In 2015, contact was made with the Facebook group Houston County Lake Tournaments. This group conducts several bass tournaments per month. Participants provided picture evidence of 30 fish > 8 pounds caught since 2015, including a 12.4-pound fish weighed at Crockett Family Resort in 2016.

2. Conduct annual aquatic vegetation surveys and recommend treatment if necessary.

Action: Aquatic vegetation surveys were conducted during 2015-2017 to monitor coverage of water hyacinth and hydrilla. Water hyacinth was treated with herbicides from 2015-2017.

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

Stocking history: Florida Largemouth Bass (FLMB) were introduced in the mid-1970s. Since 2003, FLMB have been stocked four times, most recently in 2010. In 2011, Triploid Grass Carp 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 treated lakewide with herbicides, and 745 Triploid Grass Carp were stocked. 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.

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 Improvement and Conservation 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 (TPWD unpublished). 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 2015).

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 13 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 2018. 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 2015).

Habitat – A structural habitat survey was conducted in 2012. Vegetation surveys were conducted in 2012 and 2015-2017 to monitor coverages of hydrilla and water hyacinth. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Water level – Source for water level data was the United States Geological Survey (USGS 2018).

Results and Discussion

Habitat: The littoral zone consisted primarily of natural shoreline, bulkhead, and boat docks (Table 6). In 2009, aquatic vegetation (mostly hydrilla) comprised approximately 30% of the reservoir surface area (Table 7). In 2011, complaints from lakeside homeowners resulted in reservoir-wide herbicide treatment of hydrilla and the stocking of 745 Triploid Grass Carp. Since 2015, only a small amount of emergent vegetation (< 1% of reservoir surface area) has persisted.

Creel: Similar to 2006, directed angling effort was highest for black basses (86%), followed by anglers fishing for crappies (13%) (Table 8). In 2006, 15% of total effort was directed at sunfishes, but no directed effort was observed in 2018. Total angling effort for all species and direct expenditures decreased from the previous survey (Table 9).

Prey species: Primary prey species include Threadfin Shad, Gizzard Shad, and Bluegill. Electrofishing catch rates of Gizzard Shad increased over the last three surveys (22.0, 74.0, and 132.0/h in 2008, 2012, and 2017, respectively) (Figure 2). Index of Vulnerability (IOV) was 26 in 2017 and similar 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 (Table 10).

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. Few anglers targeted catfishes (1% of directed effort) (Table 8) and only 36 Channel Catfish were estimated as harvested (Table 11).

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

Black basses: Electrofishing catch rates of Spotted Bass have been historically low ($< 20.0/h$). Fall electrofishing catch rates increased to 38.0 and 76.0/h in 2012 and 2017, respectively (Figure 4). Nearly all fish were ≤ 12 inches in length.

Fall electrofishing catch rates from the previous three surveys reflect an abundant and stable Largemouth Bass population (range = 117.0 to 155.0/h) (Figure 5). Size structure was adequate as PSD ranged from 46 to 58. Growth and body condition was acceptable. Largemouth Bass average age at 14 inches (13.0 to 14.9 inches) was 2.5 years ($N = 13$; range = 1 – 4 years), and relative weights were above 85 for most size classes. Similar to fall surveys, spring electrofishing catch rates also suggest an abundant Largemouth Bass population (217.0 and 153.0/h in 2016 and 2018, respectively) with desirable size structure. Proportionally more quality-sized fish were collected when compared to fall surveys, as PSD was higher and ranged from 77 to 80.

Directed fishing effort for black basses in 2018 declined (4.4 h/acre) from 2006 (6.9 h/acre), but catch per hour increased (0.4/h in 2006; 0.7/h in 2018) (Table 11). Total harvest was low and similar among years (≤ 250 fish). In 2018, an estimated 143 Spotted Bass (Figure 7) and 107 Largemouth Bass (Figure 8) were harvested. Most legal-length black basses were released (94% both years) (Table 12). In 2018, an estimated 369 fish ≥ 4 pounds were caught (46 fish ≥ 7 pounds).

Crappies: During past surveys, trap nets have not been effective at capturing crappie at Houston County Reservoir. Surveys were discontinued in 2017. In 2018, the crappie fishery was the second most popular (13% of total angler effort) (Table 8). When compared to 2006, directed effort, angler catch rate, and harvest in 2018 all declined (Table 13).

Fisheries Management Plan for Houston County Reservoir, Texas

Prepared – July 2018

ISSUE 1: Creel surveys indicate most angling effort at Houston County Reservoir is for Largemouth Bass. 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, anecdotal information from anglers indicate that catch of trophy Largemouth Bass (≥ 8 pounds) has declined in recent years.

MANAGEMENT STRATEGIES

1. Continue to manage Largemouth Bass harvest with a 14-21 inch slot limit to maintain angling quality.
2. Continue collecting angler catch of trophy Largemouth Bass from the Houston County Lake Tournaments Facebook group and Crockett Family Resort to justify FLMB stockings.
3. Conduct annual stockings of FLMB to maximize trophy fish abundance.

ISSUE 2: Hydrilla coverage in Houston County Reservoir has exceeded 25% and prompted complaints from lakeside homeowners. Although hydrilla was eradicated via a 2011 herbicide treatment and Grass Carp stocking, coverage will likely return and again cause public complaints.

MANAGEMENT STRATEGIES

1. If hydrilla coverage returns, 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.
3. Deploy plastic fish attractors to compensate for the current lack of aquatic vegetation and increase angling success.

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 through the use of 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 (2018–2022)

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 14.

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 or White Bass, but both fisheries will be monitored via spring quarter creel surveys (2022, and every four years thereafter) directed at the Largemouth Bass fishery.

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 in 2007, 2010, 2011, 2016, and 2018 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 (2021, and every four years thereafter) and spring (biennially, 2020 and 2022) 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 2022 (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 Houston County Lake Tournaments Facebook group and Crockett Family Resort to document trends of trophy bass abundance and justify FLMB stockings.

Average age of Largemouth Bass between 13.0 and 14.9 inches (Category 2; $N = 13$) will be estimated in 2021, and every four years thereafter. If growth problems are detected from this cursory estimate, mean length-at-age will be estimated from a random population sample of 400 fish > 6 inches, subsampled at 10 fish per 0.4-inch strata (Category 4).

Crappies: The crappie fishery accounts for approximately 10% of the annual angling effort. Historically, trap netting resulted in low catch rates. Beginning in 2017, trap net sampling was discontinued. 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; $RSE-S \leq 25$). Largemouth Bass body condition (fish ≥ 8 " TL) will be used to provide additional information on forage abundance and vulnerability.

Habitat: Historically, hydrilla has exceeded 25% of the reservoir surface area, prompting complaints from lakeside homeowners. In recent years, water hyacinth coverage has expanded to 10-15 acres, requiring annual herbicide treatments. Aquatic vegetation will be monitored annually to document trends in abundance and recommend appropriate management strategies.

Literature Cited

- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- DiCenzo, V. J., M. J. Maceina, and M. R. Stimpert. 1996. Relations between reservoir trophic state and Gizzard Shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.
- Guy, C. S., R. M. Neumann, D. W. Willis, and R. O. Anderson. 2007. Proportional size distribution (PSD): a further refinement of population size structure index terminology. Fisheries 32(7): 348.
- Homer, M., and M. Webb. 2013. Statewide freshwater fisheries monitoring and management program survey report for Houston County Reservoir, 2012. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.
- Texas Commission on Environmental Quality. 2018. Trophic classification of Texas reservoirs. 2016 Texas Water Quality Inventory and 303 (d) List, Austin. 15 pp.
- United States Geological Society (USGS). 2018. National water information system: Web interface. Available: <http://waterdata.usgs.gov/tx/nwis> (May 2018).

Tables and Figures

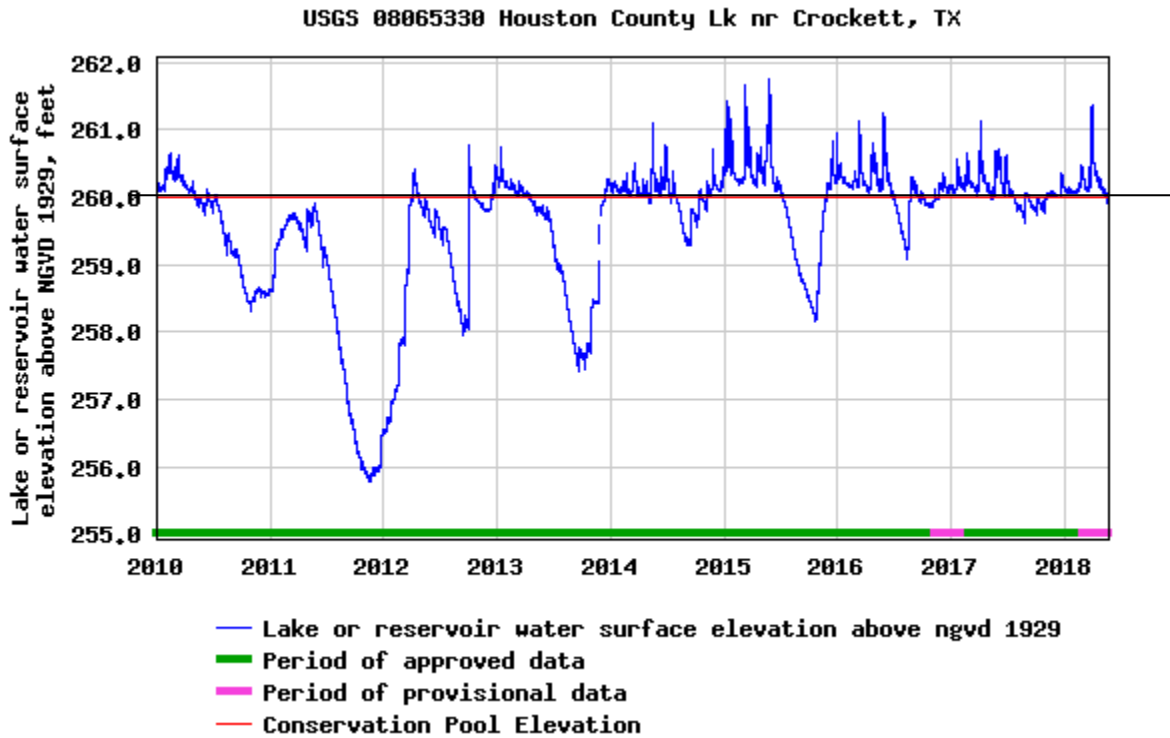


Figure 1. U.S. Geological Survey daily water level elevations in feet above mean sea level recorded for Houston County Reservoir, Texas.

Table 1. Characteristics of Houston County Reservoir, Texas.

Characteristic	Description
Year constructed	1966
Controlling authority	Houston County Water Conservation and Improvement District #1
County	Houston
Reservoir type	Tributary – Little Elkhart Creek
Shoreline Development Index	4.60
Conductivity	120 μ S/cm

Table 2. Boat ramp characteristics for Houston County Reservoir, Texas, August, 2017. 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)	12-inch minimum
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. FGL = fingerling; AFGL = advance fingerling; UNK = unknown.

Species	Year	Number	Size
Black Crappie	1967	2,000	UNK
Channel Catfish	1967	5,000	AFGL
	1973	26,221	AFGL
	1986	<u>75,112</u>	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	<u>135,370</u>	FGL
	Total	762,095	
Green x Redear Sunfish	1967	2,000	UNK
	1971	<u>8,000</u>	UNK
	Total	10,000	
Kemp's Largemouth Bass	1985	34,735	FGL
	1986	<u>62,630</u>	FGL
	Total	97,365	
Northern Pike	1972	200	UNK
Palmetto Bass	1979	14,500	UNK

Table 5. Objective-based sampling plan components for Houston County Reservoir, Texas 2017–2018.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
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	

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

Table 6. Survey of structural habitat types, Houston County Reservoir, Texas, 2012. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Bulkhead with boat docks	11.0 miles	41.3
Natural	14.4 miles	54.1
Rip-rap	1.2 miles	4.5
Standing timber	816.0 acres	53.6

Table 7. Survey of aquatic vegetation, Houston County Reservoir, Texas, 2009–2017. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2009	2012	2015	2016	2017
Native submersed	94.1 (6.2)	72.4 (4.8)	0	0	0
Native floating-leaved	Trace	63.8 (4.2)	0	0	0
Native emergent	3.3 (0.2)	1.2 (0.1)	0	5.5 (0.4)	6.0 (0.4)
Non-native					
Hydrilla	410.3 (26.9)	Trace	0	0	0
Water hyacinth	Trace	Trace	15.0 (1.0)	2.0 (0.1)	Trace

Table 8. Percent directed angler effort by species for Houston County Reservoir, Texas, 2006 and 2018. Survey periods were from 1 March through 31 May.

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

Table 9. Total fishing effort (h) for all species and total directed expenditures at Houston County Reservoir, Texas, 2006 and 2018. Survey periods were from 1 March through 31 May. Relative standard error is in parentheses.

Creel statistic	2006	2018
Total fishing effort	14,423 (32)	7,741 (35)
Total directed expenditures	\$114,857 (72)	\$41,879 (55)

Gizzard Shad

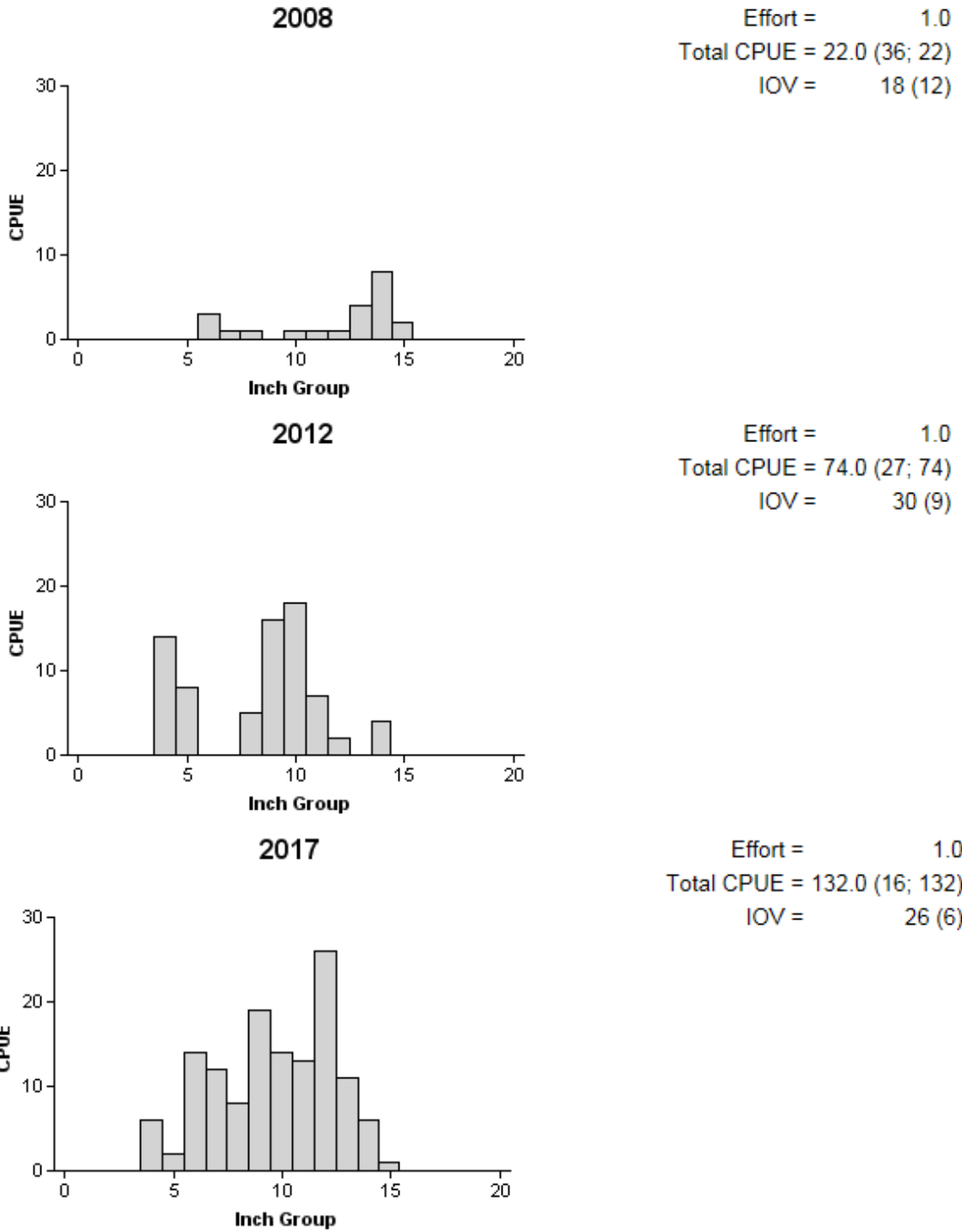


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Houston County Reservoir, Texas, 2008, 2012, and 2017.

Bluegill

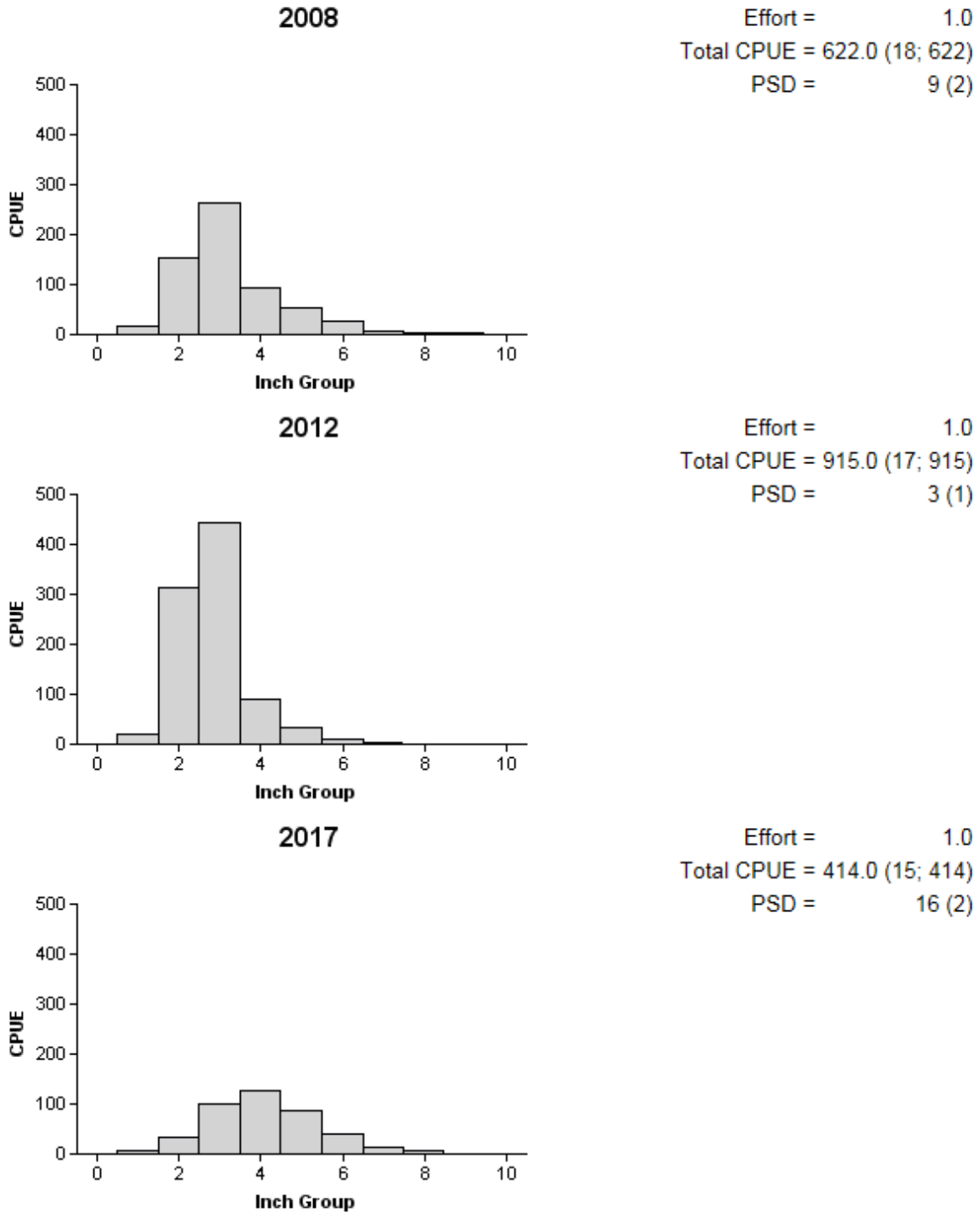


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Houston County Reservoir, Texas, 2008, 2012, and 2017.

Table 10. Creel survey statistics for sunfishes at Houston County Reservoir, Texas, from March through May, 2006 and 2018. 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
Surface area (acres)	1,523	1,523
Directed effort (h)	2,148.09 (62)	0.00
Directed effort/acre	1.41 (62)	0.00
Total catch per hour	2.86 (81)	
Total harvest	7,097.00 (69)	0.00
Harvest/acre	4.66 (69)	0.00
Percent legal released	0.0	

Table 11. Creel survey statistics for catfishes at Houston County Reservoir, Texas, from March through May, 2006 and 2018. 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
Surface area (acres)	1,523	1,523
Directed effort (h)	0.00	97.73 (139)
Directed effort/acre	0.00	0.06 (139)
Total catch per hour		0.25 (.)
Total harvest	0.00	36.00 (329)
Harvest/acre	0.00	0.02 (329)
Percent legal released		51.7

Spotted Bass

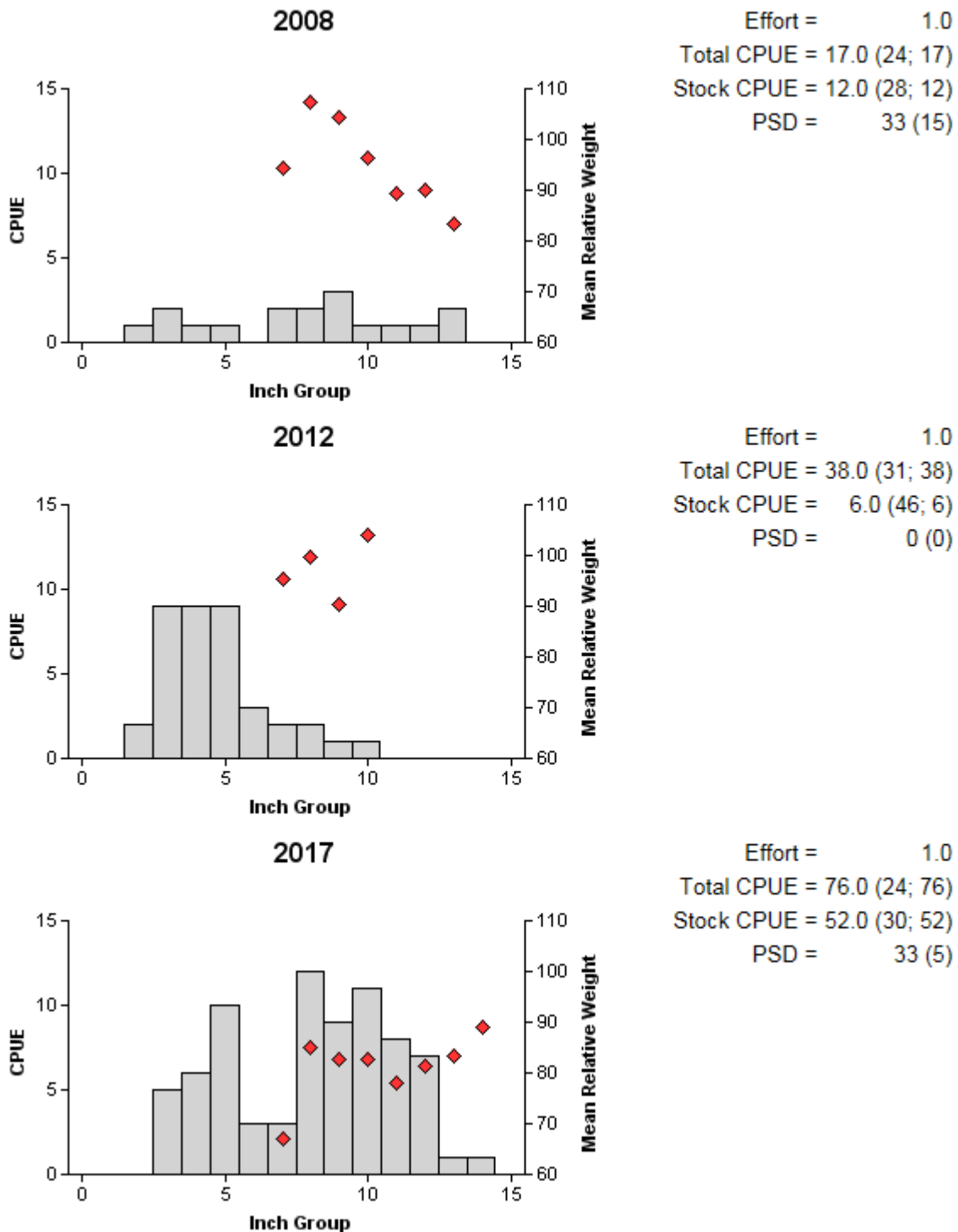


Figure 4. Number of Spotted Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Houston County Reservoir, Texas, 2008, 2012, and 2017.

Largemouth Bass

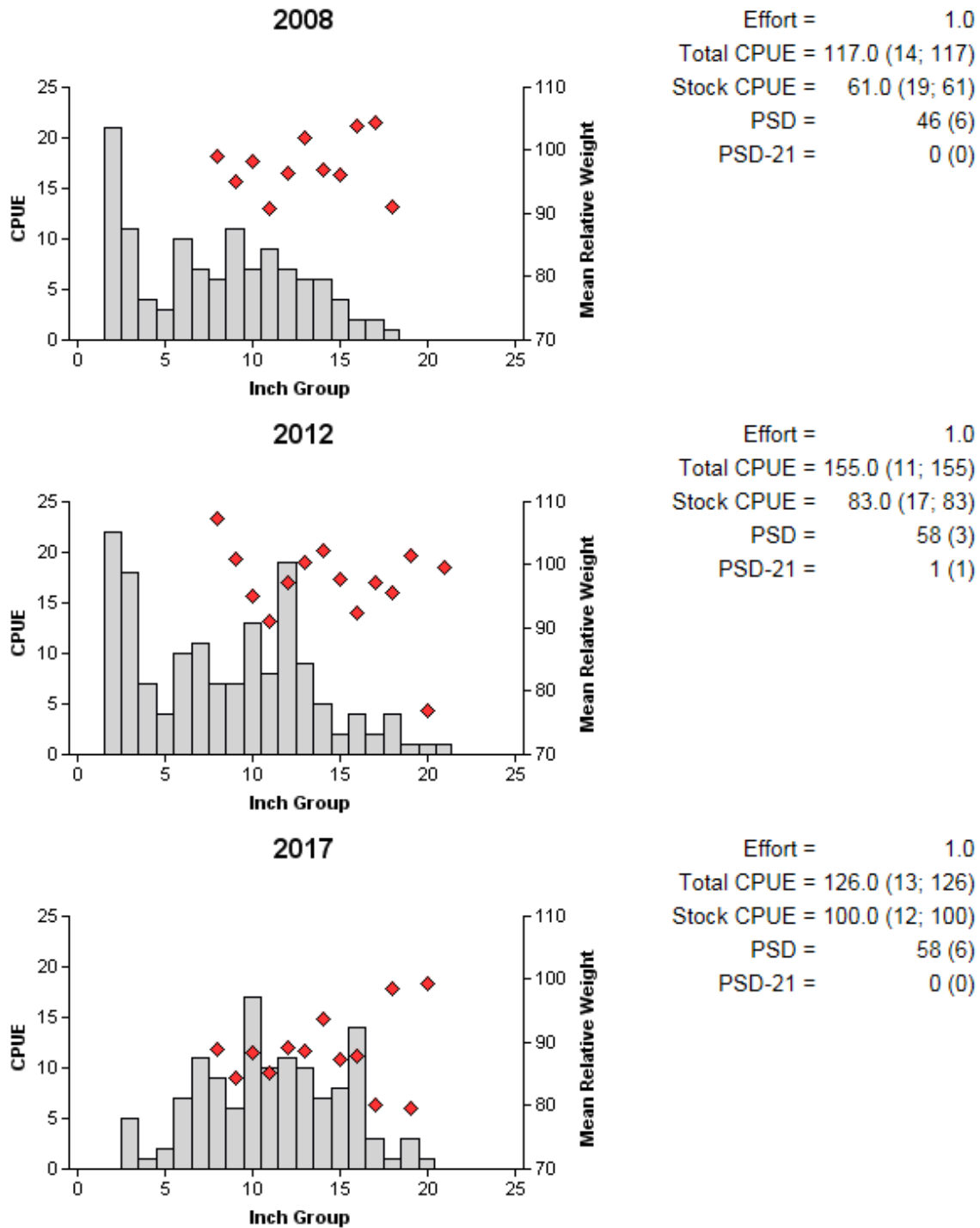


Figure 5. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Houston County Reservoir, Texas, 2008, 2012, and 2017.

Largemouth Bass

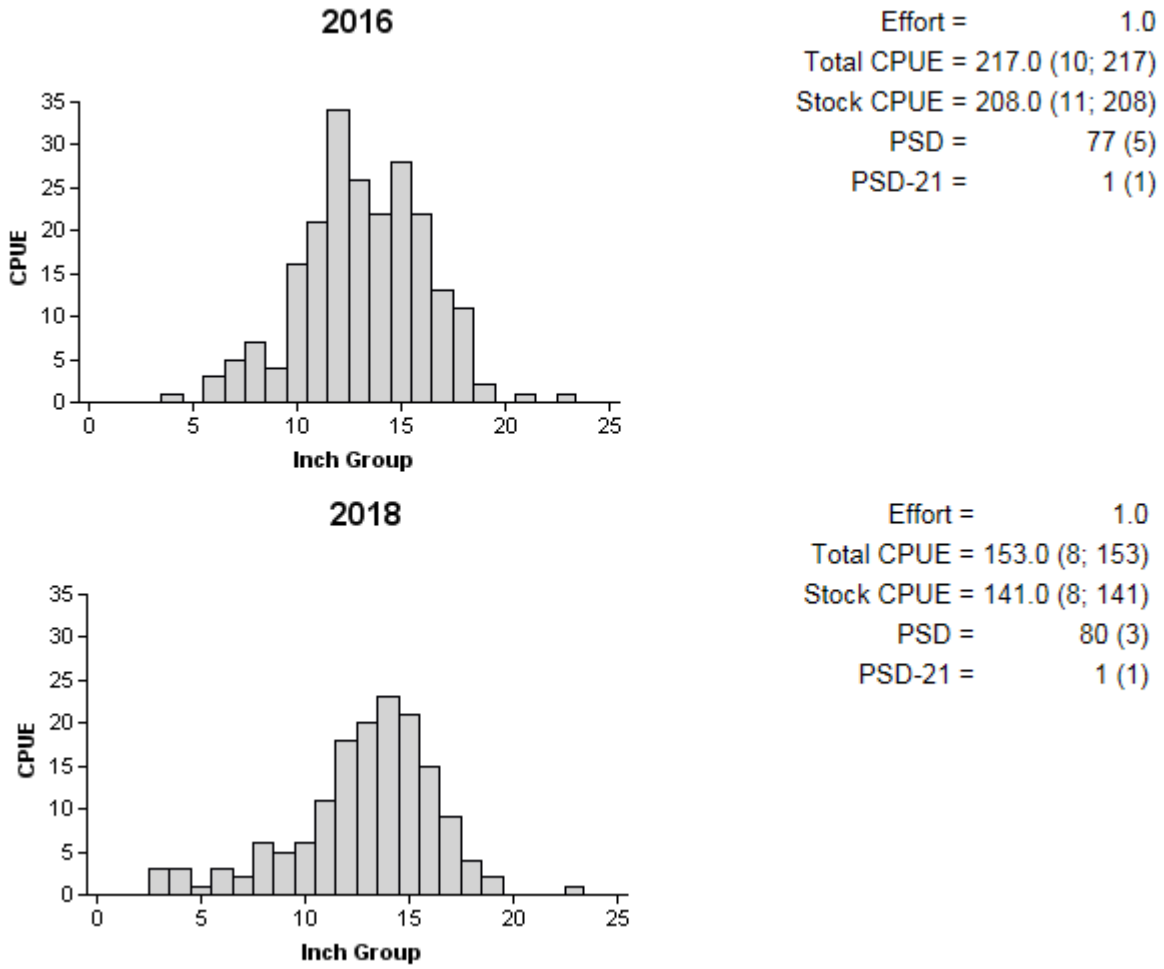


Figure 6. Number of Largemouth Bass caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring electrofishing surveys, Houston County Reservoir, Texas, 2016 and 2018.

Table 12. Creel survey statistics for black basses at Houston County Reservoir, Texas, from March through May, 2006 and 2018. 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 released by weight category is for anglers targeting black basses. Relative standard errors (RSE) are in parentheses.

Statistic	2006	2018
Surface area (acres)	1,523	1,523
Directed angling effort (h)		
Tournament	0	0
Non-tournament	10,536 (35)	6,652 (35)
All black bass anglers combined	10,536 (35)	6,652 (35)
Angling effort/acre	6.9 (35)	4.4 (35)
Catch rate (number/h)	0.4 (33)	0.7 (19)
Harvest		
Non-tournament harvest	118 (145)	250 (111)
Harvest/acre	0.1 (145)	0.2 (111)
Tournament weigh-in and release	0	0
Release by weight		
<4.0 lbs		5,806 (42)
4.0-6.9 lbs		323 (75)
7.0-9.9 lbs		46 (175)
≥10.0 lbs		0
Percent legal released (non-tournament)	93.8	94.0

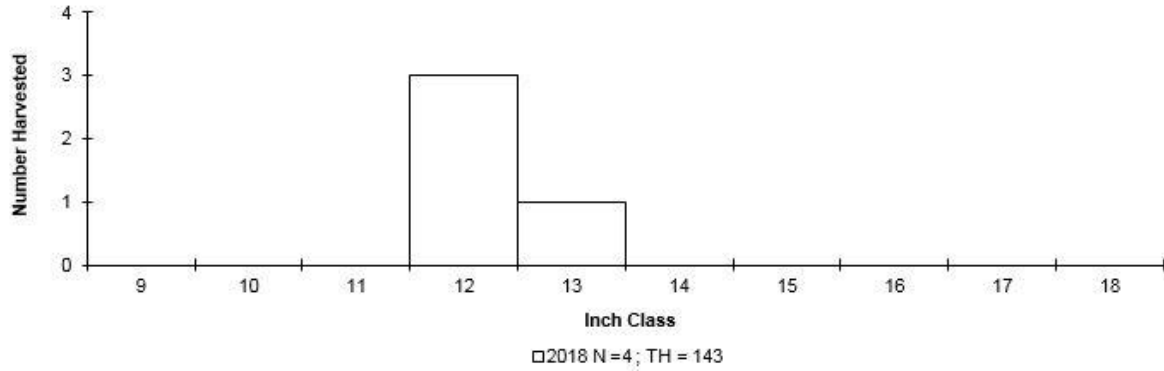


Figure 7. Length frequency of harvested Spotted Bass observed during creel surveys at Houston County Reservoir, Texas, March through May 2018, all anglers combined. N is the number of harvested Spotted Bass observed during creel surveys, and TH is the estimated non-tournament harvest for the creel period.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

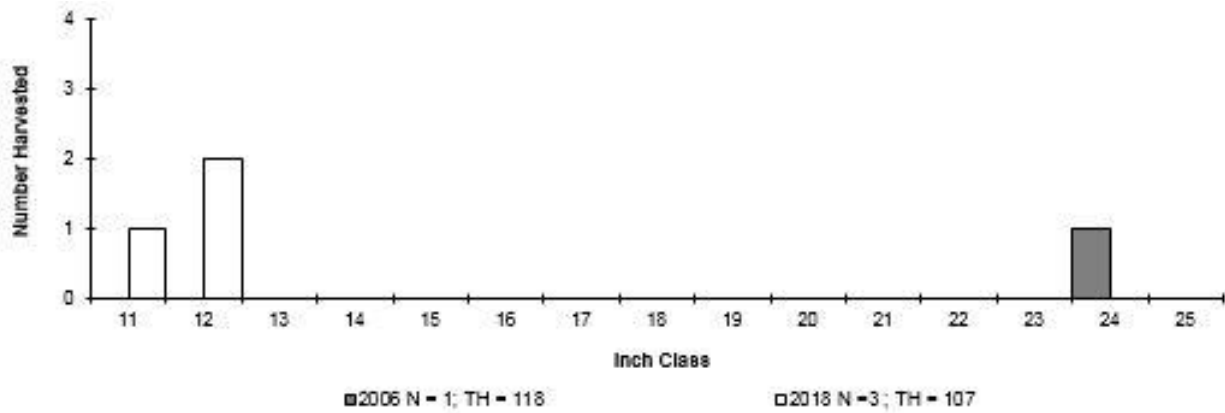


Figure 8. Length frequency of non-tournament harvested Largemouth Bass observed during creel surveys at Houston County Reservoir, Texas, March through May, 2006 and 2018, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and NTH is the estimated non-tournament harvest for the creel period.

Table 13. Creel survey statistics for crappies at Houston County Reservoir, Texas, from March through May, 2006 and 2018. 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
Surface area (acres)	1,523	1,523
Directed effort (h)	1,534.35 (72)	991.60 (53)
Directed effort/acre	1.01 (72)	0.65 (53)
Total catch per hour	2.73 (77)	1.08 (76)
Total harvest	2,957.00 (95)	1,574.00 (78)
Harvest/acre	1.94 (95)	1.03 (78)
Percent legal released	3.4	0.0

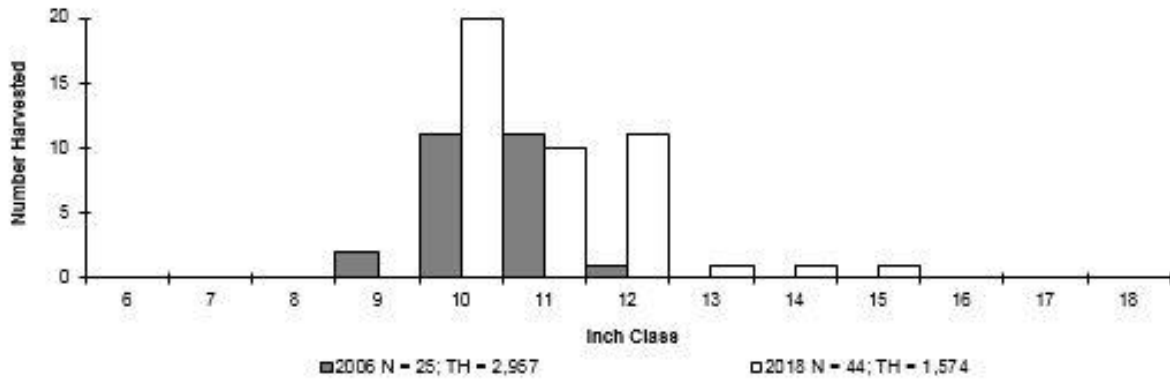


Figure 9. Length frequency of harvested crappies observed during creel surveys at Houston County Reservoir, Texas, March through May, 2006 and 2018, all anglers combined. N is the number of harvested crappies observed during creel surveys, and TH is the total estimated harvest for the creel period.

Proposed Sampling Schedule

Table 14. Proposed sampling schedule for Houston County Reservoir, Texas. Survey period is June through May. Electrofishing surveys are conducted in the fall and spring. Standard survey denoted by S and additional survey denoted by A.

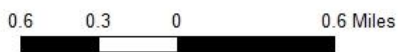
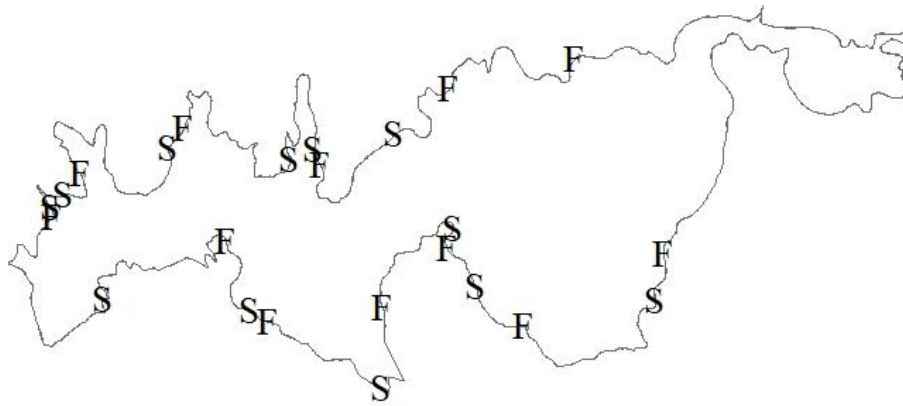
	Survey year			
	2018-2019	2019-2020	2020-2021	2021-2022
Angler Access				S
Vegetation	A	A	A	S
Electrofishing – Fall				S
Electrofishing – Spring		A		A
Creel survey				A
Report				S

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, 2017-2018. Sampling effort was 1 hour for fall and spring electrofishing.

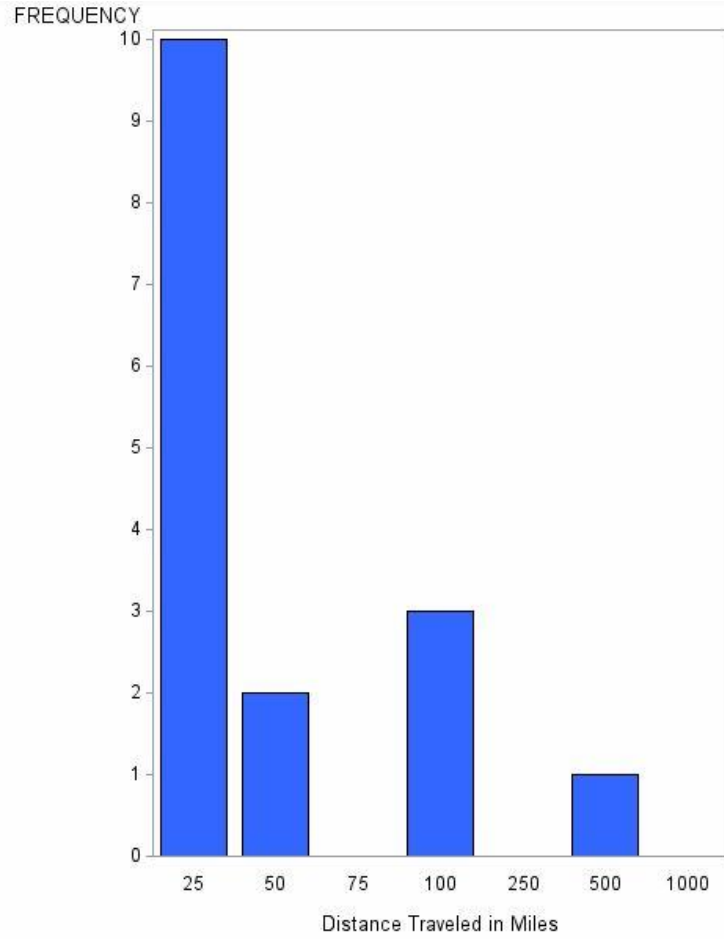
Species	Fall Electrofishing		Spring Electrofishing	
	N	CPUE	N	CPUE
Gizzard Shad	132	132.0 (16)		
Threadfin Shad	4,734	4734.0 (34)		
Warmouth	1	1.0 (100)		
Bluegill	414	414.0 (15)		
Longear Sunfish	7	7.0 (49)		
Redear Sunfish	36	36.0 (23)		
Redspotted Sunfish	1	1.0 (100)		
Spotted Bass	76	76.0 (24)		
Largemouth Bass	126	126.0 (13)	153	153.0 (8)

APPENDIX B – Map of sampling locations



Location of sampling sites, Houston County Reservoir, Texas, 2017-2018. Fall 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 2018 creel survey.



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