PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-6

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2015 Fisheries Management Survey Report

Sheldon Reservoir

Prepared by:

Alice Best, Assistant District Management Supervisor
Niki Ragan, Assistant District Management Supervisor
and
Mark Webb, District Management Supervisor

Inland Fisheries Division
College Station – Houston District
Snook, Texas

Carter Smith
Executive Director

Craig Bonds
Director, Inland Fisheries

July 31, 2016

TABLE OF CONTENTS

SURVEY AND MANAGEMENT SUMMARY

Fish populations in Sheldon Reservoir were surveyed in 2015 using electrofishing. Historical data are presented with the 2015 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 very important asset to Texas Parks and Wildlife and to the people of Houston. To make the most of this resource, Inland Fisheries Division has worked closely with Sheldon Lake State Park's and Infrastructure's staffs to improve the reservoir in conjunction with the development of the Sheldon Environmental Learning Center. Heavy infestations of hydrilla, giant salvinia, and water hyacinth have greatly impeded recreational use at Sheldon Reservoir. However, herbicide treatments in 2011, 2012, 2014, and 2015 have improved the situation.

- **Fish Community**
  - **Prey species:** Although Gizzard Shad were collected in 2015, Threadfin Shad were not. The catch rate of Bluegill and Redear Sunfish in 2015 was lower than in 2012 but still higher than it was in 2008. Most Bluegills were less than 6-inches long and function primarily as prey; however, Redear Sunfish over 6-inches were observed.

  - **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. Fingerling Blue Catfish were stocked in 2015, but no catfish of either species was collected in 2015.

  - **Largemouth Bass:** Electrofishing catch rate of Largemouth Bass in 2015 was lower than it was in 2012 but higher than the 2008. Body condition of collected fish was good, and size distribution was within the recommended range. The lake record Largemouth Bass, caught in 2016, was 10.42 lbs and 25.88 inches.

  - **Crappie:** Both Black Crappie and White Crappie were collected in the past, but only Black Crappie were documented in the current survey.

  - **Bowfin:** Bowfin support a popular fishery in Sheldon Reservoir and were collected in the 2015 electrofishing survey.

- **Management Strategies:** The primary challenge at Sheldon Reservoir is aquatic vegetation management and water level management. An integrated pest management strategy has been implemented to address the aquatic vegetation problem. Sheldon Lake State Park staff continue to explore ways to supplement water supply to Sheldon Reservoir in low rainfall years. Electrofishing and angler access surveys will be conducted every four years. 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.

INTRODUCTION

This document is a summary of fisheries data collected from Sheldon Reservoir in 2015. 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 2015 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. Being a highly productive wetland ecosystem, Sheldon Reservoir 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 of the existing fishing piers are in disrepair, and most 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 (Webb and Homer 2013) included:

1. Access to Sheldon Reservoir is limited due to heavy infestations of exotic vegetation and infrastructure improvement needs. Funding limits implementation of extensive aquatic vegetation control.
   Action: Nuisance aquatic vegetation was controlled through herbicide applications as funds became available. Sheldon Reservoir was treated with the herbicide Galleon in 2012, 2014, and 2015 to control water hyacinth, giant salvinia (*Salvinia molesta*), and hydrilla (*Hydrilla verticillata*) and with biweekly spot treatments of Rodeo to control water hyacinth (*Eichornia crassipes*) and giant salvinia in 2015 (Table 8). Work continues with TPWD State Parks and Infrastructure staffs to secure funding for infrastructure improvements and to develop better access infrastructure, including new boat ramp construction, building new and/or repairing existing fishing piers, and dredging to increase boating access.
2. Sheldon Reservoir is very shallow with a small watershed. During drought conditions in 2010, Sheldon Reservoir nearly went dry. This same problem will exist if rainfall is low in the future.
   Action: Work continues with TPWD State Parks and Infrastructure staffs to secure funding for dredging to increase volumetric capacity of the reservoir.
3. Sheldon Reservoir would benefit from the support of local anglers and other users.
   Action: There has been some community interest to participate in a Friends of Reservoir Chapter for Sheldon Reservoir or to organize regular meetings with local bass fishing clubs, but action has not progressed beyond the initial discussion phase. However, District Staff did meet with diverse constituent groups across the Houston MSA to raise awareness of fishing opportunities at Sheldon Reservoir, and Sheldon Lake State Park

Staff have hosted multiple youth-oriented fishing events adjacent to Sheldon Reservoir in small fishing ponds in Sheldon Lake State Park.

4. Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels *(Dreissenia 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.

   Action: Annual vegetation surveys were conducted to assess infestation levels of water hyacinth, hydrilla, giant salvinia, and other exotic invasive aquatic vegetation. Infestations were controlled using herbicide in 2012, 2014, and 2015 (Table 8). Presence of invasive shellfish including zebra mussels and apple snails (*Pomacea insularum*) was monitored visually throughout the year. Zebra mussels were not found, but Sheldon Reservoir does host a large infestation of apple snails. There is currently no effective control or eradication method for apple snails.

Harvest regulation history: Sport fishes in Sheldon Reservoir are managed under the current statewide regulations 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. Since Sheldon Reservoir falls completely within Sheldon Lake 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 and Florida Largemouth Bass (*Micropterus salmonoides Floridanus)* stocked in 2015. The complete stocking history is presented in Table 4.

Vegetation/habitat management history: Sheldon Reservoir has a highly productive mixed aquatic plant community of both native and non-native species (Table 7). Hydrilla, giant salvinia, and water hyacinth have all been problematic at times and continue to impede access. Management efforts have had moderate success overall and herbicide treatments conducted in 2012, 2014, and 2015 have decreased the amount of non-native vegetation substantially.

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 (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 *(Lepomis spp.)*, Gizzard Shad *(Dorsoma cepedianum)*, Threadfin Shad *(D. petenense,)*, and all other fish species were collected by electrofishing (2 hours at 24, 5-min stations). The number of stations was determined by the OBS plan which stated that a minimum of 12, 5-min stations would be sampled until enough Largemouth Bass were collected to meet a Relative Standard Error (RSE) of 25 or until 24, 5-min stations would be sampled, whichever occurred first. 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). Total number of fish for each species was recorded. Lengths and weights were collected for Largemouth Bass, sunfish species, and catfishes; and lengths were collected for Threadfin Shad and Gizzard Shad

Trap netting – No trap netting was conducted due to negligible crappie fishery.

Gill netting – No gill netting was conducted due to negligible Blue Catfish and Channel Catfish fisheries.

Genetics – Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015). Micro-satellite DNA analysis was used to determine genetic composition of individual fish from 2005 through 2012 and by electrophoresis for previous years.

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). 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 2015. Aquatic Nuisance Species vegetation surveys were conducted annually 2012 – 2014, and a comprehensive vegetation survey of all species was conducted in 2015. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2015). 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%.

Water level – Water level was visually monitored by Sheldon Lake State Park staff. Water level has remained close to pool since 2012.

RESULTS AND DISCUSSION

Habitat: Structural shoreline habitat consists primarily of non-descript shoreline with overhanging brush and has not changed in recent years (Table 6). Native and exotic vegetation was present in mixed communities over much of the reservoir's surface and has been highly variable over time. In 2015, native vegetation covered 74.5% of the reservoir's surface area, and non-native vegetation covered 87.5 % (Table 7). Giant salvinia, hydrilla, and water hyacinth have all been present in the reservoir in fluctuating abundances for many years. During the most recent survey in 2015, only trace amounts of hydrilla were

found in Sheldon Reservoir; however, alligator weed (*Alternanthera philoxeroides*) abundances increased, and substantial amounts of water hyacinth and giant salvinia continue to impact access.

Prey species: Although Gizzard Shad and Threadfin Shad have been present in past years (most recently in 2012), only Gizzard Shad were collected in 2015 (Figure 1). The catch rate of Bluegill (*Lepomis macrochirus*) in 2015 was 21.0/h, lower than it was in 2012 (87.0/h) but still higher than it was in 2008 (8.0/h, Figure 2). Redear Sunfish (*L. microlophus*) are also available as prey with a catch rate of 81.5/h in 2015, lower than it was in 2012 (225.0/h) but higher than in 2008 (22.7/h). Very few Bluegill were over 6-inches long; however, Redear Sunfish over 6-inches were observed (Figure 3).

Catfishes: Historically, catfishes have been poorly represented in gillnet surveys (Webb and Homer 2013). Under the Objective Based Sampling (OBS) protocol no gill net sampling was conducted in 2016, and no catfish were observed during the electrofishing survey (Appendix A).

Largemouth Bass: Electrofishing catch rate of Largemouth Bass in 2015 was 58.5/h, down from the 2012 catch rate of 147.0/hr but still higher than the 2008 rate of 21.3/h (Figure 4). However, apparent changes in catch rate may be more reflective of variable sampling efficiency resulting from changing vegetation coverage in the reservoir rather than the actual abundance of Largemouth Bass. The number of stock-sized Largemouth Bass decreased slightly from 2012, and the size distribution of Largemouth Bass was biased toward smaller individuals. Although PSD (45 in 2015) was lower than it was in 2008 or 2012 (60 and 70 respectively), it was still within the target range of 40-70 (Guy et al. 2007). Body condition in 2015 was good (relative weight over 100) for nearly all size classes of fish (Figure 4). Florida Largemouth Bass influence has remained relatively constant as Florida alleles have ranged from 65% to 68% (Table 9). Pure Florida genotype was present in 3% of a 30 fish sample collected in 2015 (Table 9). The lake record Largemouth Bass, caught in 2016,was 10.42 lbs and 25.88 inches.

Crappie: Trap netting was removed in 2015 under the OBS sampling protocol. However, persistence of Black Crappie (*Pomoxis nigromaculatus*) was documented in the electrofishing survey (Appendix A). Although White Crappie *(P. annularis)* have been collected in historical trap net surveys (Webb and Homer 2013), none were collected in electrofishing in 2015. Previous surveys indicate that Black Crappie were more abundant than White Crappie and most crappie were small.

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

Fisheries management plan for Sheldon Reservoir, Texas

Prepared – July 2016.

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 when funds are available.
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 to improve boating access.

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

MANAGEMENT STRATEGY

1. Request 9 inch Channel Catfish annually to support a put, grow, and take fishery.
2. If stockings occur, notify the public through traditional and social media outlets

ISSUE 3: Sheldon Reservoir is very shallow with a small watershed. During drought conditions in 2010, Sheldon Reservoir nearly went dry. This same problem will exist if rainfall is low in the future.

MANAGEMENT STRATEGIES

1. Work with the Sheldon Lake State Park staff to find funding to purchase water rights when needed and to work on a dredging plan to increase volumetric capacity in the reservoir.

ISSUE 4: Sheldon Reservoir would benefit from the support of local anglers and other users.

MANAGEMENT STRATEGIES

1. Work with Sheldon Lake State Park staff to develop a Friends of Reservoirs Chapter in support of Sheldon Reservoir.
2. Meet with the local bass club to provide information about Sheldon Reservoir and its fisheries to local constituents.

ISSUE 5: 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 (*Salvinia molesta*) 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 2016-2020

Sport fish, forage fish, and other important fishes

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

Negligible fisheries

Catfish: Blue Catfish and Channel Catfish are present in Sheldon Reservoir, but population abundance is extremely low. High levels of submersed aquatic vegetation make angling for catfish difficult. Gill net surveys from 2001-2013 showed CPUE of Channel Catfish ranged from 0.2 to 2.4 fish/nn. Gill net surveys for Blue Catfish showed a CPUE of 10.4 in 2001 but 1.4 and 0.6 in 2005 and 2013, respectively.

Crappie: White Crappie and Black Crappie have been present in Sheldon Reservoir in the past, but population abundance is extremely low.

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. The popularity and reputation for quality Largemouth Bass fishing at this reservoir warrant sampling time and effort. Largemouth Bass have always been managed with the statewide 14-in MLL regulation. Trend data on CPUE, size structure, and body condition have been collected every two to four years since 1986 with fall nighttime electrofishing. The population appears to be in fair shape, but anglers are anecdotally unsatisfied with the fishing, with the primary complaints stemming from access issues from nuisance aquatic vegetation. A minimum of 12 randomly selected 5-min electrofishing sites will be sampled, but sampling will continue at random sites until 50 stock-sized fish are collected and the RSE of CPUE-S is $\leq$ 25. Due to reservoir size and occasionally high levels of invasive vegetation, effort will be suspended after 24 predetermined, randomly selected 5-min electrofishing sites even if the objective is not met. Electrofishing will be conducted during daytime for improved safety and efficiency on this very shallow and heavily vegetated reservoir. The genetic contribution of Florida strain Largemouth Bass alleles to the bass population will be assessed a minimum of every eight years.

Bluegill and Redear Sunfish: Bluegill and Redear Sunfish are the primary forage fish at Sheldon Reservoir, and historic data indicate that individuals large enough to provide sport fishing opportunities exist in the populations. 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.

Largemouth Bass body condition (fish > 8” TL) will be used to provide additional information on forage abundance and vulnerability.

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.

Webb, M. and M. Homer. 2013. Statewide freshwater fisheries monitoring and management program survey report for Sheldon Reservoir, 2012. Texas Parks and Wildlife Department, Federal Aid Report F-221-M-3, Austin. Texas.

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 (SDI)	2.7
Conductivity	80 µmhos/cm

Table 2. Boat ramp characteristics for Sheldon Reservoir, Texas, August 2015. Reservoir was near pool level 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
Species Total	295,389	
Red Drum		
1976	246	UNK
Species Total	246	

Table 5. Objective-based sampling plan components for Sheldon Reservoir, Texas, 2015 – 2016.

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, any age
Bluegill [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 any other species if not reached from designated Largemouth Bass sampling effort. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density.

Table 6. Survey of structural habitat types, Sheldon Reservoir, Texas, 2015. Shoreline habitat type units are in miles and standing timber is in acres.

Habitat type	Estimate	% of total
Gravel/Native submersed	0.2 miles	1.3
Overhanging brush/Native emergent	2.5 miles	14.9
Overhanging brush/Native submersed	3.6 miles	21.9
Overhanging brush/Native floating	9.0 miles	54.6
Overhanging brush/Standing timber	1.2 miles	7.3

Table 7. Survey of aquatic vegetation, Sheldon Reservoir, Texas, 2009 – 2015. Surface area (acres) is listed with percent of total reservoir surface area in parentheses. 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%.

Vegetation	2009	2012	2015
Native submersed	280.7 (22.8)	86.6 (7.0)	653 (50.7)
Native floating-leaved	223.4 (18.2)	827.2 (67.3)	328 (25.5)
Native emergent	479.1 (40.0)	511 (41.6)	307 (23.8)
Non-native			
Alligator weed (Tier II)*			669 (52.0)
Giant salvinia (Tier II)*	586.5 (47.7)	810 (65.9)	208 (16.2)
Hydrilla (Tier II)*	554.9 (45.1)	8 (0.7)	167 (13.0)
Water hyacinth (Tier II)*	772 (62.8)	<1.0 (0.1)	81 (6.3)

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

Table 8. Summary of recent treatment efforts to control nuisance non-native vegetation on Sheldon Reservoir.

Year	Non-Native Target Species	Treatment	Treatment Area
2012	Giant salvinia, water hyacinth, hydrilla	Galleon SC	Whole Lake
2014	Giant salvinia, water hyacinth, hydrilla	Galleon SC	Whole Lake
2015	Giant salvinia, water hyacinth, hydrilla	Galleon SC	Whole Lake
2015	Giant salvinia, water hyacinth	Biweekly sectional application of Rodeo	77 acres

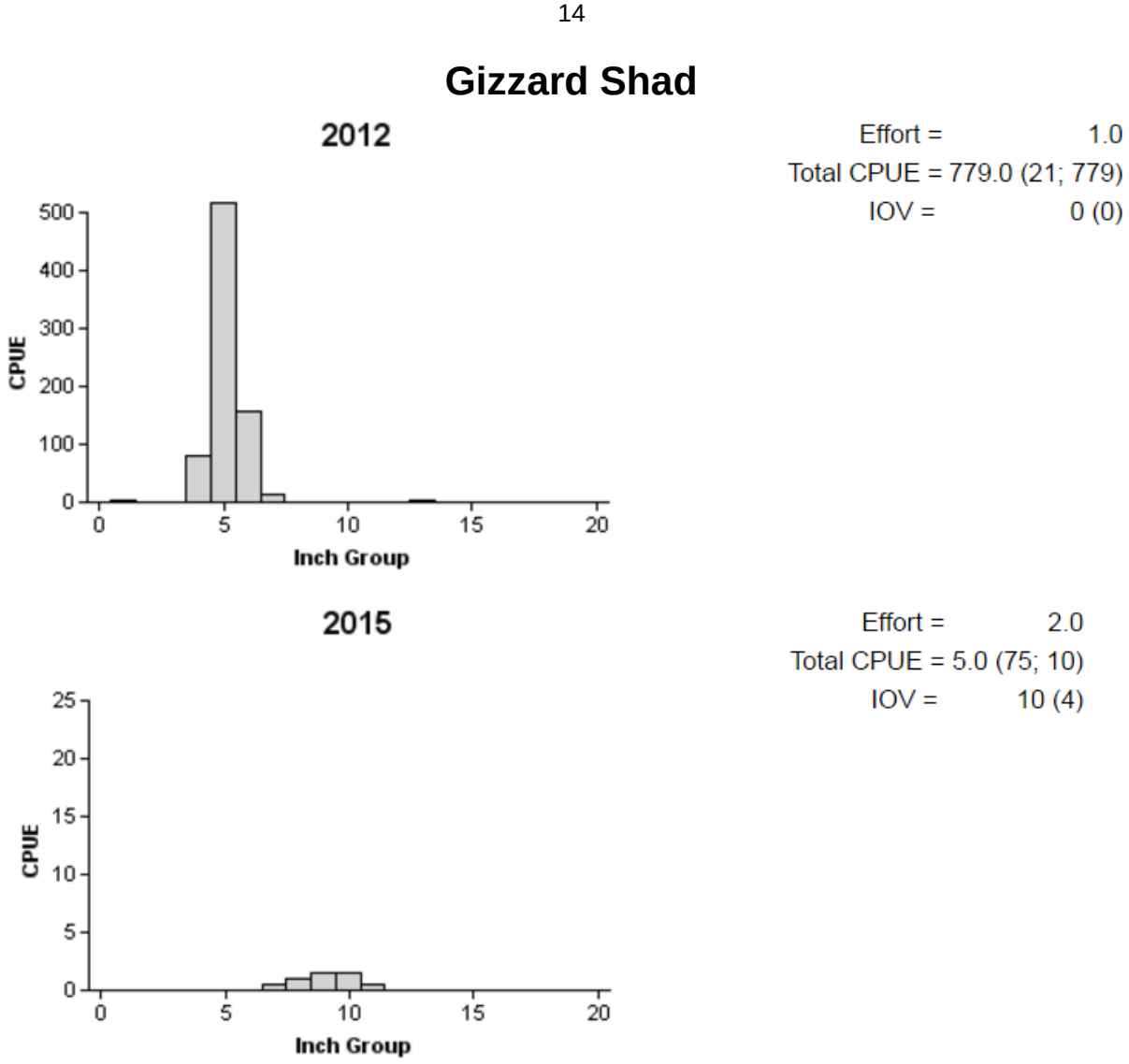


Figure 1. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Sheldon Reservoir, Texas, 2012 and 2015. No Gizzard Shad were collected in 2008.

Bluegill

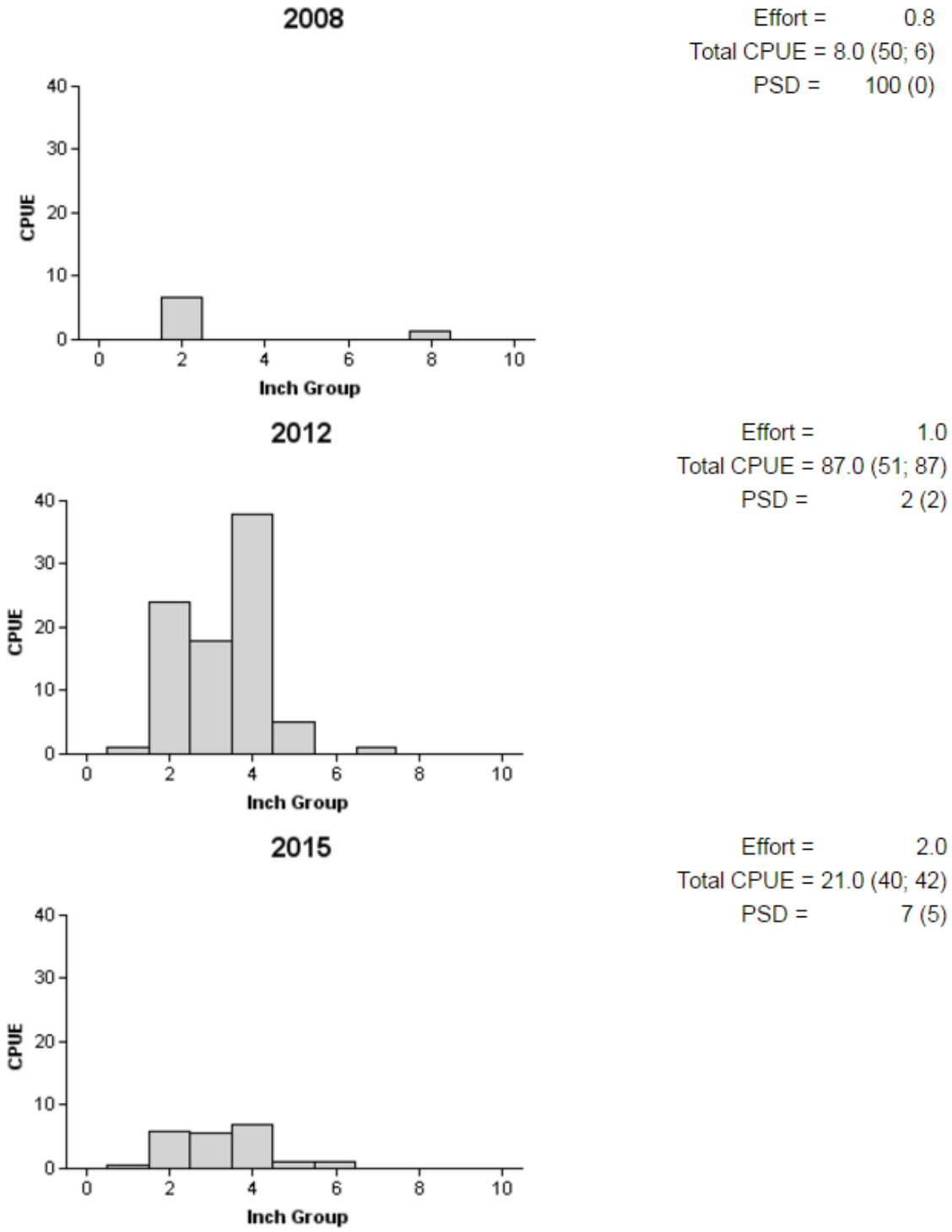


Figure 2. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sheldon Reservoir, Texas, 2008, 2012, and 2015.

Redear Sunfish

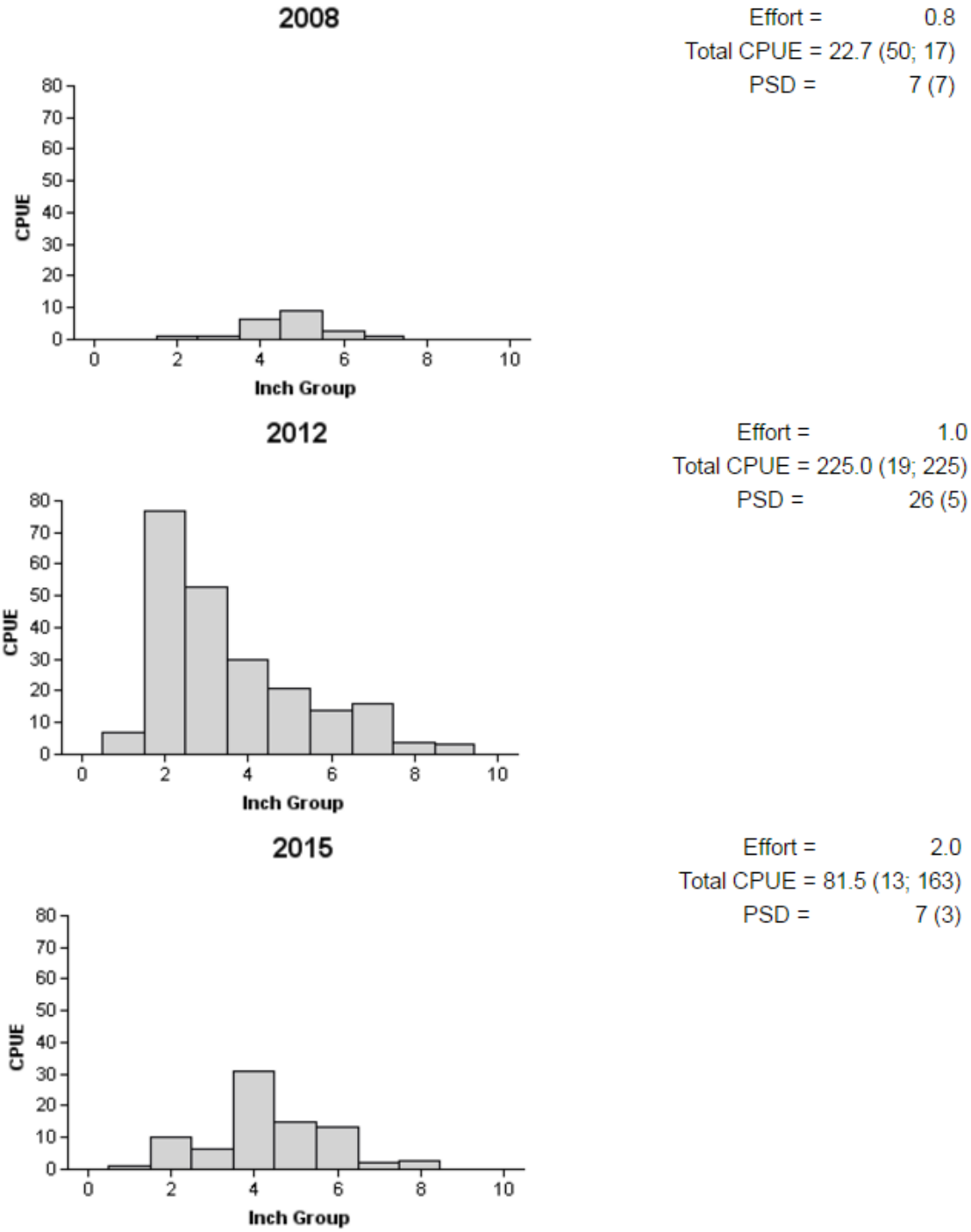


Figure 3. Number of Redear Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sheldon Reservoir, Texas, 2008, 2012, and 2015.

Largemouth Bass

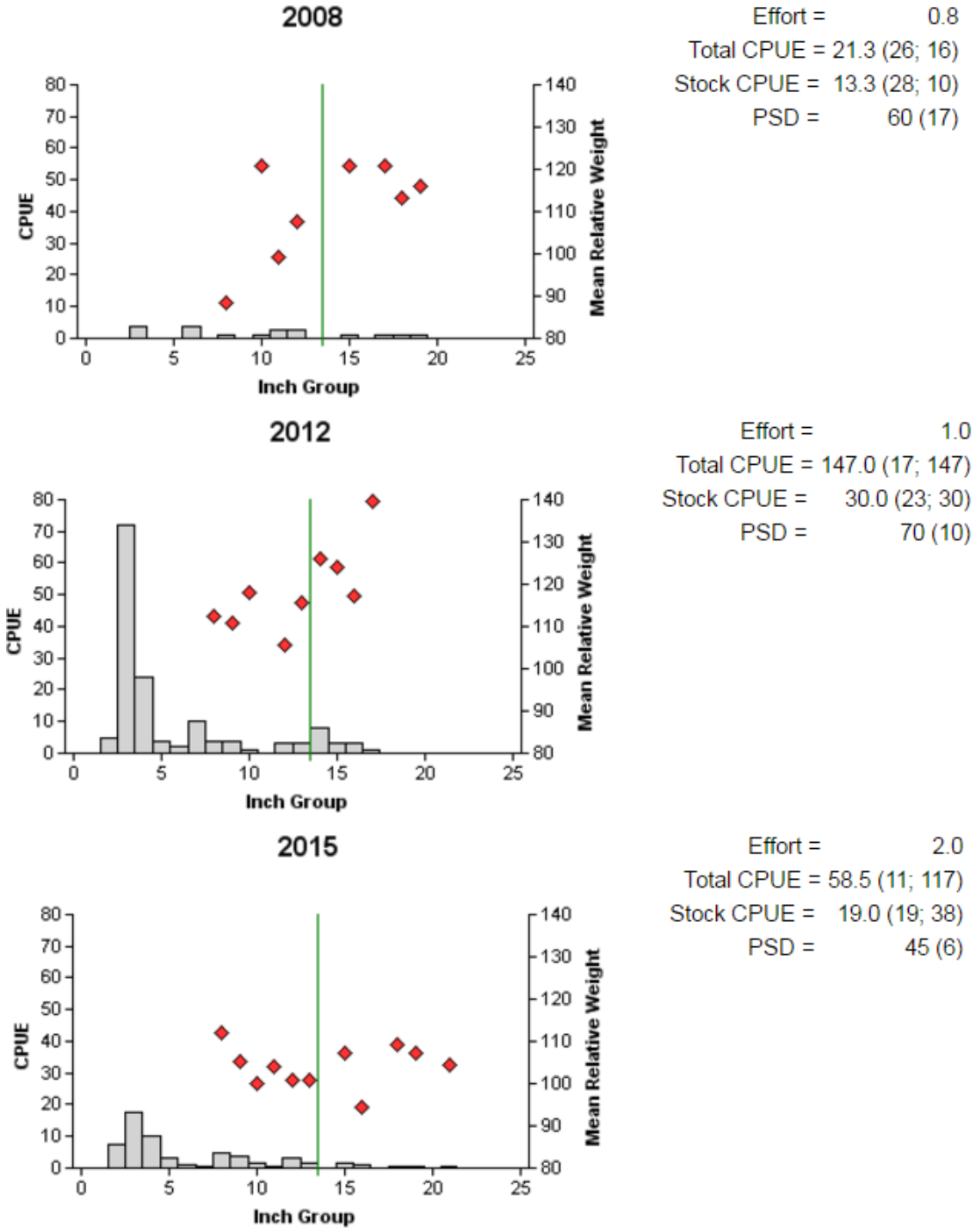


Figure 4. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sheldon Reservoir, Texas, 2008, 2012, and 2015. Vertical line indicates minimum length limit.

Largemouth Bass

Table 9. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Sheldon Reservoir, Texas, 2004, 2012, and 2015. 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

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.

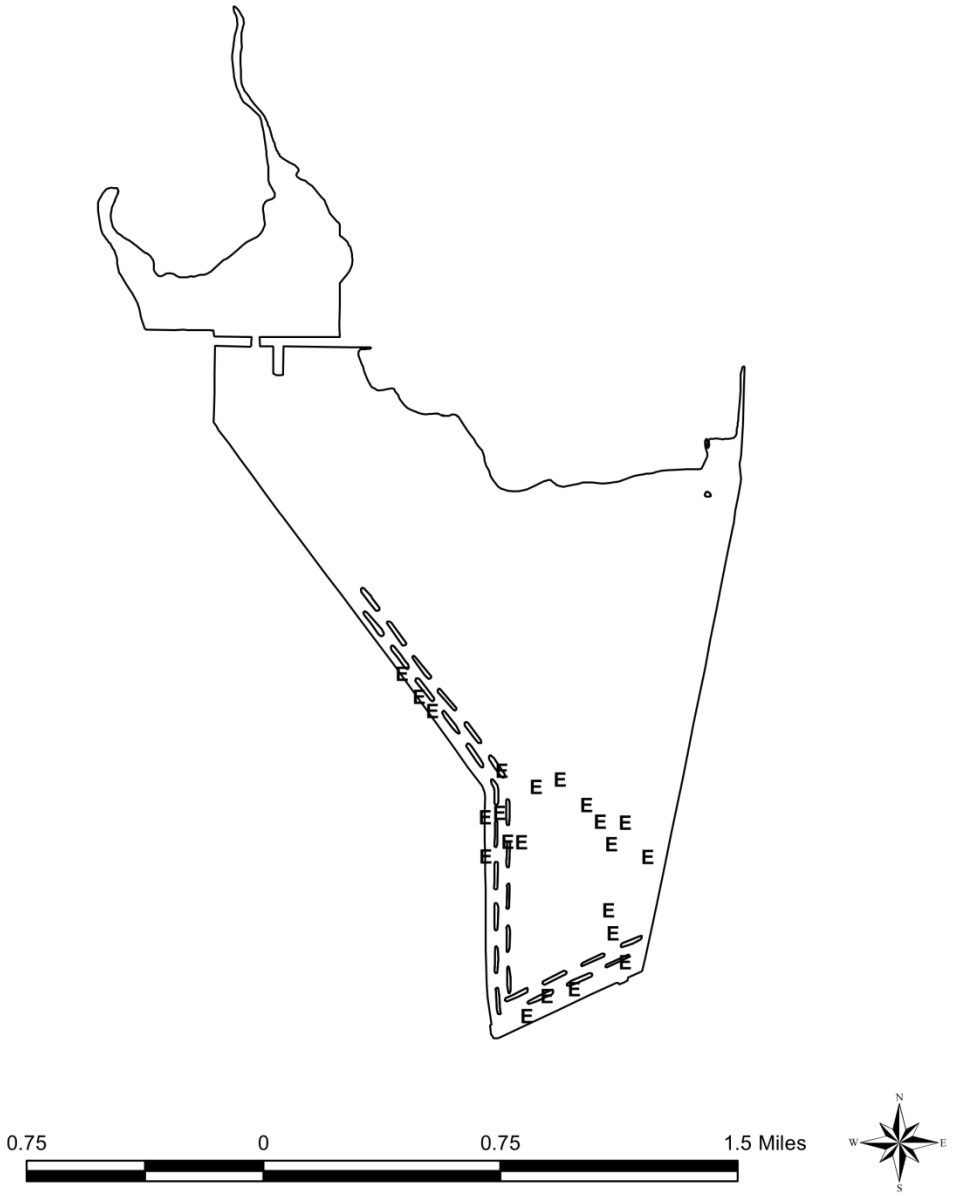
		Habitat			
Survey year	Electrofish Fall(Spring)	Structural	Vegetation	Access	Report
2016-2017			A		
2017-2018			A		
2018-2019			A		
2019-2020	S	S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all fish species collected from electrofishing from Sheldon Reservoir, Texas, 2015. Sampling effort was 2 hours for electrofishing.

Species	Electrofishing	
	N	CPUE
Spotted Gar	11	5.5
Bowfin	6	3.0
Gizzard Shad	10	5.0
Redfin Pickerel	10	5.0
Common Carp	2	1.0
Pirate Perch	2	1.0
Warmouth	3	1.5
Bluegill	42	21.0
Redear Sunfish	163	81.5
Largemouth Bass	117	58.5
Black Crappie	12	6.0

APPENDIX B



Location of ecletrofishing sites, Sheldon Reservoir, Texas, 2015 indicated by E. Water level was near full pool at time of sampling. Sampling was confined to the lower portion of the reservoir due to shallow depths and abundant vegetation in the upper portion.