

Kickapoo Reservoir

2017 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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Survey and Management Summary

Fish populations at Kickapoo Reservoir were surveyed in 2017 using low-frequency electrofishing, trap netting and electrofishing. Historical data are presented with the 2017 data for comparison. This report summarizes the results of the surveys and contains a management plan based on those findings.

Reservoir Description: Kickapoo Reservoir is a 6,028-acre impoundment located on the Little Wichita River in the Red River Basin approximately 30 miles west of Wichita Falls. It has a primarily natural and rocky shoreline. The reservoir elevation has been near conservation pool (1,045 msl) since 2015. Kickapoo water quality is considered good for municipal use, but is turbid from surrounding clay soils.

Management History: Important sport fish include catfishes, Largemouth Bass, and White Crappie. Past management plans recommended maintaining the genetic integrity of the existing pure northern strain Largemouth Bass population as a defined source for Texas Parks and Wildlife Department (TPWD) hatchery brood stock program. The reservoir is popular for its White Crappie fishery. Kickapoo has always been managed with statewide regulations.

Fish Community

- **Prey species:** Gizzard Shad catch rate was below the historical average for the reservoir but should provide an abundant prey base for game fish. The catch per unit effort (CPUE) for Bluegill was also below the historical average but increased over the previous survey. Historically, Bluegill have been found in low abundance. Threadfin Shad were present for the first time in low abundance.
- **Catfishes:** A 2017 low frequency electrofishing survey was completed targeting Blue Catfish. Many small individuals were captured but few fish above the legal length limit were observed. The lack of legal length fish is probably a result of the severe drought that ended in 2015. The abundance of small fish indicate good reproduction has occurred since the drought. Channel Catfish and Flathead Catfish were also observed during the survey but were not enumerated. A new lake record Blue Catfish (68.3-pounds and 49-inches) was established in 2014.
- **White Bass:** White Bass are present in the reservoir but are in low abundance with little to no targeted fishing effort. Two individuals were sampled in trap nets.
- **Largemouth Bass:** Largemouth Bass, with the exception of one survey, have never been very abundant in the reservoir. The 2017 survey was the second highest CPUE sampled but abundance is still considered low. Kickapoo Reservoir is important to Texas Parks and Wildlife Department as a primary source of northern strain Largemouth Bass for the hatchery system. Genetic analysis in 2017 identified presence of Florida strain genetic influence for the first time. A new lake record Largemouth Bass (5.22-pounds and 22-inches) was established in 2017.
- **White Crappie:** The 2017 trap net CPUE was the highest since the 2009 survey but below the historical average for the reservoir. The White Crappie were considered to exhibit good body condition.

Management Strategies: Continue conducting genetic testing every four years when Largemouth Bass are collected during routine monitoring and during brood stock collections. Monitor the White Crappie population every four years using trap nets. Monitor the Blue Catfish population using low-frequency electrofishing every eight years.

Introduction

This document is a summary of fisheries data collected from Kickapoo Reservoir in 2017. The purpose is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fish were collected, this report deals primarily with important sport fish and prey species. Historical data are also presented for comparison.

Reservoir Description

Kickapoo Reservoir is a 6,028-acre impoundment constructed in 1945 on the Little Wichita River. It is located in Archer County approximately 30 miles west of Wichita Falls and is operated and controlled by the City of Wichita Falls. Primary uses include municipal water supply and recreation. Mean depth was 14.2 feet with a maximum depth of 43.4 feet (Solis et. al 2014). Solis et. al (2014) reported that Kickapoo reservoir has a drainage of approximately 275 mi², a shoreline length of 62 miles (not counting islands), shoreline development index of 5.5, and the reservoir impounds 85,825 ac/ft of water at full pool. Conductivity was 401 μ S/cm in July 2017. Habitat at time of sampling consisted of natural and rocky shoreline. Water level has been within three feet of conservation pool since 2015 (1,045 mean sea level; Figure 1). Other descriptive characteristics for Kickapoo are in Table 1.

Angler Access

Kickapoo Reservoir has one public two-lane boat ramp and no private boat ramps available to the public. The public ramp was unavailable to anglers from 2013 to 2015 because the end of the boat ramp was above the reservoir elevation. Extension of the ramp is not feasible. Additional boat ramp characteristics are in Table 2. Shoreline access is limited to the public boat ramp area and spillway area. A popular fee fishing barge (\$4.00/person with an additional \$2.00 per rod over two rods) and camp also operates on the reservoir.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Lang and Mauk 2014) included:

1. Maintain the genetic integrity of the existing Largemouth Bass population as a pure northern strain population and as a possible source for TPWD hatchery program brood stock.

Action: Northern Largemouth Bass were stocked in 2015 and 2016 to rebuild the population that was devastated by the drought that ended in 2015. Florida Largemouth Bass genetic influence was documented for the first time in 2017.

2. Kickapoo had traditionally been viewed by anglers as a good crappie reservoir with other game fish species being underutilized. This reservoir also supported a good catfish population and periodically a good Largemouth Bass fishery. Anglers needed to be made aware of the opportunities that existed at the reservoir.

Action: Promoted the reservoir fisheries through various media outlets.

3. The potential spread of zebra mussels and other invasive species exists. Informing the public and reservoir authorities of what to do to prevent the spread and what to do if they suddenly appear in the reservoir are prudent actions.

Action: Spoke and gave material about invasive species to fishing barge operator. Published articles about invasive species in the local newspaper. Gave the controlling authority signage about invasive species that were placed at the boat ramp for boater awareness. Partnered with City of Wichita Falls to hold a joint media announcement about zebra mussels being very near and what the public can do to help protect our local municipal water supply reservoirs.

Harvest regulation history: Sport fish species in Kickapoo Reservoir have always been managed using statewide regulations (Table 3).

Stocking history: Northern strain Largemouth Bass were stocked in 2015, 2016, and 2018. Bluegill were stocked in 2015. The complete stocking history is in Table 4.

Vegetation/habitat management history: Kickapoo has no significant vegetation/habitat management history. Noxious vegetation has never been documented in the reservoir.

Water transfer: Kickapoo Reservoir, in the Red River basin, is used primarily by the City of Wichita Falls for municipal and industrial uses. Raw water is transferred to the City of Wichita Falls secondary reservoir through a large underground pipeline that is gravity fed. Since water does not have to be mechanically pumped, it tends to be the favored surface water choice when the reservoir elevation is relatively high. Small amounts of untreated water are also used by waterfront property owners for irrigation purposes. The City of Wichita Falls also sells water from Kickapoo to the cities of Olney and Archer City to supplement their municipal water sources. For Olney, Kickapoo water is pumped to city lakes that include Cooper Reservoir and Olney City Lake. These two reservoirs are in the upper Brazos River basin which results in an inter-basin transfer of raw water.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Kickapoo Reservoir (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), except for electrofishing which was completed during the daylight hours. This change to standard procedures was made to accommodate collection of northern strain Largemouth Bass for the hatchery system, which required hatchery staff to be on standby. The reservoir is quite turbid, so this deviation likely had minimal impact to our survey results.

Electrofishing – Largemouth Bass, Sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1.5 hours at 18, 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. In 2017, this survey was completed in conjunction with collecting northern Largemouth Bass as brood fish for the TPWD hatchery system. Thus, the survey was performed during the daytime instead of at night, as was done in previous surveys.

Trap netting – Crappie were collected using trap nets (10 net nights at 10 stations). CPUE for trap netting was recorded as the number of fish caught per net night (fish/nn).

Low-frequency electrofishing – Blue Catfish were collected by low-frequency electrofishing at 12 stations. The duration of electrofishing at each station was 5 minutes. CPUE for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing.

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 from 2005 through 2017 and by electrophoresis prior to 2005.

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

Habitat – A structural habitat survey was conducted in 2017. A vegetation survey was also conducted in 2017 to monitor aquatic vegetation. 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 2018).

Results and Discussion

Habitat: A structural habitat survey conducted July, 2017 indicated that the littoral zone habitat consisted primarily of natural or rocky shoreline (Table 6). The previous structural habitat survey was conducted in August 2013 (Lang and Mauk 2014). Very few manmade changes to the physical habitat had occurred during the four-year period. A vegetation survey was also conducted during 2017 finding minimal presence of native submersed, floating leaved, or emergent vegetation present (Table 7). The reservoir elevation has fluctuated from >15 feet below full pool to over the spillway during the last four years. The extreme low water elevation negatively influenced available habitat until 2015 when the reservoir refilled and inundated terrestrial vegetation that had established in the lakebed.

Prey species: Electrofishing catch rate of Gizzard Shad was 280.7/h (Figure 2) and Bluegill was 16.7/h (Figure 3). Index of Vulnerability for Gizzard Shad was high, indicating that 87% of Gizzard Shad were available to predators. This was slightly lower than IOV estimates in previous years. The total CPUE for

Gizzard Shad was below the historical average of 407.6/h. Historically, Bluegill have had low relative abundance in the reservoir (historical average of 25.4/h; Figure 3). Threadfin Shad were documented in low abundance (6.0/h) for the first time at the reservoir.

Catfish species: A low frequency electrofishing survey was completed in 2017 targeting Blue Catfish. The catch rate was 96.0/h with the majority of the catfish being <7-inches in length (Figure 4). Very few legal length or greater fish were captured. These findings are probably the result of the severe drought depressing reproduction until 2015 when the reservoir filled and ran over the spillway. Timing of sampling efforts may have resulted in biased results of legal-length fish. Regardless, the many small catfish that were captured indicate that good reproduction has occurred since 2015. The objective based sampling goals of age at legal length and capturing 50 stock length or greater catfish for size structure were not feasible given the sampling effort that CPUE indicated would need to occur to meet desired objectives. A new lake record Blue Catfish (68.3-pounds and 49-inches) was established in 2014.

Channel Catfish were not examined during the recent sampling period. Historically, they have been present in very low abundance and were observed but not enumerated, during low-frequency electrofishing for Blue Catfish.

Flathead Catfish were observed during the recent low frequency electrofishing survey but were not enumerated.

White Bass: White Bass are present but typically in very low abundance with little to no fishing pressure and thus were not targeted with sampling efforts. However, they were captured during the trap net survey.

Largemouth Bass: The electrofishing CPUE of Largemouth Bass was 16.0/h in 2017, an increase from the past surveys in 2013 (4.0/h), and 2009 (6.0/h; Figure 5), but still below the historical average of 27.0/h (Figure 5). Largemouth Bass are rarely found in abundance in the reservoir except when conditions are optimal with the reservoir full and plenty of flooded terrestrial habitat is available. Kickapoo is utilized as a northern strain Largemouth Bass procurement reservoir for the hatchery system. Eighty Largemouth Bass 10-inches or greater were collected during the electrofishing survey and extra collection efforts. For the first time, Florida Largemouth Bass influence was found in the population (Table 8). Seventy-five of the 80 bass collected were pure northern strain Largemouth Bass (Table 8). The genetics of the population will be monitored closely to ensure that the population is a viable hatchery brood-stock source. A new lake record Largemouth Bass (5.22-pounds and 22-inches) was established in 2017.

White Crappie: The trap net catch rate of White Crappie was 17.4/nn in 2017, higher than the two previous surveys (Figure 6) but well below the historical average of 38.6/nn. Stock length and above exhibited good body condition with Wr's of around 90 and above.

Fisheries Management Plan for Kickapoo Reservoir, Texas

Prepared – July 2018

ISSUE 1: Kickapoo Reservoir has been one of the prime locations to obtain northern strain Largemouth Bass for TPWD hatchery program brood stock. Locations with pure northern strains of Largemouth Bass are limited in Texas. The 2017 genetic survey documented Florida strain influence in the population for the first time.

MANAGEMENT STRATEGIES

1. Do not stock any Florida Largemouth Bass in Kickapoo. Request northern strain Largemouth Bass stockings in 2020 and 2022 to minimize the introduced Florida allele influence.
2. Continue to monitor for Florida strain influence by conducting genetic testing every time Largemouth Bass are collected for the hatchery system or in four years if no hatchery collection has occurred before then.

ISSUE 2: Lake Kickapoo has traditionally been viewed by anglers as a good White Crappie reservoir with other game fish species being present. The reservoir can produce good populations of catfish species and Largemouth Bass depending on reservoir elevation and available habitat. Little fishing pressure exists on the reservoir except when good populations exist and are promoted. Increased water elevation should improve game fish populations over time.

MANAGEMENT STRATEGY

1. Promote the fisheries when appropriate through news releases and when talking to the public.

ISSUE 3: 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. Educate the public about invasive species through the use of media and the internet.
3. Make a speaking point about invasive species when presenting to constituent and user groups.
4. 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 (2018–2022)

Sport fish, forage fish, and other important fishes

Important species include Gizzard Shad, Bluegill, Blue Catfish, Largemouth Bass, and White Crappie. White Crappie are the most important species at this reservoir as evidenced from the results of a 2006 creel survey (Howell and Mauk 2006). Largemouth Bass are an important source for TPWD Inland Fisheries hatcheries as a brood source of northern Largemouth Bass.

Low-density fisheries

Bluegill, Channel Catfish, Flathead Catfish, and White Bass would all be considered low-density species with little targeted angling.

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass, Bluegill, and Gizzard Shad will be monitored in 2021 using electrofishing at 18 sites. Fin clips for genetic analysis will be collected from 30 Largemouth Bass during the electrofishing survey. Additionally, all bass collected for the hatchery brood stock program will be analyzed. White Crappie will be monitored using trap nets at 10 stations. Blue Catfish were sampled by low-pulse electrofishing in 2017 and the results found a high abundance of sub-legal length fish with few legal length fish present. This is probably the result of a record drought which resulted in Kickapoo losing about 60% of its acreage in 2015. This prolonged drought possibly resulted in many missing year-classes. In 2015, the drought broke with record precipitation that resulted in the reservoir filling up. The reservoir had new habitat available in flooded terrestrial vegetation and few predators available so Blue Catfish had good reproduction and recruitment resulting in an abundant population of sub-legal length catfish. It will take some time for growth and reproduction in the abundant sub-legal length catfish to occur since Blue Catfish don't mature for several years. Timing of sampling efforts may have resulted in biased results of legal-length fish and future low-frequency electrofishing efforts should occur in mid to late spring to avoid this potential bias in the future. In order to allow the population to grow, mature, and reproduce; the next Blue Catfish survey will not occur during the four-year sampling period covered by the next report but is scheduled for 2023.

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Tables and Figures

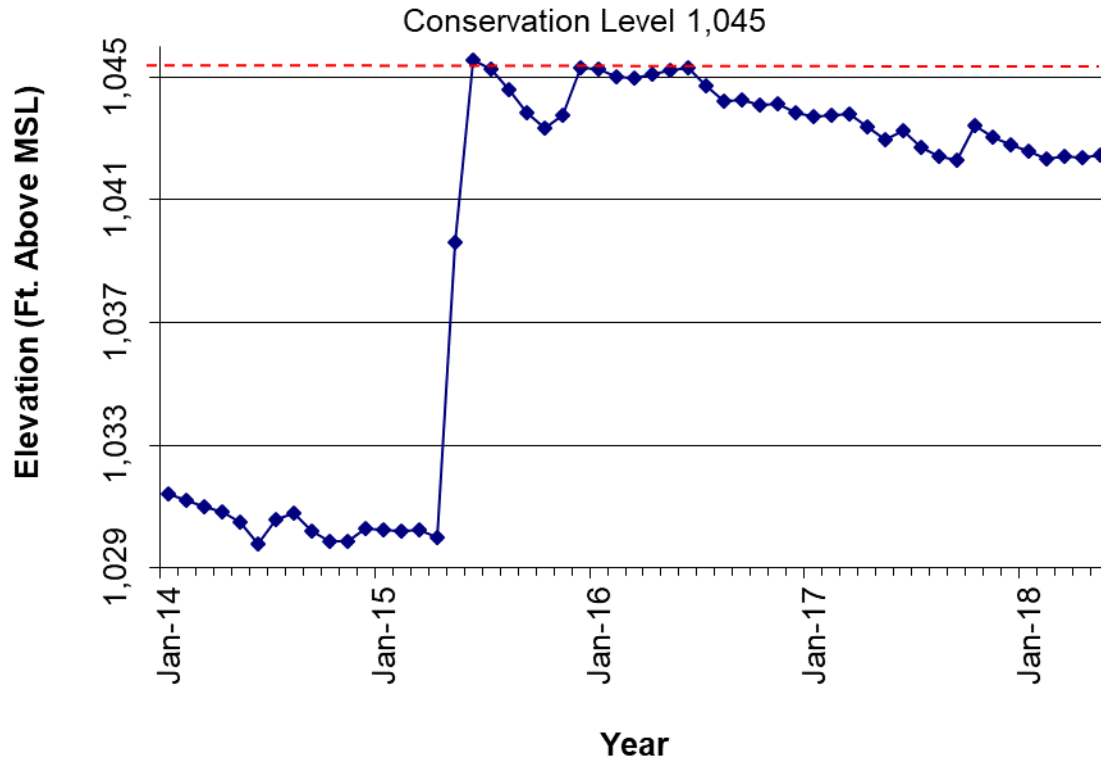


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Kickapoo Reservoir, Texas.

Table 1. Characteristics of Kickapoo Reservoir, Texas.

Characteristic	Description
Year constructed	1945
Controlling authority	City of Wichita Falls
County	Archer
Reservoir type	Tributary
Shoreline Development Index	5.5
Conductivity	401 μ S/cm

Table 2. Boat ramp characteristics for Kickapoo Reservoir, Texas, August, 2017. Reservoir elevation at time of survey was 1,042.3 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Public Ramp	33.65027 -99.78355	Y	15	1,032	Good

Table 3. Harvest regulations for Kickapoo Reservoir, Texas.

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

Table 4. Stocking history of Kickapoo Reservoir, Texas. UNK = unknown; FGL = fingerling; AFGL = advanced fingerling.

Species	Year	Number	Size
Blue Catfish	1986	18,475	FGL
	1990	63,162	FGL
	1991	62,039	FGL
	Species Total	143,676	
Channel Catfish	1969	10,000	AFGL
	1971	88,375	AFGL
	1972	50,000	AFGL
	1973	1,000	UNK
	Species Total	149,375	
Bluegill	2015	76,463	AFGL
Largemouth Bass	1970	100,000	UNK
	2013	99,088	FGL
	2015	3,668	FGL
	2016	114,218	FGL
	2018	109,716	FGL
	Species Total	426,690	

Table 5. Objective-based sampling plan components for Kickapoo Reservoir, Texas 2017-2018.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Exploratory	Presence/absence	Practical effort
Bluegill	Exploratory	Presence/absence	Practical effort
Gizzard Shad	Exploratory	Presence/absence	Practical effort
<i>Low-frequency electrofishing</i>			
Blue Catfish	General monitoring	PSD, length frequency	$N \geq 50$ stock
	Age-and-growth	Age at 12 inches	$N = 13$, 11.0 – 12.9 inches
<i>Trap netting</i>			
Crappie	Exploratory	Presence/absence	Practical effort

Table 6. Survey of structural habitat types, Kickapoo Reservoir, Texas, 2017. Shoreline habitat type units are in miles (includes islands).

Habitat type	Estimate	% of total
Natural	38.2 miles	52.3
Natural with boat docks	2.1 miles	2.9
Rocky	30.1 miles	41.2
Rocky with boat docks	2.6 miles	3.6

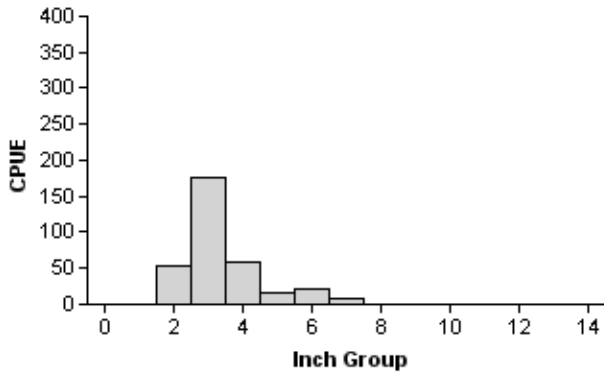
Table 7. Survey of aquatic vegetation, Kickapoo Reservoir, Texas, 2001-2017. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2001	2005	2009	2013	2017
Native submersed					0.1 (<0.1)
Native floating-leaved	0.1 (<0.1)		0.1 (<0.1)		2.0 (<0.1)
Native emergent	0.1 (<0.1)				0.1 (<0.1)

Gizzard Shad

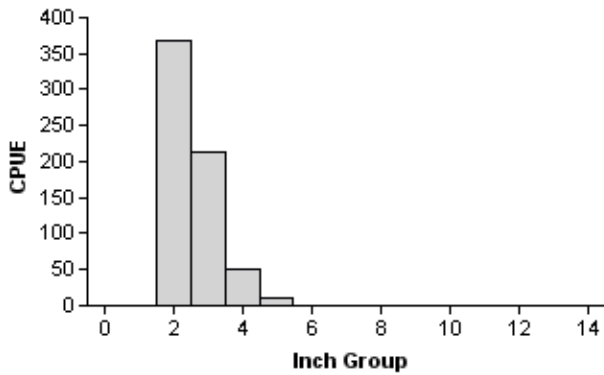
2009

Effort = 1.5
 Total CPUE = 338.7 (37; 508)
 IOV = 99 (1)



2013

Effort = 1.0
 Total CPUE = 644.0 (47; 644)
 IOV = 100 (0)



2017

Effort = 1.5
 Total CPUE = 280.7 (22; 421)
 IOV = 87 (2)

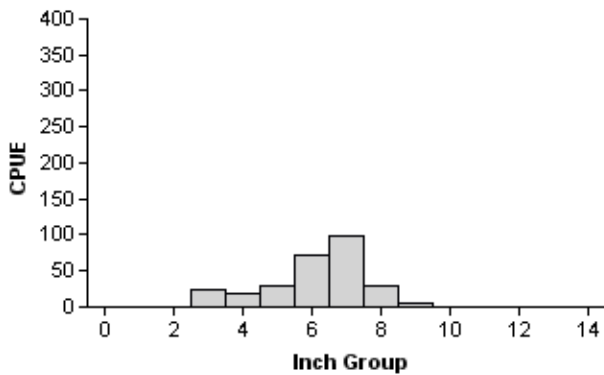


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Kickapoo Reservoir, Texas, 2009, 2013, and 2017. The 2017 electrofishing survey was performed during the daytime.

Bluegill

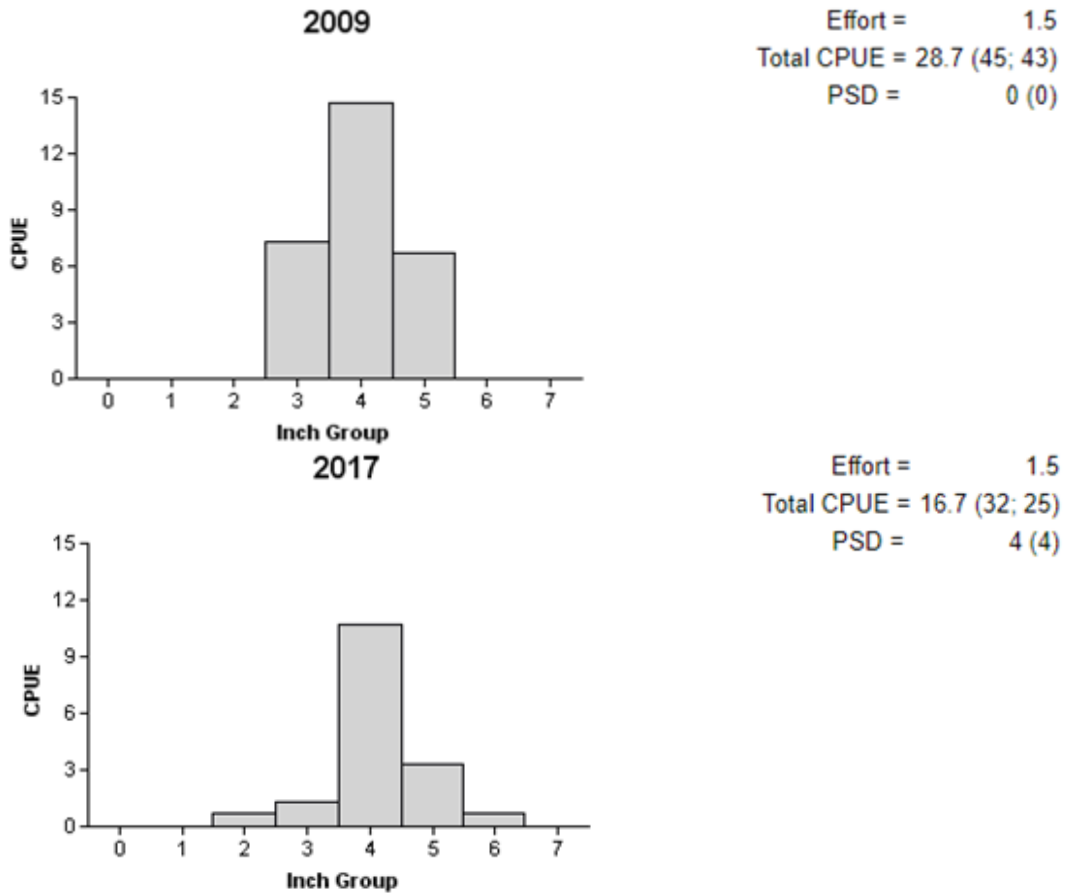


Figure 3. Number of Bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Kickapoo Reservoir, Texas, 2009, 2013, and 2017. No Bluegill were captured during the 2013 survey. The 2017 electrofishing survey was performed during the daytime.

Blue Catfish

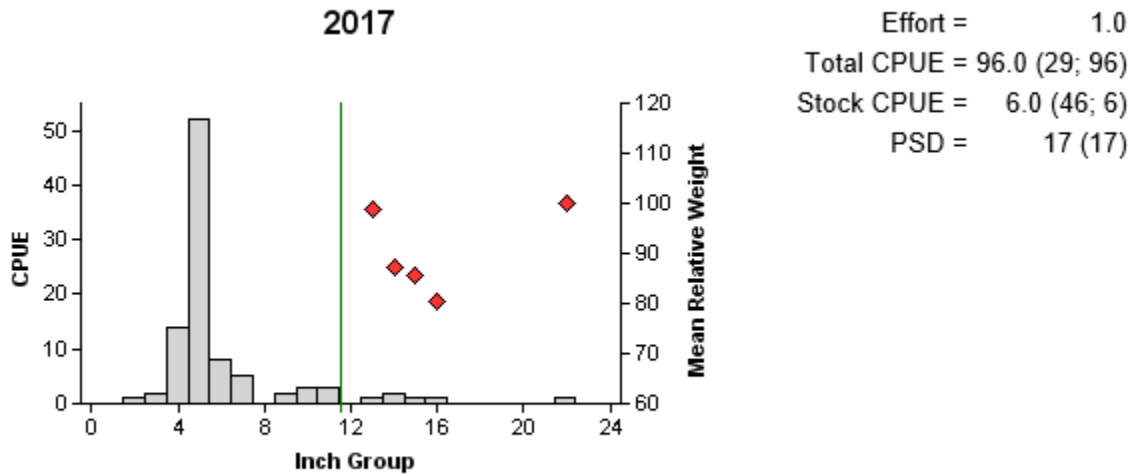


Figure 4. Number of Blue Catfish caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall low-frequency electrofishing surveys, Kickapoo Reservoir, Texas, 2017. Vertical line indicates minimum size limit at time of sampling.

Largemouth Bass

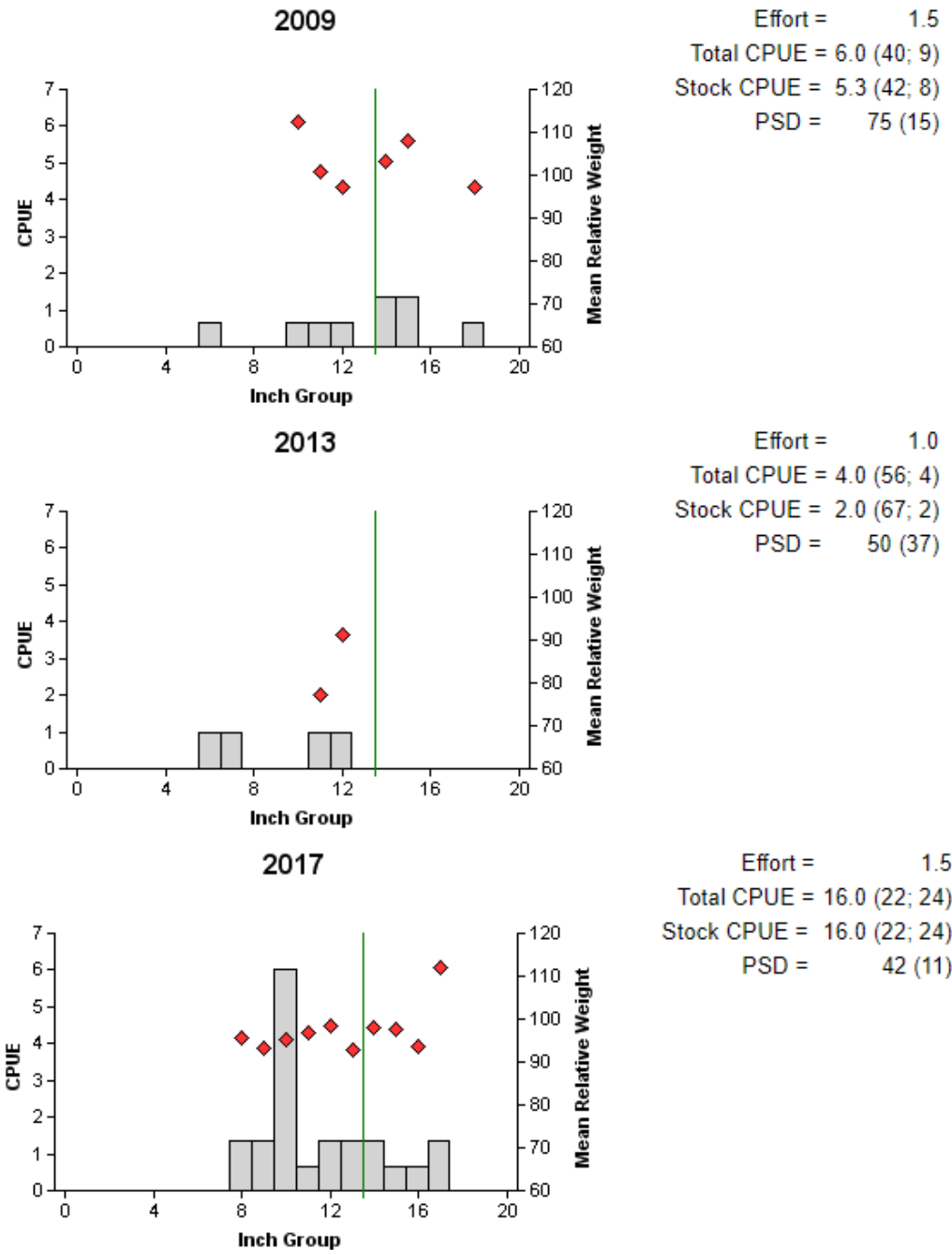


Figure 5. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Kickapoo Reservoir, Texas, 2009, 2013, and 2017. The 2017 electrofishing survey was performed during the daytime. Vertical line indicates minimum size limit at time of sampling.

Table 8. Results of genetic analysis of Largemouth Bass collected by electrofishing, Kickapoo Reservoir, Texas, 1997, 2001, 2004, 2008, 2009, 2011, and 2017. 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		
1997	15	0	0	15	0	0
2001	30	0	0	30	0	0
2005	1	0	0	1	0	0
2006	64	0	0	64	0	0
2009	2	0	0	2	0	0
2011	19	0	0	19	0	0
2017	80	0	5	75	0.6	0

White Crappie

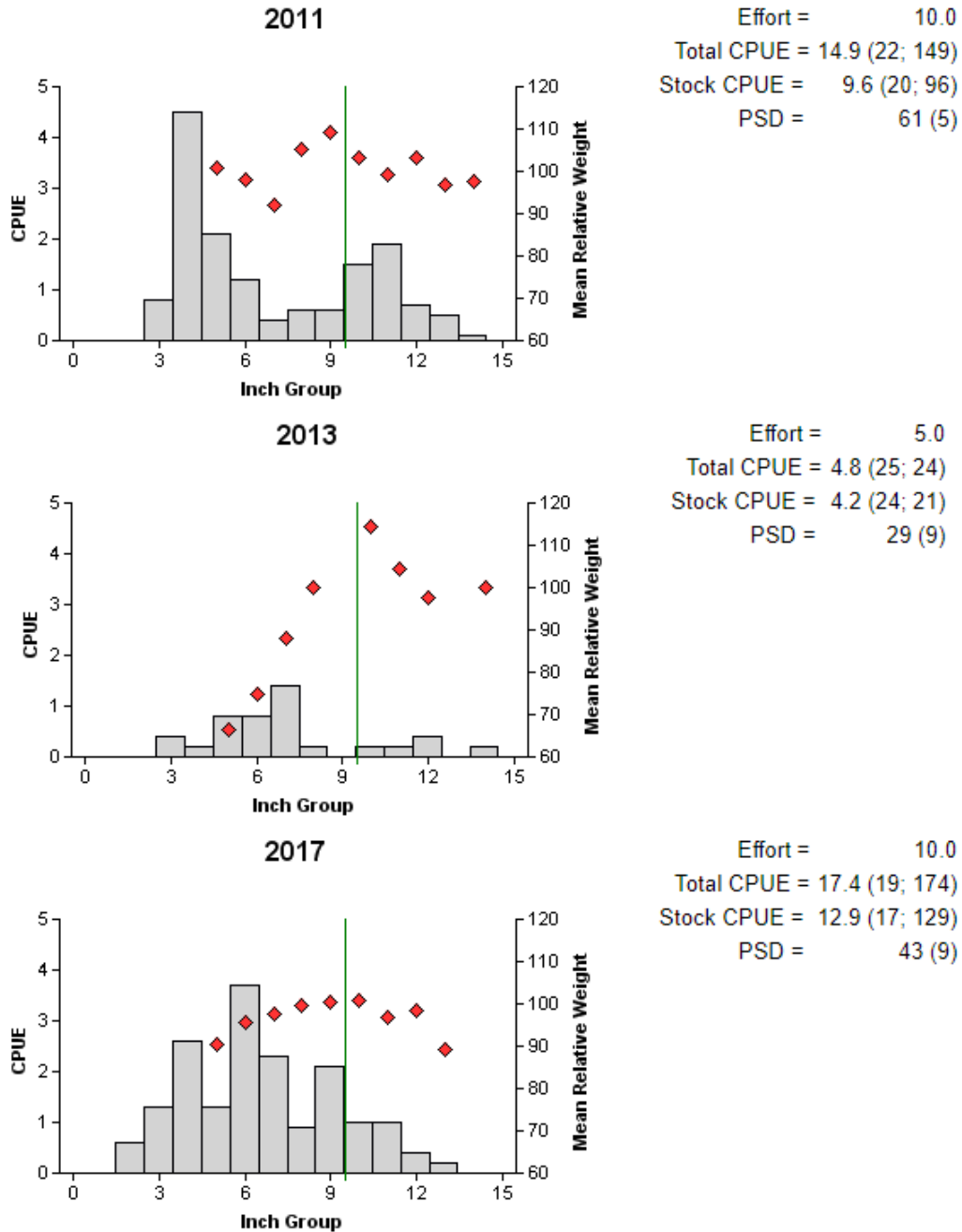


Figure 6. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Kickapoo Reservoir, Texas, 2011, 2013, and 2017. Vertical line indicates minimum size limit at time of sampling.

Proposed Sampling Schedule

Table 9. Proposed sampling schedule for Kickapoo 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.

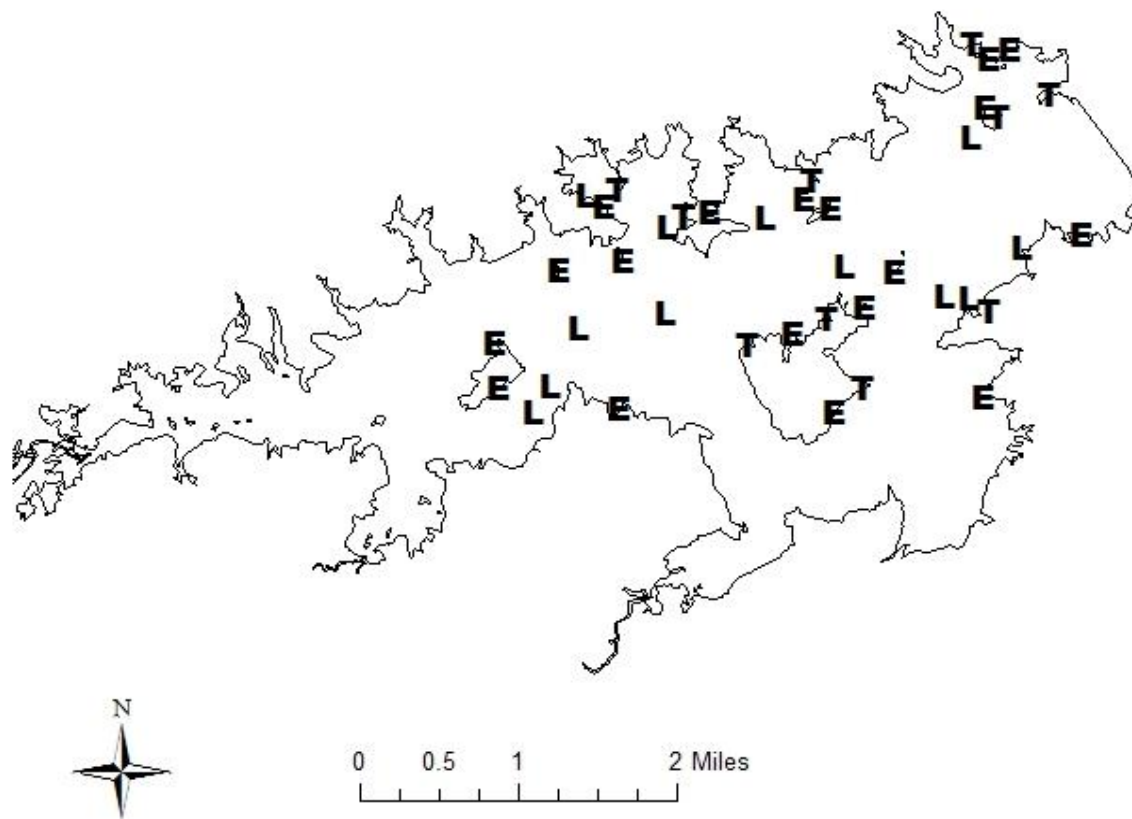
	Survey year			
	2018-2019	2019-2020	2020-2021	2021-2022
Angler Access				S
Structural Habitat				S
Vegetation				S
Electrofishing – Fall				S
Trap netting				S
Report				S

APPENDIX A – Catch rates for all species from all gear types

Number (N) and catch rate (CPUE) (RSE in parentheses) of all target species collected from all gear types from Kickapoo Reservoir, Texas, 2017. Only targeted species were recorded for low-frequency electrofishing and electrofishing. Sampling effort was 1.0 hour for low-frequency electrofishing, 10 net nights for trap netting, and 1.5 hours for electrofishing.

Species	Low-pulse Electrofishing		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Longnose Gar			1	0.1 (100)		
Gizzard Shad			1	0.1 (100)	421	280.7 (22)
Threadfin Shad					9	6.0 (69)
Smallmouth Buffalo			3	0.3 (71)		
Blue Catfish	96	96.0 (29)				
White Bass			2	0.2 (67)		
Green Sunfish					2	1.3 (100)
Warmouth					1	0.7 (100)
Bluegill			20	2.0 (38)	25	16.7 (32)
Longear Sunfish			1	0.1 (100)	10	6.7 (36)
Largemouth Bass					24	16.0 (22)
White Crappie			174	17.4 (19)		

APPENDIX B – Map of sampling locations



Location of electrofishing (E), trap netting (T), and low-frequency electrofishing (L) sites, Kickapoo Reservoir, Texas, 2017. Water level was near full pool at time of sampling.



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