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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2016 Fisheries Management Survey Report

Diversion Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Diversion Reservoir were surveyed in 2016 using electrofishing. Historical data are presented with the 2016 data for comparison. This report summarizes the results of the survey and contains a management plan based on those findings.

- **Reservoir Description:** Diversion Reservoir is a 3,133-acre impoundment located in Archer and Baylor counties on the Wichita River, a tributary of the Red River, approximately 30 miles west of Wichita Falls. It was impounded in 1924 and is jointly owned by the City of Wichita Falls and Wichita County Water Improvement District No. 2. Its primary purpose has been irrigation water supply. In February 2009, Diversion began to be utilized as a secondary municipal water sources for the city of Wichita Falls. The Waggoner Ranch based in Vernon, Texas owned all but a few feet of land surrounding the reservoir but recently (2015) sold the ranch. The new owner closed all access to the public and evicted all tenants that leased property at the reservoir beginning February 1, 2017. The reservoir elevation is consistent, varying not more than three feet a year except for 2014-2015 when the reservoir reached 5 feet below normal pool caused by the severe drought and elevation conditions at Kemp reservoir, which feeds Diversion. At this elevation, the lone boat ramp is unusable. Diversion is relatively shallow, with moderately clear water. Littoral area habitat includes standing timber and submersed vegetation as observed during the 2016 habitat survey. During the winter/spring months of 2003-2016 the fishery was adversely affected by toxic golden alga blooms resulting in significant losses of game fish and a reduction in angling effort.

- **Management History:** Historically important sport fish included Channel Catfish, White Bass, Largemouth Bass and White Crappie. Fingerling Florida Largemouth Bass and Channel Catfish were stocked in 2005 in response to golden alga fish kills.

- **Fish Community:**

    - **Prey species:** Gizzard Shad were low in abundance in 2016 being similar to the previous survey completed in 2008. Likewise, Bluegill abundance was extremely low, much like in 2008.

    - **Largemouth Bass:** Very few Largemouth Bass were collected during the 2016 electrofishing survey.

- **Management Strategies:** Because of the closure of access to the public, monitoring and management of this reservoir and its fisheries will cease immediately. If access is ever provided to the public, these efforts will resume.

INTRODUCTION

This document is a summary of fisheries data collected from Diversion Reservoir in 2016. 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 2016 data for comparison.

Reservoir Description

Diversion is a 3,133-acre reservoir on the Wichita River located approximately 20 miles below Kemp Reservoir in Archer and Baylor counties. Controlled releases from Kemp maintain nearly constant water levels at Diversion. This results in reservoir fluctuations of not more than three feet a year except for 2014-2015 when the reservoir reached 5 feet below normal pool, a result of severe drought in the watershed (Figure 1). The reservoir has a 234 square-mile drainage area which flows through rolling plains and grasslands. Erosion of Permian outcroppings and salt springs in the watershed results in high concentrations of dissolved salts in the reservoir. Diversion is relatively shallow, with moderately clear water and a basic pH. It has a shoreline length of 28 miles, mean depth of 12 feet, and a maximum depth of 35 feet. The reservoir is jointly owned by the City of Wichita Falls and Wichita County Water Improvement District No. 2 and has been operated primarily for irrigation purposes. In February 2009 Diversion along with Kemp Reservoir began serving as secondary municipal water sources for the city of Wichita Falls. The Waggoner Ranch based in Vernon, Texas privately owned the land surrounding the reservoir charging a fee to access their property. On January 1, 2009, a $15 per person fee for three-day passes was instituted. Also on January 1, 2009 annual permit fees were raised to $500. Ownership of the ranch changed in 2015. In 2016, the new owner announced that no leases would be renewed and all tenants would need to vacate the property as of January 31, 2017. At that point, public access ceased. During the 2016 habitat survey, standing timber and over 185 acres of submersed vegetation were observed.

Diversion serves as the water supply for the Dundee State Fish Hatchery. On March 16, 2001, a heavy bloom of the toxic golden alga *Prymnesium parvum* was first confirmed in the reservoir. Fish hatchery operations were impacted and significant mortalities occurred. During the winter and spring months of 2003-2016 the Diversion fishery has been impacted by toxic golden alga blooms, which combined with the increased gate fees, has led to a sharp reduction in angling activity.

Angler Access: There is no longer any access to the reservoir.

Management History

Previous management issues and actions: Management issues and actions from the previous survey report (Lang and Mauk 2013):

1. Golden alga fish kills have occurred nearly every year at Diversion since 2001. Monitor golden alga by utilizing the Dundee State Fish Hatchery which monitors golden alga cells activity by cell counts. Monitor the fish populations every four years.

   Actions:
   1. Monitored reservoir for golden alga blooms utilizing the Dundee State Fish Hatchery incoming water cell counts as an early indicator of problems.
   2. Performed an electrofishing survey in 2016 but no other work since the reservoir will no longer be accessible to the public.

2. Waggoner Ranch controls access to the reservoir by owning the surrounding land except for a small area of hard to access public land by the spillway. Entry fees are somewhat steep discouraging reservoir usage. Ranch ownership change offered potential that access could be improved.

Actions:

1. Monitored entry fees charged by the Waggoner Ranch.
2. Made public aware of a small area of public land near the spillway.
3. New ownership decided to close public access to the reservoir as of January 31, 2017. Fisheries management practices also ceased on that date.

3. During the drought, the boat ramp was often unusable since it was out of the water. Extension was not possible.

   Action: Monitored ramp conditions so that we could keep the public informed of whether boating was possible.

4. Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. Therefore, the district office would be vigilant for invasive species and would try to educate the public about them.

   Actions:

   1. The office spread the message about invasive species through the use of television, new releases, signage at reservoir, and the internet.
   2. Made a speaking point about invasive species when presenting to constituent and user groups.
   3. Keep track of existing and future inter-basin water transfers to facilitate potential invasive species responses.

Harvest regulation history: Sport fish species were managed with statewide regulations (Table 3).

Stocking history: In response to Largemouth Bass and Channel Catfish population decreases caused by golden alga fish kills, both species were supplementally stocked in 2005. The complete stocking history is shown in Table 4.

Water transfer: Diversion is primarily used as an irrigation water supply reservoir. In 2009, the city of Wichita Falls began treating Kemp Reservoir water for municipal usage. Kemp is immediately upstream of Diversion and it's water releases help keep Diversion a constant level reservoir. Three water transfers take place from the reservoir. The first is the irrigation canals that exit the reservoir and transport water to surrounding ranches and Wichita Reservoir. The second is the water that goes to the Dundee State Fish Hatchery just below the dam. The final transport of water is to the AEP Texas North coal burning Oklaunion Power Plant for water cooling.

METHODS

An electrofishing survey was conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Diversion Reservoir (TPWD unpublished). Primary components of the OBS plan are listed in Table 5. All survey sites were randomly selected and the survey was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015) except the survey took place during daylight hours.

Electrofishing – Largemouth Bass, Sunfishes, and Gizzard Shad were collected by daytime electrofishing in 2016 and nighttime electrofishing in 2004 and 2008 (1 hour at 12, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing.

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

Habitat – A structural habitat survey was conducted in 2016. Vegetation surveys were conducted in 2004, 2008, 2012, and 2016 to monitor species type and coverage. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Water level – Source for water level data was the United States Geological Survey (USGS 2017).

RESULTS AND DISCUSSION

Habitat: A physical habitat survey was conducted August 26, 2016. Llittoral zone habitat consisted primarily of rocky and featureless shoreline. Open water habitat consists of submerged aquatic vegetation (Table 5). The acreage of submerged aquatic vegetation has decreased significantly since the previous physical habitat survey conducted in 2012 (Lang and Mauk 2013). There were few if any observed manmade changes to the physical habitat during the four year period.

Prey species: Gizzard Shad 2016 electrofishing CPUE (25.0/h) was similar to that of 2008 survey (30.0/h; Figure 2). The 2016 Bluegill population of 3.9/h is similar to the 2008 CPUE of 1.0/h but well below the pre-golden alga fish kills CPUE of 88.0/h in 2000 (Figure 3). Abundance of both species is considered low.

Largemouth Bass: Largemouth Bass electrofishing CPUE was 3.0/h, well below the CPUE of 52.0/h in 2008 (Figure 4). All fish in 2008 were 10-inches in length and less. Two of the three bass caught in 2016 were 14-inches and above. Body condition was good with *Wr*'s above 100.

Fisheries management plan for Diversion Reservoir, Texas

Prepared – July 2017

ISSUE 1: The Waggoner Ranch has recently sold with the new owner closing public access to the reservoir starting in January 31, 2017.

MANAGEMENT STRATEGY

1. Discontinue all management activities at the reservoir starting immediately since there is no public access to the reservoir.

Objective-Based Sampling Plan and Schedule

Sport fish, forage fish, and other important fishes

Annual golden alga fish kills at the reservoir have resulted in populations extremely low in abundance that none would be considered important.

Low-density fisheries

All species are considered low-abundance that are the result of annual golden alga fish kills that have occurred at the reservoir.

Survey objectives, fisheries metrics, and sampling objectives

All management activities at the reservoir have ceased since the reservoir has no public access.

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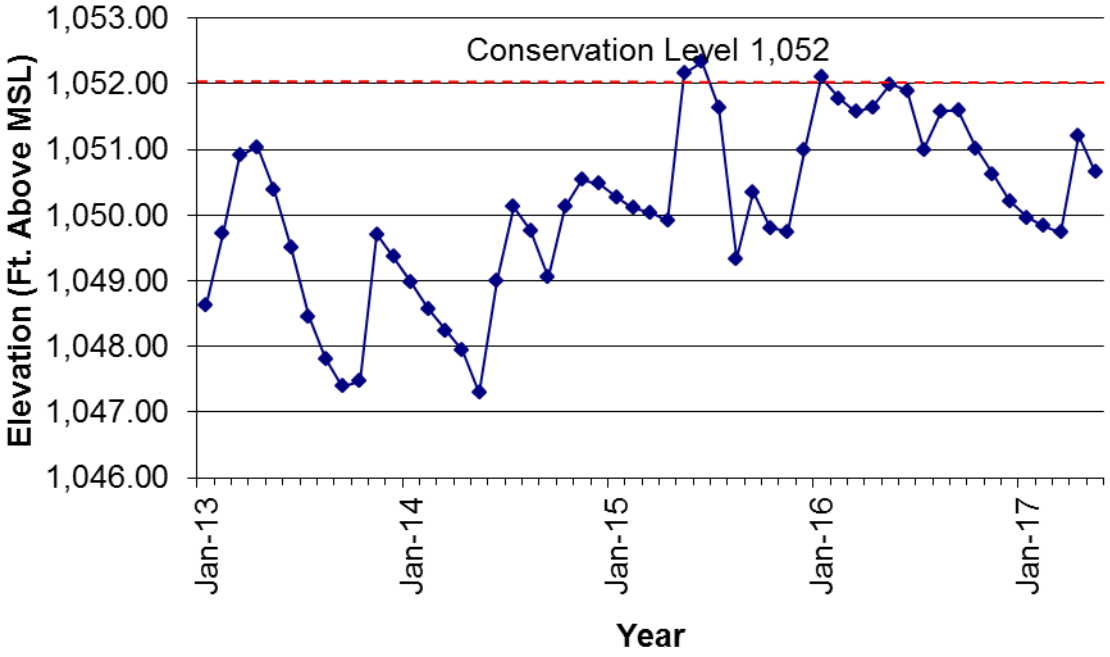


Figure 1. Monthly water level elevation averages in feet above mean sea level (MSL) recorded for Diversion Reservoir, Texas.

Table 1. Characteristics of Diversion Reservoir, Texas.

Characteristic	Description
Year constructed	1924
Controlling authority	City of Wichita Falls-Wichita Co. WID #2
Counties	Archer and Baylor
Reservoir type	Tributary
Shoreline development index (SDI)	4.5
Conductivity	3,307 μS/cm

Table 2. Boat ramp characteristics for Diversion Reservoir, Texas, August, 2016. Reservoir elevation at time of survey was 1050 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Diversion	33.82260 -98.94955	Y	18	1,049	No longer available to the public

Table 3. Harvest regulations for Diversion Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Flathead Catfish	5	18-inch minimum
White Bass	25	10-inch minimum
Largemouth Bass	5	14-inch minimum
White Crappie	25	10-inch minimum

Table 4. Stocking history of Diversion (Baylor County), Texas. FGL = fingerling, AFGL = advanced fingerling, ADL = adults.

Species	Year	Number	Life Stage	Mean TL (in)
Blue Catfish	1989	34,315	FGL	2.5
	1990	34,620	FGL	2.0
	1991	33,099	FGL	2.1
	Total	102,034		
Channel Catfish	1969	10,000	AFGL	7.9
	1970	14,000	AFGL	7.9
	1981	53,527	AFGL	7.9
	2005	71,946	FGL	2.9
	Total	149,473		
Florida Largemouth Bass	1993	177,710	FGL	1.7
	2005	177,151	FGL	1.5
	Total	354,861		
Palmetto Bass (Striped X White Bass hybrid)	1979	350,000	FRY	0.4
	1981	400,000	FRY	0.4
	Total	750,000		
Walleye	1969	4,700,030	FRY	0.2
	1970	400,000	FRY	0.2
	1971	1,450,000	FRY	0.2
	1972	435,675	FRY	0.2
	1973	1,230,475	FRY	0.2
	1974	70,000	FRY	0.2
	1989	445,000	FRY	0.2
	1993	3,367,368	FRY	0.2
	1994	6,847,103	FRY	0.2
	1998	75,300	FGL	1.7
	1999	38,945	FGL	1.4
	2000	171,711	FGL	1.6
	Total	19,231,607		

Table 5. Objective-based sampling plan components for Buffalo Creek Reservoir, Texas 2016.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Exploratory	Presence/absence	Practical effort
Bluegill	Exploratory	Presence/absence	Practical effort
Gizzard Shad	Exploratory	Presence/absence	Practical effort

Table 6. Survey of structural habitat types, Diversion Reservoir, Texas, 2016. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Bulkhead	0.1 miles	0.4
Rocky with boat docks	1.4 miles	5.0
Natural with boat docks	1.8 miles	6.4
Natural	11.5 miles	41.0
Rocky	13.2 miles	47.1
Flooded terrestrial	6.5 acres	0.2
Standing timber	5.0 acres	0.2

Table 7. Survey of aquatic vegetation, Diversion Reservoir, Texas, 2004, 2008, 2012, and 2016. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2004	2008	2012	2016
Native submersed	962.0 (30.7)	318.8 (9.1)	634.5 (18.2)	185.0 (5.9)
Native emergent	2.1 (<0.1)	10.9 (0.3)	0	7.5 (0.2)

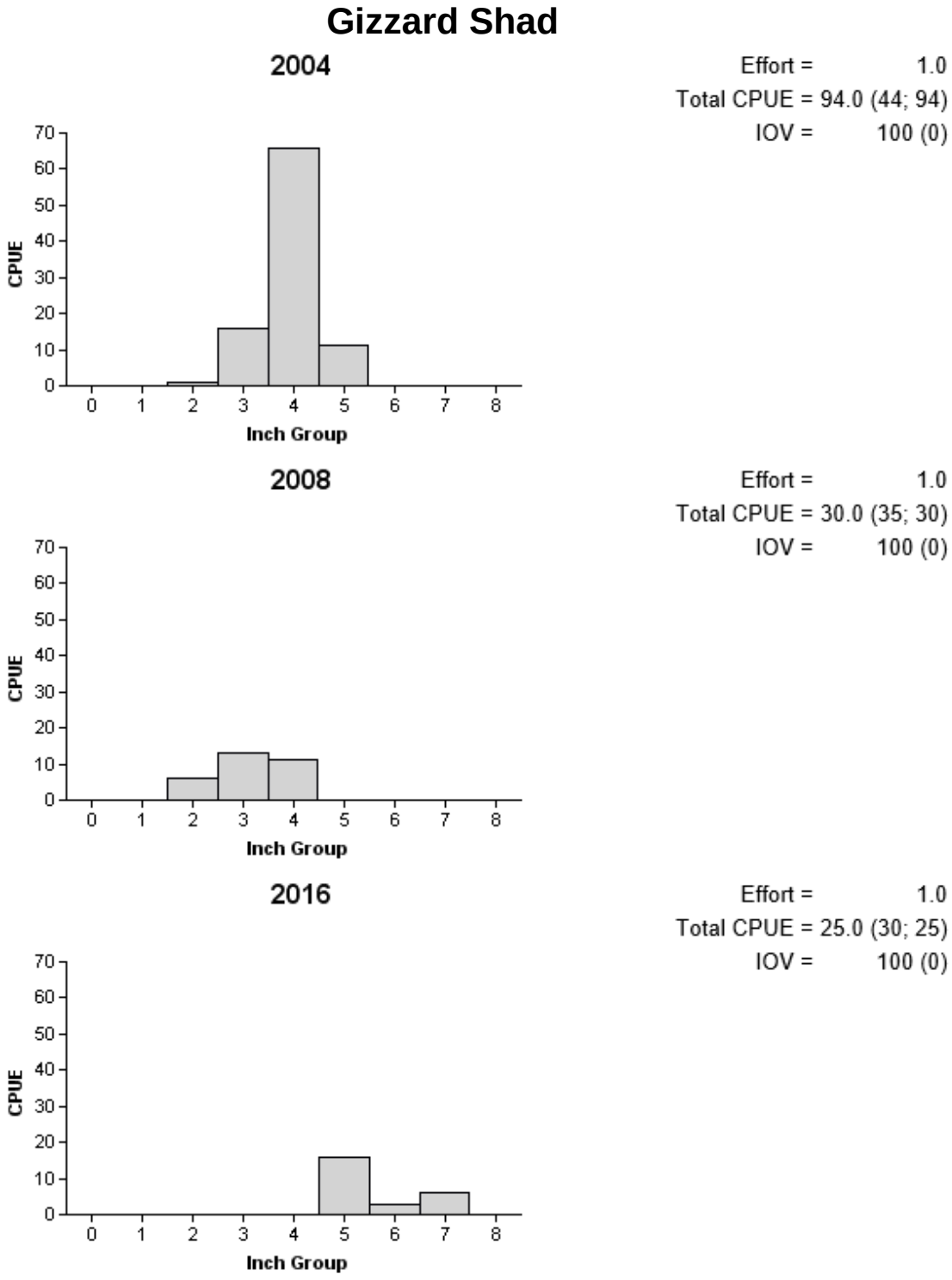


Figure 2. Number of Gizzard Shad caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for Diversion Reservoir, Texas, 2004, 2008, and 2016. Daytime electrofishing occurred in 2016.

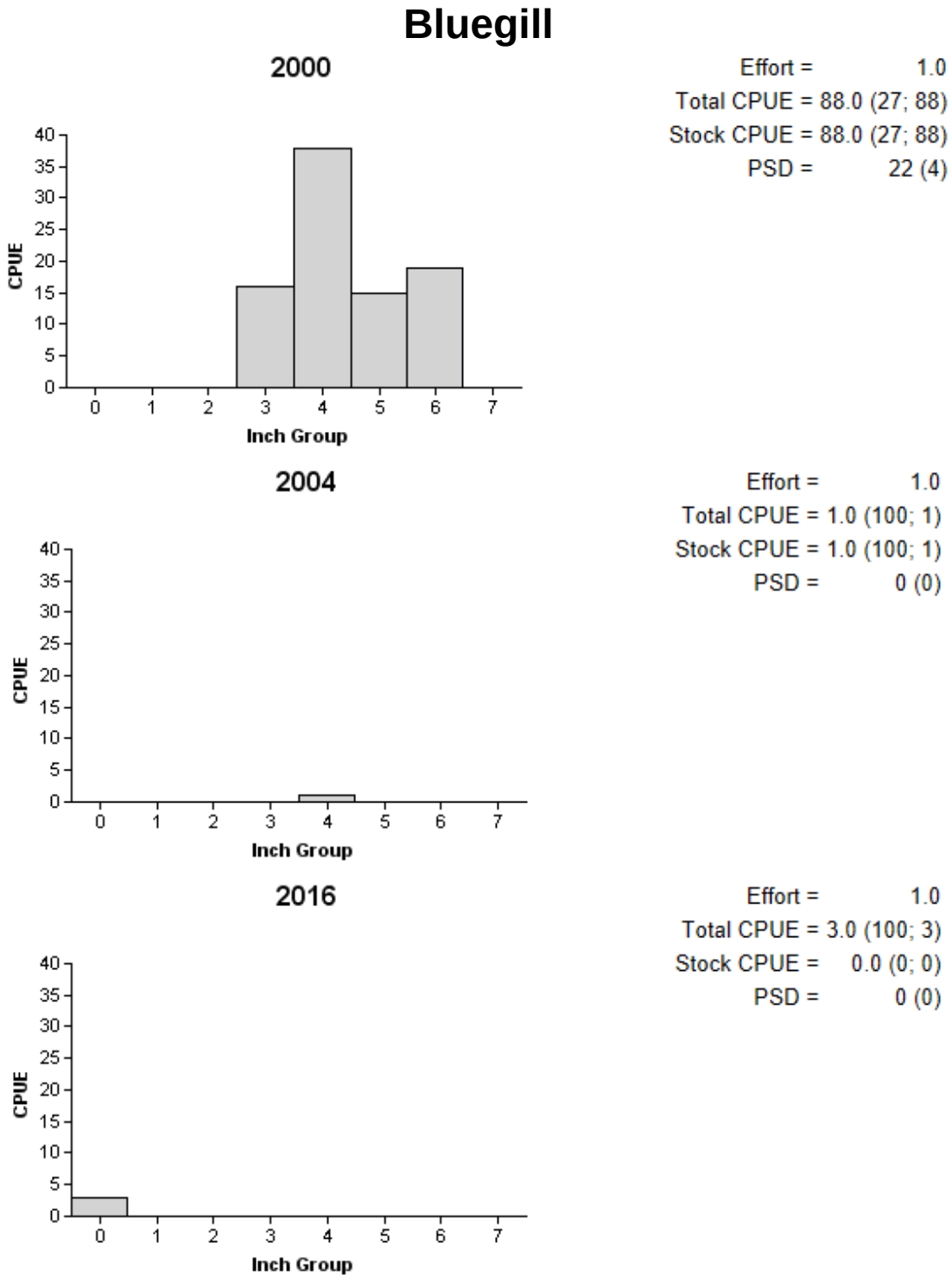


Figure 3. Number of Bluegill caught per net night (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for daytime electrofishing, Diversion Reservoir, Texas, 2000, 2004, and 2016. Daytime electrofishing occurred in 2016.

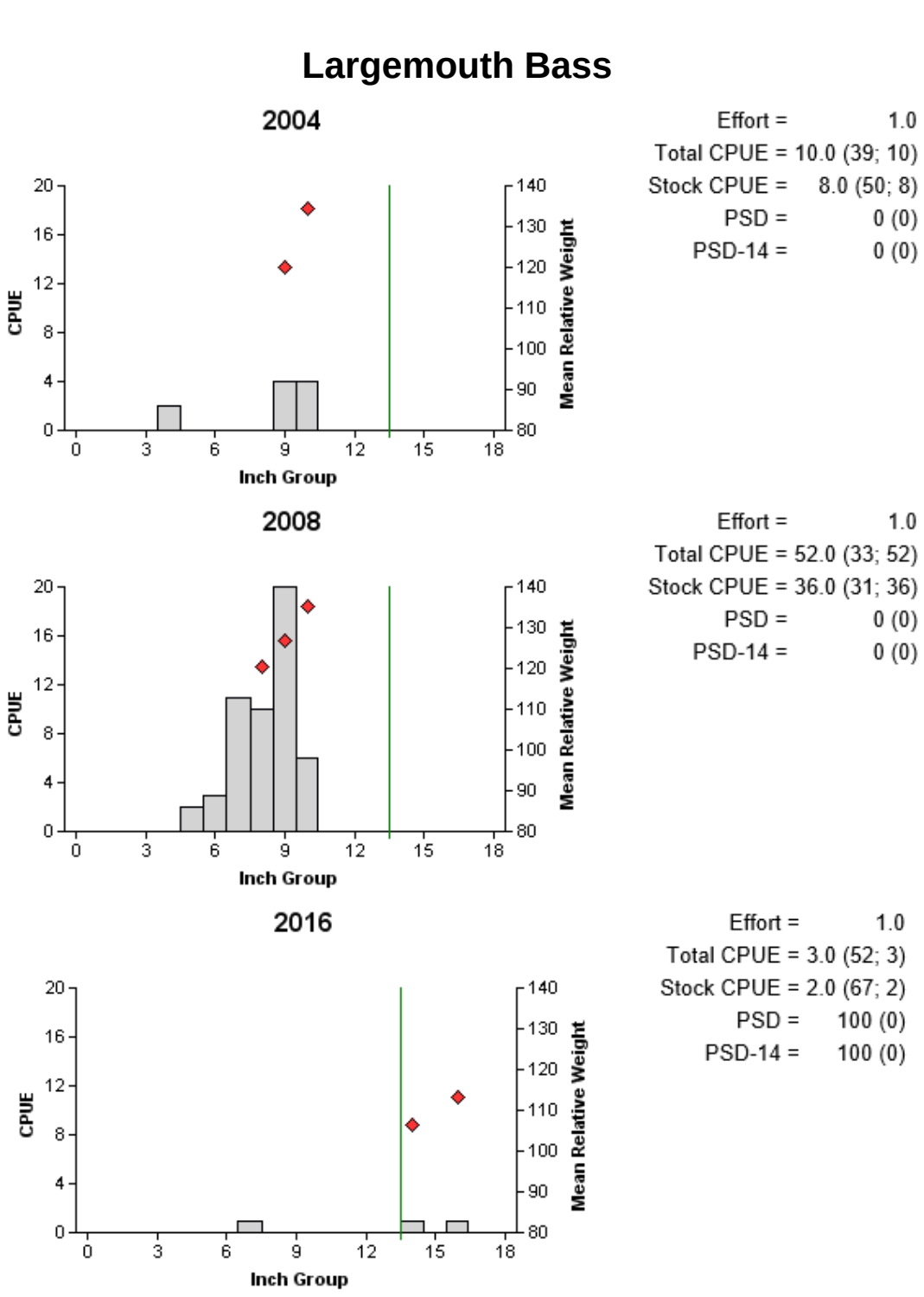


Figure 4. Number of Largemouth Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for daytime electrofishing surveys, Diversion Reservoir, Texas, 2004, 2008, and 2016. Daytime electrofishing occurred in 2016. Vertical line indicates minimum length limit.

Table 8. Proposed sampling schedule for Diversion Reservoir, Texas. No surveys are planned since the reservoir access is now closed to the public.

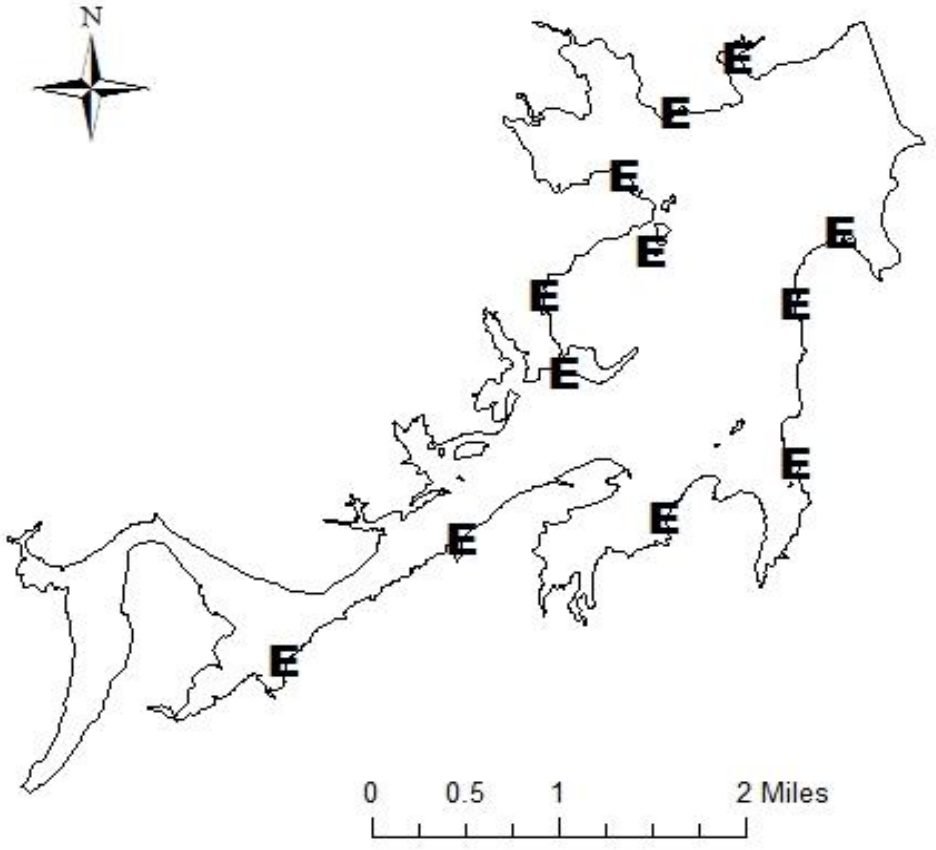
Survey year	Electrofish Fall(Spring)	Trap net	Gill net	Habitat		Access	Creel survey	Report
				Structural	Vegetation			
2017-2018								
2018-2019								
2019-2020								
2020-2021								

APPENDIX A

Number (N) and catch rate (CPUE) for species collected from daytime electrofishing from Diversion Reservoir, Texas, 2016. No trap net or gill net surveys were completed in 2016-2017 because of reservoir closure to the public.

	Electrofishing	
Species	N	CPUE
Gizzard Shad	25	25.0
Bluegill	3	3.0
Largemouth Bass	3	3.0

APPENDIX B



Location of sampling sites, Diversion Reservoir, Texas, 2016. Electrofishing stations are indicated by E.