

PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2012 Fisheries Management Survey Report

Lake Jacksonville

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake Jacksonville were surveyed in 2012 using electrofishing. Anglers were surveyed from December 2012 through May 2013 with a creel survey. Historical data are presented with the 2012-2013 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:** 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 sunfishes, Largemouth Bass, Channel Catfish, White Crappie and Black Crappie. Largemouth Bass are managed with an 18-inch minimum-length limit; remaining species are managed under the statewide harvest regulations. Supplemental Largemouth Bass sampling was conducted in 2010 and 2011; fingerling stockings were conducted in 2010 and 2011 and stocking of 126 surplus brood fish was conducted in 2012. A local angler group purchased 40,000 threadfin shad in 2012 to supplement the prey base. 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 (spring; pre-treatment and summer; annual) 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 were reduced to once a year (at the peak of the growing season) from 2009-2012.
- **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 807/h; Redbreast Sunfish was the most abundant species.
 - **Catfishes:** Channel Catfish, although still present, were rare. Although gill netting was not conducted, continued presence was documented through angler harvest in the creel.
 - **Black basses:** Black bass were the most sought-after species group by anglers at Lake Jacksonville during the winter/spring creel survey and angler success was high. Relative abundance was within the historical range, but size structure had improved considerably. Overall harvest of spotted and largemouth bass was low but both species contribute to the regular and tournament fisheries.
 - **Crappie:** Crappies were the second most sought after sport fish group during the winter/spring creel surveys.
 - **Management strategies:** Conduct electrofishing surveys in fall 2014 and 2016 to monitor largemouth bass and prey populations. Continue monitoring results of Thursday night angling tournament. Continue native vegetation restoration and promote removal of triploid Grass Carp. Continue annual aquatic vegetation surveys and an access survey in 2016. Provide signage promoting the Clean-Drain-Dry campaign.

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INTRODUCTION

This document is a summary of fisheries data collected from Lake Jacksonville from June 2012 through May 2013. 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 2012-2013 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). 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 but no commercial ramps (Table 2). Two public ramps, Northwest ramp and Southside ramp, were unavailable to anglers during summer 2012 due to low water level (Figure 1). The canal from Peninsula Point ramp to the main lake was dredged in 2011 and remained accessible. Handicap-specific facilities and restrooms are available at the main boat ramp.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Ott and Bennett 2009) included:

1. Continue electrofishing on a biennial basis 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 2010 and Largemouth Bass-only electrofishing was conducted in spring 2011. A meeting with local anglers in December 2011 resulted in recommended changes to Largemouth Bass harvest regulations scheduled for implementation in September 2013. Numerous live interviews and news releases have been submitted.
2. 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. However, structures were temporarily removed during low water condition. Angling groups have been contacted regarding artificial reef construction and city officials have been consulted regarding regulations. To date, angling groups have not formed a partnership.
3. Consult with the City of Jacksonville about obtaining advance-sized Channel Catfish (*Ictalurus punctatus*) from a private vendor. Solicit assistance from angling groups in funding the stocking program.
Action: Angler concerns regarding perceived prey base deficiencies resulted in stocking of ~40,000 Threadfin Shad (*Dorsoma petenense*). Stocking of Channel Catfish was relegated to lower priority.
4. Under the terms of the integrated management plan discuss with the City the possibility of removing protection of triploid Grass Carp (*Ctenopharyngodon idella*) and allowing angler

harvest.

Action: The Jacksonville City Council agreed to triploid Grass Carp removal. An experimental bowfishing tournament was conducted but Triploid Grass Carp removal was inefficient. Regulation proposals were made to the TPWD Commission to allow angler removal of Triploid Grass Carp when they were no longer deemed beneficial and became effective in June 2013.

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 imposed in 2000 (Table 3). A regulation change for Largemouth Bass was proposed and adopted by the TPWD Commission. The changed regulation will allow daily harvest of 5 Largemouth bass, only two of which can be <18 inches, and will be effective September 1, 2013.

Stocking history: Significant stockings conducted since the last survey includes: Florida Largemouth Bass fingerlings in 2010 and 2011 and 126 retired brood Florida Largemouth Bass (5-7 pounds) in 2012. To supplement the prey base, a local angler group funded stocking nearly 40,000 Threadfin Shad in 2012. A complete stocking history is found 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 triploid Grass Carp barrier was removed, disallowing any additional stocking. Annual herbicide treatments were conducted, but hydrilla continued to expand to over 300 acres with approximately 95 acres of native vegetation. In 2006, an improved fish barrier was constructed 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 triploid 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 treatment or triploid Grass Carp stocking has been conducted.

Water transfer: Lake Jacksonville is primarily used for municipal water supply, recreation, residential, 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 other inter basin transfers are known to exist.

METHODS

Fishes were collected by electrofishing (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. All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). A roving creel survey was conducted from December 2012 through May 2013. 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 2011).

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 (*D. cepedianum*), (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. Ages were determined using otoliths from 39 Largemouth Bass from 5.4 to 18.9 inches in length.

Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Micro-satellite DNA analysis was used to determine genetic composition of individual fish from 2005 through 2012 and by electrophoresis for previous years. Analysis was conducted on a sample of 30 fish (selected at random) from 5.4-18.9 inches in length.

Source for water level data was the United States Geological Survey (USGS 2013). Effort and catch information on the Thursday night angling tournament was obtained from the tournament web site (Lake Jacksonville Championship 2013).

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. Following triploid Grass Carp introduction and severe flooding in 2007 (Ott and Bennett 2008), aquatic vegetation has continued to be scarce, and only comprised 0.4% of the reservoir surface area in 2012. Hydrilla has not been detected in the last four years (Table 5). Alligatorweed (*Alternanthera philoxeroides*) and elephant ear (*Colocasia spp.*) were the only non-native species detected. Traces of southern watergrass (*Hydrochloa caroliniensis*), pondweed (*Potamogeton spp.*), and water stargrass (*Heteranthera dubia*) were present in 2009 and 2010, but no submersed species were detected in 2011. During 2012, a trace amount of muskgrass (*Chara vulgaris*) was the only submersed species detected. Triploid Grass Carp resistant floating-leaved species, spatterdock (*Nuphar luteum*) and white waterlily (*Nymphaea odorata*), were present in 2009, 2010, and 2012, but were exposed by low water level in 2011. The native emergent species community was relatively diverse but low in abundance in 2009 and 2010 and included: arrowhead (*Sagittaria spp.*) maidencane (*Panicum hemitomon*), common reed (*Phragmites australis*), cattail (*Typha spp.*), Louisiana iris (*Iris giganticaerulea*), softrush (*Juncus effuses*), smartweed (*Polygonum hydropiperoides*), and water primrose (*Ludwigia spp.*). However, following drought conditions in 2011, only common reed was detected in 2012.

Creel: Total angling effort for the December 2012 through May 2013 creel (7,329 hours) represented a decline from the 2008-2009 survey (Table 7). Black basses continued to be the most sought after species group and the percentage of directed effort increased from 68 in 2008-2009 to 76 in 2012-2013. Crappie received the second highest directed effort (11%), but exhibited a slight decline from 14% in 2008-2009. Overall, angler expenditures for the period (\$20,935) were substantially reduced from 2008-2009. It is possible that overall effort and expenditures may be much higher than recorded as night tournaments for black basses have become very popular and this information is not captured in standard creel surveys. Anecdotal information obtained from the Lake Jacksonville Open Tournament web site (Lake Jacksonville Championship 2013) indicates that 8 to 36 teams (16-72 anglers) participate in the Thursday night tournament on a weekly basis from March – October.

Prey species: Both Threadfin Shad and Gizzard Shad were present in Lake Jacksonville (Appendix A), but clupeid abundance continues to be low despite stocking. Index of Vulnerability (IOV) for Gizzard Shad was only 8, indicating that most were too large for predators to consume (Figure 2). Threadfin Shad electrofishing catch rate (49/h) was lower than in 2008 (111/hr), but is still above previous surveys (8/h, 2004; 0/h, 2006). As in previous surveys, the prey community is dominated by sunfishes (*Centrarchidae*). Redear Sunfish (*Lepomis microlophus*) abundance was still low relative to previous surveys (Figure 6) and is likely due to reduced aquatic plant and snail abundance. However, both Redbreast Sunfish (*L. auritus*) and Bluegill (*L. macrochirus*) exhibited substantial increases in abundance (Figures 4 and 5) and the combined catch rate for all sunfish species was over 800/h, (Appendix 1). Although Redear Sunfish abundance was low, the size distribution suggests the potential for a fishery. However, no directed effort toward sunfishes was recorded in the 2012-2013 creel season. Other sunfish species were comprised of individuals mostly ≤ 6 inches (Figures 4, 5, and 6) and functioned primarily as prey.

Black basses: Spotted Bass (*M. punctulatus*) were collected by electrofishing at a higher rate than past surveys (Figure 7) but most were small (<13 inches). Anecdotal information indicates that this species

makes up a substantial proportion of the tournament catch (Lake Jacksonville Championship 2013). Non-tournament anglers also harvested an estimated 322 Spotted Bass from 6 – 12 inches in length during the 6-month creel period (Figure 8).

Electrofishing catch rate of Largemouth Bass in 2012 (49/h; Figure 9) was lower than the unusually high catch rate in 2008 (91.5/h), but was within the range exhibited historically. The unusually low catch rate and missing size classes in fall 2010 was likely a sampling affectation that reflected low water level at the time of sampling (Figure 1). Optional sampling in spring 2011 (following partial water-level recovery) did not exhibit missing size classes (Figure 10). By the time sampling was conducted in fall 2012, water level had recovered completely and size distribution of Largemouth Bass was excellent. Proportional Size Distribution (PSD) was 55, PSD-18 was 18, and relative weight (W_r) was >90 for most size classes. Growth trajectory appeared normal up to age two, but flattened out past that age (Figure 11). Limited sample sizes hampered our ability to make strong inferences on growth for older fish (>age 1). The continued high percentage of Florida bass alleles and pure Florida strain Largemouth bass in the population (Table 10), suggest success of the 2010 and 2011 stockings (Table 3). Angling success was relatively high (1.2/h; Table 9), but most fish reported in the creel survey were less than the 18-inch minimum length. Measured harvest of legal-length Largemouth Bass was low, with only 22 estimated for the period (Figure 11). Although this suggests low angler catch of legal-length fish, results of Thursday night fishing tournaments in spring 2013 (Appendix D) and the high PSD-18 noted above suggest adequate availability of legal-length fish in the population.

Crappie: Due to low historical success, trap netting for crappie was not conducted in 2012. Angling catch rate (1.2/h) and directed effort (818 hours) declined compared to the same creel period in 2008-2009 (7.9/h and 1,318 hours, respectively). However, estimates in the 2008-2009 survey were based on one interview and statistical confidence in those data were low. Statistical power of the current survey was also low so few inferences can be made about apparent changes (Table 11). However, fish retained by anglers were large (Figure 12).

Fisheries management plan for Lake Jacksonville, Texas

Prepared – July 2013

ISSUE 1: Lake Jacksonville has traditionally provided a high-quality Largemouth Bass fishery and it is important to local anglers. Recently, anglers have expressed their concern about a perceived lack of legal-length fish and its influence on the tournament fishery. In response, a change in harvest regulations has been submitted to and approved by the TPWD Commission. This regulation modifies the current 18-inch minimum-length, 5-fish daily bag limit, to allow harvest of 5 fish, only 2 of which may be less than 18 inches in length. New regulation takes effect September 1, 2013.

MANAGEMENT STRATEGIES

1. Continue electrofishing surveys every other year beginning in 2014 to monitor Largemouth Bass and prey populations.
2. Continue conducting outreach presentations to area angling groups as requested.
3. Continue providing information to local news media concerning the status of the fishery.
4. Provide length-limit signage to the controlling authority for posting at the three boat ramps.

ISSUE 2: Current creel procedures do not capture angler effort, success, or expenditures for night-time angling tournaments. These tournaments account for a substantial amount of effort directed toward black basses.

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. Nursery enclosures are present in Byrd Branch and Cat Creek, but are in disrepair.

MANAGEMENT STRATEGIES

1. Continue annual vegetation survey to monitor recovery of native and or exotic plant species as triploid Grass Carp mortality allows plant survival.
2. Make repairs to existing enclosures to ensure continued production of native plant propagules.
3. Replant enclosures to take advantage of declining triploid Grass Carp numbers.
4. Solicit partnership with angling groups to construct and install artificial reefs.

ISSUE 4: Triploid Grass Carp stocked for hydrilla control have successfully reduced hydrilla below the level specified in the Lake Jacksonville Aquatic Vegetation Management Plan and are interfering with native vegetation recovery. Regulations regarding protection of triploid Grass Carp stocked for vegetation control have been modified to allow for removal after management goals are met.

MANAGEMENT STRATEGY

1. Provide information to controlling authority, local news media, and angling groups regarding removal of protection for triploid Grass Carp.

ISSUE 5: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing,

boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

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

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes an annual vegetation survey, electrofishing in 2014 and 2016, an angler creel survey from December 2016-June 2017, and an access survey in 2016 (Table 10).

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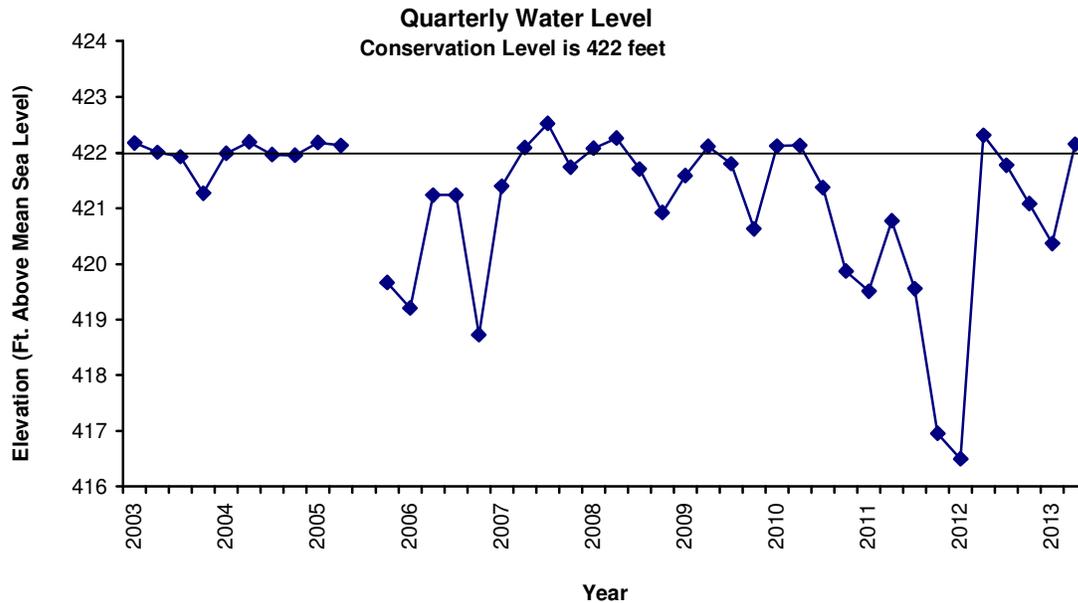


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Lake Jacksonville, Texas. Horizontal line represents conservation level. Data provided by the United States Geological Survey.

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, February, 2013. 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 ^b
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.

^b A revised regulation will allow daily harvest of 5 Largemouth bass, only two of which can be <18 inches, will be effective September 1, 2013.

Table 4. Stocking history of Lake Jacksonville, Texas. FGL = fingerling; ADL = adults; 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	<u>126</u>	ADL	
	1,200,550		

White Crappie	1988	<u>180,143</u> 180,143	FGL
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	
Triploid Grass Carp (triploid)	1997	100	ADL
	1998	100	ADL
	2006	1,390	ADL
	2007	<u>2,500</u>	ADL
		4,090	

Table 5. Survey of aquatic vegetation, Lake Jacksonville, Texas, 2009 – 2012. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2009	2010	2011*	2012
Native submersed				
Muskgrass				tr
Southern watergrass	<0.01 (<0.1)	<0.01 (<0.1)		
Pondweed	0.05 (<0.1)	0.05 (<0.1)		
Water stargrass	tr			
Native floating-leaved				
Spatterdock	1.52 (0.1)	3.0		1.4 (0.1)
White waterlily	<0.01 (<0.1)	<0.01 (<0.1)		
Native emergent				
Arrowhead	0.1 (<0.1)	0.1 (0.1)		
Cattail	0.05 (<0.1)	0.05 (<0.1)		
Common reed	0.08 (<0.1)	1.4 (0.1)		3.00 (0.2)
Giant cutgrass	9.8 (0.8)	9.8 (0.8)		
Louisiana iris	<0.06 (<0.1)	0.06 (<0.1)		
Maidencane	0.1 (<0.1)	0.2 (<0.1)		
Softrush	<0.02 (<0.1)	<0.02 (<0.1)		
Smartweed	<0.01 (<0.1)	<0.01 (<0.1)		
Water primrose	0.06 (<0.1)	0.1 (<0.01)		
Non-native				
Alligatorweed	0.1 (<0.1)	10.3 (0.8)		
Elephant ear	0.3.0 (<0.1)	0.4.0 (<0.1)		1.00 (0.1)

* Due to low water level in summer 2011 all emergent species present were above the water line. No submersed species were detected.

Table 6. Percent directed angler effort by species for Lake Jacksonville, Texas, from December 2008 through May 2009 and December 2012 through May 2013.

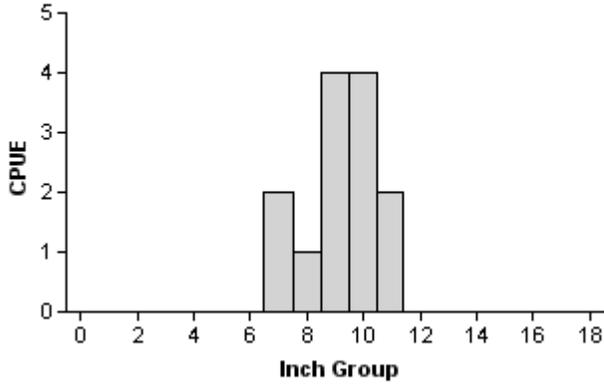
Species	2008/2009	2012/2013
black bass	68	76
sunfish spp.	11	0
crappie spp.	14	11
anything	7	9
Channel Catfish.	0	4

Table 7. Total fishing effort (h) for all species and total directed expenditures at Lake Jacksonville, Texas, from December 2008 through May 2009 and December 2012 through May 2013. Relative standard error is in parentheses.

Creel statistic	2008/2009	2012/2013
Total fishing effort	9,656 (20)	7,329 (23)
Total directed expenditures	\$36,990 (49)	\$20,935 (45)

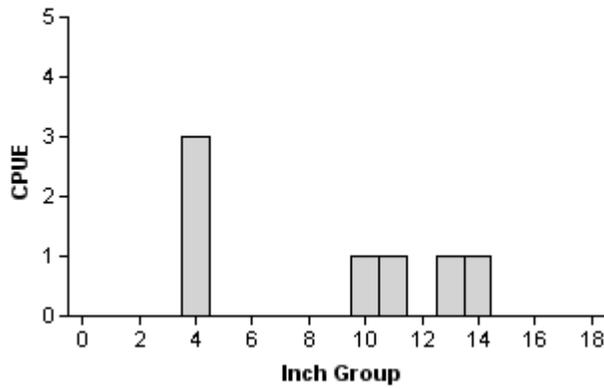
Gizzard Shad

2008



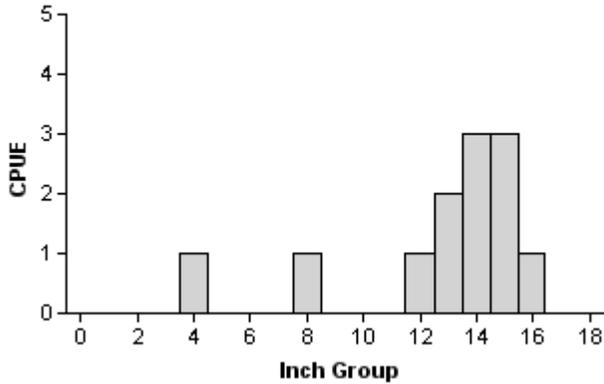
Effort = 1.0
 Total CPUE = 13.0 (33; 13)
 Stock CPUE = 13.0 (33; 13)
 IOV = 15 (9.8)

2010



Effort = 1.0
 Total CPUE = 7.0 (58; 7)
 Stock CPUE = 4.0 (56; 4)
 IOV = 43 (13.1)

2012



Effort = 1.0
 Total CPUE = 12.0 (51; 12)
 Stock CPUE = 11.0 (54; 11)
 IOV = 8 (8.6)

Figure 2. Number of Gizzard Shad caught per hour (CPUE, bars), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Jacksonville, Texas, 2008, 2010, and 2012.

Table 8. Creel survey statistics for Channel Catfish at Lake Jacksonville December 2008 through May 2009, and December 2012 through May 2013. Total catch per hour is for anglers targeting Channel Catfish and total harvest is the estimated number of Channel Catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year	
	2008/2009	2012/2013
Directed effort (h)	0	259 (55)
Directed effort/acre	0	0.2 (55)
Total catch per hour	0	0.2 (189)
Total harvest	0	33 (152)
Harvest/acre	0	>0.1 (152)
Percent legal released	na	0

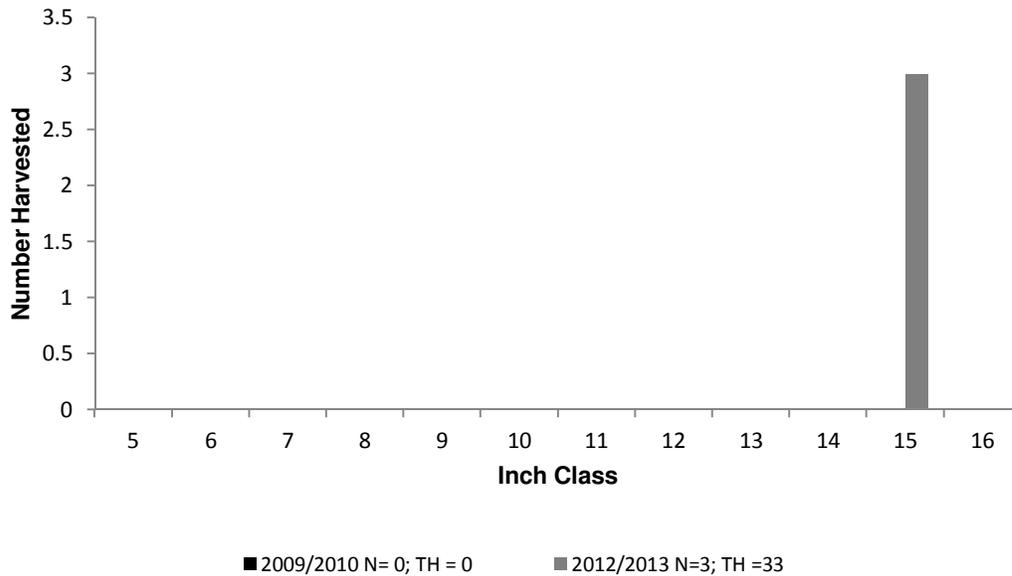
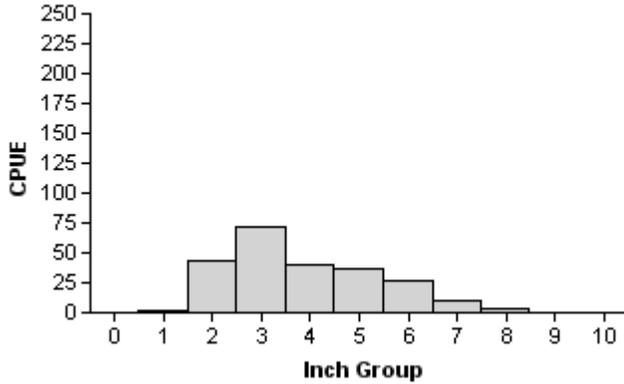


Figure 3. Length frequency of harvested Channel Catfish observed during creel surveys at Lake Jacksonville, Texas, December 2008 through May 2009 and December 2012 through May 2013, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

Redbreast Sunfish

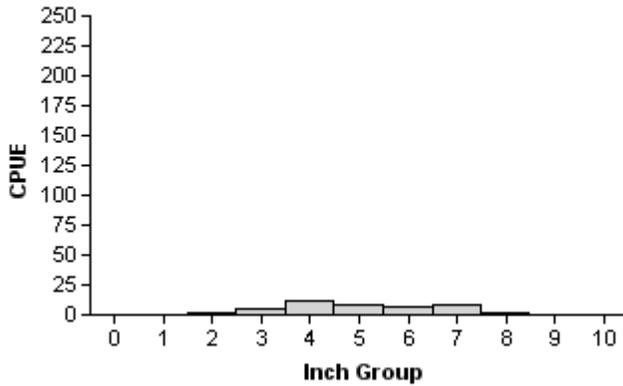
2008

Effort = 1.0
 Total CPUE = 230.0 (10; 230)
 Stock CPUE = 186.0 (12; 186)
 PSD = 21 (3)



2010

Effort = 1.0
 Total CPUE = 42.0 (24; 42)
 Stock CPUE = 41.0 (25; 41)
 PSD = 39 (5.8)



2012

Effort = 1.0
 Total CPUE = 492.0 (15; 492)
 Stock CPUE = 429.0 (14; 429)
 PSD = 9 (2.5)

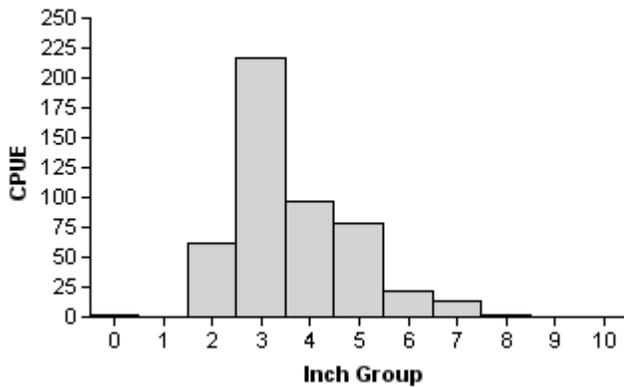
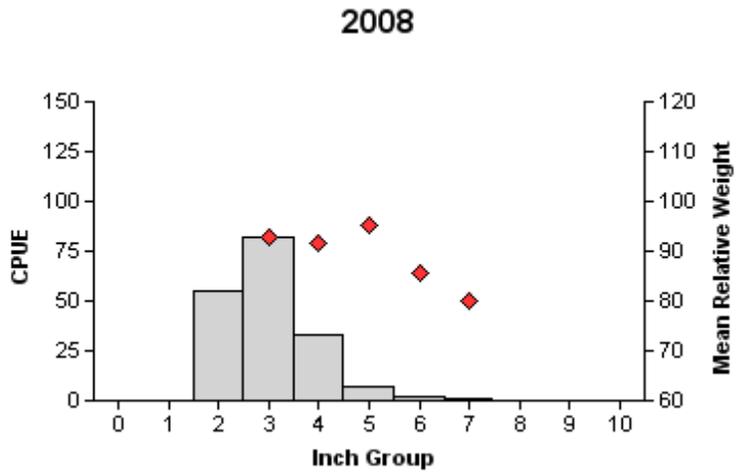
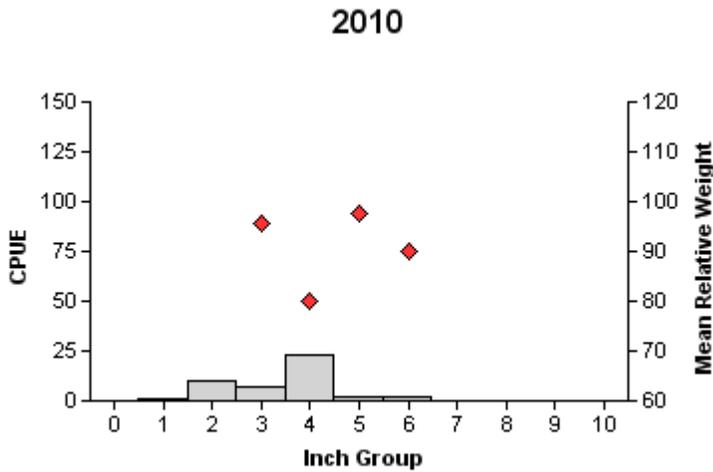


Figure 4. Number of Redbreast Sunfish caught per hour (CPUE, bars), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Jacksonville, Texas, 2008, 2010, and 2012.

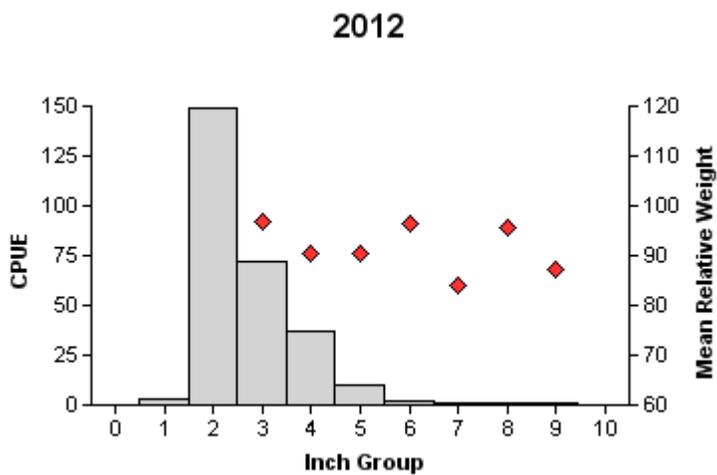
19
Bluegill



Effort = 1.0
 Total CPUE = 180.0 (15; 180)
 Stock CPUE = 125.0 (17; 125)
 PSD = 2 (1.2)



Effort = 1.0
 Total CPUE = 45.0 (65; 45)
 Stock CPUE = 34.0 (66; 34)
 PSD = 6 (2.9)

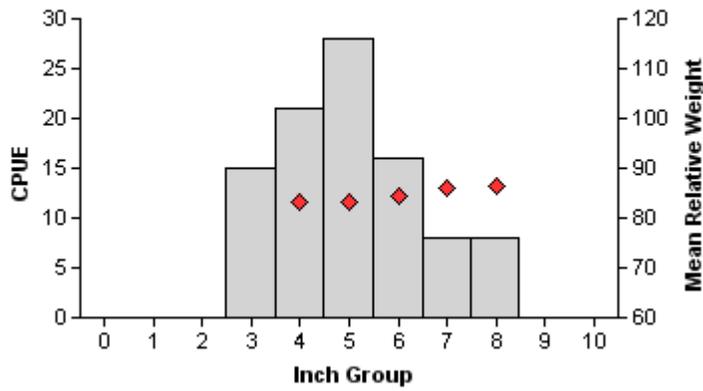


Effort = 1.0
 Total CPUE = 276.0 (20; 276)
 Stock CPUE = 124.0 (17; 124)
 PSD = 4 (2.1)

Figure 5. Number of Bluegill 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, 2008, 2010, and 2012.

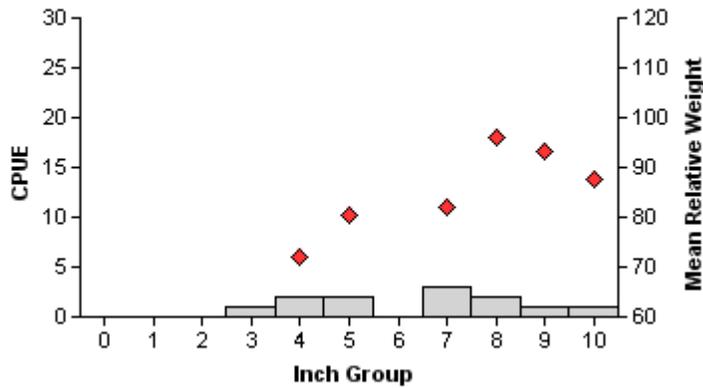
Redear Sunfish

2008



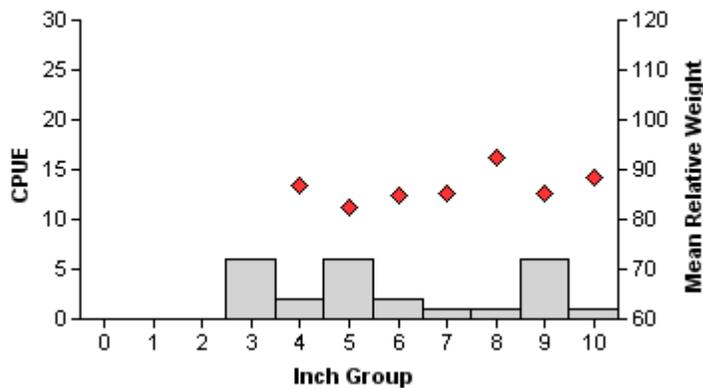
Effort = 1.0
 Total CPUE = 96.0 (18; 96)
 Stock CPUE = 81.0 (19; 81)
 PSD = 20 (7.8)

2010



Effort = 1.0
 Total CPUE = 12.0 (33; 12)
 Stock CPUE = 11.0 (34; 11)
 PSD = 64 (15)

2012



Effort = 1.0
 Total CPUE = 25.0 (33; 25)
 Stock CPUE = 19.0 (35; 19)
 PSD = 47 (20.1)

Figure 6. Number of Redear Sunfish 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, 2008, 2010, and 2012.

Spotted Bass

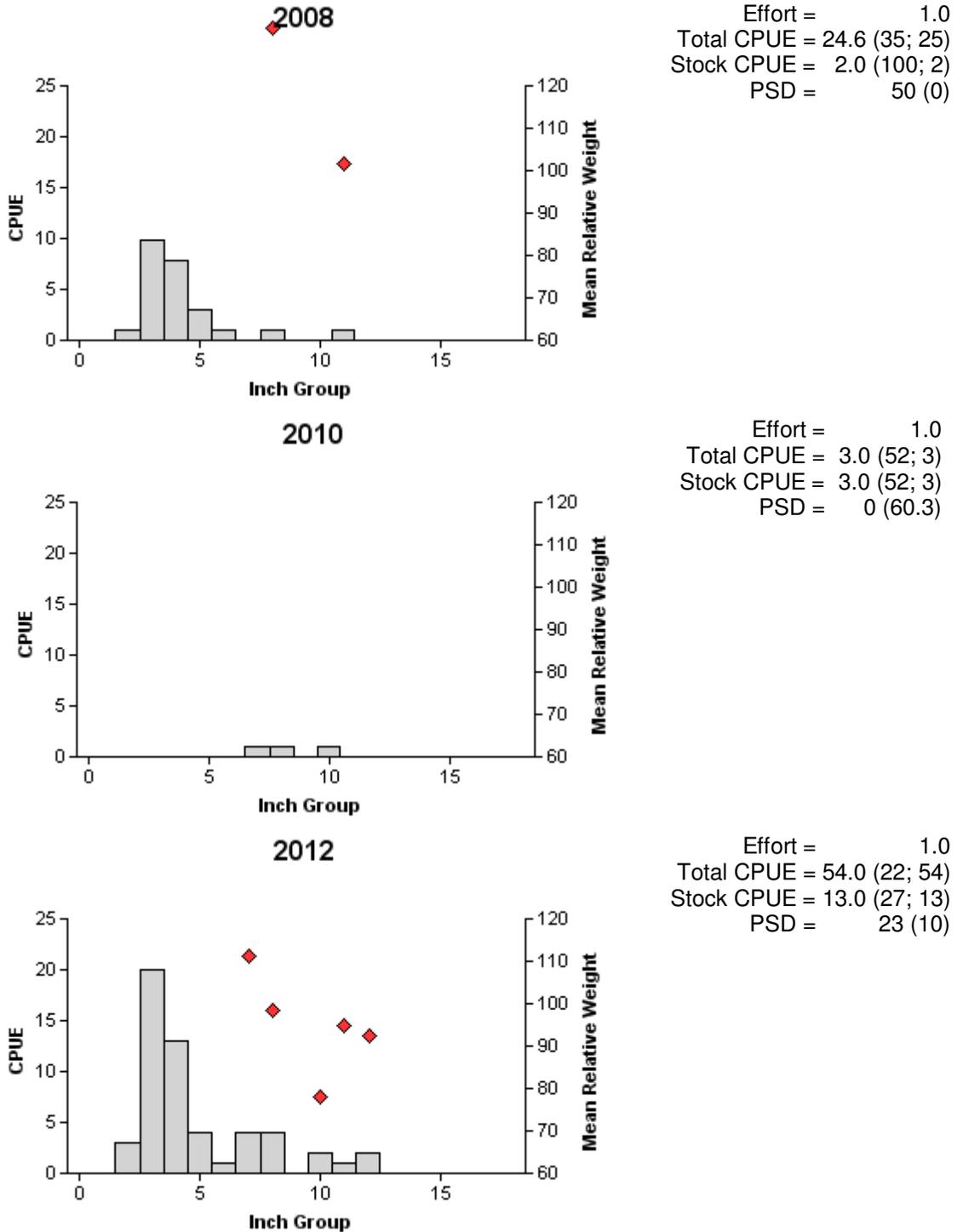


Figure 7. Number of Spotted Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Jacksonville, Texas, 2008, 2010, and 2012.

Spotted Bass

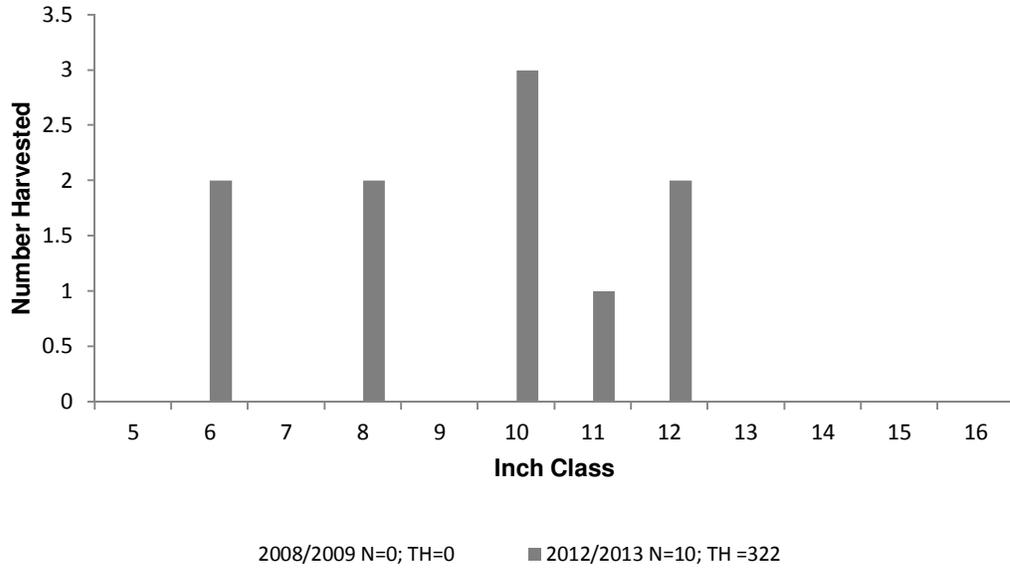
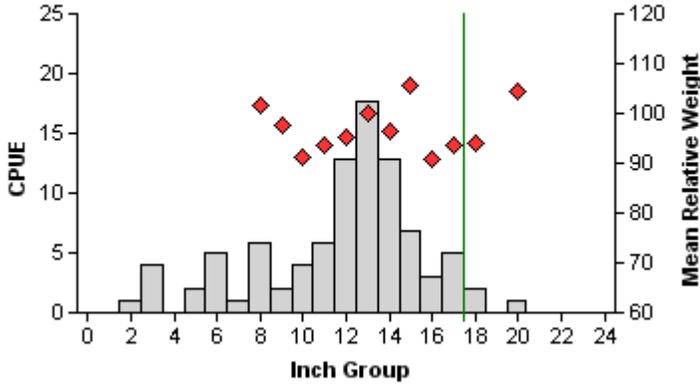


Figure 8. Length frequency of harvested Spotted Bass observed during creel surveys at Lake Jacksonville, Texas, December 2008 through May 2013, all anglers combined. N is the number of Spotted Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

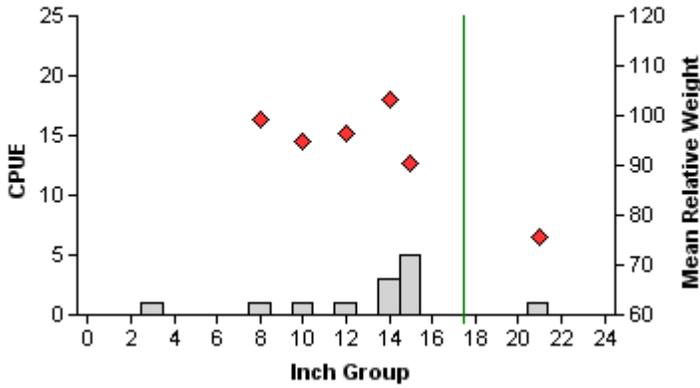
Largemouth Bass

2008



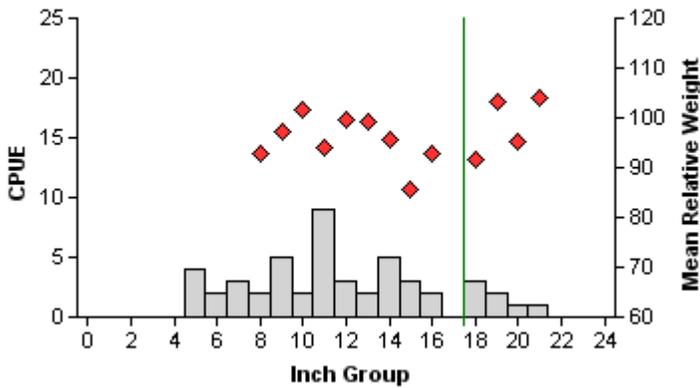
Effort = 1.0
 Total CPUE = 91.5 (17; 93)
 Stock CPUE = 78.7 (18; 80)
 PSD = 78 (4.9)
 PSD-18 = 4 (3.6)

2010



Effort = 1.0
 Total CPUE = 13.0 (24; 13)
 Stock CPUE = 12.0 (28; 12)
 PSD = 83 (9.8)
 PSD-18 = 8 (7.1)

2012



Effort = 1.0
 Total CPUE = 49.0 (27; 49)
 Stock CPUE = 40.0 (28; 40)
 PSD = 55 (7.1)
 PSD-18 = 18 (5.7)

Figure 9. 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, 2008, 2010, and 2012. Vertical line represents length limit at time of survey.

Largemouth Bass

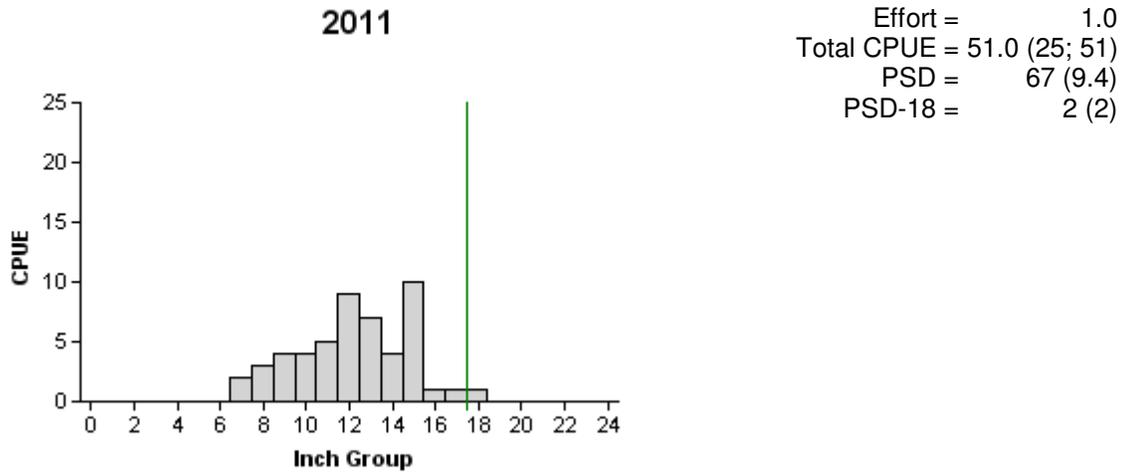


Figure 10. Number of Largemouth Bass caught per hour (CPUE, bars), and population indices (RSE and N for CPUE and SE are in parentheses) for spring electrofishing survey, Lake Jacksonville, Texas, 2011. Vertical line represents length limit at time of survey.

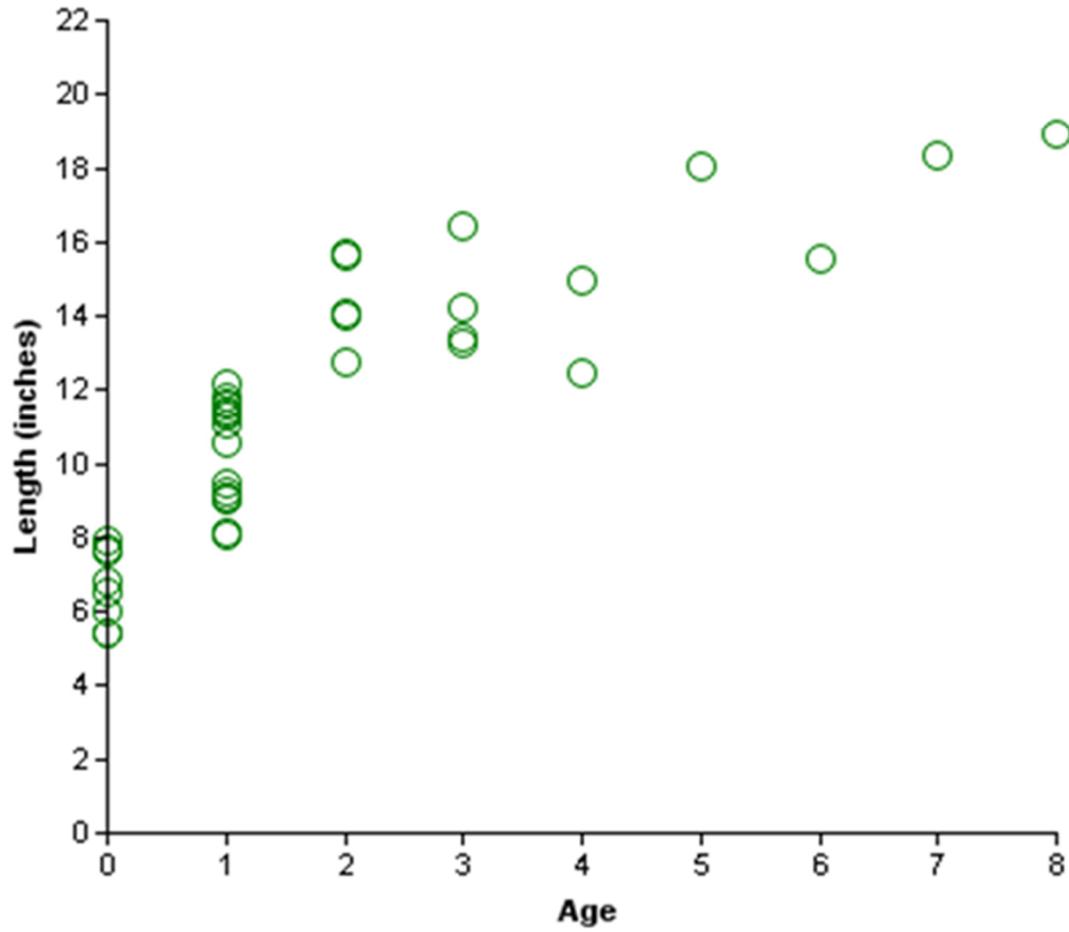


Figure 11. Length at age for Largemouth Bass (both sexes combined) collected by electrofishing at Lake Jacksonville, Texas, October 2012.

Largemouth Bass

Table 9. Creel survey statistics for Largemouth Bass at Lake Jacksonville, TX from December 2008 through May 2009 and December 2012 through May 2013. Catch rate is for all anglers targeting black basses. Harvest is partitioned by the estimated number of fish harvested by non-tournament anglers and the number of fish retained by tournament anglers for weigh-in and release. The estimated number of fish released by weight category is for anglers targeting black basses. Relative standard errors (RSE) are in parentheses.

Statistic	2008/2009	2012/2013
Directed angling effort (h)		
Tournament		0*
Non-tournament		5,590 (22)
All black bass anglers combined	6,588 (29)	5,590 (22)
Angling effort/acre	5.4 (29)	4.6 (22)
Catch rate (number/h)	1.8 (33)	1.2 (44)
Harvest		
Non-tournament harvest	204 (74)	22 (100)
Harvest/acre	0.2 (74)	>0.1 (100)
Tournament weigh-in and release	204 (74)	0*
Release by weight		
<4.0 lbs		3,596 (42)
4.0-6.9 lbs		
7.0-9.9 lbs		
≥10.0 lbs		
Percent legal released (non-tournament)		0

*Note data in Appendix C regarding tournament data not captured by the standard creel survey .

Largemouth Bass

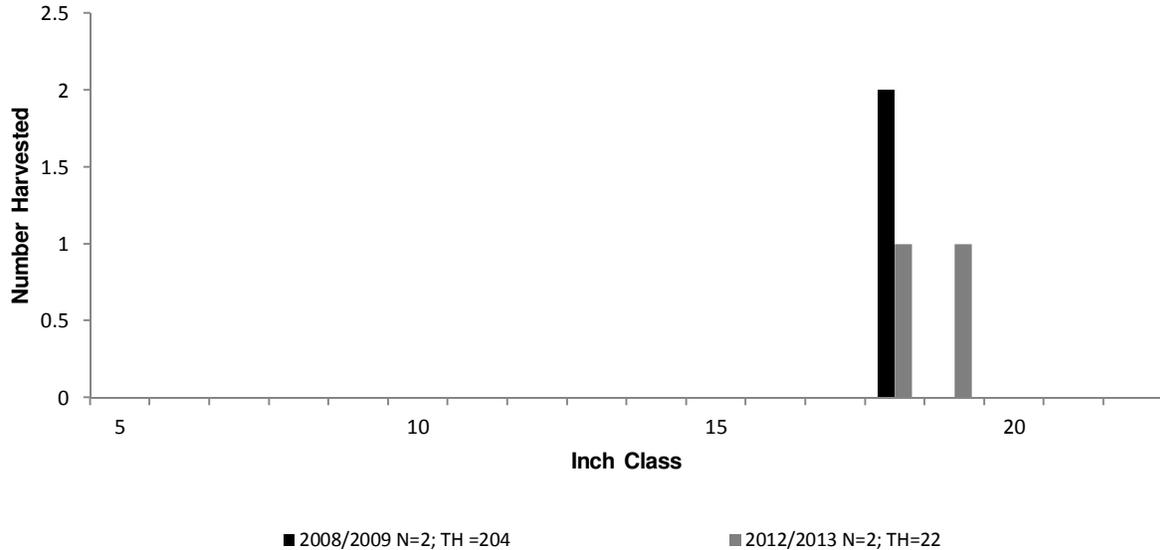


Figure 12. Length frequency of harvested Largemouth Bass observed during creel surveys at Lake Jacksonville, Texas, December 2008 through May 2013, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

Largemouth Bass

Table 10. Results of genetic analysis of Largemouth Bass collected by fall electrofishing Lake Jacksonville, Texas, 1995, 1998, 2000, 2004, 2008, and 2012. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

Year	Sample size	Number of fish			% FLMB alleles	% FLMB
		FLMB	Intergrade	NLMB		
1995	30	3	23	3	50	10
1998	25	4	19	1	58	16
2000	30	4	24	2	57	13
2004	30	3	21	2	56	12
2008	30	1	28	1	61	3
2012	30	4	26	0	73	13

Crappie

Table 11. Creel survey statistics for crappie at Lake Jacksonville December 2008 through May 2009, and December 2012 through May 2013. Total catch per hour is for anglers targeting crappie and total harvest is the estimated number of Black Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year	
	2008/2009	2012/2013
Directed effort (h)	1,318 (63)	818 (36)
Directed effort/acre	1.1 (63)	0.7 (36)
Total catch per hour	7.9 (0)	1.2 (42)
Total harvest	102 (157)	1,555 (97)
Harvest/acre	0.1 (49)	1.3 (97)
Percent legal released	0	0

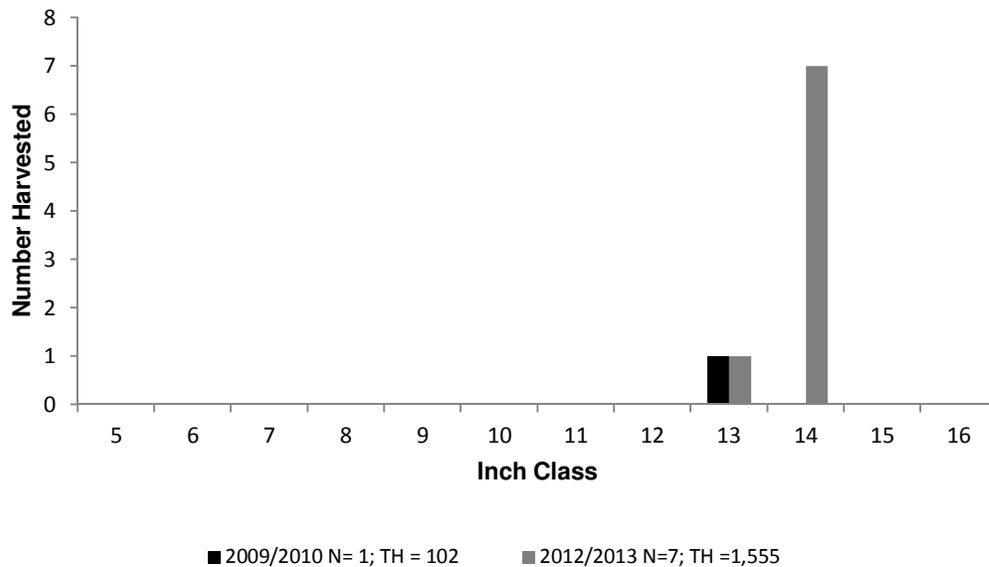


Figure 13. Length frequency of harvested Black Crappie observed during creel surveys at Lake Jacksonville, Texas, December 2008 through May 2009 and December 2012 through May 2013, all anglers combined. N is the number of harvested Black Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 12. 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	Trap net	Gill net	Habitat			Creel survey	Report
				Structural	Vegetation	Access		
2013-2014					A			
2014-2015	A				A			
2015-2016					A			
2016-2017	S				S	S	A*	S

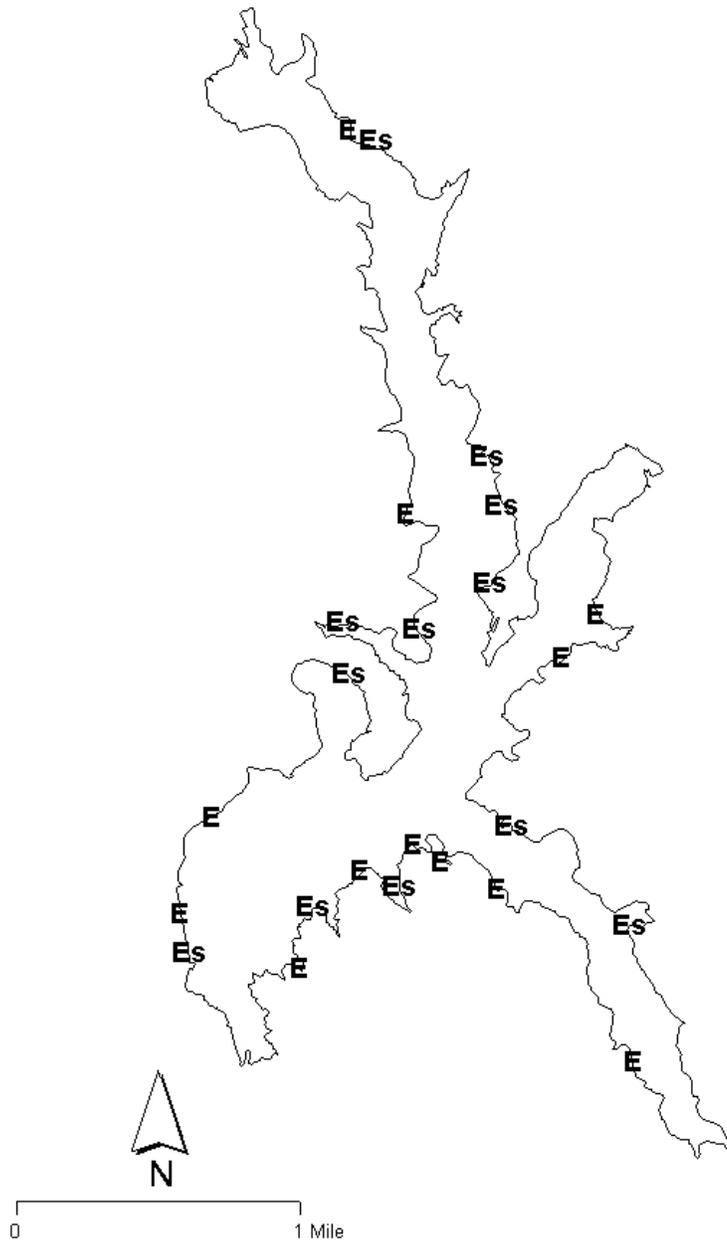
*December 2016-May 2017

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected by electrofishing from Lake Jacksonville, Texas, 2012. Sampling effort was 1 hour.

Species	Electrofishing	
	N	CPUE
Gizzard Shad	12	12.0
Threadfin Shad	49	49.0
Redbreast Sunfish	49	492.0
Warmouth	1	1.0
Green Sunfish	13	13.0
Bluegill	276	276.0
Redear Sunfish	25	25.0
Longear Sunfish	1	1.0
Spotted Bass	54	54.0
Largemouth Bass	49	49.0

APPENDIX B



Location of sampling sites, Lake Jacksonville, Texas, 2011-2013. Fall and spring electrofishing stations are indicated by E and Es, respectively. Water level was near full pool at time of sampling.

APPENDIX C

Results of Thursday Night Lake Jacksonville Open angling tournament. Tournament rules allow Largemouth Bass ≥ 18 inches or Spotted Bass of any size to be part of the 5 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 conditions (comment)
03/07/13	36	72	na	12.7	6.9	5	2.5	good
03/14/13	25	50	6	9.0	8.3	2	4.5	good
03/21/13	26	52	10	11.0	na	5	2.2	na
03/28/13	27	55	na	10.9	9.6	5	2.2	na
04/04/13	19	38	14	13.3	7.0	5	2.7	cold
04/11/13	18	36	6	12.1	9.5	5	2.4	cold
04/18/13	14	28	6	9.0	na	3	3.0	cold
04/25/13	28	56	8	5.8	na	5	1.2	good
05/02/13	13	26	8	13.2	na	5	2.6	high wind
05/09/13	8	16	6	12.3	6.8	5	2.5	storms
05/16/13	26	53	6	7.7	na	5	1.5	good
05/23/13	30	60	5	5.7	na	4	1.4	good
05/30/13	14	37	6	8.2	na	3	2.7	high wind
06/06/13	21	42	7	11.5	7.3	4	2.9	storms
06/13/13	29	57	6	8.1	na	3	2.7	hot
06/20/13	24	48	8	15.1	7.5	5	3.0	hot
06/27/13	21	42	3	4.9	na	4	1.2	hot
07/11/13	18	36	6	7.9	6.9	5	1.6	na
07/18/13	21	41	6	6.3	na	2	3.2	hot