Sheldon Lake Reservoir

2019 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 Sheldon Reservoir were surveyed in 2019 using electrofishing. Historical data are presented with the 2019 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: Sheldon Reservoir is a 1,229-acre reservoir in Sheldon Lake State Park on Culpepper Bayou in Harris County, Texas. The reservoir has a drainage area of 4 square miles and a shoreline length of 13.1 miles. The reservoir has a mean depth of 3 feet and a maximum depth of 20 feet. Sheldon Reservoir is a highly productive wetland ecosystem that hosts a diverse community of fish and wildlife species that attract anglers, boaters, and wildlife viewers from across the state.

Management History: Sheldon Reservoir is a highly productive, shallow reservoir. Cypress trees and diverse wildlife make it a popular place for kayaking, birding, and fishing in a coastal wetland environment. It offers unusual fisheries – such as Bowfin and the occasional Grass Pickerel – and traditional fisheries for Largemouth Bass and panfish. However, excess vegetation has regularly caused access issues and much of the management history of Sheldon Reservoir focuses on reducing exotic vegetation and maintaining a balanced ecosystem that is accessible to visitors. The reservoir lies within Sheldon Lake State Park and many management decisions and actions are a cooperative effort with state park staff.

Fish Community

- **Prey species:** Gizzard Shad, Bluegill, and Redear Sunfish were collected in 2019 and catch rates were slightly higher than in 2015. Gizzard Shad were large, with few available to existing predators. Small-bodied Bluegill and Redear Sunfish were common and available as prey. Large Redear Sunfish were also observed, providing a possible target for panfish anglers.
- **Catfishes:** Blue Catfish and Channel Catfish are only present in Sheldon Reservoir as a put-grow-and-take fishery from occasional stockings of surplus fish. Blue Catfish fingerlings were last stocked in 2015, but no catfish of either species was collected in 2019.
- **Largemouth Bass:** Total and stock electrofishing catch rates of Largemouth Bass in 2019 were higher than in 2015. Fish were in good condition. Florida Largemouth Bass genetic influence has held steady since 2004, with 60-70% Florida influence. The lake record Largemouth Bass, caught in 2016, was 10.42 lbs and 25.88 inches.
- **Crappie:** Both Black Crappie and White Crappie were present in 2019.
- **Bowfin:** Bowfin support a popular fishery in Sheldon Reservoir and were collected in the 2019 electrofishing survey.

Management Strategies: The primary challenge at Sheldon Reservoir is aquatic vegetation management. Aquatic nuisance species surveys will be conducted annually, and efforts to inform the public about the negative impacts of aquatic invasive species and preventive measures will continue. Electrofishing and angler access surveys will be conducted every four years. The bowfin fishery will be advertised to anglers searching for bowfin fishing opportunities.

Introduction

This document is a summary of fisheries data collected from Sheldon Reservoir in 2019. 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 2019 data for comparison.

Reservoir Description

Sheldon Reservoir is a 1,229-acre reservoir on Culpepper Bayou in Harris County, Texas, lying within the Sheldon Wildlife Management Area and Sheldon Lake State Park. Sheldon Reservoir is a highly productive wetland ecosystem with large, established cypress trees, a variety of aquatic and riparian plant species, and hosts a diverse community of fish and wildlife species that attract anglers, boaters, and wildlife viewers from across the state. The reservoir has a drainage area of 4.0 square miles, a shoreline length of 13.1 miles, and a Shoreline Development Index of 2.7. The reservoir has a mean depth of 3 feet and a maximum depth of 20 feet. Rainfall in the watershed averages 42.6 inches per year. Sheldon Reservoir is found within the Gulf Coast Plains Land Resource Area with Lake Charles/Benard Association (clay) soil types. Land uses around the reservoir are primarily industrial and residential. Other descriptive characteristics for Sheldon Reservoir are presented in Table 1.

Angler Access

Sheldon Reservoir has one boat ramp (Table 2). The ramp is steep and has inadequate parking. Plans are underway to replace the ramp when funding is available. Public shoreline access is good; however, all existing fishing piers are in disrepair, and many have been closed to the public for safety reasons and are being dismantled or rebuilt.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Best et al. 2016) included:

1. Conduct Aquatic Nuisance Species (ANS) annual surveys, coordinate with Aquatic Habitat Enhancement (AHE) team for necessary treatments, and provide public education about the threat of invasive species in Texas.

   Action: ANS surveys were conducted annually to monitor giant salvinia, water hyacinth, and other ANS species. The AHE team treated nuisance vegetation through 41 herbicide applications in 2016-2019. Signage and pavement decals were installed at the boat ramp at Sheldon Reservoir.

2. Work with TPWD State Parks and Infrastructure staffs to develop better access, including a new boat ramp, new and repaired fishing piers, and navigational channel dredging to improve boating access throughout the reservoir.

   Action: No action was taken due to funding limitations

3. Stock Channel Catfish and Blue Catfish when available for a put, grow, and take fishery.

   Action: Channel Catfish and Blue Catfish were not available for stocking at Sheldon Reservoir.

4. Major droughts, such as the one in 2012, heavily impact Sheldon Reservoir which is less than 3 feet deep in many places. Investigate ability to obtain water rights for Sheldon Reservoir to ensure adequate water supply during future dry periods.

Action: No funding was available to pursue water rights acquisitions.

5. Support the formation and growth of a Friends of Reservoir Chapter or a local bass fishing club at Sheldon Reservoir.

   Action: Public interest for a Friends of Reservoir chapter or local bass fishing club was lacking.

Harvest regulation history: Sheldon Reservoir falls completely within Sheldon Lake State Park and is therefore managed as a Community Fishing Lake (CFL). All CFLs abide by statewide regulations for all sport fishes except for Channel Catfish (*Ictalurus punctatus*) and Blue Catfish *(I. furcatus*), which are managed with a combined 5-fish daily bag and no size limit. Fishing is by pole-and-line only. Being within a state park, no fishing license is required. Current regulations are presented in Table 3.

Stocking history: The most recent stockings at Sheldon Reservoir include Blue Catfish in 2015 and Florida Largemouth Bass (*Micropterus salmoides Floridanus*) in 2015, 2019, and 2020. The complete stocking history is presented in Table 4.

Vegetation/habitat management history: Sheldon Reservoir has natural woody and brushy shoreline habitat with a highly productive mixed aquatic plant community of both native and non-native species (Table 5 and Table 6). Hydrilla (*Hydrilla verticillata)*, giant salvinia (*Salvinia molesta)*, and water hyacinth *(Eichhornia crassipes)* have all been problematic at times and continue to impede access. From 2016-2019 the AHE team used a variety of herbicides to treat water hyacinth, giant salvinia, and alligator weed over 42 treatments. Annual treatment summaries may be found in Table 7. Regular herbicide treatments have been successful in recent years and will require ongoing, regular treatment to control nuisance species.

Water transfer: Sheldon Reservoir serves as wildlife habitat and as a State Park recreational lake. Very rarely is there any discharge from the reservoir. If any discharge occurs during flood events, the water enters the Houston area bayou drainage system leading to the Houston Ship Channel. Currently no interbasin transfer exists.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Sheldon Reservoir. Primary components of the OBS plan are listed in Table 8. 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 (Lepomis spp.), Gizzard Shad (*Dorsoma cepedianum*), Threadfin Shad (*D. petenense*), and all other fish species were collected by daytime, fall electrofishing (1 hour at 12, 5-min stations). The 2016 OBS plan called for up to 24 stations to be sampled until 50 stock sized fish were collected; however, excess hydrilla growth prevented access to much of the reservoir and limited the survey to 12 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 all available fish ranging from 13.0 to 14.9 inches (N=6). Total number of fish for each species was recorded. Lengths and weights were collected for Largemouth Bass and catfishes; and lengths were collected for Threadfin Shad, Gizzard Shad, and sunfish species.

Genetics – Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017). Micro-satellite DNA analysis was used to determine genetic composition of individual fish since 2005 Electrophoresis analysis was used prior to 2005.

Statistics – Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight (W_r)] were calculated for target fishes according to 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.

Habitat – A structural habitat survey was conducted in 2019. Aquatic Nuisance Species vegetation surveys were conducted annually 2015 – 2019, and a comprehensive vegetation survey of all species was conducted in 2019. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2017). Vegetation types at Sheldon Reservoir are highly mixed and estimates of native and non-native vegetation were independent; thus, percentage cover sums to more than 100%.

Results and Discussion

Habitat: Structural shoreline habitat has not changed in recent years and consisted primarily of non-descript, natural shoreline with overhanging brush (Table 5). Native and exotic vegetation were present in mixed communities over much of the reservoir's surface. Hydrilla was widespread and limited access to much of the reservoir. Native floating-leaved and emergent species have increased since the 2015 survey, but so have giant salvinia, hydrilla, and water hyacinth. Trace amounts of Asian marshweed (*Limnophila sessiliflora*) were observed for the first time since 2009, when it was observed and treated with Sonar herbicide. Between 2016 and summer of 2020, the AHE team treated 533 acres of exotic vegetation over 42 treatments with a variety of herbicides with the goal of maintaining open boat lanes (Table 7).

Prey species: Electrofishing catch rates of Gizzard Shad, Bluegill, and Redear Sunfish were 16.0/h, 27.0/h, and 96.0/h respectively. Total CPUE of Gizzard Shad was slightly increased from 2015 but were lower than 2012 rates. Index of Vulnerability (IOV) for Gizzard Shad was very poor, indicating that no small-bodied Gizzard Shad were available to predators (Figure 1). Similar to Gizzard Shad, total CPUE of Bluegill and Redear Sunfish in 2019 was higher than total CPUE in 2015 (21.0/h and 81.5/h, Figures 2 and Figure 3). Bluegill size structure continued to be dominated by small individuals. Threadfin shad are uncommon in Sheldon reservoir; a single fish was collected in 2019 (Appendix A)

Catfish: Historically, catfishes have been poorly represented in gill net surveys (Webb and Homer 2013). Gill net sampling was discontinued under the OBS plan in 2015 due to historically low success, alligator and bird by-catch risks, and difficulty finding suitable depths to set gill nets. No catfish were observed during the 2019 electrofishing survey.

Largemouth Bass: Total Largemouth Bass electrofishing CPUE in 2019 was 99.0/h, an increase from the 2015 catch rate (58.5/h) but lower than the 2012 catch rate (147.0/h, Figure 4). However, stock-sized Largemouth Bass CPUE in 2019 was 41.0/h, an increase from both 2015 (19.0/h) and 2012 (30.0/h). The size distribution of Largemouth Bass was biased toward smaller individuals with a PSD of 39 (Guy et al. 2007). Body condition in 2019 was excellent (W_r > 100) for nearly all size classes of fish. Florida

Largemouth Bass influence was 64% and has remained relatively constant since 2004 with a range from 60% to 68%. No pure Florida or northern genotypes were present in any of the fish sampled in 2019. Only 6 bass were collected within the size range for age determination (13.0-14.9 inches) and most of those fish reached legal-size at 2 years old.

Crappie: Trap netting was removed in 2015 under the OBS sampling protocol; however, persistence of Black Crappie (*Pomoxis nigromaculatus*) and White Crappie (*P. annularis*) were documented in the electrofishing survey (Appendix A).

Bowfin: Bowfin (*Amia calva*) are present in Sheldon Reservoir, and anecdotal reports indicate the reservoir is a popular location for anglers targeting Bowfin. Although Bowfin are typically poorly represented in electrofishing surveys (due to the species' preference for dense vegetation), they were documented in the 2015 and 2019 electrofishing surveys (Appendix A, Best et al. 2016).

Fisheries Management Plan for Sheldon Reservoir, Texas

Prepared – July 2020

ISSUE 1: Access to Sheldon Reservoir is limited due to heavy infestations of exotic vegetation and infrastructure improvement needs.

MANAGEMENT STRATEGY

1. Continue to treat problematic plant species with appropriate herbicide. Ensure shoreline access to deep water remains open to anglers along the levee. Create boat lanes and large areas clear of invasive vegetation to improved boat access to the flats in the northern portion of the reservoir.
2. Continue to work with TPWD State Parks and Infrastructure staffs to develop better access infrastructure, including a new boat ramp, new and repaired fishing piers, and dredging boat lanes to improve boating access.

ISSUE 2: Catfishes are popular sport fish in Houston and anecdotal reports indicate that anglers target catfish on Sheldon Reservoir. Fisheries for Blue Catfish and Channel Catfish have existed in the reservoir after regular stockings of Channel Catfish from 1972 to 2005. Recently stockings have been opportunistic from surplus Blue Catfish including Blue Catfish fingerlings in 2015, but natural recruitment is low.

MANAGEMENT STRATEGIES

1. Request 9-inch Channel Catfish and surplus Channel Catfish and Blue Catfish to support a put, grow, and take fishery.
2. If stockings occur, notify the public through traditional and social media outlets.
3. Install catfish spawning structures to encourage natural reproduction and recruitment of catfish.

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches, and

plugging engine cooling systems. Giant salvinia 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, literature, etc… 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. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

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

Sport fish, forage fish, and other important fishes

Sport fishes in Sheldon Reservoir include Largemouth Bass, Blue Catfish, and Channel Catfish and known important forage species include Bluegill and Redear Sunfish.

Negligible fisheries

Catfish: Blue Catfish and Channel Catfish are present in Sheldon Reservoir as a put-grow-take fishery. High levels of submersed aquatic vegetation make angling for catfish difficult and limit the effectiveness of gill nets for surveys. From 2005-2013 total gillnet CPUE for Channel Catfish ranged from 0.4-2.4/nn and total CPUE for Blue Catfish ranged from 0-1.4/nn. Sampling for this population using gill nets is unnecessary.

Crappie: White Crappie and Black Crappie have been present in Sheldon Reservoir in the past, but population abundance is extremely low and high levels of vegetation renders trap nets ineffective. Presence and absence of crappie species will be noted during electrofishing surveys in the fall of 2023.

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Largemouth Bass are believed to be the most popular sport fish in Sheldon Reservoir based on reports from State Park staff and social media posts by self-identified Sheldon Reservoir anglers. The popularity and reputation for quality Largemouth Bass fishing at this reservoir warrant sampling time and effort. Trend data on CPUE, size structure, and body condition have been collected every two to four years since 1986 with fall electrofishing.

Largemouth Bass will be surveyed with electrofishing every four years to continue trend monitoring of CPUE, size structure, and body condition. Due to reservoir size and occasionally high levels of invasive

vegetation, site accessibility can be limited. A minimum of 12, 5-min electrofishing sites will be sampled. If additional sites are accessible, sampling will continue at up to 24 sites until 50 stock-sized fish are collected and the RSE of CPUE-S is $\leq$ 25. No more than 24 sites will be surveyed. All sites will be randomly selected. Electrofishing will be conducted during daytime for improved safety and efficiency on this very shallow and heavily vegetated reservoir.

Largemouth Bass age and growth will be determined using otoliths from 13 fish between 13.1 and 14.9 inches in length to determine the age at which they become available for legal harvest (Category 2 evaluation, TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Prey Species: Bluegill and Redear Sunfish are the primary forage fish at Sheldon Reservoir and historic data has documented quality sized fish of both species large enough to provide sport fishing opportunities. Continuation of sampling, as per Largemouth Bass above, will allow for monitoring of large-scale changes in Bluegill and Redear Sunfish relative abundance and size. Threadfin shad are uncommon in Sheldon Reservoir and Gizzard Shad are not abundant; sampling effort for Largemouth Bass will be sufficient to determine presence or absence of Threadfin Shad and determine a CPUE and IOV for Gizzard Shad.

Largemouth Bass body condition will be used to provide additional information on forage abundance and vulnerability.

Habitat and Vegetation: Sheldon reservoir is highly productive with multiple native and exotic species of vegetation. Nuisance aquatic vegetation has created access issues numerous times in its history. Exotic vegetation surveys will be conducted annually to monitor abundance of exotic aquatic vegetation, guide treatment methods, and monitor access that may impact angling on the reservoir. The entire vegetation community and structural habitat will be surveyed once every four years to monitor native aquatic plant species and the vegetation community.

Literature Cited

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Tables and Figures

Table 1. Characteristics of Sheldon Reservoir, Texas.

Characteristic	Description
Year constructed	1958
Controlling authority	Texas Parks and Wildlife Department
County	Harris
Reservoir type	State Park Reservoir
Shoreline Development Index	2.7
Conductivity	80 µmhos/cm

Table 2. Boat ramp characteristics for Sheldon Reservoir, Texas, August 2019. Reservoir was full at time of survey.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Pineland Road	29.868455 - 95.168196	Y	10	45	Steep, inadequate parking

Table 3. Harvest regulations for Sheldon Reservoir, Texas.

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

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

Table 4. Stocking history of Sheldon Reservoir, Texas. FGL = fingerling; UNK = unknown size.

Year	Number	Size
Blue Catfish		
1972	4,800	UNK
1978	46,360	UNK
1983	89	UNK
2015	102,640	FGL
Species Total	153,889	
Channel Catfish		
1972	12,500	UNK
1976	34,640	UNK
1978	63,470	UNK
1978	27,184	UNK
1984	49,143	FGL
1984	29,289	FGL
1990	12,261	FGL
2004	1,968	FGL
2005	4,477	FGL
2005	4,057	FGL
2005	4,956	FGL
2005	4,418	FGL
Species Total	248,363	
Flathead Catfish		
1972	1,015	UNK
1983	25	UNK
Species Total	1,040	
Black Crappie		
1972	51,000	UNK
Species Total	51,000	
Warmouth		
1972	41,600	UNK
Species Total	41,600	
Redear Sunfish		
1983	107,800	UNK
Species Total	107,800	
Green X Redear Sunfish		
1972	50,000	UNK
1972	30,000	UNK
1976	24,365	UNK
1978	70,300	UNK
Species Total	174,665	
Largemouth Bass		
1972	73,000	UNK
1983	15,569	UNK
Species Total	88,569	
Florida Largemouth Bass		
1978	40,000	FGL
1978	80,000	FGL
1983	52,344	FGL
2015	123,045	FGL
2019	15,623	
2020	21,158	
Species Total	310,652	
Red Drum		
1976	246	UNK
Species Total	246	

Table 5. Survey of structural habitat types, Sheldon Reservoir, Texas, 2019.

Habitat type	Estimate	% of total
Asphalt or Concrete [a]	0.33 miles	2
Natural Shoreline with overhanging brush/Hydrilla	10.22 miles	61
Natural Shoreline with overhanging brush/Water hyacinth	3.85 miles	23
Natural Shoreline with overhanging brush/Native Emergent	2.29 miles	14

[a] Asphalt and concrete with natural slope.

Table 6. Survey of aquatic vegetation, Sheldon Reservoir, Texas, 2015–2019. All vegetation was surveyed in 2015 and 2019. Non-native vegetation was surveyed in 2016 and 2018; non-native vegetation surveys could not be conducted in 2017 due to hurricane activity. Surface area in acres is listed with percent of total reservoir surface area in parentheses. The area each vegetation species covered was measured independently and many overlapped, therefore the total vegetation reported here is greater than the total surface area of the reservoir.

Vegetation	2015	2016	2018	2019
Native submersed	653 (50.7)			
Native floating-leaved	328 (25.5)			525.2 (43.7)
Native emergent	307 (23.8)			890.5 (72.4)
Non-native				
Alligator weed (Tier II)*	669 (54.4)	587 (47.8)		0.1 (<0.1)
Arundo				49.9 (4.1)
Asian Marshweed				Trace
Giant salvinia (Tier II)*	208 (16.9)	697 (56.7)		382.8 (31.1)
Hydrilla (Tier II)*	167 (13.6)			656.0 (53.4)
Water hyacinth (Tier II)*	81 (6.6)	170 (13.8)	100 (8.1)	151.5 (12.3)

*Tier I is Immediate Response, Tier II is Maintenance Status, Tier III is Watch Status

Table 7. Annual summary of recent treatment efforts to control nuisance non-native vegetation on Sheldon Reservoir.

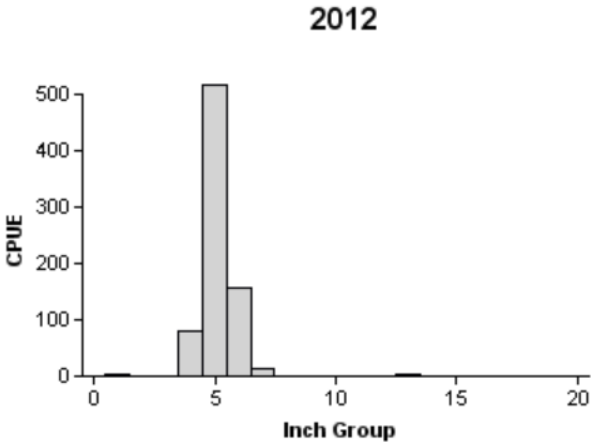
Year	Non-Native Target Species	Treatment	Number of treatments	Total Treatment Area
2016	Giant salvinia, water hyacinth, alligatorweed	Rodeo, Roundup Custom mix	5	100 acres
2017	Giant salvinia, water hyacinth	Weedar 64	1	38 acres
2018	Water hyacinth	Weedar 64, Tribune, Galleon SC/Clipper, Galleon SC/Tribune/ Clipper, AquaNeat/Clipper, Roundup Custom, Roundup Custom/AquaNeat	23	265 acres
2019	Giant salvinia, water hyacinth	Aquaneat/Clipper, Tribune, Tribune/Clipper	9	84 acres
2020	Giant salvinia, water hyacinth	Tribune/Clipper, Roundup Custom/Clipper	4	49 acres

Table 8. Objective-based sampling plan components for Sheldon Reservoir, Texas 2019.

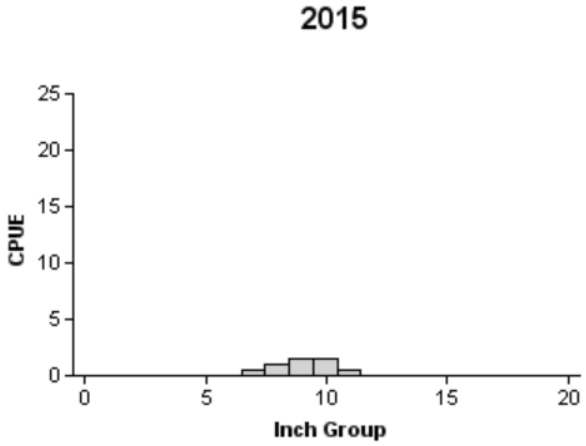
Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Abundance	CPUE – Stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Age-and-growth	Age at 14 inches	N = 13, 13.0 – 14.9 inches
	Condition	W_r	10 fish/inch group (max)
	Genetics	% FLMB	N = 30
Sunfish (Bluegill and Redear Sunfish) [a]	Abundance	CPUE – Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
Gizzard Shad [a]	Abundance	CPUE – Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
	Prey availability	IOV	N ≥ 50
Crappie [a]	Presence/Absence	CPUE	N ≥ 1
Blue Catfish [a]	Presence/Absence	CPUE	N ≥ 1
Channel Catfish [a]	Presence/Absence	CPUE	N ≥ 1

[a] No additional effort will be expended to achieve an RSE ≤ 25 for CPUE of sunfish species, 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.

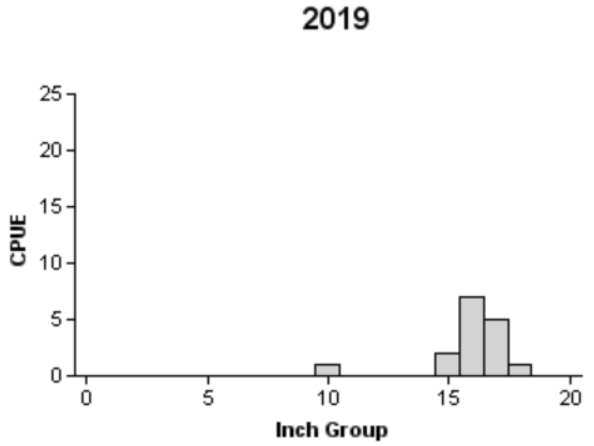
Gizzard Shad



Effort = 1.0
Total CPUE = 779.0 (21; 779)
IOV = 99 (1)



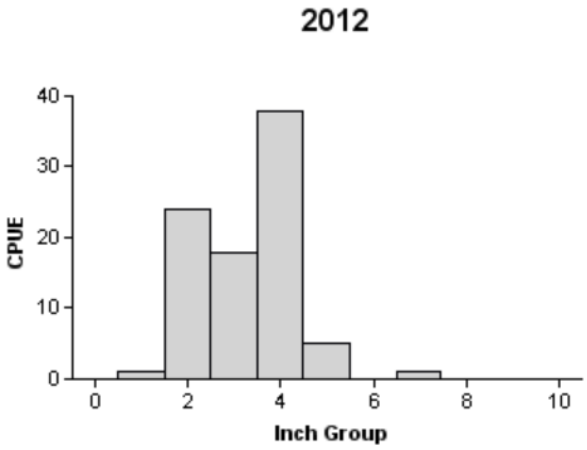
Effort = 2.0
Total CPUE = 5.0 (75; 10)
IOV = 10 (4)



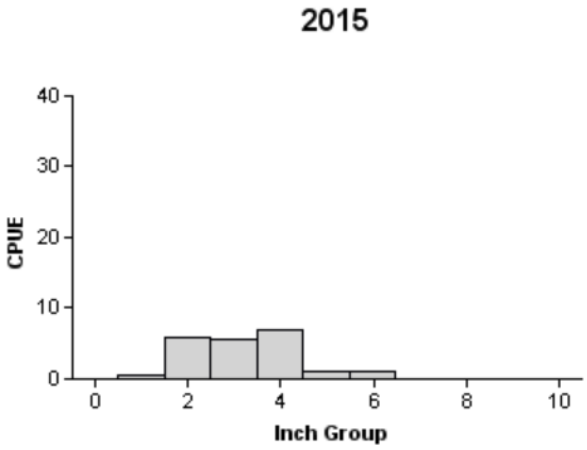
Effort = 1.0
Total CPUE = 16.0 (35; 16)
IOV = 0 (0)

Figure 1. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Sheldon Reservoir, Texas, 2012, 2015, and 2019.

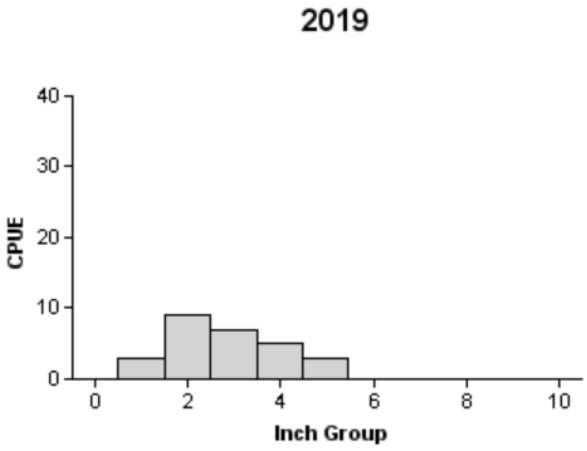
Bluegill



Effort = 1.0
Total CPUE = 87.0 (51; 87)
PSD = 2 (2)



Effort = 2.0
Total CPUE = 21.0 (40; 42)
PSD = 7 (5)



Effort = 1.0
Total CPUE = 27.0 (48; 27)
PSD = 0 (0)

Figure 2. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Sheldon Reservoir, Texas, 2012, 2015, and 2019.

Redear Sunfish

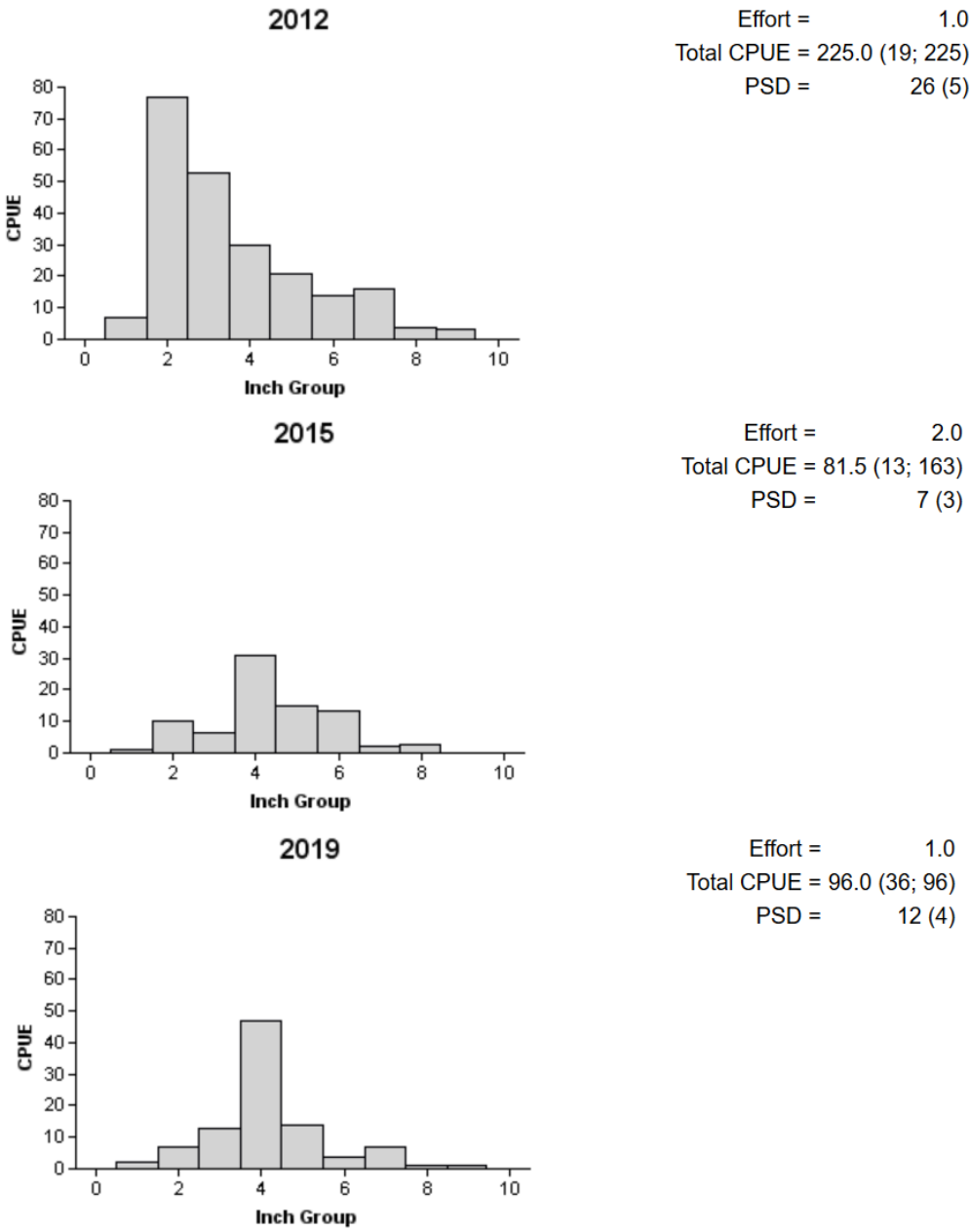


Figure 3. Number of Redear Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Sheldon Reservoir, Texas, 2012, 2015, and 2019.

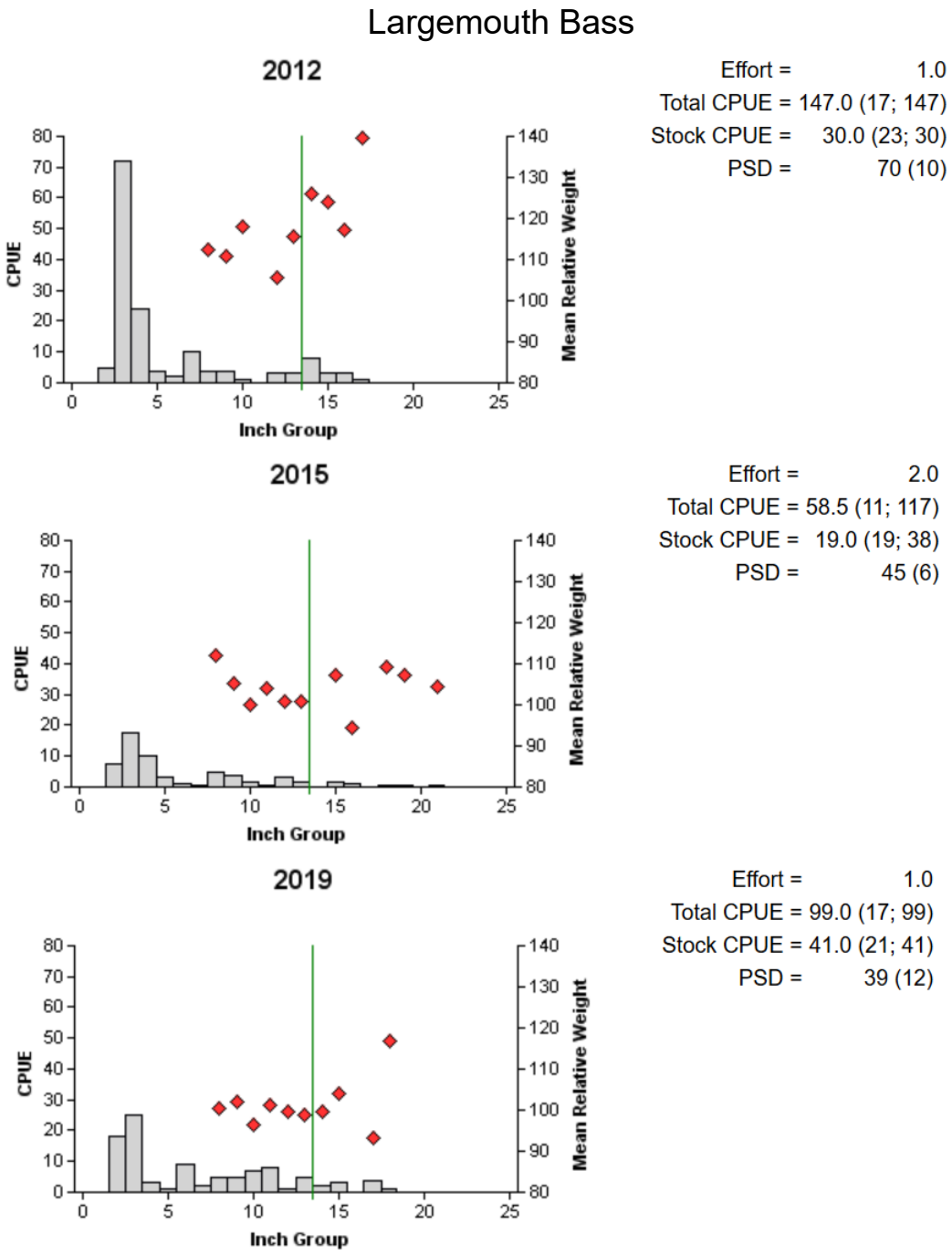


Figure 4. Number of Largemouth Bass caught per hour (CPUE) mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Sheldon Reservoir, Texas, 2012, 2015, and 2019. Vertical line indicates the 14-inch minimum length limit.

Table 9. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Sheldon Reservoir, Texas, 2004, 2012, 2015, and 2019. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

		Number of fish				
Year	Sample size	FLMB	Intergrade	NLMB	% FLMB alleles	% FLMB
2004	50	8	42	0	65.0	16.0
2012	30	1	29	0	60.0	0.3
2015	30	1	29	0	68.0	3.0
2019	30	0	30	0	64.0	0

Proposed Sampling Schedule

Table 10. Proposed sampling schedule for Sheldon Reservoir, Texas. Survey period is June through May, and electrofishing surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

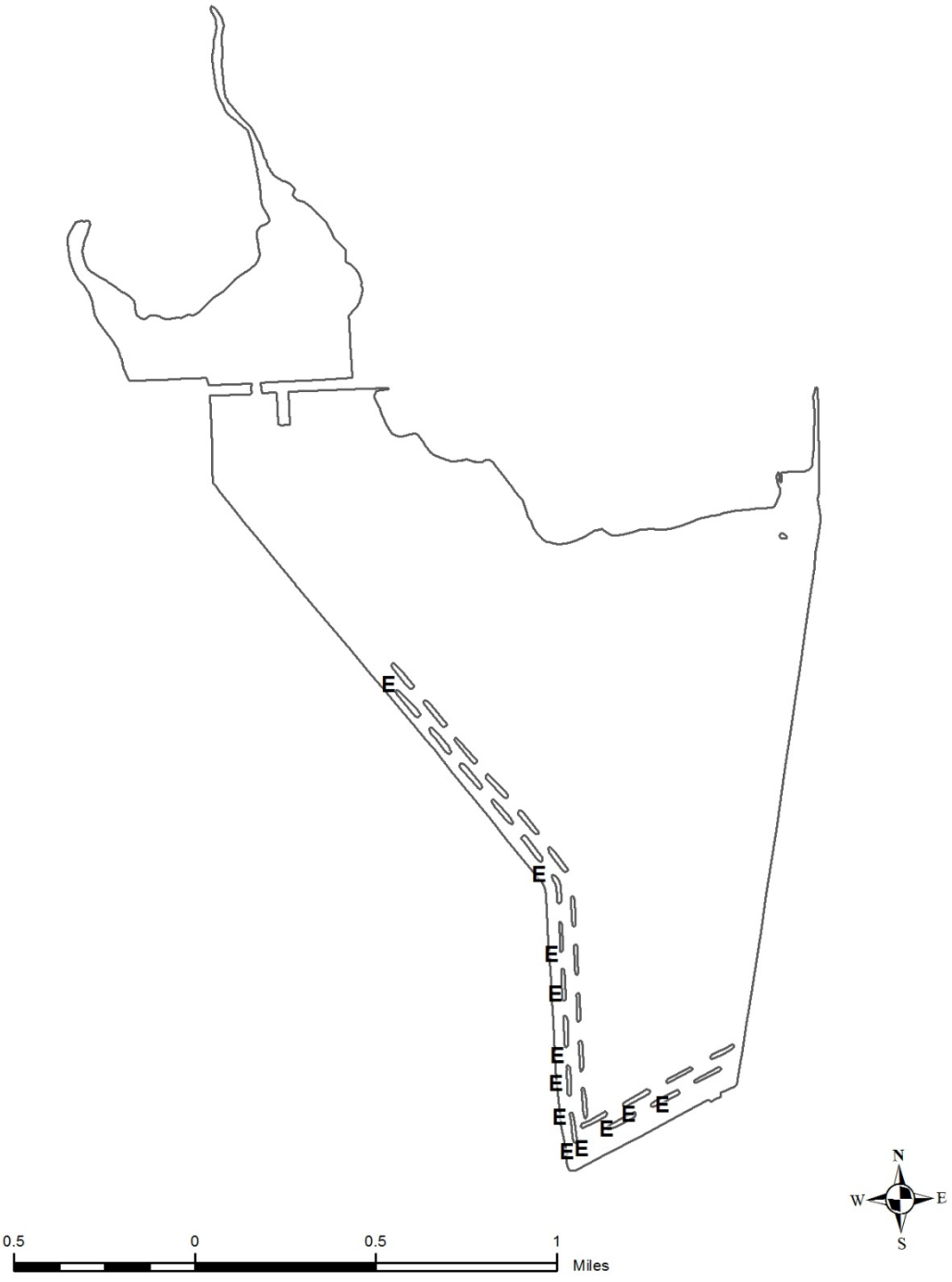
	Survey year			
	2020-2021	2021-2022	2022-2023	2023-2024
Angler Access				S
Vegetation-Total				S
Vegetation-Aquatic Nuisance Species	A	A	A	
Electrofishing – Daytime Fall				S
Report				S

APPENDIX A – Catch rates for all species from all gear types

Number (N) and catch rate (CPUE) of all fish species collected from electrofishing from Sheldon Reservoir, Texas, 2019. Sampling effort was 1 hour for electrofishing.

Species	Electrofishing	
	N	CPUE
Spotted Gar	1	1 (100)
Bowfin	2	2 (100)
Gizzard Shad	16	16 (35)
Threadfin Shad	1	1 (1)
Bluegill	27	27 (48)
Redear Sunfish	96	96 (17)
Largemouth Bass	99	99 (17)
White Crappie	3	3 (100)
Black Crappie	5	5 (36)

APPENDIX B – Map of sampling locations



Location of electrofishing sites, Sheldon Reservoir, Texas, 2019 indicated by E. Water level was near full pool at time of sampling. Sampling was confined to the lower portion of the reservoir between the levy and islands due to shallow depths and abundant vegetation in the upper portion.

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