

PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2015 Fisheries Management Survey Report

**Tucker Reservoir**

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## SURVEY AND MANAGEMENT SUMMARY

Fish populations in Tucker Reservoir were surveyed in 2015 using electrofishing. Trap netting and gill netting could not be completed as planned because water level elevation was too high to launch a boat. The road to the reservoir was inundated and there was not sufficient slope to launch. Historical data are presented with the 2015 data for comparison. This report summarizes the results of the survey and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Tucker Reservoir is a 91-acre impoundment constructed in 1938. It is located in Palo Pinto County approximately 88 miles southwest of Fort Worth and the controlling authority is the City of Strawn while Texas Parks and Wildlife Department own the surrounding land. The primary use is for municipal water supply. Maximum depth is 30 feet. Habitat consisted of rocks and emergent vegetation. Boat access consists of a single, gradual sloping dirt/rock bank. Bank fishing was available along most of the lower half of the reservoir. Water clarity was 1.5 feet as measured by secchi disk. The property surrounding the reservoir was recently purchased by the Texas Parks and Wildlife Department and is in the process of being developed into Palo Pinto Mountains State Park.
- **Management History:** Historically important sport fish include Largemouth Bass, White Crappie, and Channel Catfish. Channel Catfish were stocked in 2011, 2012, and 2013 and Largemouth Bass were stocked in 2015 and 2016.
- **Fish Community**
  - **Prey species:** Prey species include Gizzard Shad and Bluegill. All of the Gizzard Shad and Bluegill sampled were of sizes that could be readily utilized by predators. Redear Sunfish were numerous in the previous survey. However, it appears the drought severely affected their population as none were sampled in the 2015 electrofishing survey.
  - **Catfishes:** The planned gill net survey in 2016 could not be completed because reservoir elevation made it impossible to launch a boat.
  - **Largemouth Bass:** Largemouth Bass abundance decreased since the last survey, probably caused by drought conditions that caused extreme low water levels. Body condition was excellent. Growth of the bass in this population is average for the region. The majority of the bass were pure Northern strain and can be used for procurement as brood fish for the hatchery system in times of need.
  - **White Crappie:** The planned trap net survey in 2015 could not be completed because reservoir elevation made it impossible to launch a boat.

**Management Strategies:** Perform electrofishing, trap netting, and gill netting surveys during 2017-2018 season if boat launching is feasible. Request Channel Catfish stocking annually into the reservoir. Request only Northern Largemouth Bass for stockings to support utilization of the reservoir by our hatchery system for procuring pure Northern strain Largemouth Bass for propagation.

## INTRODUCTION

Fish populations in Tucker Reservoir were surveyed in 2015 using electrofishing. Trap netting and gill netting could not be completed as planned because water level elevation was too high to launch a boat. The road to the reservoir was inundated and there was not sufficient slope to launch. Historical data are presented with the 2015 data for comparison. This report summarizes the results of the survey and contains a management plan for the reservoir based on those findings.

### *Reservoir Description*

Tucker Reservoir is a 91-acre impoundment of North Fork Creek constructed in 1938. Tucker is listed as 68.0 acres and is currently listed as a Community Fishing Lake. It is located in Palo Pinto County approximately 88 miles southwest of Fort Worth and the controlling authority is the City of Strawn while Texas Parks and Wildlife Department own the surrounding land. Primary use is as a municipal water supply. Maximum depth is 30 feet. Habitat consisted of rocks, standing timber, and emergent aquatic vegetation (water willow *Justicia americana*). The upper end of the reservoir has a navigable channel that can be traversed for roughly 0.8 miles. Other characteristics are found in Table 1. The property surrounding the reservoir has been purchased by the Texas Parks and Wildlife Department to be developed into Palo Pinto Mountains State Park.

### *Angler Access*

Tucker Reservoir does not have a public boat ramp. The reservoir is located completely within the new Palo Pinto Mountains State Park. Shoreline access is available but limited by littoral aquatic vegetation. State Park design and development is ongoing and access to Tucker Reservoir is included. The reservoir had quite a few old pier posts that are submerged when near full pool and could prove to be a boating hazard.

### *Management History*

**Previous management strategies and actions:** Management strategies and actions from the previous survey report (Mauk 2012) included:

1. The Texas Parks and Wildlife Department just acquired land surrounding Tucker Reservoir with the intention of developing Palo Pinto Mountains State Park as a new state park. This provided the opportunity to recommend angler access improvements such as constructing a boat ramp, fishing piers, fish cleaning station, improved access, and improved habitat.  
**Action:** State Parks continue to work on plans for the park and Tucker Reservoir.
2. Largemouth Bass exhibited poor body condition. Growth and genetics of the population were unknown.  
**Action:** Collected genetic and Tier I age and growth data on the population in 2012.
3. Sampling Channel Catfish indicates a they are present in very low abundance, possibly caused by illegal harvest by jug, trot, and limb lines that are found throughout the reservoir.  
**Action:** Talked to the new park manager about the illegal effort at the reservoir, and removed a great number of the illegal lines and posted signage advising the public of the rules and regulations. Plans called for annual Channel Catfish stockings but the recent drought limited stockings to 2012 and 2013.
4. Aquatic invasives threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. Zebra mussels have been found in Texas waters nearby and could establish in Tucker Reservoir if introduced.  
**Action:** Contacted state park personnel about zebra mussels and the threat they are to the environment and water source. We educated the public about invasive species through the

use of media and the internet and make a speaking point about invasive species when presenting to constituent and user groups.

**Harvest regulation history:** Sport fish species in Tucker Reservoir are currently managed under statewide community fishing lake regulations (Table 2).

**Stocking history:** The last stockings this reservoir received were advanced fingerling Channel Catfish in 2011, 2012, and 2013 and Northern Largemouth Bass fingerlings in 2015 and 2016. See stocking history (Table 3).

**Vegetation/habitat management history:** Noxious aquatic vegetation has not been observed at the reservoir. Water willow *Justicia americana* is found along much of the shoreline (Table 5).

**Water transfer:** Tucker Reservoir is primarily used as a municipal water supply source for the City of Strawn. No other water transfers into or out of the reservoir occur.

## METHODS

Surveys were conducted to achieve survey and sampling objectives of an exploratory nature to examine the status of fish populations after a prolonged drought and low water elevations. 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, and Gizzard Shad were collected by electrofishing (25 minutes at 5, 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.

*Age and Growth* – A tier I mean length at age of capture for Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

*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 in 2012.

*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 2015. Vegetation surveys were conducted in 2015. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

## RESULTS AND DISCUSSION

**Habitat:** Tucker Reservoir habitat consists of primarily rocky shoreline, emergent vegetation consisting mostly of water willow *Justicia americana*, and standing timber (Table 4 and 5). There were also numerous pilings remaining from defunct piers, which at full pool would be under the water and could pose boating hazards.

**Prey species:** Electrofishing catch rates of Gizzard Shad in 2015 were 448.8/h; with an Index of Vulnerability (IOV) of 100 indicating a good prey base exists in the reservoir (Figure 1). Both catch rate and IOV increased from the previous survey in 2011. Bluegill catch rate was 86.4/h with fish ranging in size from 2-5 inches in length (Figure 2). The catch rate was much lower than the 2011 catch rate of 530.4/h. This drop was likely the result of the drought of record that occurred between the two surveys. Redear Sunfish were sampled at a rate of 84.0/h in 2011 but none were sampled during the current survey (Figure 3).

**Channel Catfish:** The planned gill net survey in 2016 could not be completed because reservoir elevation made it impossible to launch a boat. Past surveys are presented in Figure 4.

**Largemouth Bass:** Electrofishing catch rate for Largemouth Bass was 36.0/h with bass length ranging from 3-14 inches (Figure 5). Stock length and greater fish had  $W_r$ s greater than 110 indicating they were

robust. A category I age and growth study, conducted in 2012 determined growth was average for the region (Table 6). Genetic analysis determined 87% of the bass were pure Northern strain while 2% Florida Largemouth Bass alleles were detected (Table 7). Tucker Reservoir may prove to be a viable source of Northern Largemouth Bass brood fish for our hatchery system.

**White Crappie:** The planned trap net survey in 2015 could not be completed because reservoir elevation made it impossible to launch a boat. Past surveys are presented in Figure 6.

### **Fisheries management plan for Tucker Reservoir, Texas**

Prepared – July 2016

**Issue 1:** The Texas Parks and Wildlife Department is in the process of developing the new Palo Pinto Mountains State Park and Tucker Reservoir is located within the park. Currently no amenities exist at the reservoir.

#### MANAGEMENT STRATEGIES

1. Construct a permanent boat ramp. The location of the current undeveloped launch site would probably be appropriate. It should include a courtesy boat dock/fishing pier alongside the boat ramp.
2. Pave the road on the east side of the impoundment or at minimum repair the gravel road at two locations where the road becomes impassible during precipitation events and is rutted when it dries out.
3. Develop a parking area on the west side of Tucker Reservoir to increase access.
4. Install fishing piers or docks on the west side to increase angler access. Install brush and artificial fish habitat structures in close vicinity to attract fish to the area.
5. Remove existing old docks, pier poles, and buildings around the impoundment to improve shoreline access and to make boating safer.
6. Construct a fish cleaning station for visitors to use.
7. Many large Common Carp can be found in the reservoir which creates an opportunity for the state park to host a carp tournament.
8. Retain the current 10 hp maximum motor size allowed on the reservoir by the City of Strawn. Boats with motors exceeding 10 hp motors will be allowed on the reservoir, but can only be operated by electric trolling motors only.
9. Shoreline access on the east side of the lake can be hampered by water willow. We recommend developing gravel spawning beds in these areas. Gravel spawning beds will provide open water areas that will increase fishing access. It will increase recruitment of sunfish which increase fishing success. Finally, they will provide the opportunity for park visitors to witness spawning firsthand and become more environmentally literate.

**Issue 2:** Channel Catfish are found in low abundance in the reservoir.

#### MANAGEMENT STRATEGIES

1. Request stocking Channel Catfish annually starting in 2016.
2. Stay vigilant with the help of park employees as to the placement of passive angling gears into the reservoir which are illegal.

**Issue 3:** Genetic analysis of the Largemouth Bass population determined a high percentage of Northern

strain Largemouth Bass residing in the reservoir. The hatchery system currently requires viable sources from which to procure Northern strain brood fish for production. Tucker Reservoir is potentially capable of contributing to this effort according to TPWD staff.

#### MANAGEMENT STRATEGIES

1. Request stocking of Northern strain Largemouth Bass only when making requests.
2. Monitor the genetics of the population every eight years to assure they are a Northern Largemouth Bass genetics are suitable for broodfish collections for the hatcheries.

**Issue 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 *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 state park staff about invasive species, and provide them with posters and literature so that they can in turn educate others.
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

**FY 2016 – 2019**

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

Sport fishes in Tucker Reservoir have historically included Channel Catfish, Largemouth Bass, and White Crappie. The primary forage species have been Bluegill and Gizzard Shad.

### Low-density fisheries

Due to extreme low water level prior to 2015, the fisheries for Channel Catfish, Largemouth Bass, and White Crappie would be considered low density populations that are currently being rebuilt.

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

Currently, most fish populations are in a rebuilding phase through stocking and natural reproduction. Because of this, sampling objectives are to collect general monitoring trend data for catfish and crappie in 2017-2018 (Table 8) since we were unable to sample them in 2015-2016. Electrofishing, trap netting, and gill netting will occur in 2019-2020 (Table 8). Catch per unit effort with an RSE of  $\leq 25$  for Largemouth Bass and White Crappie is the sampling objective. Other species will be collected along with these species until the desired RSE is attained. Largemouth Bass sampled in 2015 were sub-legal in length and most were probably stocked fish. Until the populations have had a chance to grow and age, nothing else will be examined. Effort will begin with 5 random electrofishing stations and 5 trap net and gill net stations to determine CPUE with RSE  $\leq 25$  the goal. Channel Catfish will be sampled with 5 gill nets with no target RSE since the reservoir is small. Once fish populations are detected in the above sampling techniques and determined to be re-established in terms of abundance and length frequency; survey objectives, fisheries metrics, and sampling effort will be reevaluated.

## 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.
- 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 32:348.
- Mauk, R., 2012. Statewide freshwater fisheries monitoring and management program survey report for Tucker Reservoir, 2012. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.

Table 1. Characteristics of Tucker Reservoir, Texas.

Characteristic	Description
Year constructed	1938
Controlling authority	City of Strawn
County	Palo Pinto
Reservoir type	Main Stream
Shoreline development index (SDI)	2.77
Conductivity	320 $\mu$ mhos/cm
Secchi disc reading	43 cm

Table 2. Harvest regulations for Tucker Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue, their hybrids and subspecies	5 (in any combination)	No size limit
Catfish, Flathead	5	18-inch minimum
Bass, Largemouth	5	14-inch minimum
Crappie: White and Black, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 3. Stocking history of Tucker Reservoir, Texas. FGL = fingerling, AFGL advanced fingerlings, and UNK = unknown.

Species	Year	Number	Life Stage	Mean TL (in)
Channel Catfish	1971	5,000	AFGL	7.9
	1993	1,875	AFGL	6.0
	1994	1,711	AFGL	7.2
	1998	1,700	AFGL	9.1
	2000	1,700	AFGL	8.7
	2002	1,719	AFGL	9.2
	2003	1,139	AFGL	8.7
	2007	1,704	AFGL	10.4
	2009	1,274	AFGL	10.2
	2011	1,741	AFGL	9.2
	2012	58,500	FGL	1.3
	2013	1,835	AFGL	9.5
	Total		79,898	
Largemouth Bass	1967	18,700	UNK	UNK
	2015	3,844	FGL	1.9
	2016	7,000	FGL	1.5
	Total		29,544	
Northern Pike	1974	1,931		UNK
	Total		1,931	

Table 4. Survey of structural habitat types, Tucker Reservoir, Texas, 2015. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Bulkhead	0.1 miles	2.7
Natural	3.2 miles	86.5
Rocky	0.4 miles	10.8
Standing timber	8.9 acres	9.8

Table 5. Survey of aquatic vegetation, Tucker Reservoir, Texas, 2011 and 2015. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2011	2015
Native emergent	0.5 (0.7)	0.5 (0.7)

## Gizzard Shad

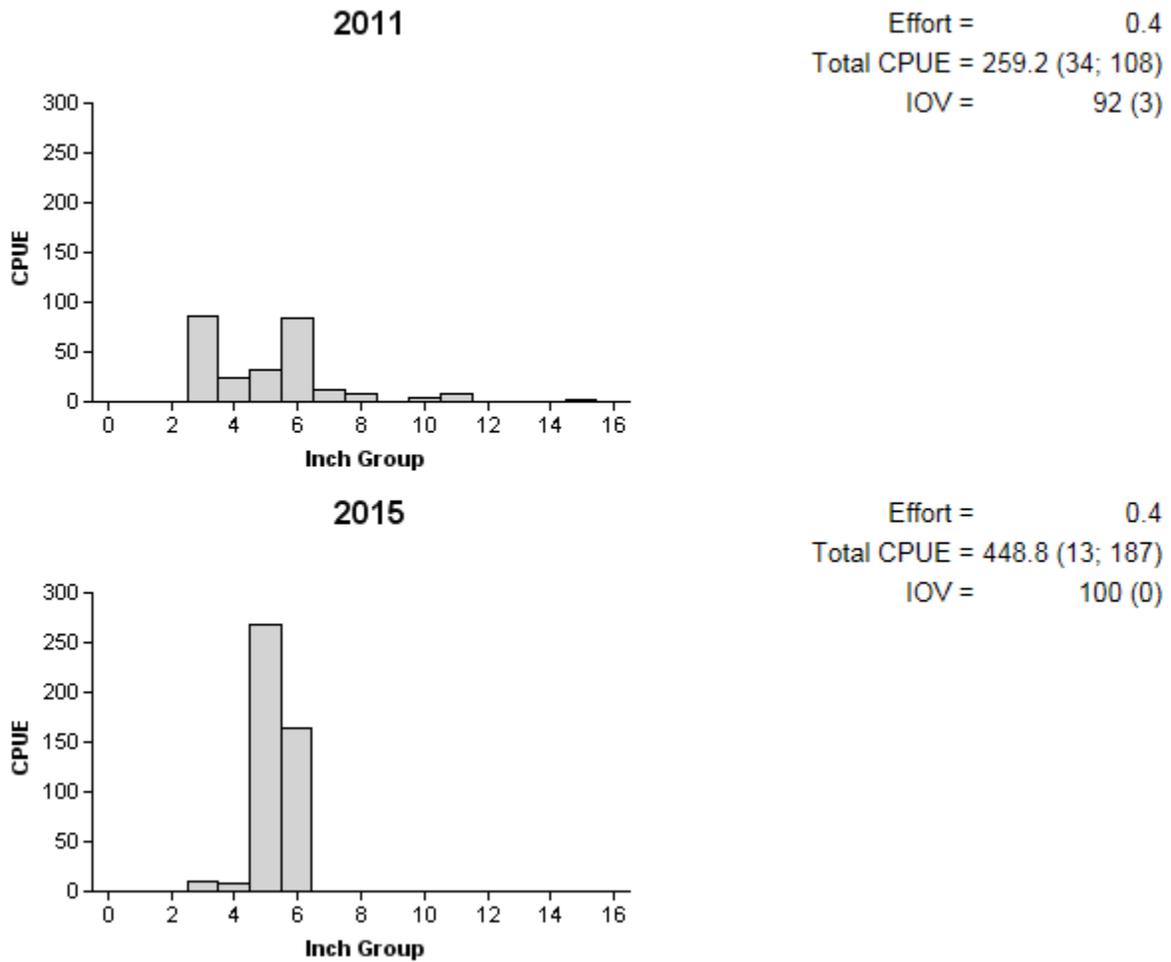


Figure 1. Number of Gizzard Shad caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) electrofishing surveys, Tucker Reservoir, Texas, 2011 and 2015.

# Bluegill

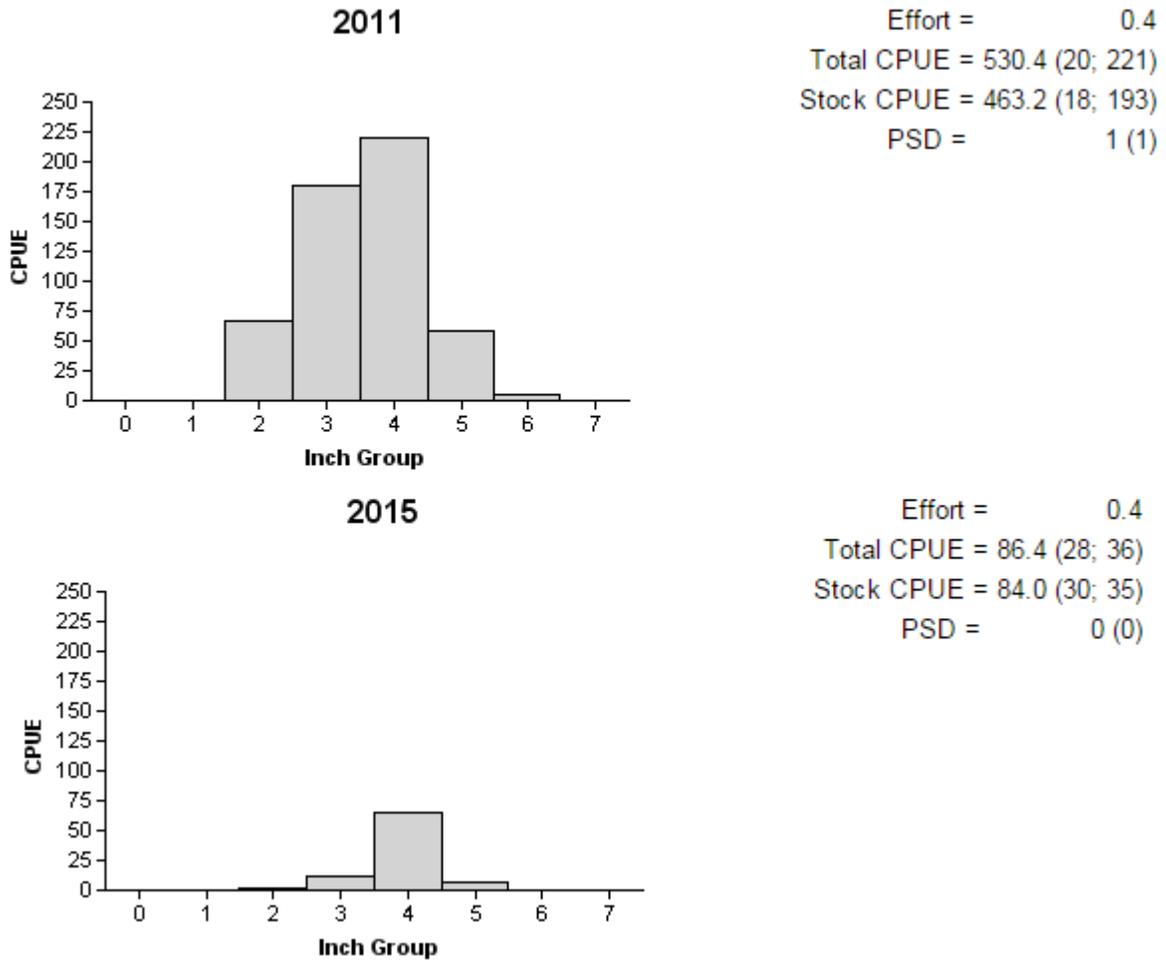


Figure 2. Number of Bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for electrofishing surveys, Tucker Reservoir, Texas, 2011 and 2015.

## Redear Sunfish

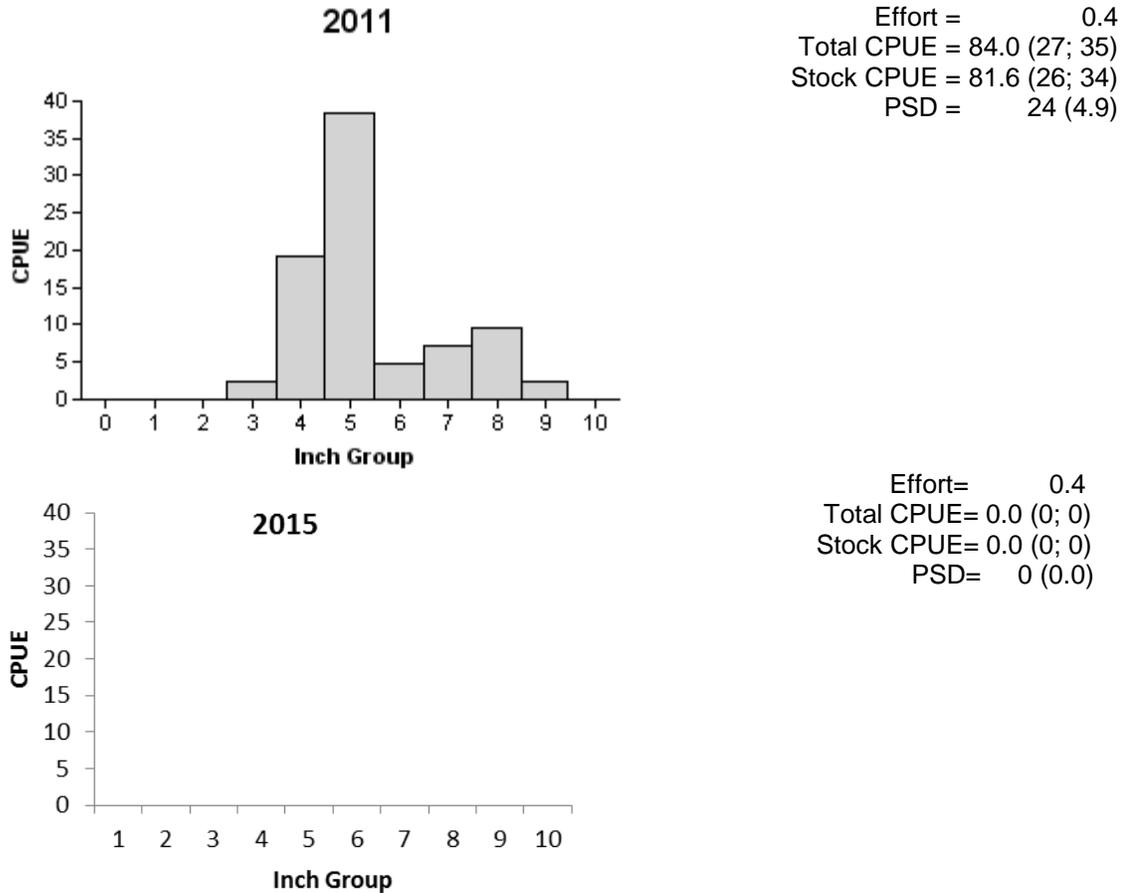


Figure 3. Number of Redear Sunfish caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for electrofishing surveys, Tucker Reservoir, Texas, 2011 and 2015. No Redear Sunfish were collected in 2015.

# Channel Catfish

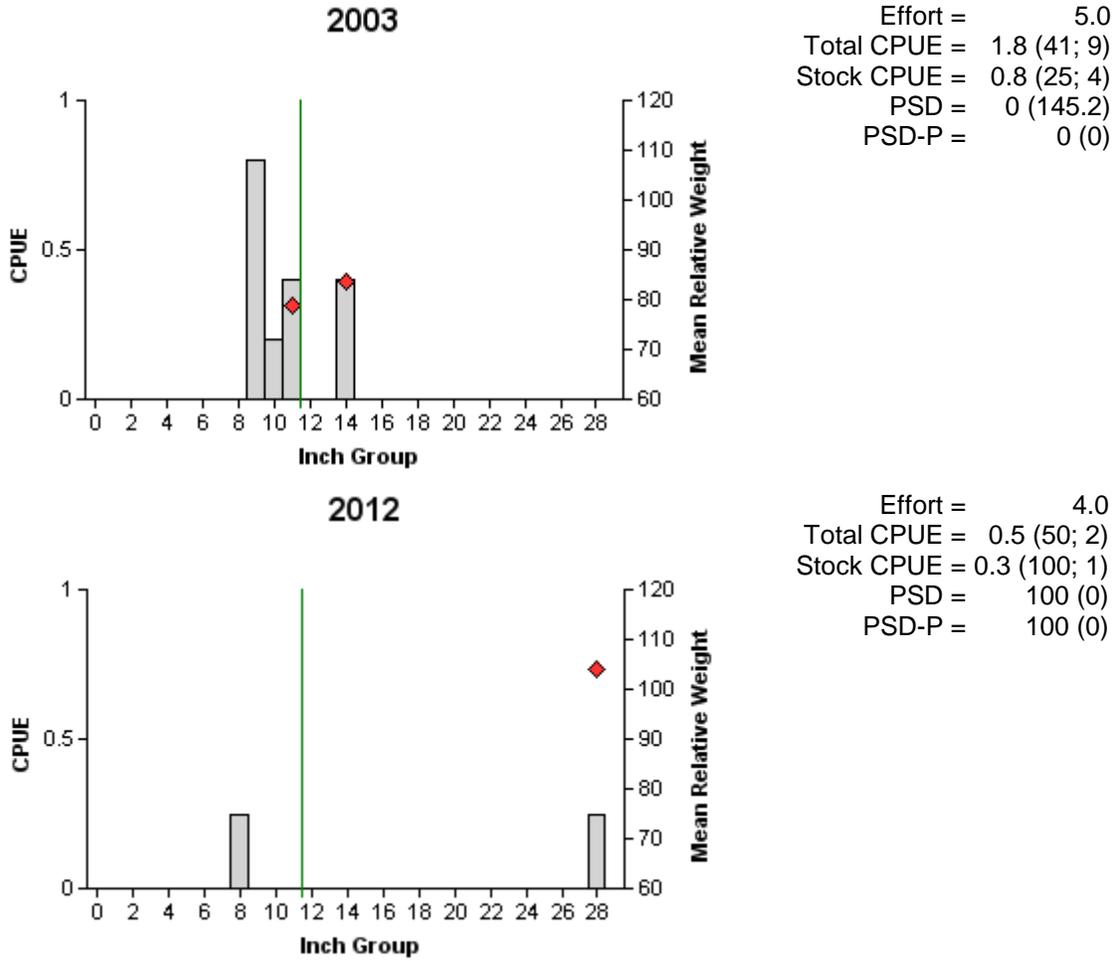


Figure 4. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Tucker Reservoir, Texas, 2003 and 2012. Line indicates minimum length limit at time of sampling.

## Largemouth Bass

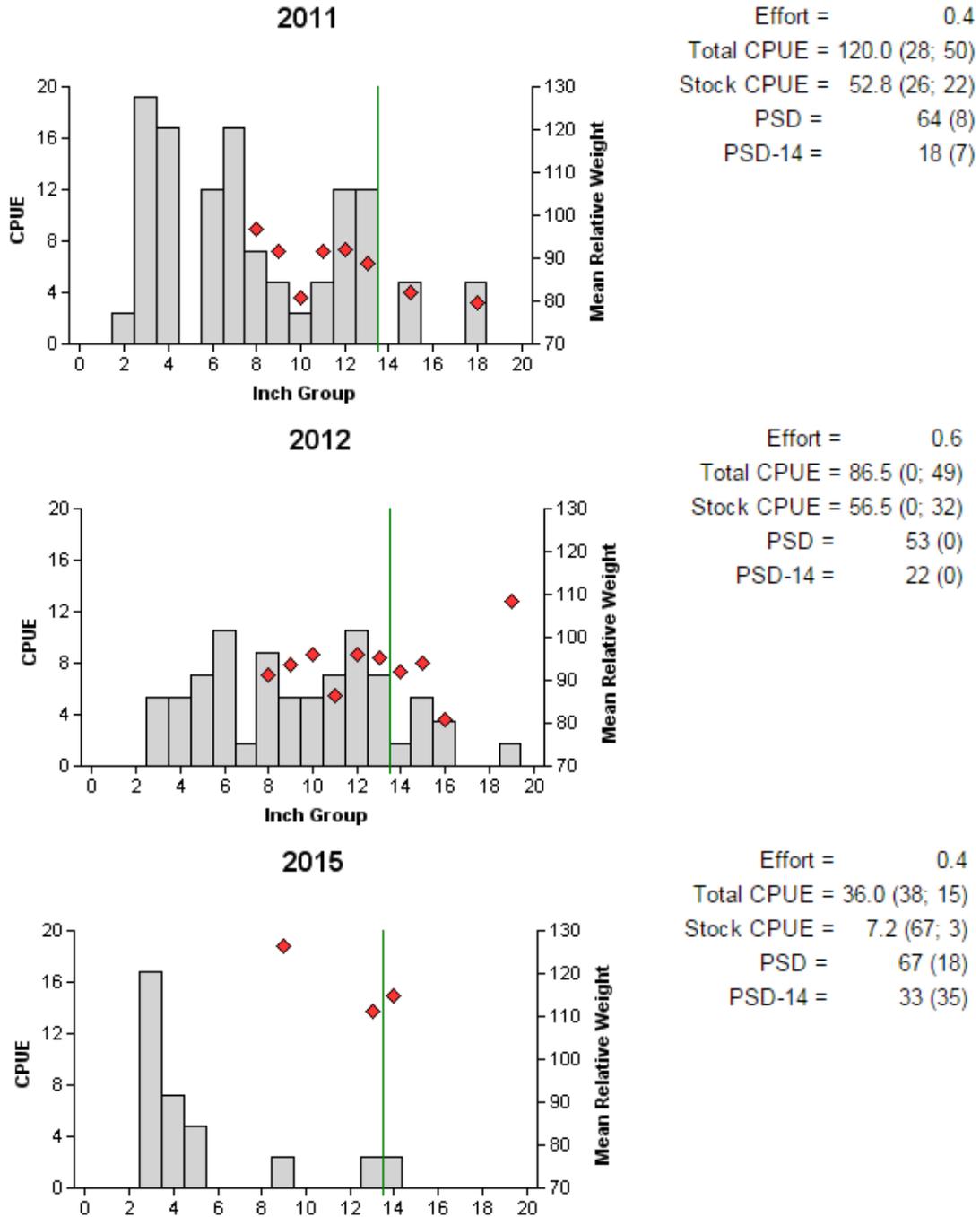


Figure 5. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for electrofishing surveys, Tucker Reservoir, Texas, 2011, 2012, and 2015. Line indicates minimum length limit at time of sampling.

Table 6. Mean length at age of capture for Largemouth Bass (sexes combined) collected by electrofishing, Tucker Reservoir, Texas, October 2012. Sample sizes are in parentheses. Ages were determined using otoliths.

Year	Length (inches) at age				
	1	2	3	4	5
2012	10.1 (17)	12.9 (7)	14.1 (6)	19.1 (1)	16.0 (2)
Averages*	10.1	12.9	15.1	16.9	18.3

\*Ecological region averages from Prentice (1987); lengths derived for October 15.

Table 7. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Tucker Reservoir, Texas, 2012. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by micro-satellite DNA analysis.

Year	Sample size	Number of fish			% FLMB alleles	% FLMB
		FLMB	Intergrade	NLMB		
2012	30	0	4	26	2.0	0.0

## White Crappie

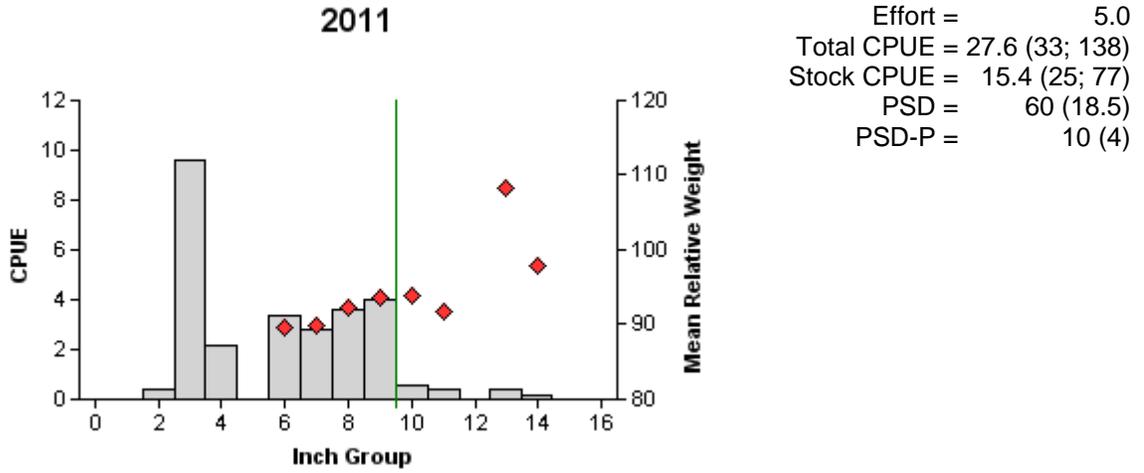


Figure 6. Number of White Crappie caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for the fall trap net survey, Tucker Reservoir, Texas, 2011. Line indicates minimum length limit at time of sampling.

Table 8. Proposed sampling schedule for Tucker Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

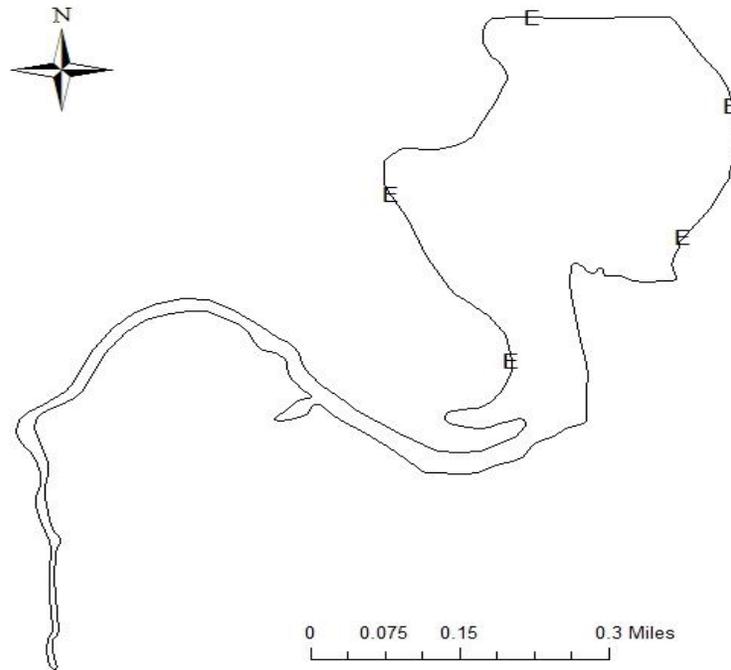
Survey year	Electrofishing Fall(Spring)	Trap net	Gill net	Habitat			Creel survey	Report
				Structural	Vegetation	Access		
2016-2017								
2017-2018	A	A	A					
2018-2019								
2019-2020	S	S	S		S	S		S

**APPENDIX A**

Number (N) and catch rate (CPUE) of all species collected from all gear types from Tucker Reservoir, Texas, 2015-2016. Sampling effort was 25 minutes for electrofishing.

Species	Electrofishing	
	N	CPUE
Gizzard Shad	187	448.8
Bluegill	36	86.4
Hybrid sunfish	1	2.4 2.4
Largemouth Bass	15	36.0

**APPENDIX B**



Location of sampling sites, Tucker Reservoir, Texas, 2015. Electrofishing, sites are indicated by E.