

PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-2

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2016 Fisheries Management Survey Report

Lake Jacksonville

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July 31, 2017

TABLE OF CONTENTS

Survey and Management Summary	1
Introduction.....	2
Reservoir Description.....	2
Angler Access	2
Management History	2
Methods.....	3
Results and Discussion.....	4
Fisheries Management Plan	6
Objective Based Sampling Plan and Schedule	7
Literature Cited.....	9
Figures and Tables	10-21
Water Level (Figure 1)	10
Reservoir Characteristics (Table 1)	10
Boat Ramp Characteristics (Table 2).....	10
Harvest Regulations (Table 3)	11
Stocking History (Table 4).....	11
Objective Based Sampling Plan for 2016-2017 (Table 5).....	13
Aquatic Vegetation Survey (Table 6).....	14
Gizzard Shad (Figure 2).....	15
Redbreast Sunfish (Figure 3).....	16
Bluegill (Figure 4).....	17
Redear Sunfish (Figure 5).....	18
Spotted Bass (Figure 6)	19
Largemouth Bass (Figure 7)	20
Proposed Sampling Schedule (Table 7)	21
Appendix A	
Catch Rates for all Species from Electrofishing.....	22
Appendix B	
Map of 2016-2017 Sampling Locations	23
Appendix C	
Results of Thursday Night Lake Jacksonville Open Angling Tournament.....	24

SURVEY AND MANAGEMENT SUMMARY

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

- **Reservoir Description:** Lake Jacksonville is a 1,208-acre reservoir on Gum Creek (a tributary of the Neches River), Texas, built to provide water for municipal and industrial purposes. Boat and bank angler access is adequate. Handicap-specific facilities are present in the parking lot and restrooms near the main boat ramp. Water is clear and low in productivity. Land surrounding the reservoir is highly modified for residential development, and approximately 40% of the shoreline has bulkhead at the land/water interface.
- **Management History:** Important sport fish include Largemouth Bass, Channel Catfish, White Crappie, and Black Crappie. Largemouth Bass are managed with a 5 fish daily bag of which only two can be less than 18 inches; remaining species are managed under the statewide harvest regulations. Supplemental Largemouth Bass sampling was conducted in 2014, and Florida Largemouth Bass fingerlings were stocked annually from 2014 through 2016. An integrated vegetation management plan was initiated in 1997 featuring triploid Grass Carp stocking, release of hydrilla flies, herbicide treatments, and native plant introduction. Vegetation surveys were conducted twice a year (pre-treatment in spring and annual in summer) to monitor changes from 2000-2008. Herbicide treatments were conducted annually through 2006. In 2006 and 2007 a total of 3,890 triploid Grass Carp were stocked (10 fish/hydrilla acre). In July 2007, a major flood event removed most of the hydrilla, and triploid Grass Carp herbivory prevented reestablishment. By summer 2008 hydrilla was reduced to trace coverage, and native vegetation was sparse. Vegetation surveys have been conducted annually (at the peak of the growing season) from 2013-2016.
- **Fish Community:**
 - **Prey species:** Threadfin Shad and Gizzard Shad were present in the reservoir, but the prey community continued to be dominated by sunfish species. Overall, electrofishing catch rate of all sunfish species combined was 499/h; Redbreast Sunfish and Bluegill were the most abundant species.
 - **Black basses:** Black bass continue to support a popular fishery; tournament style angling has become increasingly popular. Relative abundance was within the historical range, and both size structure and relative weights were healthy. However, relative abundance of Largemouth Bass \geq 18 inches continued to remain low.
 - **Management strategies:** Conduct electrofishing surveys in fall 2018 and 2020 to monitor Largemouth Bass and prey populations. Continue monitoring results of Thursday night angling tournament and reinstate a seasonal creel survey in 2020. Reduce frequency of vegetation surveys to every other year. Maintain signage promoting the Clean-Drain-Dry campaign.

2
INTRODUCTION

This document is a summary of fisheries data collected from Lake Jacksonville from June 2016 through May 2017. 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 2016-2017 data for comparison.

Reservoir Description

Lake Jacksonville is a 1,208-acre reservoir on Gum Creek, Texas, a tributary of the Neches River. The reservoir was built to provide water for municipal and industrial purposes. Lake Jacksonville is slightly eutrophic with a mean chlorophyll-*a* of 4.58 mg/m³ (Texas Commission on Environmental Quality 2011). The majority of the shoreline is a combination of bulkhead and boat docks (38%), eroded shoreline with boat docks (28%), or featureless (26%) (Ott and Bister 2001). While providing limited habitat, small amounts of native and non-native aquatic vegetation is present. Other descriptive characteristics for Lake Jacksonville are found in Table 1.

Angler Access

Lake Jacksonville has three public boat ramps and several private boat ramps (Table 2). Handicap-specific facilities and restrooms are available at the Peninsula Point boat ramp. Shore-fishing access is limited to the Lake Jacksonville Concession Area, the immediate area around the boat ramps, and the dam.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Ott and Norman 2013) included:

1. Continue biennial electrofishing to monitor and evaluate the Largemouth Bass (*Micropterus salmoides*) population. Continue promoting the fishery through outreach presentations to angling groups and news releases to area media.

Action: Supplemental electrofishing was conducted in fall 2014 using existing protocol. Sampling in 2016 was conducted using OBS protocol; 24 5-minute electrofishing stations were conducted to achieve minimum sample size and precision goals. No outreach presentations have been requested, but several telephone interviews have been provided to local print and on-line media.
2. To supplement creel data, continue monitoring and tabulating the results of the Thursday night Lake Jacksonville Open Bass Tournament.

Action: Creel survey was temporarily discontinued for 2016-2017, but tabulation of tournament data has been continued.
3. Continue annual vegetation survey. Maintain existing exclosures and solicit partners (including the City of Jacksonville) in native plant restoration. Solicit partnership with angling groups to construct and install artificial reefs.

Action: Annual vegetation surveys have continued as scheduled. Property owners were contacted, and small scale exclosure construction and planting was conducted. A new water willow (*Justicia Americana*) colony was established near the dam. City officials have been consulted regarding brush reef regulations. To date, angling groups have not formed a partnership for reef construction.
4. Provide information to controlling authority, local news media, and angling groups

regarding removal of protection for triploid Grass Carp (*Ctenopharyngodon idella*).

Action: Notifications have been made, and bow fishermen continue limited activity. Because few Grass Carp remain, promotion of removal is no longer necessary.

5. Provide and maintain Clean-Drain-Dry signage and outreach to the Controlling Authority.

Action: Display of signage is current at all boat ramps.

Harvest regulation history: Sport fishes in Lake Jacksonville have been managed with statewide harvest regulations except for an 18-inch minimum-length limit for Largemouth Bass in place from 2000-2013. On September 1, 2013 the regulation was changed to allow daily harvest of 5 Largemouth bass, only two of which can be <18 inches (Table 3).

Stocking history: Significant stockings conducted since the last survey include: Florida Largemouth Bass (*M. s. floridanus*) fingerlings in 2014, 2015, and 2016. The complete stocking history is provided in Table 4.

Vegetation/habitat management history: To control hydrilla (*Hydrilla verticillata*), an integrated vegetation management plan was initiated in 1997, featuring low-density triploid Grass Carp stocking, herbicide treatments, and native plant introduction. Native plant introduction was part of a seven reservoir evaluation of 21 different species with varying levels of protection, and results were used to prepare *A Guide to the Propagation and Establishment of Aquatic Plants in Reservoirs* (Webb et al. 2012). Following a flood in February 1999, the Grass Carp barrier was removed, disallowing any additional stocking. Annual herbicide treatments were conducted (1997 – 2006), but hydrilla continued to expand to over 300 acres with approximately 95 acres of native vegetation. In 2006, an improved fish barrier was installed, and in 2006 and 2007, a total of 3,890 triploid Grass Carp were stocked (10/hydrilla acre), and approximately 750,000 hydrilla flies (*Hydrellia pakistanae*) were released. In July 2007, a major flood event removed most of the hydrilla, and Grass Carp herbivory prevented reestablishment. By summer 2008 <1.0 acre of hydrilla and only approximately 30 acres of native vegetation were observed. No additional herbicide treatments or triploid Grass Carp stocking has been conducted, and based on an attrition model (Kirk and Socha 2003) only an estimated 73 (0.06/acre) grass carp are still likely to be present. Annual vegetation surveys have not documented any additional hydrilla. Supplemental introduction of water willow was conducted in 2014 and 2015.

Water transfer: Lake Jacksonville is primarily used for municipal water supply, recreation, shoreline residential development, and to a lesser extent, flood control. One permanent pumping station on the reservoir is operated by the City of Jacksonville Water Supply for use as municipal water. No inter basin transfers are known to exist.

METHODS

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Lake Jacksonville (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).

Fishes were collected by electrofishing (2 hours at 24, 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 statistics.

Tournament Angling Data – Effort, catch, and weather information reported for the Thursday night angling tournament was obtained from the tournament web site (<http://www.jacksonvilleopen.com/>).

Habitat – A structural habitat survey was conducted in 2000 (Ott and Bister 2001). Vegetation surveys were conducted in 2013 – 2015 to monitor recovery of hydrilla and in 2016 to collect a comprehensive representation of the aquatic vegetation community. 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) website.

RESULTS AND DISCUSSION

Habitat: A structural habitat survey was last conducted in 2000 (Ott and Bister 2001). Littoral habitat consisted mainly of bulkhead and boat docks, eroded shoreline with boat docks, and featureless bank. Triploid Grass Carp introduction in 2006 and 2007 (Table 4), severe flooding in mid-summer 2007 (Ott and Bennett 2008), and drought in 2011-2012 (Figure 1) seriously impacted the aquatic plant community, and coverage declined substantially. However, by 2013 attrition of Grass Carp allowed survival of some herbivory-resistant native species such as spatterdock (*Nuphar luteum*, common reed (*Phragmites australis*), water primrose (*Ludwigia* spp.) and American lotus (*Nelumbo lutea*) occupied approximately 5.8 acres (Table 6). Alligatorweed (*Alternanthera philoxeroides*) and giant reed (*Arundo donax*) (3.7 acres) were the only non-native species detected in 2013. Only Aquatic Nuisance Species (ANS) surveys were conducted in 2014 and 2015, and alligatorweed was the only non-native species recorded; hydrilla has not been detected at Lake Jacksonville since 2008. Using a model based on 32% annual mortality of triploid Grass Carp (Kirk and Socha 2003), it is estimated that only 73 (<0.1/acre) were still present in Lake Jacksonville in 2016. However, coverage of aquatic vegetation continued to be low. In 2016, Pondweed (*Potamogeton* spp.) was the only native submersed aquatic species detected; along with trace amounts of spatterdock, white waterlily (*Nymphaea odorata*), and maidencane (*Panicum hemitomon*). Additionally, giant cutgrass (*Zizaniopsis miliacea*) and water willow both occupied less than 1 acre apiece. Non-native species detected in 2016 included alligatorweed, giant reed, and elephant ear (*Colocasia* spp.), all in small quantities (Table 6).

Angling data: Information obtained from the Lake Jacksonville Open Tournament web site (<http://www.jacksonvilleopen.com/>) indicates that 8 to 45 teams (16-90 anglers) participate in the 4-hour Thursday-night tournament on a weekly basis from March – October (Appendix C).

Prey species: Both Threadfin Shad (*Dorsoma petenense*) and Gizzard Shad (*D. cepedianum*) were present (Appendix A), but clupeid abundance continues to be low. Index of Vulnerability (IOV) for Gizzard Shad was only 30, indicating that most were too large for predators to consume (Figure 2). Threadfin Shad electrofishing catch rate (30.5/h) was similar to that of 2012 (49.0/hr), but was below that of 2008 (111.0/hr). As in previous surveys, the prey community is dominated by sunfishes (*Centrarchidae*) with a combined catch rate of 499/h (Appendix A). Redbreast Sunfish (*Lepomis auritus*) and Bluegill (*L. macrochirus*) continued to be the most abundant sunfish species with electrofishing catch rates of 205/hr and 130/hr, respectively (Figures 3 and 4). Redear Sunfish (*L. microlophus*) (Figure 5) and Longear Sunfish (*L. megalotis*) were also collected but at lower abundance. Few sunfishes collected were \geq 6 inches in length, and it is unlikely that they support a recreational fishery.

Black basses: Spotted Bass (*M. punctulatus*) were collected by electrofishing at a rate similar to that of past surveys (Figure 6), but most were small (< 13 inches). Anecdotal information indicates that this species makes up a substantial proportion of the tournament catch in the Thursday night tournaments. (<http://www.jacksonvilleopen.com/2017-PIC.html>).

Electrofishing catch rate of Largemouth Bass in 2016 (39/h; Figure 7) was similar to that of the past two surveys and reflects low sampling efficiency resulting from limited littoral habitat. Proportional Size Distribution (PSD) was 59 and was within the 40-70 target range for a balanced population (Guy e.al. 2007). However, relative abundance of Largemouth Bass ≥ 18 inches was low, PSD-18=4. Relative weight (W_r) was ≥ 100 for most size classes and indicates an adequate prey base. Two hours of electrofishing did not provide ≥ 13 specimens 13-14.9 inches in length necessary for age-and-growth assessment. Ott and Norman (2012) reported that growth trajectory was normal to age 2 but flattened out past that age. Despite poor electrofishing efficiency and low apparent abundance of Largemouth Bass ≥ 18 inches, Lake Jacksonville continued to support a popular fishery as indicated by the four-hour Thursday night Jacksonville Open Bass Tournament which runs from March through October. The average number of two angler teams has increased from 21/week in 2013 to 30/week in 2016 (Appendix C). Expanding reported angler participation by elapsed tournament time results in 4.1 – 6.4 hours of angling effort/acre annually and is similar in magnitude to total directed effort for Largemouth Bass reported on the 2008-2009 and 2012-2013 (December – May) creel surveys (Ott and Norman 2013). Although tournament rules changed from a 5-fish team bag to a 3-fish team bag in September 2013, the average bag weight increased from 9.2 lbs. in 2013 to 10.3 lbs. in 2016.

Fisheries management plan for Lake Jacksonville, Texas

Prepared – July 2017

ISSUE 1: Lake Jacksonville has traditionally provided a popular Largemouth Bass fishery; tournament style angling has become increasingly important. Angler desire to temporarily retain Largemouth Bass < 18 inches in length during tournaments led to revision of the 18-inch minimum-length, 5-fish daily bag limit. The compromise regulation allowing harvest of 5 fish, only 2 of which may be less than 18 inches in length went into effect September 1, 2013. The Largemouth Bass population and its fishery under this regulation should be monitored and evaluated.

MANAGEMENT STRATEGIES

1. Continue electrofishing surveys every other fall beginning in 2018 to monitor any Largemouth Bass and prey population changes resulting from the regulation change.
2. Re-establish a creel survey from December 2020 – May 2021 to determine Largemouth Bass fishery characteristics and angler opinion of the regulation.

ISSUE 2: Tournament angling effort appears to be increasing and likely represents a large proportion of the effort directed toward black basses. Current creel procedures do not capture angler effort or success for nighttime angling tournaments.

MANAGEMENT STRATEGY

1. To supplement creel data, continue monitoring and tabulating the results of the Thursday night Lake Jacksonville Open Bass Tournament.

ISSUE 3: The Lake Jacksonville aquatic vegetation community is still recovering after triploid Grass Carp introduction and flooding in 2007 and drought from 2011-2012. Annual vegetation surveys have not detected the presence of hydrilla since 2008. No other exotic or native vegetation species are considered problematic.

MANAGEMENT STRATEGY

1. Reduce vegetation survey sampling schedule to an every other year (2018 & 2020) unless problematic species are reported or detected during electrofishing sampling

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. Provide Clean-Drain-Dry signage (as necessary) to the controlling authority for posting at the three boat ramps.
2. Provide outreach information to local media regarding the Clean-Drain-Dry campaign.

Objective-Based Sampling Plan and Schedule for Lake Jacksonville FY 2017-2021

Sport fishes in Lake Jacksonville include Channel Catfish, White Bass, Largemouth Bass, and both Black and White Crappie. Important forage species include sunfishes and Threadfin and Gizzard Shad.

Low-density fisheries

White Bass have historically been very low in abundance and appear to be habitat-limited. Although this species may be caught opportunistically, there was no directed effort for this species in the 2012-2013 or 2008-2009 creel surveys. Channel Catfish are present but recruitment limited and only represented 4% of the directed effort in the 2012-2013 and 0% in the 2008-2009 creel survey.

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Largemouth Bass support the majority of the directed angling effort at Lake Jacksonville, 76% in the 2012-2013 creel survey. Electrofishing CPUE-S estimated during the last three surveys ranged from 13-35 fish/h and was dominated by specimens <14 inches in length. RSE-S in the most recent survey in 2016 was 23 but the previous two surveys in 2012 and 2014 were 24 and 31 respectively. None of the past three surveys have provided the desired ≥ 50 stock sized specimens to adequately estimate size distribution. However, Bootstrap analysis of past surveys predict reliable population metrics (CPUE; RSE<25, PSD and Wr; N>50 stock size individuals) could be obtained with 22-37 randomly selected five-minute electrofishing stations. Therefore, Largemouth Bass population trend data will be monitored in fall 2018 and 2020 for relative abundance, size distribution, growth (2020 only), and condition to evaluate the regulation implemented in 2013 (**this is the survey objective**). For 2018 a total of 24, five-minute electrofishing stations will be randomly generated. Individual stations will be sampled until the minimum of 50 stock-length individuals are collected and RSE is ≤ 25 (**this is the sample objective**). If sampling objectives are not met using the initial 24 stations, no additional stations will be generated. Because an extensive age-and-growth sample was collected in 2012, only mean age at legal length will be estimated in 2020; this will allow us to continue monitoring long-term trends in growth. If a minimum of 13 specimens 13.0-14.9 inch specimens are not collected in the random stations necessary to reach the stock number and RSE goals, no additional sampling will be conducted (**this is the secondary sample objective**). The Largemouth Bass fishery will be assessed directly through a winter and spring quarter roving creel survey in 2020-2021 to provide angling data (tournament and non-tournament) to evaluate the regulation implemented in 2013 (**this is the survey objective**). Five weekend days and four week days will be surveyed in each of the two quarters to provide direct estimates of angler pressure, catch rate, and harvest of black basses.

Sunfishes and shad: Sunfish species, Threadfin Shad, and to a lesser extent Gizzard Shad are the primary forage species at Lake Jacksonville. Relative abundance, size distribution, PSD, and IOV have been collected every other year since 2001 and every third year prior to that. Bluegill CPUE has been variable ranging from 276/hr in 2012 to 130/h in 2016. Variability in total CPUE appears to be related to reservoir elevation, but RSE for bluegill has been < 26 during the last two surveys based on 12-24 randomly selected five-minute stations. Redbreast sunfish were roughly twice as abundant as Bluegill, but their catch dynamics mirrored those of Bluegill. CPUE for Gizzard Shad is very low and IOV is high and the contribution of this species to the prey base is negligible. Sunfishes and shad species will be sampled in fall 2018 and 2020 for continuation of trend information for relative abundance (CPUE) and size structure (PSD for sunfishes and IOV for Gizzard Shad). Sampling intensity and schedule will be the same as is proposed for Largemouth Bass. Largemouth Bass body condition and growth will provide additional information on forage abundance and vulnerability.

Crappie: During the December 2012-May2013 creel survey crappie represented 11% (0.7 hours/acre) of the directed angler effort. Although both White and Black Crappie were harvested, White Crappie were the most abundant in angler creels. Historically, crappie have been sampled every four years with 5 single-cod, shoreline set trap nets in late fall. This sampling was determined to be unreliable and was discontinued after 2008. A more cost effective method is to monitor the fishery directly through a winter and spring quarter roving creel survey in 2020-2021 (**this is the survey objective**). Five weekend days and four week days will be surveyed in each of the two quarters to provide direct estimates of angling pressure, catch rate, harvest of crappie.

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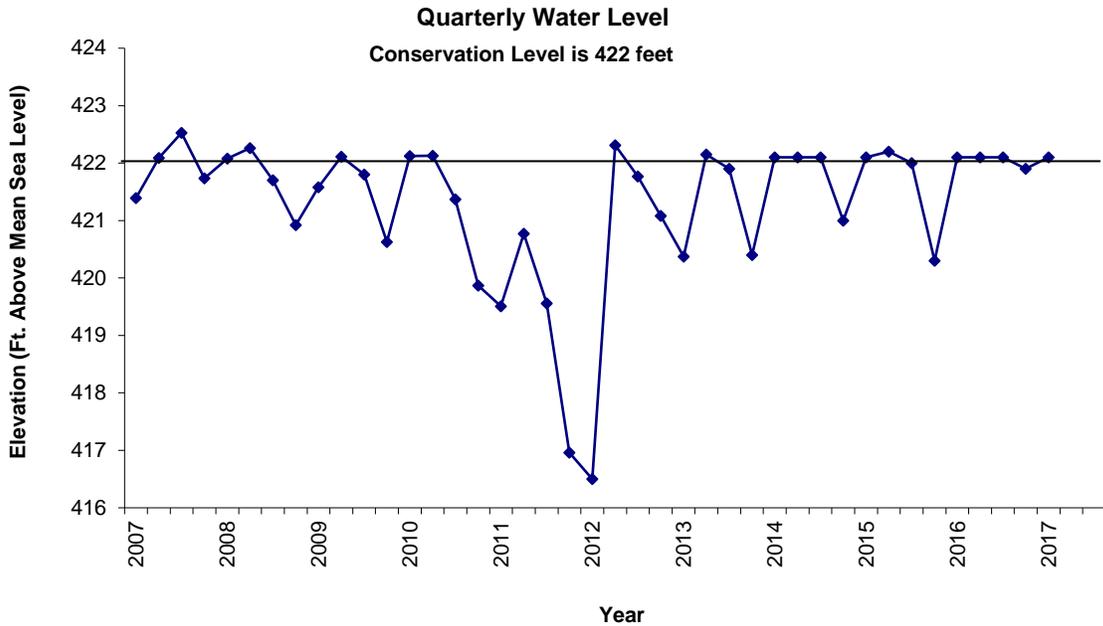


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Lake Jacksonville, Texas. Horizontal line represents conservation level.

Table 1. Characteristics of Lake Jacksonville, Texas.

Characteristic	Description
Year completed	1958
Controlling authority	City of Jacksonville
County	Cherokee
Reservoir type	City lake
Shoreline Development Index (SDI)	4.9
Conductivity	80 umhos/cm

Table 2. Boat ramp characteristics for Lake Jacksonville, Texas, August 2016. Reservoir elevation at time of survey was 422 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Peninsula Point	31.92111 -95.29023	Y	40	418	Accessible
Northwest Ramp	31.94174 -95.29750	Y	20	419	Accessible
Southshore Park	31.90176 -95.30862	Y	15	420	Accessible, shallow slope

Table 3. Harvest regulations for Lake Jacksonville, 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, White	25	10-inch minimum
Bass, Largemouth	5 ^a	18-inch minimum (2 may be < 18- inches)
Bass, Spotted	5 ^a	None
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

^a Daily bag for Largemouth Bass and Spotted Bass = 5 fish in any combination.

Table 4. Stocking history of Lake Jacksonville, Texas. FGL = fingerling; ADL = adults; FRY = fry; UNK = unknown.

Species	Year	Number	Size
Threadfin Shad	1987	2,500	ADL
	2012	<u>39,900</u>	ADL
		42,400	
Blue Catfish	1975	2,000	UNK
	1987	<u>6,149</u>	FGL
		8,149	
Channel Catfish	1967	2,000	UNK
	1968	2,500	UNK
	1969	2,500	UNK
	1970	2,000	UNK
	1971	2,000	UNK
	1973	2,000	UNK
	1974	2,000	UNK
	1978	17,500	UNK
	1979	4,000	UNK
	1980	2,000	UNK
	1981	2,000	UNK
	1982	4,000	ADL
	1983	4,000	FGL
	1986	4,011	FRY
1994	<u>295</u>	ADL	
	60,993		
Palmetto Bass	1974	15,000	UNK
	1979	14,000	UNK
	1981	16,349	UNK
	1983	<u>15,584</u>	UNK
	59,933		

Largemouth Bass	1973	4,000	UNK
	1974	<u>24,000</u>	UNK
		28,000	
Florida Largemouth Bass	1975	67,000	FGL
	1976	137,500	FGL
	1977	47,200	FGL
	1977	85,000	FRY
	1978	138,053	FGL
	1979	4,000	FGL
	1999	135,300	FGL
	2000	135,222	FGL
	2006	86,081	FGL
	2007	120,790	FGL
	2010	121,200	FGL
	2011	123,078	FGL
	2012	126	ADL
	2014	125,121	FGL
	2015	120,895	FGL
2016	<u>135,272</u>	FGL	
	1,581,838		
White Crappie	1988	<u>180,143</u>	FGL
		180,143	
Black Crappie	1968	1,500	UNK
	1969	2,000	UNK
	1970	2,000	UNK
	1988	118,946	FGL
	1990	69,638	FRY
	1992	<u>85,312</u>	FRY
	279,396		
Grass Carp (triploid)	1997	100	ADL
	1998	100	ADL
	2006	1,390	ADL
	2007	<u>2,500</u>	ADL
	4,090		

Table 5. Objective-based sampling plan components for Lake Jacksonville, Texas 2016 – 2017.

Gear/target species	Survey objective	Metrics	Sampling objective
	For all target species monitor for large-scale changes in:		
Electrofishing			
Largemouth Bass	Abundance Size structure Age-and-growth Condition	CPUE – stock PSD, length frequency Age at 14 inches W_r	RSE-Stock ≤ 25 $N \geq 50$ stock $N = 13, 13.0 - 14.9$ inches 10 fish/inch group (max)
Bluegill ^a	Abundance Size structure	CPUE – Total PSD, length frequency	$N \geq 50$
Gizzard Shad ^a	Abundance Size structure Prey availability	CPUE – Total PSD, length frequency IOV	$N \geq 50$ $N \geq 50$

^a No additional effort will be expended to achieve an RSE ≤ 25 or CPUE or $N \geq 50$ for 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.

Table 6. Survey of aquatic vegetation, Lake Jacksonville, Texas, 2013 – 2016. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2013	2014 ^A	2015 ^A	2016
Native submersed				
Pondweed				Trace
Native floating-leaved				
American Lotus	<1.0 (0.1)			
Spatterdock	2.8 (0.2)			Trace
White waterlily				Trace
Native emergent				
Common reed	<1.0 (<0.1)			Trace
Giant cutgrass				0.6 (<0.1)
Maidencane				Trace
Water primrose	1.0 (<0.1)			
Water willow				0.1 (<0.1)
Non-native				
Alligatorweed (Tier III)	2.7 (0.2)	Trace	0.8 (<0.1)	0.7 (<0.1)
Giant reed (Tier III)	1.0 (<0.1)			0.7 (<0.1)
Hydrilla (Tier II)				
Elephant ear (Tier III)				Trace

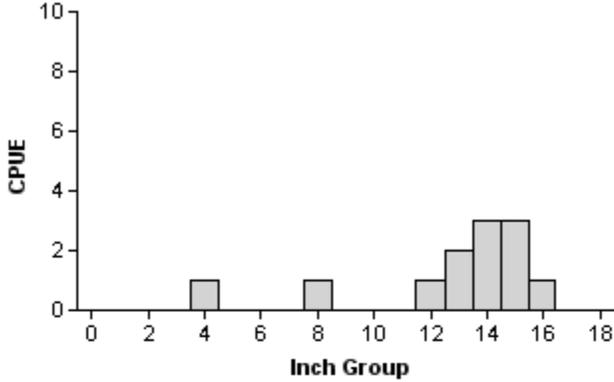
^A Aquatic Nuisance Species survey only

*Tier I is immediate Response, Tier II is management status, Tier III is watch status.

Gizzard Shad

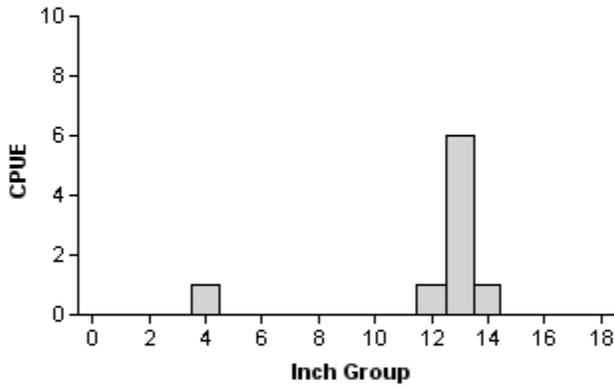
2012

Effort = 1.0
 Total CPUE = 12.0 (51; 12)
 Stock CPUE = 11.0 (54; 11)
 IOV = 8 (9)



2014

Effort = 1.0
 Total CPUE = 9.0 (37; 9)
 Stock CPUE = 8.0 (43; 8)
 IOV = 11 (12)



2016

Effort = 2.0
 Total CPUE = 28.0 (18; 56)
 Stock CPUE = 19.5 (19; 39)
 IOV = 30 (12)

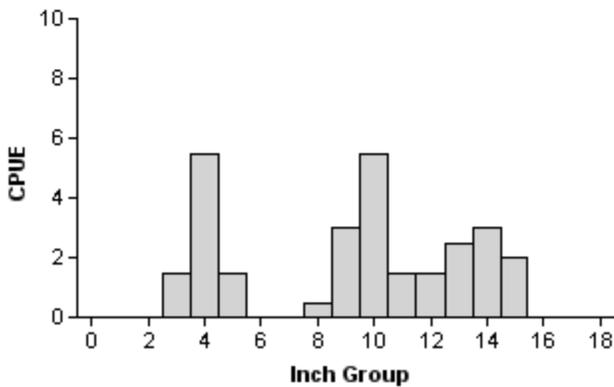


Figure 2. Number of Gizzard Shad caught per hour (CPUE), and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Jacksonville, Texas, 2012, 2014, and 2016.

Redbreast Sunfish

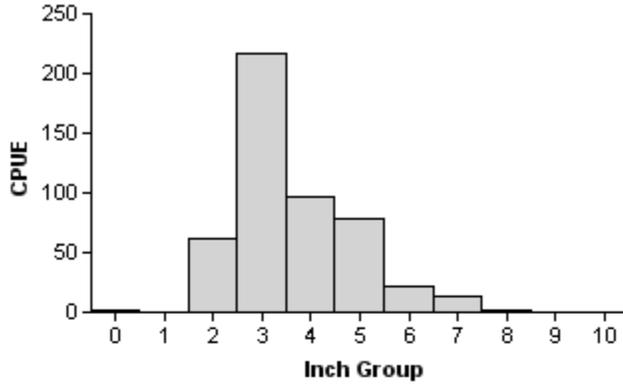
2012

Effort = 1.0

Total CPUE = 492.0 (15; 492)

Stock CPUE = 429.0 (14; 429)

PSD = 9 (2)



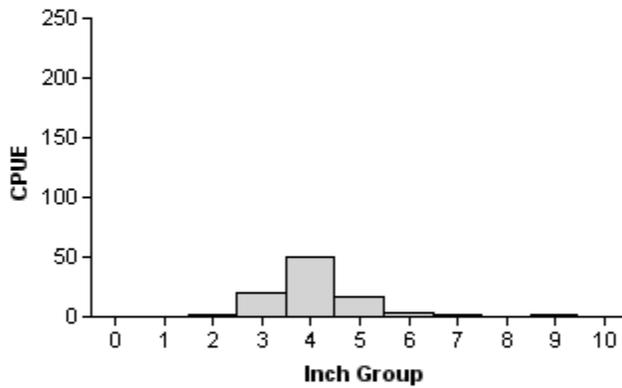
2014

Effort = 1.0

Total CPUE = 94.0 (24; 94)

Stock CPUE = 92.0 (24; 92)

PSD = 7 (2)



2016

Effort = 2.0

Total CPUE = 205.0 (23; 410)

Stock CPUE = 193.0 (24; 386)

PSD = 26 (4)

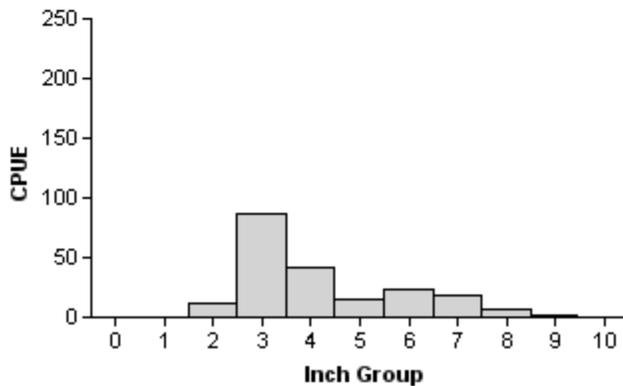
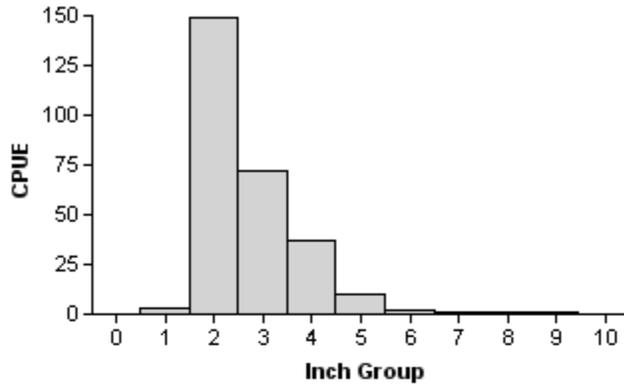


Figure 3. Number of Redbreast Sunfish caught per hour (CPUE), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Jacksonville, Texas, 2012, 2014, and 2016.

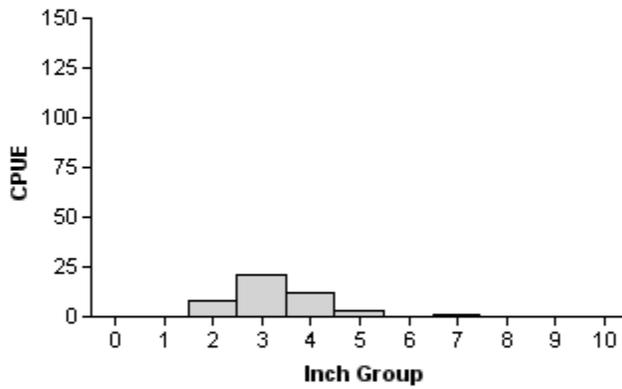
Bluegill

2012



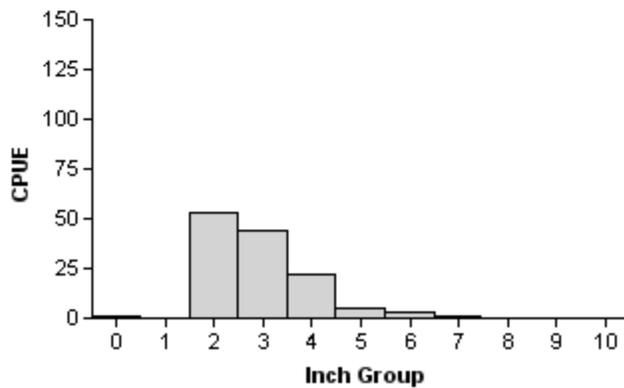
Effort = 1.0
 Total CPUE = 276.0 (20; 276)
 Stock CPUE = 124.0 (17; 124)
 PSD = 4 (2)

2014



Effort = 1.0
 Total CPUE = 45.0 (26; 45)
 Stock CPUE = 37.0 (27; 37)
 PSD = 3 (2)

2016



Effort = 2.0
 Total CPUE = 130.5 (20; 261)
 Stock CPUE = 76.0 (23; 152)
 PSD = 6 (3)

Figure 4. 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, Lake Jacksonville, Texas, 2012, 2014, and 2016.

Redear Sunfish

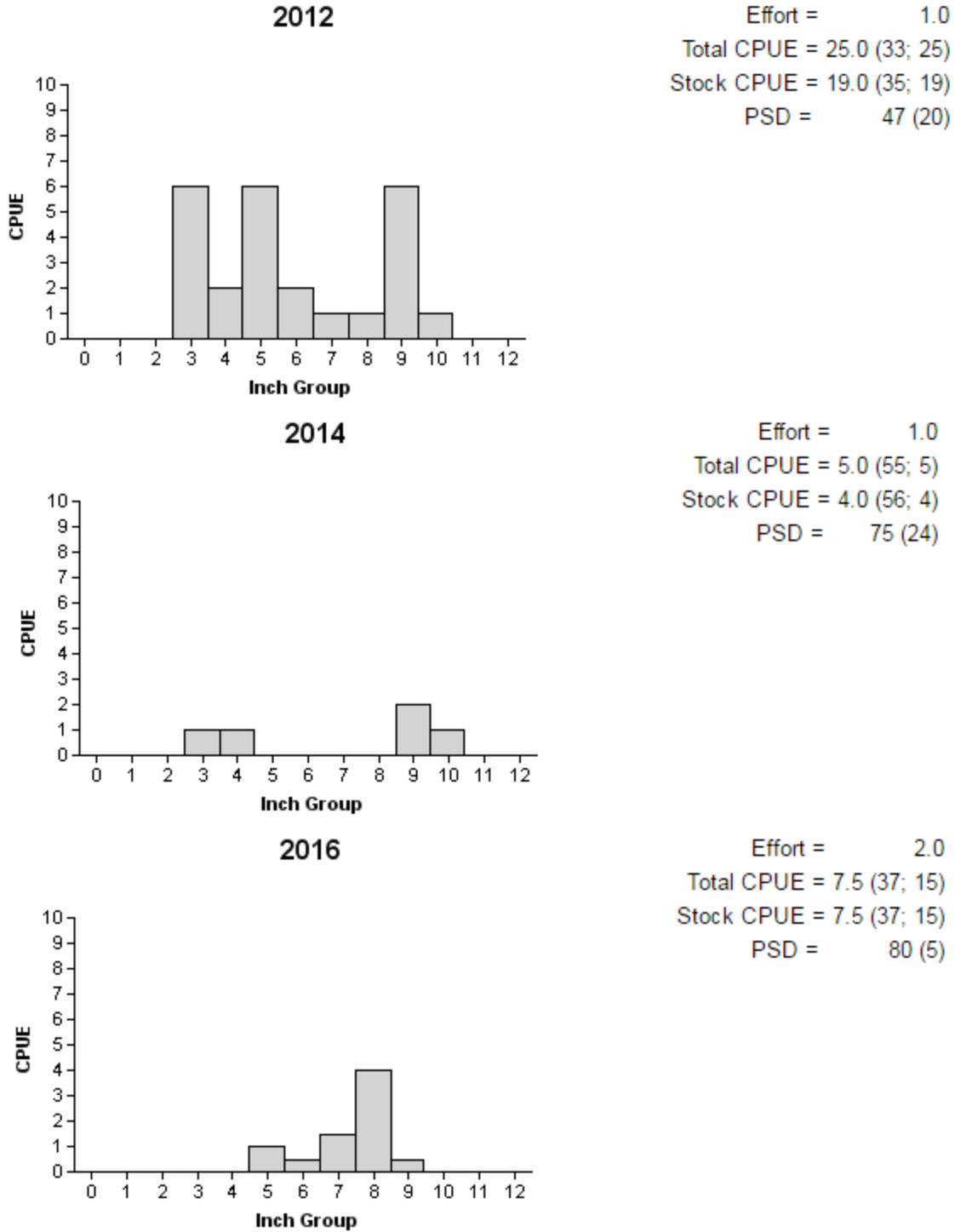


Figure 5. Number of Redear Sunfish caught per hour (CPUE), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Jacksonville, Texas, 2012, 2014, and 2016.

Spotted Bass

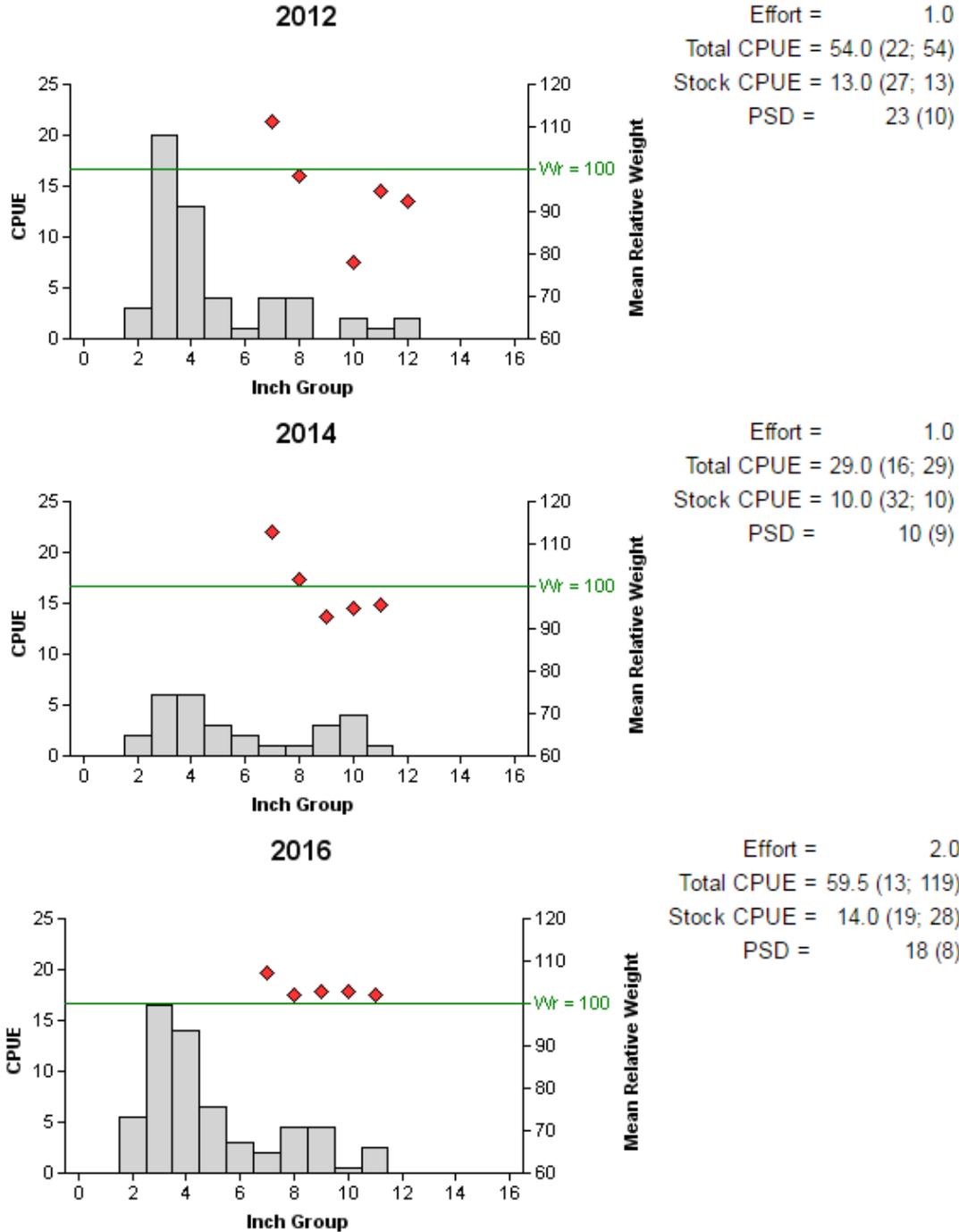


Figure 6. Number of Spotted Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Jacksonville, Texas, 2012, 2014, and 2016.

Largemouth Bass

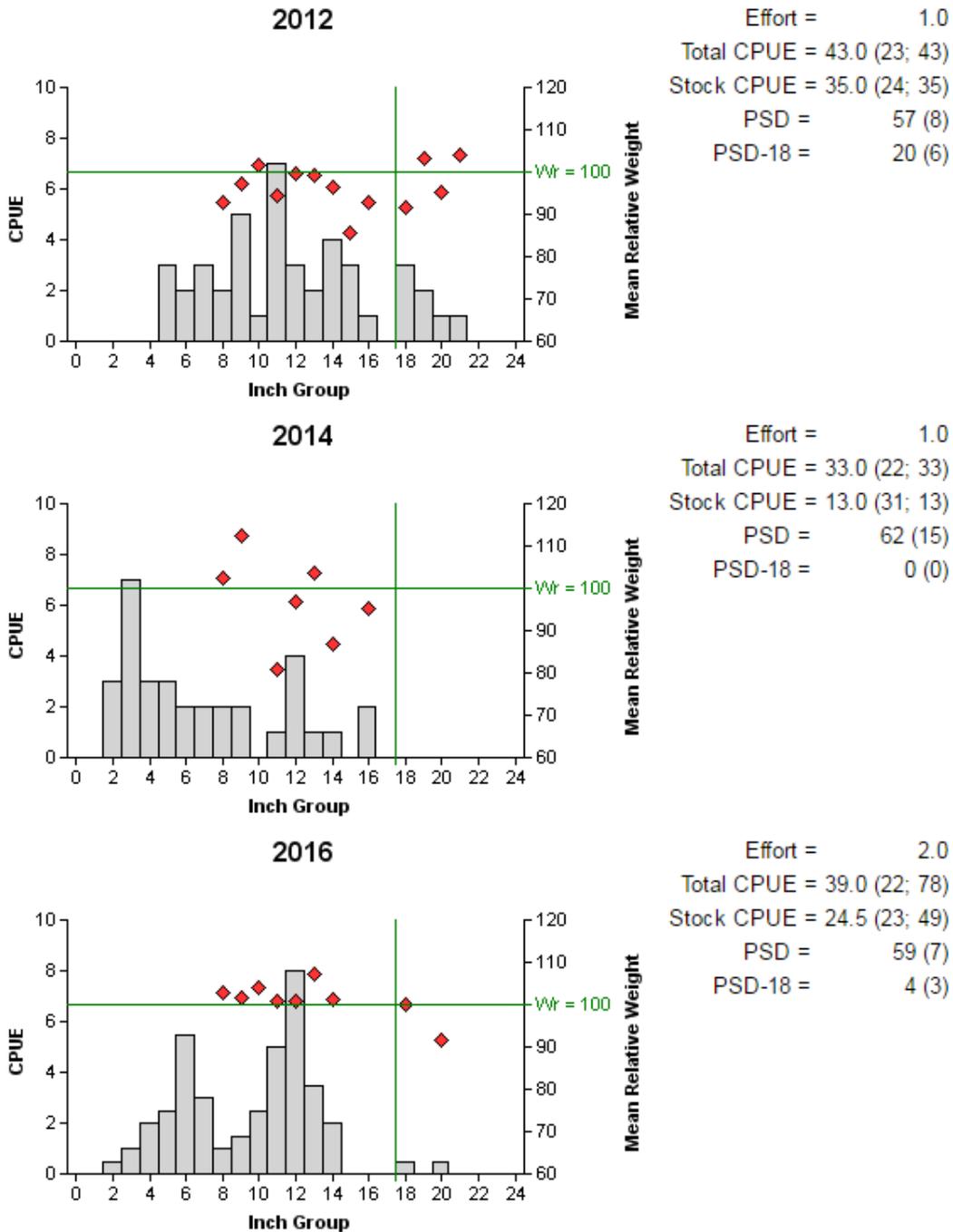


Figure 7. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Jacksonville, Texas, 2012, 2014, and 2016. Vertical line represents length limit.

Table 7. Proposed sampling schedule for Lake Jacksonville, Texas. Survey period is June through May. Electrofishing surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A

Survey year	Electrofishing Fall	Habitat			Creel survey	Report
		Structural	Vegetation	Access		
2017-2018						
2018-2019	A		A			
2019-2020						
2020-2021	S		S	S	A*	S

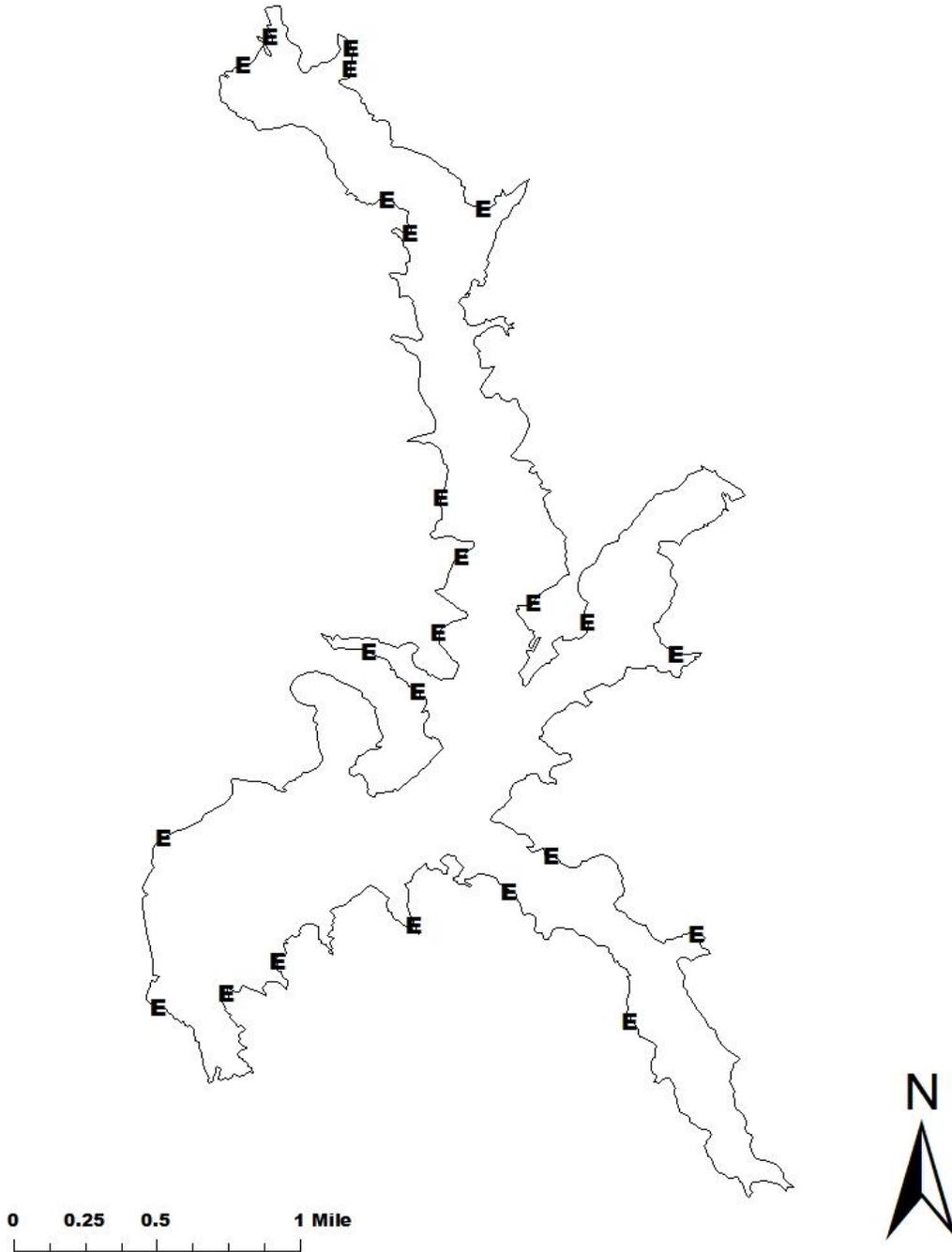
*December 2020-May 2021

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected by electrofishing from Lake Jacksonville, Texas, 2016. Sampling effort was 2 hours.

Species	Electrofishing	
	N	CPUE
Gizzard Shad	56	28.0
Threadfin Shad	61	30.5
Redbreast Sunfish	410	205.0
Warmouth	14	7.0
Green Sunfish	149	74.5
Bluegill	261	130.5
Redear Sunfish	15	7.5
Longear Sunfish	149	74.5
Spotted Bass	119	59.5
Largemouth Bass	78	39.0

APPENDIX B



Location of sampling sites, Lake Jacksonville, Texas, 2016. Fall electrofishing stations are indicated by E. Water level was near full pool at time of sampling.

APPENDIX C

Results of Thursday Night Lake Jacksonville Open angling tournament, 2013. Tournament rules allow legal-length Largemouth Bass or Spotted Bass of any size as part of the 5-fish bag (^A changed to a 3-fish bag in September).

Date	Teams (#)	Anglers (#)	Fish >18 inches (#)	Big string (lbs)	Big fish pot (lbs)	Fish in big string (#)	Average weight in big string (#)	Weather/ (Comments)
3/7/2013	36	72		12.7	6.9	5	2.5	Great
3/14/2013	25	50	6	9.0	8.3	2	4.5	Great
3/21/2013	26	52	10	11.0		5	2.2	NA
3/28/2013	27	55		10.9	9.6	5	2.2	NA
4/4/2013	19	38	14	13.3	7.0	5	2.7	Cold
4/11/2013	18	36	6	12.1	9.5	5	2.4	Cold
4/18/2013	14	28	6	9.0		3	3.0	Cold
4/25/2013	28	56	4	5.8		5	1.2	Nice
5/2/2013	13	26	8	13.2		5	2.6	High wind
5/9/2013	8	16	6	12.3	6.8	5	2.5	Storms
5/16/2013	26	53	6	7.7		5	1.5	Nice
5/23/2013	30	60	5	5.7		4	1.4	Nice
5/30/2013	14	37	6	8.2		3	2.7	High wind
6/6/2013	21	42	7	11.5	7.3	4	2.9	Storms
6/13/2013	29	57	6	8.1		3	2.7	Hot
6/20/2013	24	48	8	15.1	7.5	5	3.0	Hot
6/27/2013	21	42	3	4.9		4	1.2	Hot
7/11/2013	18	36	6	7.9	6.9	5	1.6	NA
7/18/2013	21	41	6	6.3		2	3.2	Hot
7/25/2013	33	16	7	9.0		2	4.5	Hot
8/1/2013	34	17	3	6.3		3	2.1	Storms late
8/8/2013	NA	NA	0	3.1		5	0.6	Hot
8/15/2013	28	56	7	8.4	7.6	4	2.1	Mixed
8/22/2013	19	39	4	7.9	6.5	3	2.6	Cool & nice
8/29/2013	16	33	5	7.2		2	3.6	NA
9/5/2013	14	27	8	13.3	7.2	3 ^A	4.4	Reg change
9/12/2013	16	31	5	10.9		3	3.6	Nice night
9/19/2013	14	28	5	9.9	6.2	3	3.3	McDonalds*
9/26/2013	16	35	0	4.3		2	2.2	Nice night
10/3/2013	17	37	2	8.1		3	2.7	Nice night
10/10/2013	15	33	6	12.3		3	4.1	Biting well
10/17/2013	14	27	4	9.6		3	3.2	Cool night
10/24/2013	<u>13</u>	<u>25</u>	<u>1</u>	<u>7.2</u>		3	2.4	Slow late
Season av.	21	39	5.5	9.2				

*McDonalds Tournament on Lake Fork likely diverted anglers

Results of Thursday Night Lake Jacksonville Open angling tournament, 2014. Tournament rules allow legal-length Largemouth Bass or Spotted Bass of any size to be part of the 3-fish bag.

Date	Teams (#)	Anglers (#)	Fish >18 inches (#)	Big string (lbs)	Big fish pot (lbs)	Fish in big string (#)	Average weight in big string (#)	Weather/ (Comments)
3/6/2014	15	30	5	10.2		3	3.4	NA
3/13/2014	29	59	1	9.3	6.5	3	3.1	NA
3/20/2014	23	57	6	12.0	7.9	3	4.0	NA
3/27/2014	14	29	7	9.3		3	3.1	Rain
4/3/2014	13	26	6	9.7		3	3.2	Storms
4/10/2014	39	78	9	14.3	8.2	3	4.8	NA
4/17/2014	26	51	2	7.1		3	2.4	NA
4/24/2014	24	47	9	11.4		3	3.8	Perfect
5/1/2014	21	41	4	6.7		3	2.2	Cold front
5/8/2014	15	29	4	8.9		3	3.0	Storm late
5/15/2014	18	35	4	9.6		3	3.2	Perfect
5/22/2014	24	57	9	7.8		3	2.6	NA
5/29/2014	19	38	7	10.2		3	3.4	Rain after
6/5/2014	24	57	0	8.0		3	2.7	NA
6/12/2014	24	58	8	11.1		3	3.7	Great night
6/19/2014	40	80	12	9.4		3	3.1	Boat traffic
6/26/2014	33	66	6	11.1		3	3.7	Storms
7/3/2014	46	92	14	10.8	6.6	3	3.6	Crowded
7/10/2014	25	50	5	8.0		3	2.7	Fishing slow
7/17/2014	14	27	4	9.1		3	3.0	Heavy rain
7/24/2014	32	63	4	9.3		3	3.1	Fishing slow
7/31/2014	19	39	3	9.1		3	3.0	Rain early
8/7/2014	23	46	4	6.8		3	2.3	Fishing slow
8/14/2014	31	62	3	7.3		3	2.4	Fishing slow
8/21/2014	28	56	3	7.2		3	2.4	Fishing poor
8/28/2014	24	49	3	11.2	7.6	3	3.7	3 over 6 lbs.
9/4/2014	22	44	5	11.6		3	3.9	Few teams
9/11/2014	12	24	3	6.5		3	2.2	Rain early
9/18/2014	13	26	4	10.4		3	3.5	McDonalds*
9/25/2014	23	47	7	9.5		3	3.2	Good
10/2/2014	15	29	0	6.4		3	2.1	Bad storm
10/9/2014	19	39	6	12.0		3	4.0	Fishing slow
10/16/2014	16	32	0	4.7		2	2.3	Fishing poor
10/23/2014	20	40	2	8.0		3	2.7	Fishing slow
10/30/2014	<u>19</u>	<u>38</u>	<u>3</u>	<u>8.5</u>		3	2.8	Bite slow
Season av.	23	47	5	9.4				

*McDonalds Tournament on Lake Fork likely diverted anglers

Results of Thursday Night Lake Jacksonville Open angling tournament, 2015. Tournament rules allow legal-length Largemouth Bass or Spotted Bass of any size to be part of the 3-fish bag.

Date	Teams (#)	Anglers (#)	Fish >18 inches (#)	Big string (lbs.)	Big fish pot (lbs.)	Fish in big string (#)	Average weight in big string (#)	Weather/ (Comments)
3/5/2015	13	25	0	4.9		2	2.5	Snow
3/12/2015	22	41	6	10.4		3	3.5	Light rain
3/19/2015	23	46	7	12.8	8.0	3	4.3	Nice
3/26/2015	22	44	8	11.6	6.8	3	3.9	Cold front
4/2/2015	24	47	9	10.8	6.8	3	3.6	Great
4/9/2015	10	20	7	10.2		3	3.4	Storms
4/16/2015	NA	NA		11.2	7.2	3	3.7	Storms
4/23/2015	22	41	10	7.7		3	2.6	Good
4/30/2015	25	49	4	9.8		3	3.3	Good
5/7/2015	28	56	4	7.6		3	2.5	Good
5/14/2015	Cancel	Cancel	NA	NA	NA	NA	NA	Flooded
5/21/2015	32	63	9	11.4	8.4	3	3.8	Light rain
5/28/2015	24	57	10	12.0		3	4.0	Good
6/4/2015	34	68	8	10.4	7.1	3	3.5	Fair
6/11/2015	31	61	7	10.4	7.3	3	3.5	Slow
6/18/2015	30	60	7	10.4		3	3.5	Good
6/25/2015	34	67	8	11.3	7.1	3	3.8	Good
7/2/2015	32	61	3	7.9		3	2.6	Traffic
7/9/2015	36	71	7	12.08		3	4.0	Tough
7/16/2015	31	61	4	8.8		3	2.9	Slow
7/23/2015	34	67	7	11.4	6.7	3	3.8	Slow
7/30/2015	26	51	4	8.9		3	3.0	Tough
8/6/2015	28	56	7	8.6		3	2.9	Slow
8/13/2015	25	50	5	7.7		3	2.6	Slow
8/20/2015	23	46	5	8.2		3	2.7	Rain early
8/27/2015	28	56	5	10.4		3	3.5	Tough
9/3/2015	22	43	3	10.0		3	3.3	Slow
9/10/2015	25	50	8	10.3		3	3.4	Storms S.
9/17/2015	22	43	3	7.9		3	2.6	Tournament*
9/24/2015	26	52	0	4.5		2	2.3	Great
10/1/2015	27	53	5	10.5	6.5	3	3.5	Perfect
10/8/2015	29	57	7	8.4		3	2.8	Great
10/15/2015	23	45	2	10.7	7.7	3	3.6	Perfect
10/22/2015	<u>22</u>	<u>44</u>	<u>1</u>	<u>8.11</u>	4.8	3	2.7	Rain
Season av.	26	52	6	9.7				

*McDonalds Tournament on Lake Fork likely diverted anglers

Results of Thursday Night Lake Jacksonville Open angling tournament, 2016. Tournament rules allow legal-length Largemouth Bass or Spotted Bass of any size to be part of the 3-fish bag.

Date	Teams (#)	Anglers (#)	Fish >18 inches (#)	Big string (lbs)	Big fish pot (lbs)	Fish in big string (#)	Average weight in big string (#)	Weather/ (Comments)
3/3/2016	32	63	19	12.0		3	4.0	Great
3/10/2016	Cancel	Cancel	NA	NA	NA	NA	NA	Flooded
3/17/2016	33	66	9	10.1		3	3.4	Biting good
3/24/2016	36	72	6	11.1		3	3.7	Cold front
3/31/2016	38	76	8	10.1		3	3.4	Getting hard
4/7/2016	33	66	6	9.4		3	3.1	Great night
4/14/2016	44	89	7	10.2	7.0	3	3.4	Slow
4/21/2016	36	73	5	9.9		3	3.3	Rain & cold
4/28/2016	39	77	5	11.3	8.4	3	3.8	Slow
5/5/2016	36	72	6	11.6		3	3.9	Muddy
5/12/2016	37	74	5	11.1		3	3.7	Perfect
5/19/2016	28	56	6	11.2		3	3.7	Rain
5/26/2016	Cancel	Cancel	NA	NA	NA	NA	NA	Flooded
6/2/2016	28	56	11	15.2	8.2	3	5.1	High water
6/9/2016	35	70	7	10.6	8.2	3	3.5	Hot
6/16/2016	38	75	7	8.8		3	2.9	Muddy
6/23/2016	37	72	5	9.2		3	3.1	Slow
6/30/2016	38	76	6	10.0		3	3.3	Traffic
7/7/2016	37	75	5	9.0		3	3.0	Slow
7/14/2016	33	65	3	7.7		3	2.6	Slow
7/21/2016	36	72	5	10.9		3	3.6	Hard
7/28/2016	27	58	3	10.0	6.5	3	3.3	Storm early
8/4/2016	24	47	5	14.0		3	4.7	Tough
8/11/2016	24	48	9	16.5	7.1	3	5.5	Very hot
8/18/2016	21	42	3	9.0		3	3.0	Temp drop
8/25/2016	22	43	3	9.2		3	3.1	Storms late
9/1/2016	19	38	3	6.6		3	2.2	Rain threat
9/8/2016	22	43	0	4.4		2	2.2	Slow
9/15/2016	19	38	4	8.4		3	2.8	McDonalds*
9/22/2016	22	44	5	12.0		3	4.0	Great night
9/29/2016	26	53	7	12.8	9.1	3	4.3	Cooler
10/6/2016	24	48	2	10.0		3	3.3	Cooler
10/13/2016	24	47	3	6.0		3	2.0	Biting great
10/20/2016	<u>24</u>	<u>48</u>	<u>4</u>	<u>8.7</u>		3	2.9	Perfect
Season av.	30	61	6	10.3				

*McDonalds Tournament on Lake Fork likely diverted anglers

Results of Thursday Night Lake Jacksonville Open angling tournament, 2017. Tournament rules allow legal-length Largemouth Bass or Spotted Bass of any size to be part of the 3 fish bag.

Date	Teams (#)	Anglers (#)	Fish >18 inches (#)	Big String (lbs)	Big fish pot (lbs)	Fish in big string (#)	Average weight in big string (#)	Weather/ (Comments)
3/2/2017	37	73	13	12.3	8.9	3	4.1	Biting well
3/9/2017	38	76	10	9.6		3	3.2	Perfect night
3/16/2017	38	76	11	9.4		3	3.1	Biting well
3/23/2017	38	76	10	10.0		3	3.3	High wind
3/30/2017	42	83	5	8.1		3	2.7	Cold front
4/6/2017	39	77	6	8.7		3	2.9	Cold front
4/13/2017	45	89	7	11.3		3	3.8	Biting well
4/20/2017	39	77	3	12.0	9.6	3	4.0	Perfect night
4/27/2017	42	83	8	11.0	8.2	3	3.7	Perfect night
5/4/2017	37	74	6	9.9		3	3.3	Cold front
5/11/2017	27	52	4	8.1		3	2.7	Storms
05/25/2017	42	84	12	8.6		3	2.9	Clear night
06/01/2017	43	85	10	13.0	9.3	3	4.3	Clear night
06/08/2017	42	84	5	12.2		3	4.1	Perfect night
06/15/2017	38	75	7	8.9		3	3.0	Many boats
06/22/2017	30	59	5	9.3		3	3.1	Threat of rain
06/29/2017	35	70	4	8.4		3	2.8	Many boats
07/06/2017	40	80	6	9.3		3	3.1	Slow fishing
07/13/2017	42	83	6	9.0		3	3.0	Large group
07/20/2017	43	86	5	10.3		3	3.4	+ after dark