

# Naconiche 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 Naconiche Reservoir were surveyed in 2019-2020 using electrofishing. Anglers were surveyed from March through May 2020 with a creel survey. Historical data are presented with the 2019-2020 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:** Naconiche Reservoir is an impoundment of Naconiche and Telesco creeks, tributaries of the Attoyac Bayou in the Neches River Basin. The lake was constructed by the County of Nacogdoches for recreation and flood control. This reservoir has a surface area of 692 acres at conservation pool (348 feet above mean sea level), a shoreline length of 22.7 miles, and an average depth of 13 feet. Access is available with a two-lane boat ramp and a lighted fishing pier. Bank access is adequate. Primary fish habitat is timber and hydrilla.

**Management History:** Important sport fish include Largemouth Bass and Black Crappie. The reservoir was opened to the public in September 2012 with an 18-inch minimum length limit and changed to a 16-inch maximum length limit in 2016. Florida Largemouth Bass have been stocked annually since 2011. Hydrilla was first observed as the reservoir began to fill in 2008 and annual vegetation surveys have been conducted since 2012. Giant salvinia was first observed in 2015. Herbicide treatments, use of a containment boom, and introduction of giant salvinia weevils have limited coverage to approximately 100 surface acres. PVC cube (Georgia DNR) fish attractors were added to the reservoir in 2017 at two sites (each site consists of 5 individual structures) to aid angling catch success rates.

### Fish Community

- **Prey species:** Threadfin Shad and Bluegill were the most abundant prey species and provided ample forage for sport fish. Gizzard Shad were also present but abundance was low and no fish were available as prey. Electrofishing catch rates of Bluegill increased in 2019; few fish were > 6 inches. Although overall abundance of Redear Sunfish was relatively low over the last three surveys, catch of larger fish ( $\geq 7$  inches) did increase in 2019.
- **Catfishes:** Although Channel Catfish were stocked in 2009 and 2011, only two adult fish were collected from gill net surveys in 2014 and 2016, combined. Channel Catfish recruitment has likely been limited by predation from the abundant Largemouth Bass population.
- **Largemouth Bass:** Fall and spring electrofishing surveys reflected an abundant and generally increasing Largemouth Bass population over the last three survey years. Both surveys also indicated an increase in the number of fish  $\geq 16$  inches in length. Fish condition was stable and desirable. Largemouth Bass had adequate growth rates (age at 14 inches was 2.5 years). The Largemouth Bass fishery was most popular (87% of fishing effort), and the angler catch rate was 0.6 /h.
- **Crappies:** The crappie fishery was the second most popular (9.3% of fishing effort). Since 2013, angler catch rate and total harvest have declined, reflecting a decrease in population abundance. No harvest was observed during the 2020 spring quarter creel survey.

**Management Strategies:** Continue to manage Largemouth Bass harvest with a 16-inch maximum length limit. Request annual stockings of Florida Largemouth Bass to maximize trophy fish abundance. Control hydrilla coverage at the boat ramp, fishing pier, and swimming area. Permit lakeside homeowners to control hydrilla (at homeowner expense) adjacent to their property. Survey giant salvinia coverage as needed to monitor effects of herbicide treatments and salvinia weevil releases.

## Introduction

This document is a summary of fisheries data collected from Naconiche Reservoir in 2019-2020. 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 2019-2020 data for comparison.

## Reservoir Description

Naconiche Reservoir was impounded in 2009 on Naconiche and Telesco creeks, tributaries of the Attoyac Bayou in the Neches River Basin. It is located in Nacogdoches County approximately 14 miles northeast of Nacogdoches and is operated and controlled by the County of Nacogdoches for recreation and flood control. This reservoir has a surface area of 692 acres at conservation pool (348 feet above mean sea level), a shoreline length of 22.7 miles, and an average depth of 13 feet. The lake opened for public fishing on September 1, 2012. Aquatic habitat consisted of standing timber, hydrilla, and trace amounts of emergent plants. The majority of the land surrounding the reservoir is used for agriculture, timber production, and residential development. Other descriptive characteristics for Naconiche Reservoir are in Table 1.

## Angler Access

Naconiche Reservoir has one public boat ramp. Additional boat ramp characteristics are in Table 2. Shoreline access is good and an ADA-approved fishing pier is present.

## Management History

**Previous management strategies and actions:** Management strategies and actions from the previous survey report (Ashe and Driscoll 2016) included:

1. Stock FLMB annually at a rate of 100 fish/acre. Monitor the success of the 16-inch maximum length limit via biennial spring electrofishing surveys, a fall electrofishing survey, and an angler creel survey.

**Action:** FLMB have been stocked annually since 2011. Spring electrofishing surveys were conducted in 2018 and 2020. A fall electrofishing survey was conducted in 2019, and an angler creel survey was conducted in 2020.

2. Document giant salvinia coverage and distribution as needed and conduct necessary control measures. Maintain giant salvinia signage regarding plant presence and prevention of transport.

**Action:** Vegetation surveys have been conducted annually. Aquatic Habitat Enhancement (AHE) personnel have deployed containment booms to minimize spread of giant salvinia and have conducted herbicide treatments and introduced giant salvinia weevils as biological control measures. Signage has been maintained informing the public of giant salvinia presence and measures to take to prevent transport.

3. Monitor hydrilla annually and continue herbicide treatments at the public boat ramp, swimming area, and fishing pier. Continue to cooperate with homeowners by permitting herbicide treatments of hydrilla adjacent to their property.

**Action:** Vegetation surveys have been conducted annually and AHE personnel have applied herbicide treatments as needed at the boat ramp, swimming area, and fishing pier. Cooperated with homeowners to allow herbicide treatments of hydrilla adjacent to personal property.

**Harvest regulation history:** Sport fishes in Naconiche Reservoir are currently managed with statewide regulations with the exception of Largemouth Bass (Table 3). The reservoir was opened in 2012 with an 18-inch minimum length limit for Largemouth Bass to protect the population as it developed. In 2016, the

Largemouth Bass regulation was changed to a 16-inch maximum length limit to protect larger fish and maximize trophy potential.

**Stocking history:** Sharelunker Largemouth Bass (2009, 2011, and 2012) and Florida Largemouth Bass (2011 – 2019) were stocked to enhance trophy fish potential (Table 4). Threadfin Shad were successfully introduced in 2010. Bluegill and Channel Catfish were stocked in 2009 and 2011 and White and Black Crappie were stocked in 2010.

**Vegetation/habitat management history:** Naconiche Reservoir reached conservation pool in 2009. The controlling authority cleared all of the timber in the lower basin but left a considerable amount in the two creek arms for fish habitat. Hydrilla was observed as the lake was beginning to fill in 2008. Since 2012, overall hydrilla coverage has varied from approximately 5 to 25% of the reservoir surface area, and is considered beneficial habitat. Annual treatments have been required around the boat ramp, swimming area, and the fishing pier. Giant salvinia was discovered in 2015. Initial attempts to eradicate giant salvinia via manual removal failed. Coverage quickly expanded, particularly in the upper reaches of each creek arm. In 2018, containment booms were deployed in each creek to restrict movement of plants to the lower part of the reservoir. Dense timber present above the booms prevents herbicide treatments, and salvinia weevils have been introduced in these areas. Numerous herbicide treatments are required each year to control giant salvinia coverage. PVC / Georgia DNR fish attractors were added in 2017 at two sites in the reservoir to aid angler catch rates. Locations for the fish attractor sites can be found on the TPWD website (<https://tpwd.texas.gov/fishboat/fish/recreational/lakes/naconiche/structure.phtml>).

**Water transfer:** The purpose of Naconiche Reservoir is to provide recreation and flood control. There are no plans for water transfer.

## Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Naconiche Reservoir (Ashe and Driscoll 2016). Primary components of the OBS plan are listed in Table 5. All electrofishing survey sites were biologist-selected (due to dense standing timber that prohibits sampling in a majority of the reservoir) and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

**Electrofishing** – Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (50 minutes at 10, 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 ( $RSE = 100 \times SE$  of the estimate/estimate) was calculated for all CPUE and creel statistics.

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

**Habitat** – Vegetation surveys were conducted in 2016–2019 to monitor hydrilla and giant salvinia coverages. Coverages were calculated with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

## Results and Discussion

**Habitat:** A structural habitat survey conducted in 2012 indicated that the littoral zone included primarily standing timber and natural shoreline (Ashe and Driscoll 2012). Standing timber was abundant and comprised 588 acres (85% of reservoir surface area). Hydrilla coverage exceeded 100 acres in 2016–2019, but declined to 24 acres in 2019. High winter and spring inflows in 2019 likely reduced hydrilla abundance (Table 6). Giant salvinia was first discovered in 2015; coverage in 2019 was 98 acres.

**Creel:** Directed fishing effort was highest for Largemouth Bass (64.7% - 86.6%), followed by effort for crappie and anything (Table 7). Total fishing effort (38,492 h) and direct expenditures (\$169,005) were highest when the reservoir was first opened to the public in 2012. Total effort (14,616 and 16,322 h) and direct expenditures (\$54,345 and \$64,702) were lower and similar in 2013 and 2016 (Table 8). However, in 2020 total effort (27,976 h) and direct expenditures (\$168,636) were considerably greater, likely driven by COVID-19 quarantines with anglers seeking recreation while social distancing.

**Prey species:** Electrofishing surveys indicated an adequate forage base for sport fishes. Forage species consisted of Threadfin Shad, Warmouth, Bluegill, Redear Sunfish, and Redspotted Sunfish (Appendix A). Bluegill was the most abundant sunfish species with 471.6/h collected during the 2019 fall electrofishing survey (Figure 2), which was greater than 2015 (111.6/h), but less than what was observed in 2013 (626.4/h). Overall abundance of Redear Sunfish was relatively low over the last three surveys (< 30 fish/h) (Figure 3). However, catch of larger fish ( $\geq 7$  inches) did increase in 2019. Few anglers sought sunfish (0 – 1.7% of total fishing effort) (Table 7), and total estimated harvest ranged from 0 – 610 fish (Table 9).

**Channel Catfish:** Although Channel Catfish were stocked in 2009 and 2011, only two total fish were collected from both the 2014 and 2016 gill net surveys combined. Gill net surveys were discontinued in 2020. Few anglers targeted Channel Catfish (0 – 0.4% of directed effort) (Table 7). Channel Catfish

recruitment is likely limited by Largemouth Bass predation. No harvest of Channel Catfish has been observed during the past three creel surveys.

**Largemouth Bass:** Fall and spring electrofishing surveys reflect an abundant Largemouth Bass population with desirable size structure. In 2019, the fall catch rate was 182.4/h in 2019, greater than the 96.0/h observed in 2015, but similar to that observed in 2013 (195.6/h) (Figure 4). In contrast, spring electrofishing catch rates were consistently high in 2016, 2018, and 2020 (163.2/h, 188.0/h, and 231.6/h, respectively) (Figure 5). The 16-inch maximum length limit has been effective at increasing the proportions of fish  $\geq$  16 inches in length (PSD-16 values have increased over the last three survey years). Growth of Largemouth Bass was adequate; average age at 14 inches (13.5 to 14.5 inches) was 2.5 years (N = 13; range = 2 – 4 years). Body condition from the past three fall electrofishing surveys was adequate (relative weight > 80) for nearly all size classes of fish (Figure 4).

In 2020, directed fishing effort (24,217 h; 35.0 h/acre) and total harvest (1,001 fish) increased substantially when compared to 2013 and 2016 (Table 10). However, despite the increase in fishing effort, angler catch rates remained similar over the past three surveys (0.6 – 0.7 fish/h). Nearly all legal-sized Largemouth Bass that were caught were released (87.2 to 98.7%). Total estimated catch in 2020 was 16,599 fish; 6.8% were 4.0 – 6.9 pounds with no fish greater than seven pounds observed during the creel survey.

**Crappies:** Trap netting for crappie was discontinued in 2011 due to poor catch rates (1.0/nn) and sampling efficiency. White and Black Crappie adults were stocked in 2010 (Table 4), but the population is primarily comprised of Black Crappie (only one White Crappie has been observed from creel surveys). The crappie fishery was the second most popular (9.3 – 22.5% of directed effort) (Table 7). Creel data reflect declining population abundance. Angler catch rates of Black Crappie were relatively low, ranging from 0.1 to 0.7 fish/h. Harvest was higher in 2016 (307 fish), but declined to no fish harvested in 2020, even though directed effort remained high (Table 11).

# Fisheries Management Plan for Naconiche Reservoir, Texas

Prepared – July 2020

**ISSUE 1:** Nearly all (87%) angling effort is directed at Largemouth Bass. Electrofishing catch rates and size structure reflect a quality population. The reservoir is relatively new and the population of trophy-sized fish is still developing. The 16-inch maximum length limit has been effective in increasing numbers of larger fish. In 2019, the park manager weighed 17 fish > 8 pounds, and the current lake record is 14.12 pounds.

## MANAGEMENT STRATEGIES

1. Continue to collect angler catch data for Largemouth Bass  $\geq$  8 pounds from the park manager.
2. Increase angler awareness and participation in the TPWD ShareLunker Program by promoting when opportunities arise.
3. Continue annual stocking of FLMB to maintain and improve the trophy Largemouth Bass population.

**ISSUE 2:** Giant salvinia was introduced in 2015. Coverage expanded quickly, particularly in the upper reaches of each creek arm. Numerous herbicide treatments are required each year to control plant abundance.

## MANAGEMENT STRATEGIES

1. The TPWD AHE office oversees management of giant salvinia at Naconiche Reservoir. Assist AHE staff with implementation of management strategies.
2. Continue herbicide treatments and salvinia weevil introductions when appropriate, and maintain containment booms.
3. Monitor giant salvinia coverage as needed to document plant distribution and effects of control measures (i.e., herbicides and weevils).
4. Maintain all giant salvinia signage regarding plant presence and prevention of transport to other waters.
5. Continue to assist TPWD AHE personnel maintain floating booms to confine giant salvinia.
6. Educate the public about giant salvinia and other invasive species via news releases and presentations.

**ISSUE 3:** Hydrilla is present in Naconiche Reservoir. Although it provides beneficial fish habitat, it impedes use of the swimming area, boat ramp, and fishing pier.

## MANAGEMENT STRATEGIES

1. Monitor hydrilla coverage annually.
2. Continue herbicide treatments at the boat ramp, swimming area, and fishing pier as needed.
3. Continue cooperating with lakeside homeowners by permitting herbicide treatments of hydrilla (at homeowner expense) adjacent to their property.

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

### Sport fish, forage fish, and other important fishes

Sport fishes in Naconiche Reservoir include Largemouth Bass, Spotted Bass, crappies, and Channel Catfish. Important forage species include Bluegill and Threadfin Shad.

### Low-density fisheries

Although 70,444 Channel Catfish fingerlings were stocked in 2009 and 72,393 stocked in 2011, only two total fish were collected from 2014 and 2016 gill net surveys. Less than 1% of angling effort was directed at catfishes during the 2012, 2016, and 2020 creel surveys. No future directed sampling is planned.

Spotted Bass abundance is low in the reservoir (one fish collected in 2012 spring electrofishing survey). Although no future directed sampling is planned, Spotted Bass catch will be recorded from electrofishing surveys directed at Largemouth Bass (see below).

### Survey objectives, fisheries metrics, and sampling objectives

**Largemouth Bass:** Largemouth Bass are the most popular sport fish in Naconiche Reservoir, accounting for approximately 85% of the annual angling effort. Impounded in 2009, the reservoir currently supports a high-quality fishery. Relative to trophy fish production, expectations are high but the population is still developing. Largemouth Bass are managed with an 18-in MLL regulation until 2016 when a 16-in maximum length limit went into effect. From 2010 to 2014, trend data on CPUE, size structure, and body condition were collected annually with fall (2010 – 2013) and spring electrofishing (2013 and 2014). Beginning in 2015, fall electrofishing was conducted every four years, and spring electrofishing was conducted biennially. Continuation of fall electrofishing (every four years) and spring (bass-only) electrofishing (every two years) will allow for determination of any large-scale changes in the Largemouth Bass population that may spur further investigation. A total of 10 biologist-selected 5-min electrofishing sites will be sampled due to lack of suitable sampling water resulting from dense, inundated timber. These 10 sites should ensure that sampling objectives are achieved ( $> 50$  stock-size fish;  $RSE \leq 25$ ), as simulations indicated that only 4 sites were required. In addition, average age of Largemouth Bass between 13.0 and 14.9 in (Category 2;  $N = 13$ ) will be estimated in 2023, and every four years thereafter. A spring quarter creel survey will be conducted every four years (next survey in 2024) to collect angler trend data, catch rates, and fishing effort.

**Crappies:** The crappie fishery is the second most popular at Naconiche Reservoir. Although an abundant crappie population has been established, 2011 trap netting resulted in a catch rate of 1.0/nn. No additional trap netting is planned. A spring quarter creel survey will be conducted every four years to detect any large-scale changes in the crappie population that may warrant additional sampling.

**Prey species:** Bluegill and Threadfin Shad are the primary forage at Lake Naconiche. Fall electrofishing every four years, sampling 10 sites per year, will result in sufficient numbers of Bluegill for size structure (50 fish minimum) and relative abundance ( $RSE \leq 25$  of CPUE-Total). At this effort, the expected RSE for CPUE-Total is 53 for Threadfin Shad. No additional effort will be expended to achieve an  $RSE \leq 25$  for Threadfin Shad or Gizzard Shad, but Largemouth Bass body condition (fish  $\geq 8$ " 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, 2<sup>nd</sup> edition. American Fisheries Society, Bethesda, Maryland.
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- 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.

## Tables and Figures

Table 1. Characteristics of Naconiche Reservoir, Texas.

Characteristic	Description
Year constructed	2009
Controlling authority	County of Nacogdoches
County	Nacogdoches
Reservoir type	Tributary
Shoreline Development Index	3.55
Conductivity	100 $\mu$ S/cm

Table 2. Boat ramp characteristics for Naconiche Reservoir, Texas, March, 2020. Reservoir elevation at time of survey was 347 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Naconiche Park	31.76980 -94.58539	Y	50	343	Excellent. No access issues

Table 3. Harvest regulations for Naconiche 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, Largemouth	5 <sup>a</sup> (only 1 > 24 inches)	16-inch maximum
Bass: Spotted	5 <sup>a</sup>	None
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

<sup>a</sup> Daily bag for Largemouth Bass and Spotted Bass = 5 fish in any combination.

Table 4. Stocking history of Naconiche Reservoir, Texas. FGL = fingerling; AFGL = advanced fingerling; ADL = adults.

Species	Year	Number	Size
Black Crappie	2010	266	ADL
Bluegill	2009	79,480	AFGL
	2011	67,369	AFGL
	Total	146,849	
Channel Catfish	2009	70,444	FGL
	2011	72,393	FGL
	Total	142,837	
Florida Largemouth Bass	2011	15	ADL
	2011	6,729	AFGL
	2011	73,135	FGL
	2012	233	ADL
	2012	75,214	FGL
	2013	69	ADL
	2013	73,080	FGL
	2014	75,696	FGL
	2015	99	ADL
	2015	74,381	FGL
	2016	69,633	FGL
	2017	64,433	FGL
	2018	69,280	FGL
	2019	40,149	FGL
Total	622,146		
ShareLunker Largemouth Bass	2009	173	ADL
	2009	27,927	AFGL
	2009	67,462	FGL

Species	Year	Number	Size
	2011	2,020	AFGL
	2012	173	ADL
	Total	<u>97,755</u>	
Threadfin Shad	2010	2,500	AFGL
	2011	4,000	FGL
	Total	<u>6,500</u>	
White Crappie	2010	89	ADL

Table 5. Objective-based sampling plan components for Naconiche Reservoir, Texas 2019–2020.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Abundance	CPUE–Stock	RSE–Stock $\leq 25$
	Size structure	PSD, length frequency	N $\geq 50$ stock
	Age-and-growth	Age at 14 inches	N = 13, 13.0 – 14.9 inches
	Condition	$W_r$	10 fish/inch group (max)
Bluegill <sup>a</sup>	Abundance	CPUE–Total	
	Size structure	PSD, length frequency	N $\geq 50$
Gizzard Shad <sup>a</sup>	Abundance	CPUE–Total	
	Size structure	PSD, length frequency	
	Prey availability	IOV	
Threadfin Shad <sup>a</sup>	Abundance	CPUE–Total	
<i>Creel Survey <sup>b</sup></i>			
Largemouth Bass	Trend information on angler utilization	Angler effort, CPUE, total harvest and size composition	
Crappies	Trend information on angler utilization	Angler effort, CPUE, total harvest and size composition	
Catfishes	Trend information on angler utilization	Angler effort, CPUE, total harvest and size composition	

<sup>a</sup> No additional effort will be expended to achieve an RSE  $\leq 25$  for CPUE of Bluegill and Gizzard Shad if not reached from designated Largemouth Bass sampling effort. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density.

<sup>b</sup> Angler utilization data and associated statistics will be calculated for all sport fish.

Table 6. Survey of aquatic vegetation, Naconiche Reservoir, Texas, 2016–2019. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2016	2017	2018	2019
Hydrilla (Tier III)*	158 (22.8)	180 (26.0)	110 (15.9)	24 (3.7)
White waterlily	8 (1.2)	51 (7.4)	45 (6.5)	19 (2.7)
Giant salvinia (Tier II)*	0 (0.0)	20 (2.9)	96 (13.9)	98 (14.2)

\*Tier II is Maintenance, Tier III is Watch Status

Table 7. Percent directed angler effort by species for Naconiche Reservoir, Texas, 2013, 2016 and 2020. Survey periods were from 1 March through 31 May.

Species	2013	2016	2020
Anything	11.1	3.2	3.8
Largemouth Bass	64.7	85.7	86.6
Crappies	22.5	10.7	9.3
Catfishes	0.0	0.4	0.0
Sunfishes	1.7	0.0	0.3

Table 8. Total fishing effort (h) for all species and total directed expenditures at Naconiche Reservoir, Texas, 2013, 2016 and 2020. Survey periods were from 1 March through 31 May. Relative standard error is in parentheses.

Statistic	2013	2016	2020
Total fishing effort	14,616 (18)	16,322 (18)	27,976 (24)
Total directed expenditures	\$54,345 (47)	\$64,702 (42)	\$168,636 (59)

## Gizzard Shad

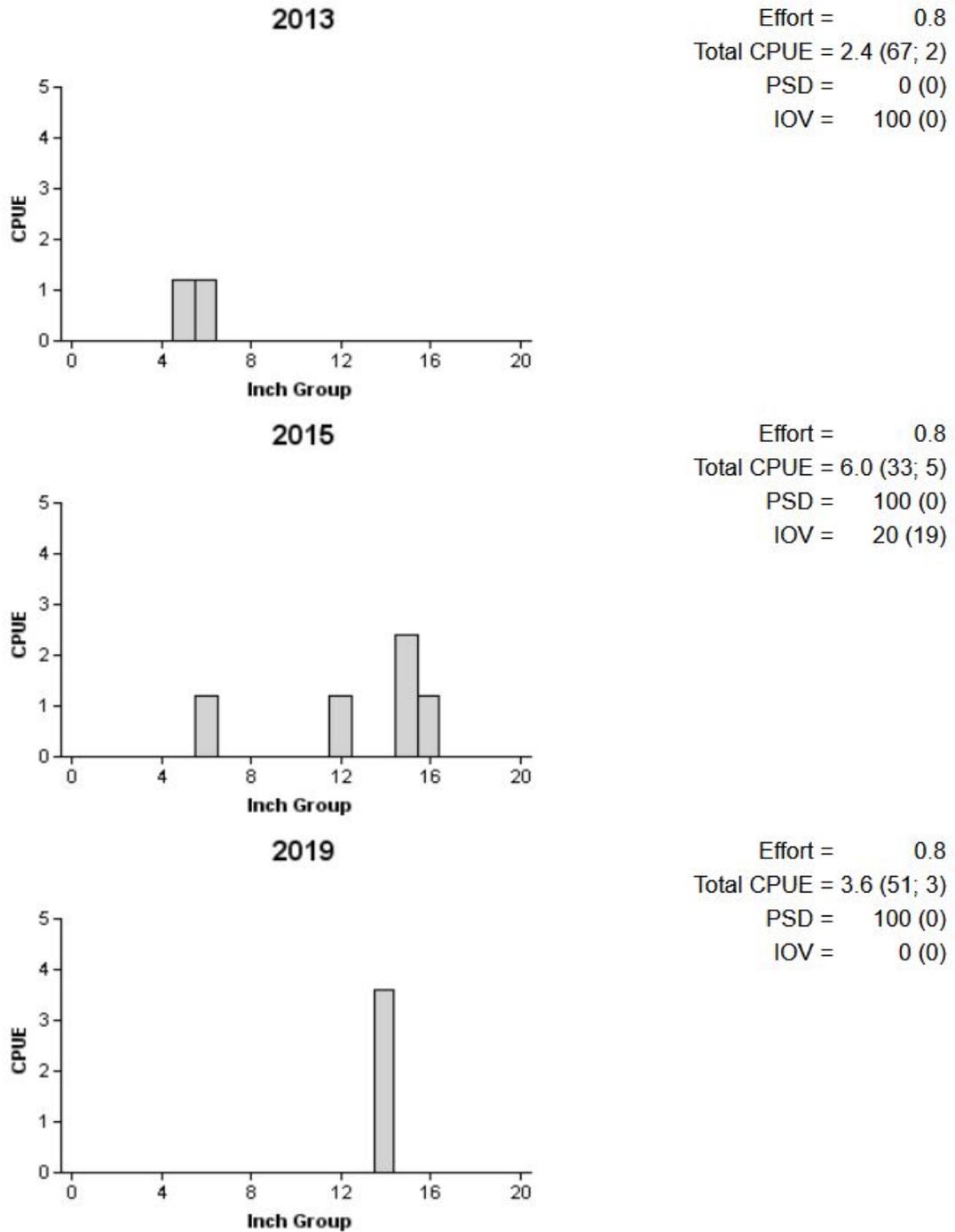


Figure 1. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Naconiche Reservoir, Texas, 2013, 2015, and 2019.

## Bluegill

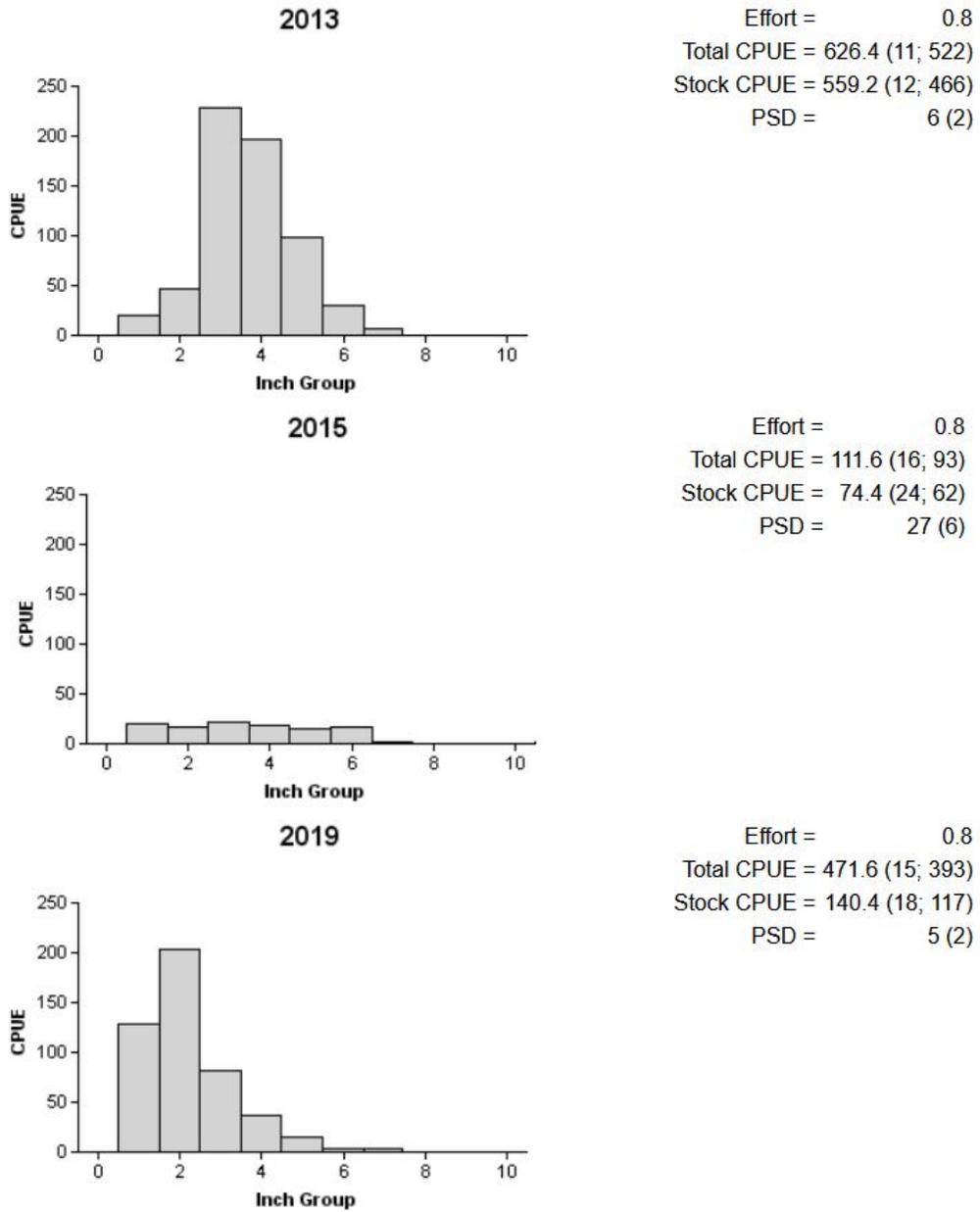


Figure 2. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Naconiche Reservoir, Texas, 2013, 2015, and 2019.

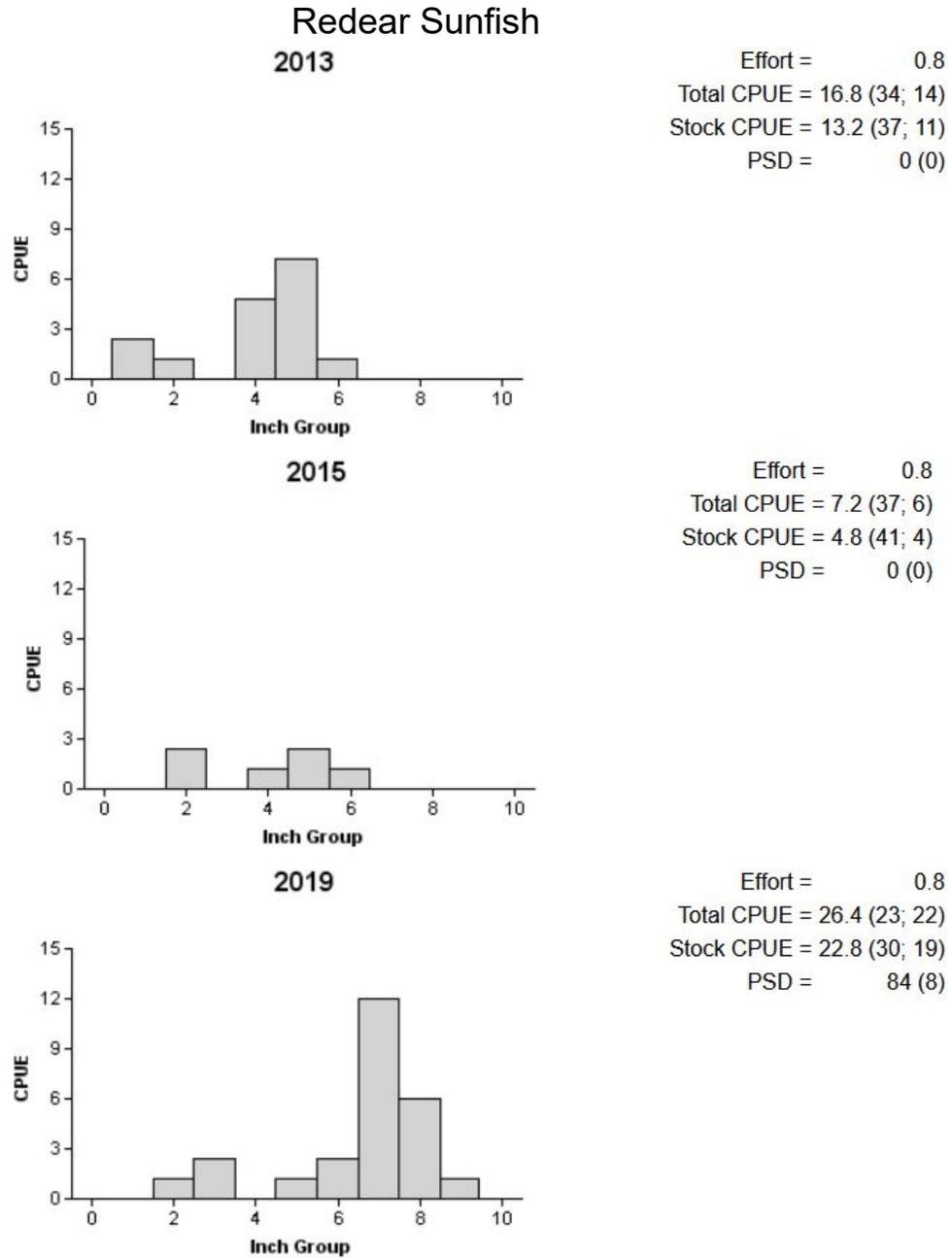


Figure 3. Number of Redear Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Naconiche Reservoir, Texas, 2013, 2015, and 2019.

Table 9. Creel survey statistics for sunfishes at Naconiche Reservoir, Texas, from March 1 through May 31, 2013, 2016 and 2020. Total catch per hour is for anglers targeting sunfish and total harvest is the estimated number of sunfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2013	2016	2020
Surface area (acres)	692	692	692
Directed effort (h)	241.6 (97)	0 (0)	97.2 (172)
Directed effort/acre	0.4 (97)	0 (0)	0.1 (172)
Total catch per hour	0.0 (0)	0 (0)	4.3
Total harvest	523 (62)	0 (0)	610 (71)
Harvest/acre	0.8 (62)	0 (0)	0.9 (71)
Percent legal released	22.3		80.8

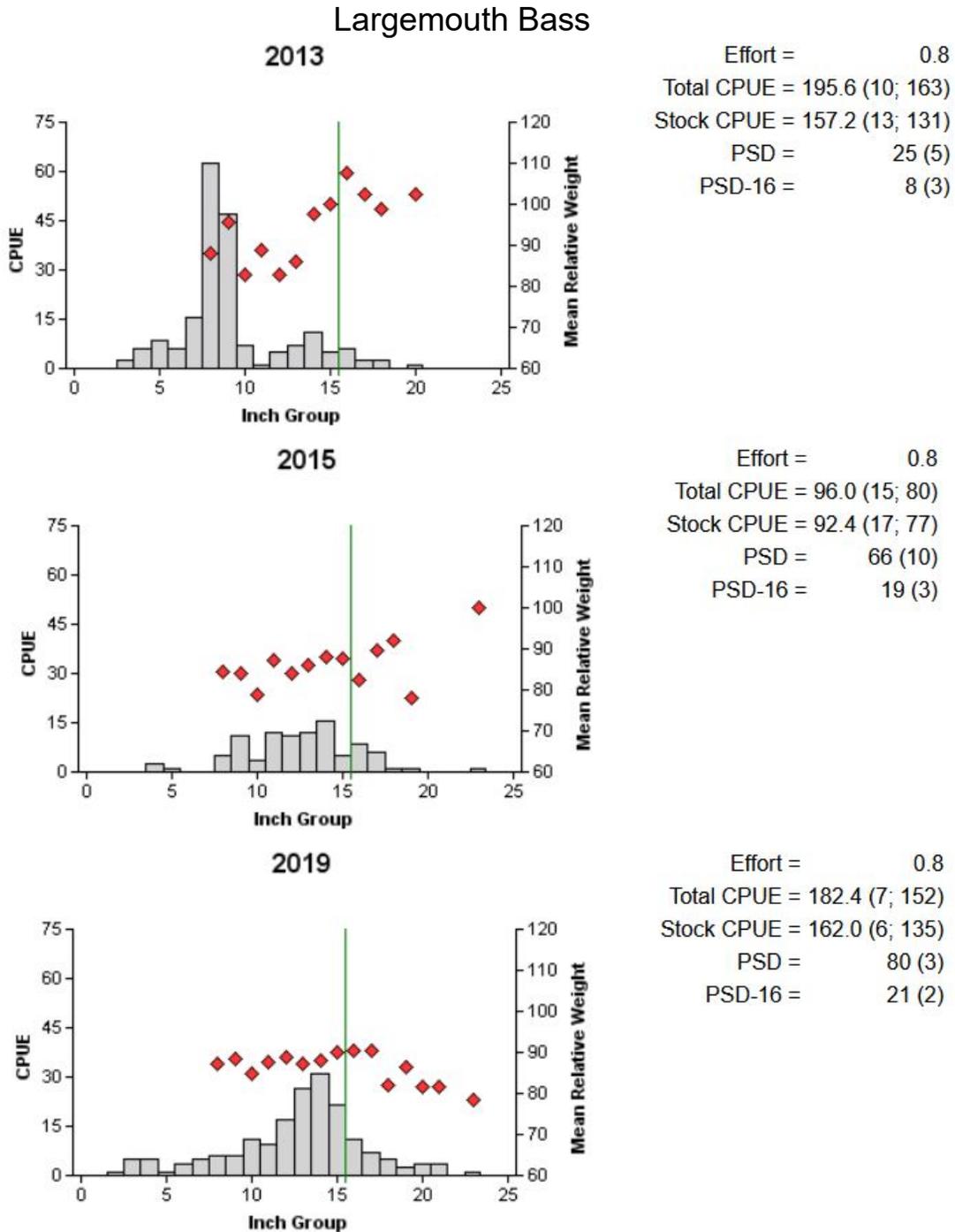


Figure 4. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Naconiche Reservoir, Texas, 2013, 2015, and 2019. Vertical lines represent the maximum length limit.

## Largemouth Bass

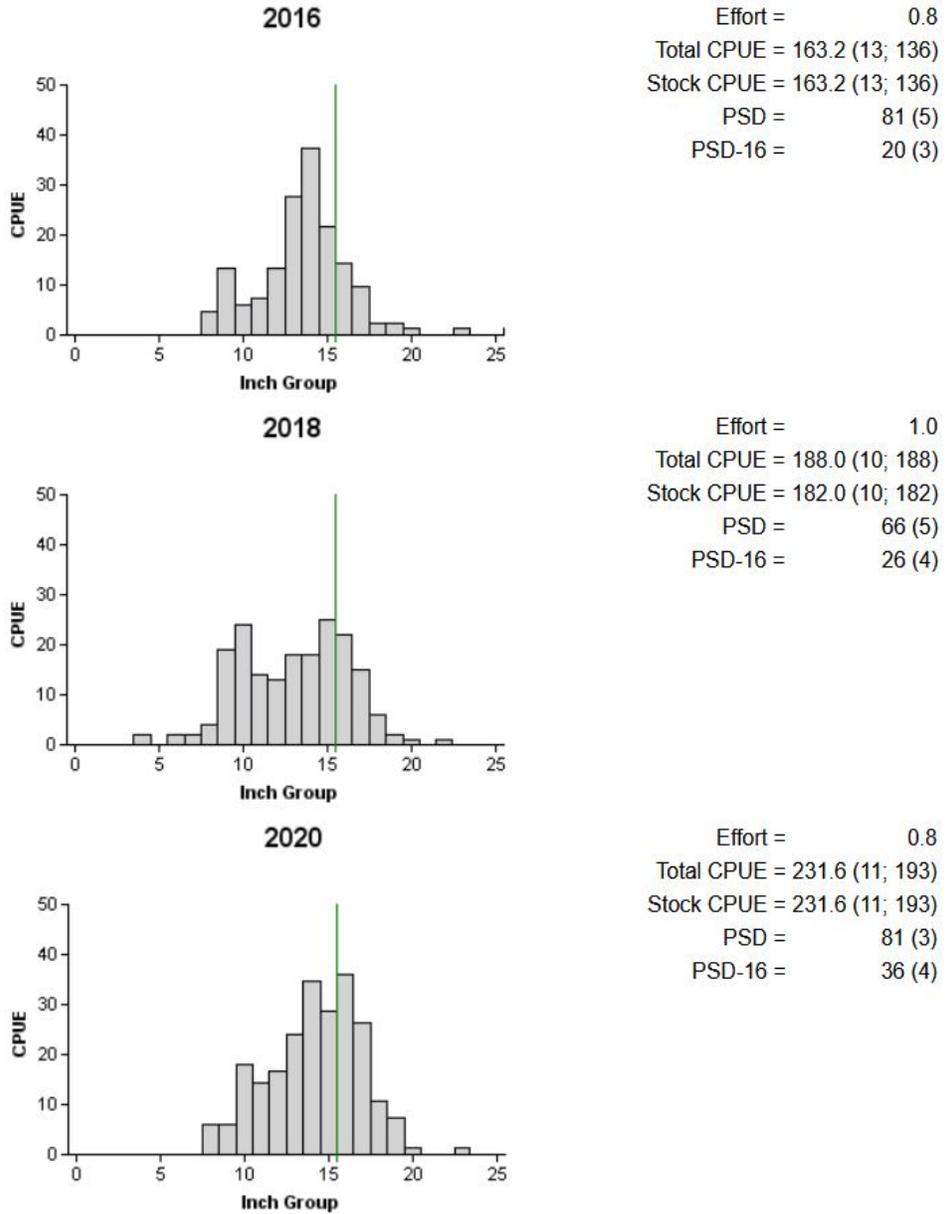


Figure 5. Number of Largemouth Bass caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring electrofishing surveys, Naconiche Reservoir, Texas, 2016, 2018, and 2020. Vertical lines represent the maximum length limit.

Table 10. Creel survey statistics for Largemouth Bass at Naconiche Reservoir, Texas, March 1 through May 31, 2013, 2016 and 2020. Catch rate is for all anglers targeting Largemouth Bass. The estimated number of fish released by weight category is for anglers targeting Largemouth Bass. Relative standard errors (RSE) are in parentheses.

Statistic	2013	2016	2020
Surface area (acres)	692	692	692
Directed effort (h)	9,456.4 (19)	13,990.9 (19)	24,216.6 (25)
Directed effort/acre	13.7 (19)	20.2 (19)	35.0 (25)
Total catch per hour	0.7 (21)	0.7 (12)	0.6 (13)
Total catch	7,676 (23)	12,197 (27)	16,599 (31)
< 4.0 lbs	6,576 – 85.7%	11,421 – 93.6%	15,464 – 93.2%
≥ 4-6.9 lbs	1,068 – 13.9%	751 – 6.2%	1,135 – 6.8%
≥ 7-9.9 lbs	32 – 0.4%	25 – 0.2%	0 – 0%
≥ 10 lbs	0 – 0%	0 – 0%	0 – 0%
Total harvest	83 (68)	29 (60)	1,001 (64)
Harvest/acre	0.1 (68)	< 0.1 (60)	1.4 (64)
Percent legal released	97.2	98.7	87.2

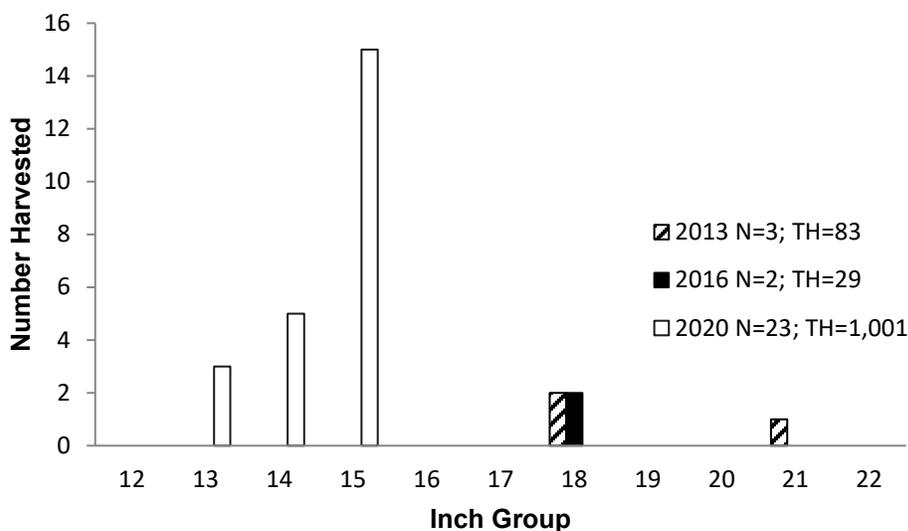


Figure 6. Length frequency of harvested Largemouth Bass observed during creel surveys at Naconiche Reservoir, Texas, March 1 through May 31<sup>st</sup>, 2013, 2016, and 2020, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the estimated harvest for the creel period. From September 1, 2012 – August 31, 2016, Largemouth Bass harvest was regulated with an 18-inch minimum length limit. Since September 1, 2016, harvest has been regulated with a 16-inch maximum length limit.

Table 11. Creel survey statistics for crappie at Naconiche Reservoir, Texas, from March 1 through May 31, 2013, 2016 and 2020. Total catch per hour is for anglers targeting crappie and total harvest is the estimated number of crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2013	2016	2020
Surface area (acres)	692	692	692
Directed effort (h)	3,289.9 (28)	1,752.6 (35)	2,600.8 (38)
Directed effort/acre	4.8 (28)	2.5 (35)	3.8 (38)
Total catch per hour	0.5 (69)	0.7 (39)	0.1 (73)
Total harvest	83 (107)	307 (50)	0 (0)
Harvest/acre	0.1 (107)	0.4 (50)	0 (0)
Percent legal released	71.4	24.6	100

## Proposed Sampling Schedule

Table 12. Proposed sampling schedule for Naconiche Reservoir, Texas. Survey period is June through May. Standard electrofishing surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

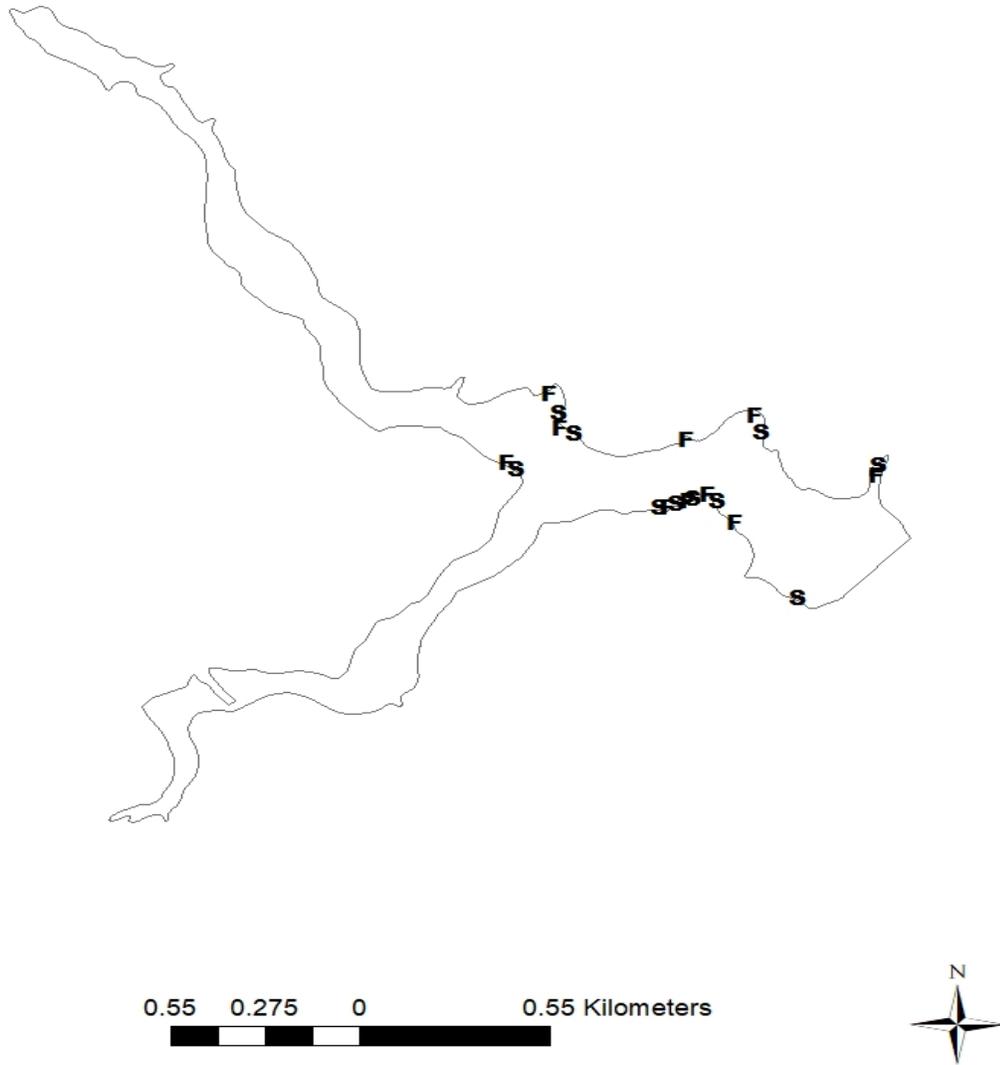
	Survey year			
	2020-2021	2021-2022	2022-2023	2023-2024
Angler Access				S
Vegetation	A	A	A	S
Electrofishing – Fall				S
Electrofishing – Spring		A		A
Creel survey				A
Report				S

## 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 Naconiche Reservoir, Texas, 2019-2020. Sampling effort was 0.8 hours for fall and spring (bass-only) electrofishing.

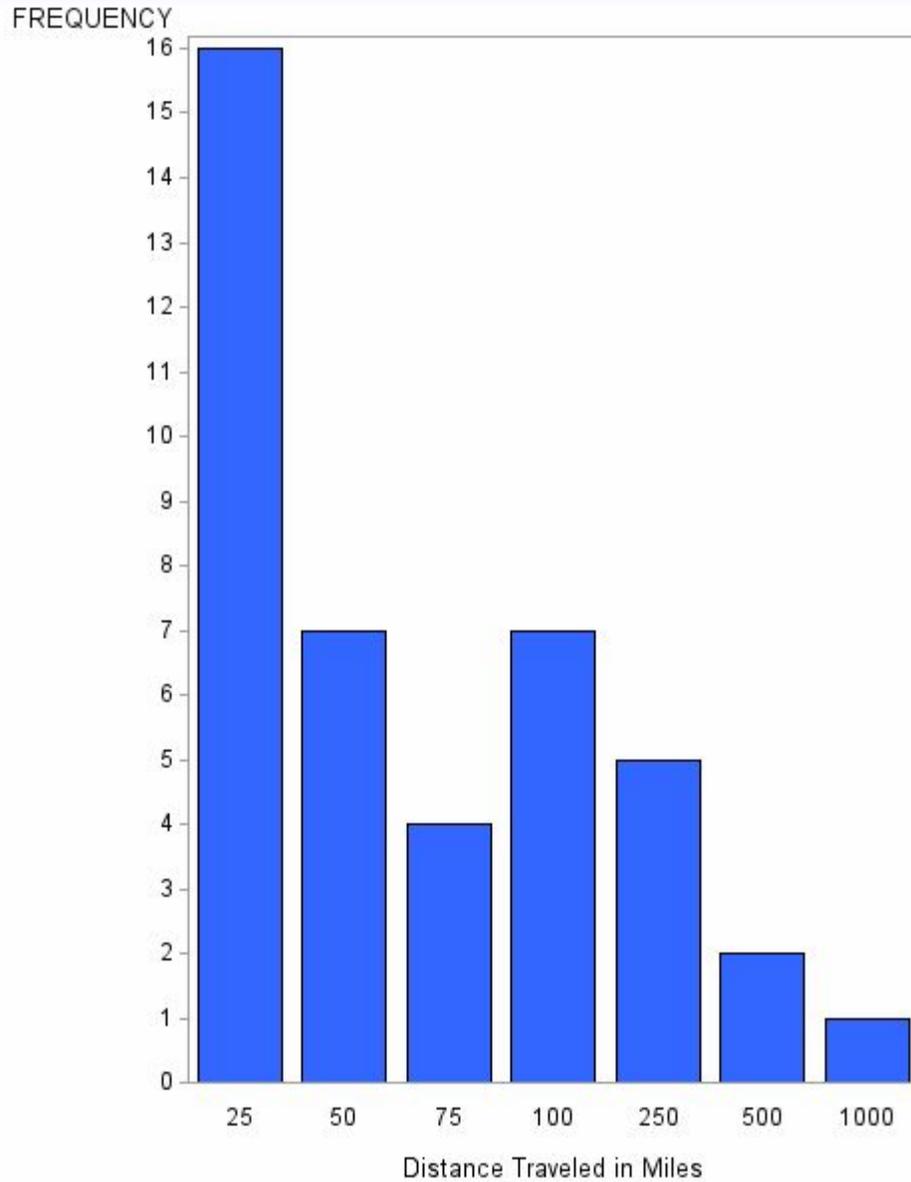
Species	Fall Electrofishing		Spring Electrofishing	
	N	CPUE	N	CPUE
Gizzard Shad	3	3.6 (51)		
Threadfin Shad	54	64.8 (41)		
Warmouth	7	8.4 (48)		
Bluegill	393	471.6 (15)		
Redear Sunfish	22	26.4 (23)		
Redspotted Sunfish	1	1.2 (100)		
Largemouth Bass	152	182.4 (7)	193	231.6 (11)

## APPENDIX B – Map of sampling locations



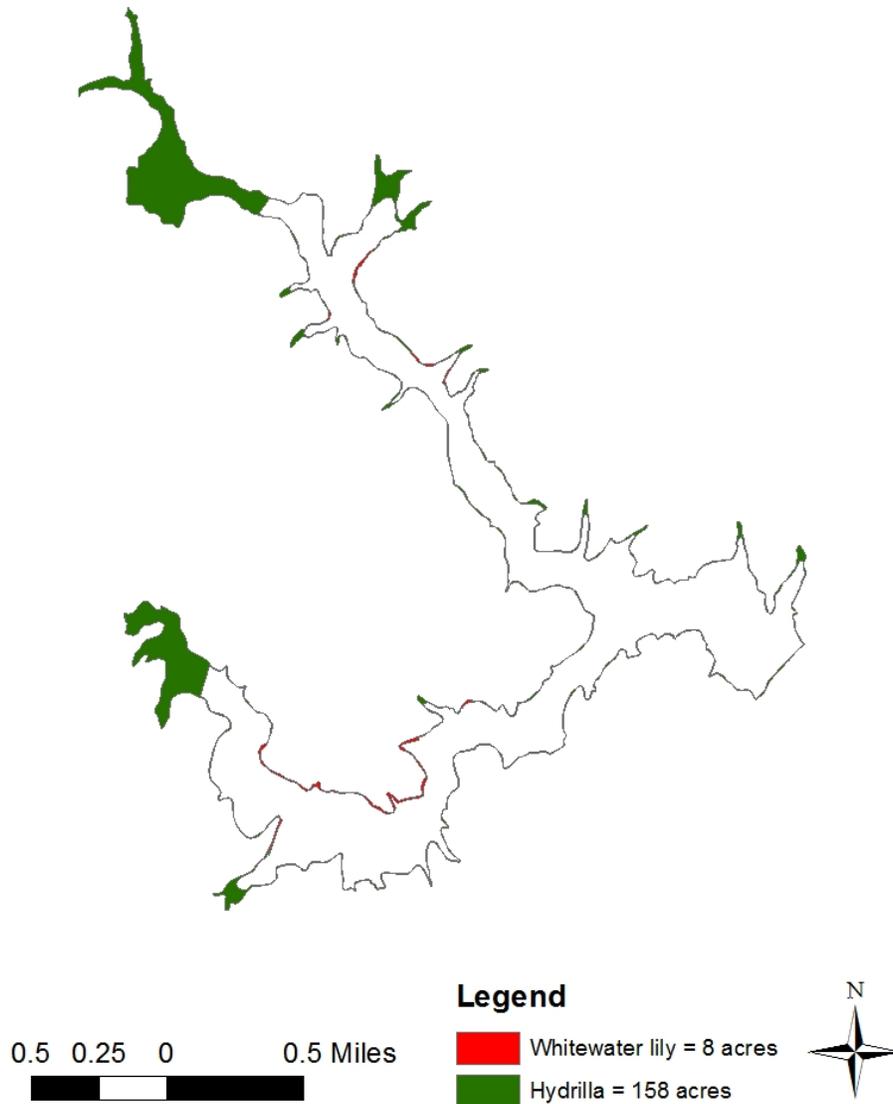
Location of sampling sites, Naconiche Reservoir, Texas, 2019-2020. Fall electrofishing and spring electrofishing stations are indicated by F and S, respectively. Water level was near full pool at time of sampling.

## APPENDIX C – reporting of creel ZIP code data

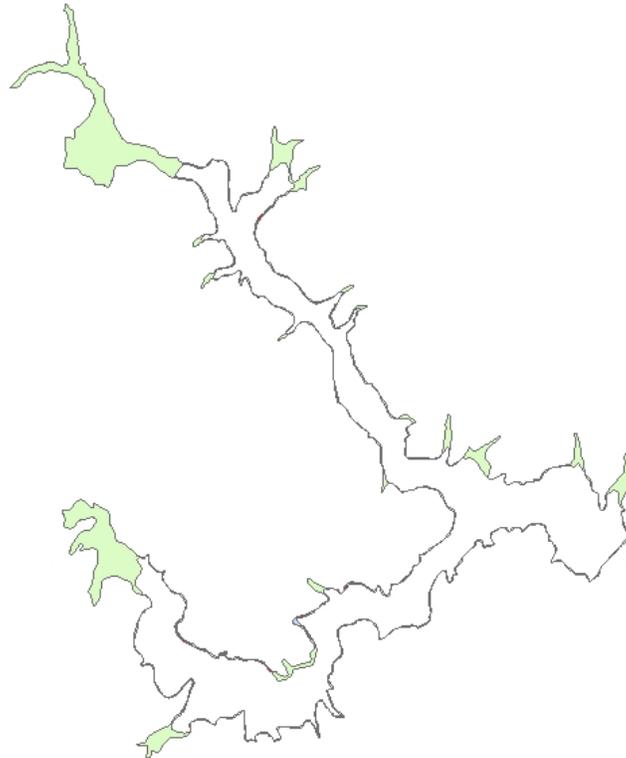


Frequency of anglers that traveled various distances (miles) to Naconiche Reservoir, Texas, as determined from the March through May 2020 creel survey.

## APPENDIX D – aquatic vegetation survey maps



Aquatic vegetation survey, Naconiche Reservoir, Texas, July 2016.



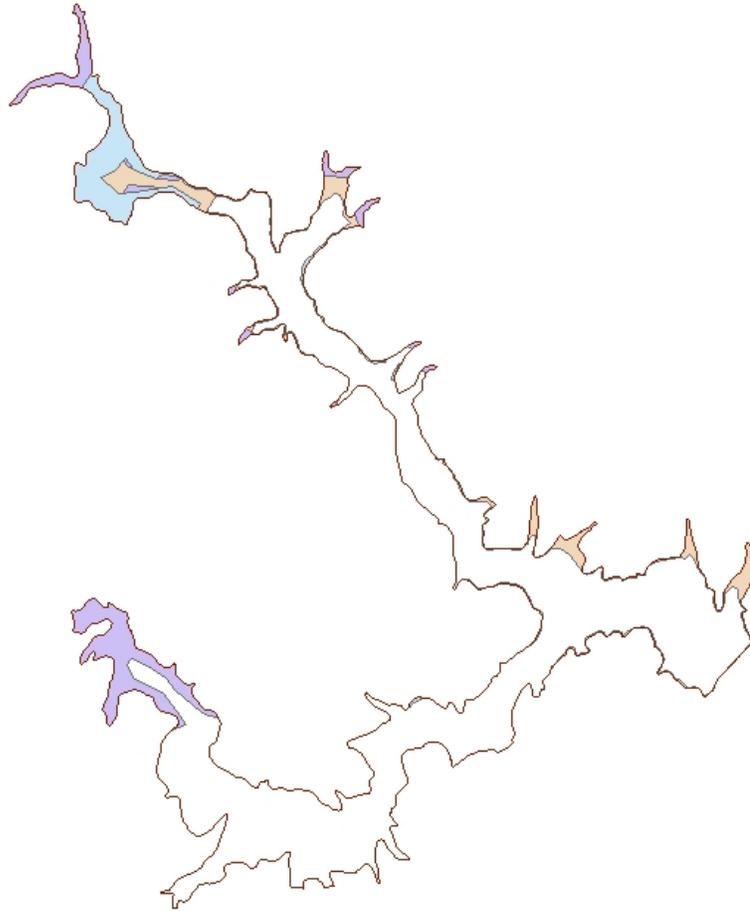
**Legend**

-  Hydrilla = 180 acres
-  Giant Salvinia = 20 acres
-  Whitewater Lily = 51 acres

0.65 0.325 0 0.65 Miles



Aquatic vegetation survey, Naconiche Reservoir, Texas, July 2017.

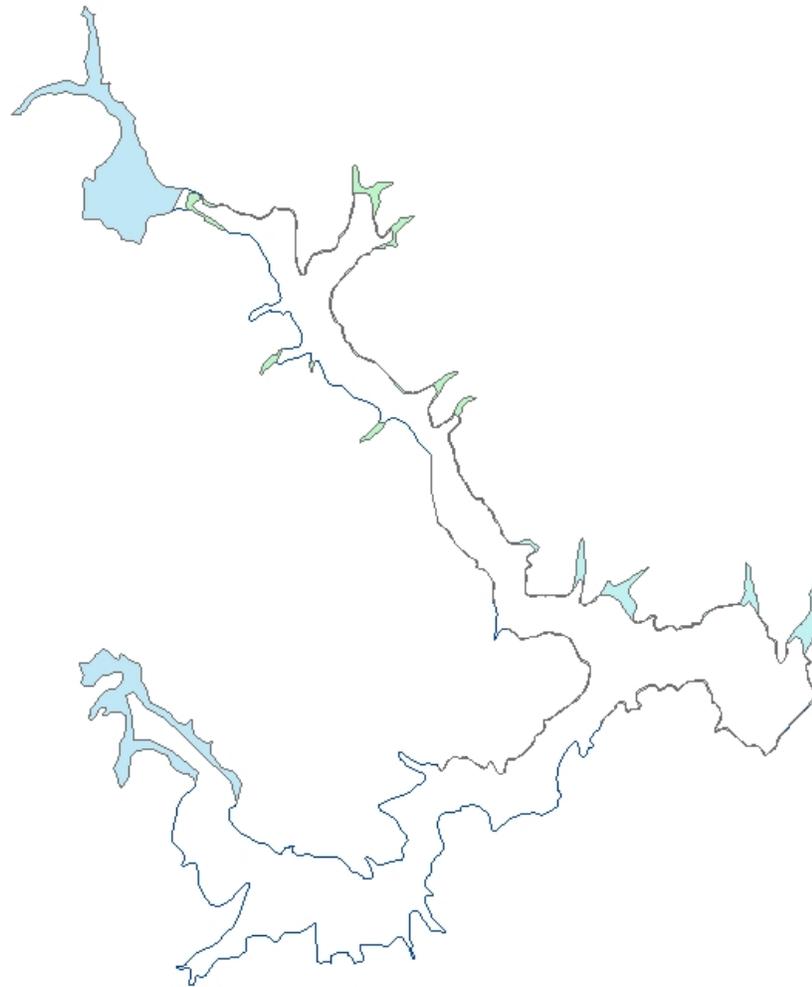


**Legend**

-  Whitewater Lily = 45 acres
-  Salvinia = 96 acres
-  Hydrilla = 110 acres

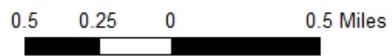


Aquatic vegetation survey, Naconiche Reservoir, Texas, July 2018.



**Legend**

-  Giant\_Salvinia = 98 acres
-  Hydrilla = 24 acres
-  White\_waterlily = 19 acres



Aquatic vegetation survey, Naconiche Reservoir, Texas, July 2019.



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