

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

Purtis Creek State Park Lake

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Purtil Creek State Park Lake were surveyed in 2016 using electrofishing and trap netting and in 2017 using hoop netting and electrofishing. Anglers were surveyed from December 2014 through May 2015 with a creel survey. Historical data are presented with the 2016-2017 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:** Purtil Creek State Park Lake is a 349-acre impoundment located on Purtil Creek in the Trinity River Basin approximately 4 miles north of Eustice, Texas. The impoundment was constructed by the Texas Parks and Wildlife Department in 1985 for recreation and flood control purposes. Boat and bank access are both good and the park maintains two handicap-accessible fishing piers. Habitat features consist of standing timber, rocks, native submersed and emergent aquatic plants, and hydrilla.
- **Management History:** Important sport fish include Largemouth Bass, White Crappie, and catfish. The management plan from the 2013 survey report included conducting a creel survey, monitor the Largemouth Bass population and the effects of its catch-and-release regulation, stock Channel Catfish when surplus adults are available, and monitor the littoral habitat annually. Efforts have been made to establish desirable native species of aquatic vegetation in the reservoir with a series of plantings within enclosure cages.
- **Fish Community**
 - **Prey species:** Threadfin Shad were present in the reservoir. Electrofishing catch of Gizzard Shad was moderate, and close to 70% of Gizzard Shad were available as prey to most sport fish. Electrofishing catch of Bluegills was high, and most were less than 4 inches long.
 - **Channel Catfish:** The Channel Catfish population continued to have few, large fish available to anglers. Catfish accounted for almost 9% of directed angler effort
 - **White Bass:** White Bass remain in the reservoir at low densities. While there was no directed White Bass effort documented, a few individuals were caught by anglers targeting other species.
 - **Largemouth Bass:** Largemouth Bass were the most popular species targeted. Recent surveys collected several fish > 20-inches, indicating the potential to grow trophy Largemouth Bass in the reservoir still exists.
 - **White Crappie:** White Crappie were abundant and provide an important fishery. Crappie displayed fast growth (mean age at 10-inches was 1.9 years)

Management Strategies: Inform the public about the negative impacts of aquatic invasive species. Recommend changing the existing Largemouth Bass regulation from a catch and release to a 16-inch maximum. Request advanced Channel Catfish fingerlings to maintain the population. Improve habitat around fishing piers with artificial structures and underwater green lighting. Assess aquatic vegetation growth and plant additional aquatic vegetation as necessary.

INTRODUCTION

This document is a summary of fisheries data collected from Purtis Creek State Park Lake in 2016-2017 and angler data from 2014-2015. 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

Purtis Creek State Park Lake is a 349-acre impoundment located on Purtis Creek in the Trinity River Basin approximately 4 miles north of Eustice, Texas. The impoundment was constructed by the Texas Parks and Wildlife Department in 1985 for recreation and flood control purposes. Recreation is the primary water use. Habitat at time of sampling consisted primarily of standing timber and emergent vegetation; the emergent vegetation occupied a shallow ring around most of the reservoir, although most was located in less than 1 foot of water. Other descriptive characteristics for Purtis Creek State Park Lake are in Table 1.

Angler Access

Purtis Creek State Park Lake has one public boat ramp located on the southeast corner of the reservoir. Additional boat ramp characteristics are available in Table 2. Shoreline access is excellent, and two handicap-accessible fishing piers offer ample fishing opportunities for bank anglers.

Management History

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

1. Implement creel survey to assess angler effort towards Largemouth Bass.
Action: A creel was conducted from December 2014 - May 2015.
2. Monitor Largemouth Bass population indices with biennial electrofishing (fall and spring).
Action: Fall electrofishing surveys were conducted in 2014 and 2016, spring surveys were conducted in 2015 and 2017.
3. Stock advanced fingerling Channel Catfish when surplus production is available and monitor the population every four years with gill net surveys.
Action: Channel Catfish were stocked in 2013, 2014 and 2016. Hoop net surveys replaced gill netting in 2017.
4. Monitor the White Bass population with gill netting and White Crappie population with trap netting every four years.
Action: Gill netting sampling was canceled for Purtis Creek State Park Lake, as the White Bass fishery is negligible and does not warrant sampling effort. A trap net survey was conducted in 2016 to monitor the White Crappie population.
5. Monitor the aquatic macrophyte community in the reservoir and maintain enclosure cages designed to reestablish native vegetation within the reservoir.
Action: Cages have been maintained, periodically reopened due to regrowth of hydrilla and subsequently replanted with native species.

Harvest regulation history: Prior to September 1, 2008, anglers were allowed to retain one fish greater than 21 inches to be weighed at a lake-side weigh station and immediately released or donated to the TPWD ShareLunker program. This regulation was modified in 2008 so that only fish 24 inches and longer can be donated or released. Channel Catfish are managed under a 5-fish, no minimum length limit. Current regulations are found in Table 3.

Stocking history: Approximately 24,180 advanced-size (6-inch) ShareLunker Largemouth Bass were stocked from 2006-2012. Channel Catfish have been stocked periodically since 1985 to maintain the population. One thousand triploid (i.e. sterile) Grass Carp were stocked in 2007. The complete stocking history is in Table 4.

Vegetation/habitat management history: Historically, hydrilla required annual treatments with aquatic herbicide by TPWD Inland Fisheries Aquatic Habitat Enhancement staff to maintain access to the reservoir. Hydrilla covered roughly 6% of the reservoir in 2004, and had expanded to cover 60% of the reservoir surface area by the fall of 2006. In 2007, strong currents from a flood event reduced hydrilla coverage to trace levels (Bennett and Ott 2008). One thousand triploid Grass Carp (stocked prior to flood event) have prevented the re-growth of hydrilla. Establishment of native plant species began in July 2012; maintenance, expansion and replanting have continued as needed. A total of 10 enclosure cages have been constructed around the native vegetation colonies to prevent Grass Carp grazing.

Water transfer: Purtil Creek State Park Lake is one of the few water bodies owned and operated by Texas Parks and Wildlife Department. The primary purpose for the lake is recreation, and to a lesser extent flood control. No interbasin 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 Purtil Creek State Park Lake (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).

Electrofishing – Largemouth Bass, Sunfishes, Gizzard Shad, and Threadfin Shad 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. Ages for Largemouth Bass were determined using otoliths from 13 randomly-selected fish (range 13.0 to 14.9 inches).

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).

Tandem hoop nets – Channel Catfish were collected using 5 tandem hoop-net series at 5 stations. Nets were baited with soap and deployed for 2-night soak durations. CPUE for tandem hoop netting was recorded as the number of fish caught per tandem hoop net series (fish/series).

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

Creel survey – An access-point creel survey was conducted from 2014 through 2015. The creel period was December through May. 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 2015).

Habitat – Vegetation surveys were conducted in 2013 – 2016 to monitor expansion of hydrilla. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

RESULTS AND DISCUSSION

Habitat: The most recent survey (summer 2016) revealed limited surface-acre coverage of all aquatic vegetation (Table 6). Emergent species formed a very narrow strip of littoral habitat around most of the reservoir. Waterwillow, smartweed, panicum, and waterleaf each occupied less than one acre. Several other species were present in trace amounts including: American lotus, pondweed, cattail, bull tongue, water primrose, maidencane, and buttonbush. Non-native species including alligator weed and hydrilla were both present in trace amounts. The last structural survey was conducted in 2000 (Ott and Bister 2001).

Creel: A large proportion of anglers fishing at Purtil Creek State Park Lake were opportunistic; over 45% reported targeting any species present. Largemouth Bass and Crappie were both popular fisheries, accounting for 23% and 20% of all directed effort, respectively (Table 7). Total fishing effort for all species was approximately 6,875 hours during the 6-month creel period with direct expenditures totaling \$31,030 (Table 8).

Prey species: Gizzard Shad, Threadfin Shad and sunfish are all important prey species within the reservoir. Electrofishing catch rates of Bluegill and Gizzard Shad were 234.0/h and 167.0/h, respectively. Index of vulnerability (IOV) for Gizzard Shad was moderate, indicating that 68% of Gizzard Shad were

available to existing predators; this was slightly improved from the 2014 survey but lower than 2012 (Figure 1). Bluegill size structure has been dominated by small individuals over the last 3 surveys; PSD ranged from 2-10 (Figure 2).

Channel Catfish: Channel Catfish historically display poor recruitment within the reservoir, presumably due to a combination of an abundant Largemouth Bass population and limited catfish spawning habitat. The success of the fishery is dependent upon stocking advanced fingerlings that possess greater chances of survival to sustain the population. This has resulted in fluctuating catfish densities, and subsequent variable gill net catch rates (Figure 3). Hoop nets were substituted for gill net surveys in 2017, but unfortunately produced poor results as well; only a few large individuals were caught (Figure 4). It is unclear if the hoop net survey results are representative of the population, or a result of the timing and location of the sampling gear, or the sampling gear itself. Future sampling will be required to determine the utility of hoop nets to sample Channel Catfish in Purvis Creek.

Directed fishing effort (580 h), catch per hour (0.28/h), and total harvest (26) for Channel Catfish showed a minimal catfish fishery (Table 9). Surprisingly, Channel Catfish were much less harvest-oriented than what is typically documented through creel surveys; 83% of the fish were released. This can likely be attributed to an overall small number of interviews during the creel survey. Only two harvested fish were observed during the creel (Figure 5).

White Bass: White Bass remain in the reservoir at low densities and are rarely targeted by anglers. While a few individuals were documented in the creel survey (Table 10), there was no directed effort for White Bass (Table 7).

Largemouth Bass: The fall 2016 catch rate of 105/h was up from the previous two fall surveys (Figure 7). However, size structure of the 2016 survey consisted primarily of fish less than 11 inches. Improved catch rate and low PSD are likely a product of strong 2014/2015 year classes. Body condition was good ($Wr > 90$) for smaller individuals and declined with increasing fish length (Figure 7). However, the low Wr 's for larger fish (15 inches and up) could be a product of the low sample size for these length groups. Age and growth analysis was not conducted as prescribed in the OBS plan due to very few fish collected in the target size range (13.1 – 14.9 inches) during the fall 2016 survey.

Similar to the fall surveys, the spring 2017 catch rate of 160/h was up from the previous two spring surveys (Figure 8). The spring survey continued to collect a greater number of large fish; PSD has ranged from 66-80 over the last three surveys.

Directed fishing effort and catch per hour for Largemouth Bass was 1,558 h and 0.35 fish/h respectively, from December 2014 through May 2015 (Table 11). Due to the current catch-and-release regulation all bass were released.

Crappie: The trap net catch rate of White Crappie was 11.4/nn in 2016, higher than in 2008 (2.0/nn) but lower than 2012 (25.4/nn) (Figure 9). Size structure was good (PSD = 81) and similar to the 2012 survey (PSD = 92). Body condition was moderate in the 2016 survey; relative weights (Wr) averaged 80-95 for all size classes. White Crappie growth rate in 2016 was normal; average age at 10 inches (9.4-10.9 inches) was 1.9 years ($N=13$; range: 1-2 years). Black Crappie also exist in the reservoir at low densities (Appendix A).

Directed fishing effort, catch per hour, and total harvest for crappie was 1,347 h, 0.26 fish/h, and 179 fish, respectively, from December 2014 through May 2015 (Table 12). Crappie anglers were harvest oriented; only 9% of legal-length fish were released. Harvested fish ranged in length from 10 to 13 inches (Figure 10).

Fisheries management plan for Purtis Creek State Park Lake, Texas

Prepared – July 2017.

ISSUE 1: Largemouth Bass at Purtis Creek State Park Lake have been managed with a special catch-and-release regulation since it was opened to public fishing in 1988. This regulation was implemented to maintain high angler catch rates of Largemouth Bass with expected high levels of directed effort for a new fishery. Recent creel data confirmed a substantial drop in angler effort from when the park first opened. Electrofishing data indicates the reservoir still possess the potential to support a quality Largemouth Bass fishery, but the catch-and-release regulation may no longer be the best option.

MANAGEMENT STRATEGIES

1. Adjust the current catch-and-release regulation to a 5 fish 16-inch maximum where one fish is allowed to be temporarily retained to be submitted to the SL program.
2. Evaluate the population and fishery as prescribed in the OBS plan.

ISSUE 2: There continues to be minimal evidence of natural Channel Catfish recruitment at Purtis Creek State Park Lake. Recent surveys indicate adequate survival and recruitment to larger sizes of advanced-fingerling stocked fish. Since this lake is a state park facility, it should be considered a high priority for stocking.

MANAGEMENT STRATEGIES

1. Continue to stock advanced fingerling Channel Catfish when production is available

ISSUE 3: Due to fluctuating water levels and the presence of triploid Grass Carp, aquatic vegetation in Purtis Creek State Park Lake consists primarily of trace amounts of emergent species. Ten nursery colonies of several native submersed species have been established within herbivore enclosure cages. Some cages, especially those established with Illinois Pondweed, have shown the ability to expand outside of the cages when conditions are favorable. Unfortunately, fluctuating water levels and remaining grass carp have prohibited multi-year growth outside of the cages.

MANAGEMENT STRATEGIES

1. Continue to monitor enclosure cages and document expansion of native vegetation outside of cages.
2. If expansion persists for multiple years, indicating grass carp densities have reduced enough to not impair macrophyte growth, consider replanting other cages with similar successful species.
3. Monitor hydrilla recovery with biennial vegetation surveys; focus primarily around the swimming beach, boat ramp and fishing piers, to prevent problematic recolonization in those areas.

ISSUE 4: Recent creel data indicates a high percentage of bank angling proportionally to boat angling on Purtis Creek State Park Lake. Two fishing piers and the surrounding accessible shoreline offer good access to anglers. Currently both littoral and pelagic habitat is poor around both piers, and habitat improvements may increase fish utilization of the fishing pier and shoreline areas.

1. Install artificial habitat structures. Seek outside sources of funding, or potential KAST (mitigation) funding, to install artificial brush piles, add supplemental feed stations and underwater lighting near the two fishing piers to congregate fish and likely improve catch rates.

2. Promote the habitat improvements and potential improved fishing opportunities through local news outlets and social media.

ISSUE 6: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels 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 and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate park staff about invasive species, and provide them with posters, literature, etc. so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

Objective-Based Sampling Plan and Schedule

Sport fishes in Purtil Creek State Park Lake (PC) include Blue and Channel Catfish, Largemouth Bass, and White Crappie. Important forage species include Gizzard and Threadfin Shad, and sunfishes.

Low density fisheries

Historically, White Bass catch rates from gill netting have been low (<4.6/nn; 0.2/nn during the last survey). Furthermore, no directed angler effort was recorded for White Bass, further indicating a negligible fishery. A few Blue Catfish remain in PC from stockings in 2000 and 2003, but very few have ever been collected in gill nets or documented through creel surveys.

Survey objectives, fisheries metrics, and sampling objectives

Crappie: Crappie are a popular sport fish in PC, and accounted for 19.6% of the directed angler effort during the most recent creel survey. Due to the popularity of this fishery within PC, crappie trend data on relative abundance, size structure, and body condition (measured by CPUE, PSD and Wr) will continue to be monitored every four years to determine large-scale changes in the population and as a tool to promote the population to park visitors and area anglers. A minimum of 10 randomly selected trap netting sites will be sampled in the fall of 2020; random sampling will continue up to 20 net nights, until 50 stocked-sized fish are collected and relative abundance estimates (CPUE-S) contain desired precision (RSE < 25). Historical data suggests the 2020 sampling objectives can be met with 18 sites (80% confidence).

Channel Catfish: Channel Catfish were the third most popular species targeted during the most recent creel survey (8.4% directed effort). Historically, the Channel Catfish population was sampled with gill nets in order to assess the White Bass and Blue Catfish population as well. The low density and infrequent catches of Blue Catfish coupled with a negligible White Bass fishery has led to the exploration of other gear types. Switching to baited hoop nets will reduce both bycatch and unnecessary mortality of non-target species. Hoop nets will continue to be evaluated in order to determine if they are an adequate gear to sample Channel Catfish at PC. Nine randomly selected hoop net sites will be sampled in the spring of 2020. If Channel Catfish catch rate is again low with hoop net sampling, additional survey efforts with gill

netting will be considered for the spring of 2021.

Largemouth Bass: Largemouth Bass accounted for 22.7% of total directed angler effort during the last creel survey. Electrofishing surveys were conducted twice annually (spring and fall) through 2012; the survey was changed to a biennial spring and biennial fall survey rotation, beginning with a spring survey in 2013 and a fall survey in 2014. PC has a catch-and-release regulation for Largemouth Bass, which could potentially be impacting growth and recruitment within the lake. Continuation of biennial trend data on relative abundance and size structure (as measured with CPUE, PSD) with night-time electrofishing (fall and spring) will further examine possible large-scale changes within the Largemouth Bass population. Beginning in the fall of 2018 a minimum of 12 randomly selected electrofishing sites will be sampled, with up to six additional sites, to adequately assess relative abundance (CPUE-S with RSE <25) and size structure (PSD with a minimum of 50 stock-length fish). Due to the small size of PC (349 ac) we feel 18 total electrofishing stations should provide an accurate assessment of the current population; lower precision will be acceptable (i.e. RSE > 25) at that point. If size structure continues to be dominated by small individuals year after year, indicated by low PSD, conduct a more extensive (10 fish/inch group) age-and-growth survey in 2020 targeting fish between 10-16 inches were potential growth issues may begin.

Prey Species: Gizzard Shad, Threadfin Shad and sunfish are all important prey species at PC. Traditionally, the Gizzard Shad and sunfish populations were surveyed every year will fall electrofishing to monitor population trends in relative abundance and size structure (CPUE and IOV for Gizzard shad, CPUE and PSD for sunfish); this switched to biennial sampling starting in 2014. Catch rates for important prey species (shad and sunfish) have varied among samples, making it difficult to confidently predict the number of samples necessary to estimate prey population indices (CPUE, IOV) in future surveys. However, efforts to monitor prey base trends within PC are still necessary, particularly due to the special catch-and-release bass regulation. Trend data (CPUE and IOV for Gizzard shad, CPUE and PSD for sunfish) will still be monitored with biennial fall electrofishing, to detect any large scale changes that may require further investigation. In accordance with the Largemouth Bass sampling objectives, a minimum of 12 randomly selected night-time electrofishing sites will be sampled in the fall of 2018 and 2020 with up to six additional sites, to monitor the prey base. No additional effort will be expended, regardless of survey precision or sample size; relative weight of Largemouth Bass will provide additional information on the prey base availability within PC.

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Table 1. Characteristics of Purtis Creek State Park Lake, Texas.

Characteristic	Description
Year constructed	1985
Controlling authority	Texas Parks and Wildlife Department
County	Henderson and Van Zandt
Reservoir type	State Park Lake
Shoreline Development Index (SDI)	3.4
Conductivity	212 μ S/cm

Table 2. Boat ramp characteristics for Purtis Creek, Texas, August, 2016. Reservoir elevation at time of survey was 410 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
State Park Ramp	32.35755 -95.99502	Y	21	404	Excellent, no access issues

Table 3. Harvest regulations for Purtis Creek State Park Lake, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	5 (in any combination)	None
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Largemouth	Fish \geq 24 inches in length may be temporarily retained in a live well and immediately weighed using personal scales.	Catch and release only
Crappie: White and Black crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Purtis Creek State Park Lake, Texas. FGL = fingerling; AFGL = advanced fingerling; ADL = adults.

Name	Year	Number	Size
Threadfin Shad	1985	1,840	ADL
	1994	<u>500</u>	ADL
	Total	2,340	
Blue Catfish	2000	8,906	FGL
	2003	<u>8,746</u>	FGL
	Total	17,652	
Channel Catfish	1985	54,140	FGL
	1986	10,080	FGL
	1987	4,400	FGL
	1989	11,230	ADL
	1990	177,503	FGL
	1991	8,875	FGL
	1992	14,650	FGL
	1993	17,882	FGL
	1994	8,876	FGL
	1995	8,170	FGL
	1995	2,703	ADL
	1996	8,850	ADL
	1998	8,973	FGL
	1999	8,870	FGL
	2001	8,875	FGL
	2002	8,875	FGL
	2005	20,824	FGL
	2006	4,604	FGL
	2009	12,288	FGL
	2009	6,187	AFGL
2010	14,741	FGL	
2013	3,750	FGL	
2014	2,204	FGL	
2016	<u>4,039</u>	FGL	
Total	431,589		
Bluegill	1994	<u>2,500</u>	FGL
Bluegill x Green Sunfish	1997	<u>700</u>	FGL
Coppernose Bluegill	1987	<u>7,300</u>	FGL
Redear Sunfish	1985	<u>86,792</u>	FGL

Table 4. Stocking history continued.

Largemouth Bass	1995	19,959	FGL
	1996	<u>17,987</u>	FGL
	Total	37,946	
Florida Largemouth Bass	1985	31,440	FGL
	1985	<u>248</u>	ADL
	Total	31,688	
ShareLunker Largemouth Bass	2006	8,734	AFGL
	2008	8,807	AFGL
	2010	3,919	AFGL
	2012	<u>2,720</u>	AFGL
	Total	24,180	
Grass Carp	2007	<u>1,000</u>	ADL

Table 5. Objective-based sampling plan components for Purtil Creek State Park Lake, Texas 2016 – 2017.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing (fall)</i>			
Largemouth Bass	Relative abundance	CPUE – stock	RSE-Stock \leq 25
	Size structure	PSD, length frequency	N \geq 50 stock
	Age-and-growth	Age at 14 inches	N = 13, 13.0 – 14.9 inches
	Condition	W_r	10 fish/inch group (max)
Bluegill ^a	Relative abundance	CPUE – Total	RSE \leq 25
	Size structure	PSD, length frequency	N \geq 50
Gizzard Shad ^a	Relative abundance	CPUE – Total	RSE \leq 25
	Prey availability	IOV	N \geq 50
<i>Electrofishing (spring)</i>			
Largemouth Bass	Relative abundance	CPUE – stock	RSE-Stock \leq 25
	Size structure	PSD, length frequency	N \geq 50 stock
<i>Trap netting</i>			
Crappie	Relative abundance	CPUE – stock	RSE-Stock \leq 25
	Size structure	PSD, length frequency	N = 50
	Age-and-growth	Age at 10 inches	N = 13, 9.0 – 10.9 inches
	Condition	W_r	10 fish/inch group (max)
<i>Tandem hoop netting</i>			
Channel Catfish	Relative abundance	CPUE – stock	RSE-Stock \leq 25

^a No additional effort will be expended to achieve an RSE \leq 25 for CPUE of 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, Purtil Creek State Park Lake, Texas, 2013 – 2016. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2013	2014	2015	2016
Native submersed				
Pondweed	Trace			Trace
Eelgrass	Trace			
Waterstargrass	Trace			
Native floating-leaved				
American lotus	1.8 (<1)			Trace
Native emergent				
Cattail	<1(<1)			Trace
Bull tongue	<1(<1)			Trace
Water primrose	<1(<1)			Trace
Waterwillow	<1(<1)			<1(<1)
Maidencane	<1(<1)			
Smartweed				<1(<1)
Buttonbush				Trace
Waterleaf				<1(<1)
Panicum sp.				<1(<1)
Non-native				
Alligator weed (Tier III)*	<1(<1)			Trace
Hydrilla (Tier III)*	Trace	Trace	Trace	Trace

* Tier III is Watch Status

Table 7. Percent directed angler effort by species for Purtis Creek State Park Lake, Texas, 2014 – 2015. Survey period was from 1 December through 31 May.

Species	2014/2015
Channel Catfish	8.4
Sunfishes	3.5
Largemouth Bass	22.7
Crappie	19.6
Anything	45.8

Table 8. Total fishing effort (h) for all species and total directed expenditures at Purtis Creek State Park Lake, Texas, 2014- 2015. Survey periods were from 1 December through 31 May. Relative standard error is in parentheses.

Creel statistic	2014/2015
Total fishing effort	6,875 (24)
Total directed expenditures	\$31,030 (66)

Gizzard Shad

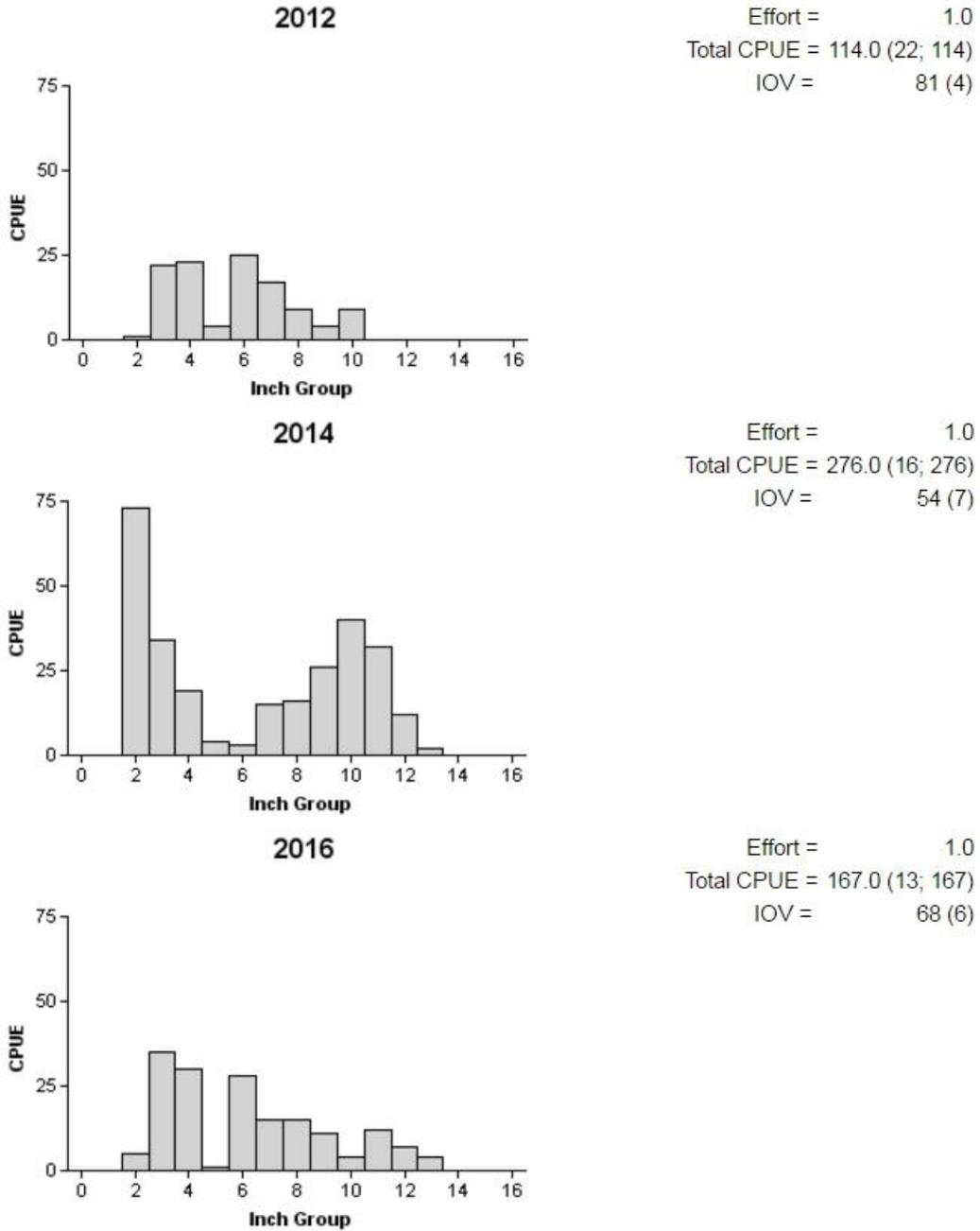
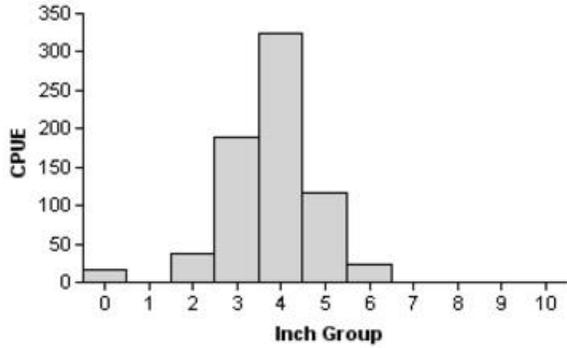


Figure 1. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Purtil Creek State Park Lake, Texas, 2012, 2014, and 2016.

Bluegill

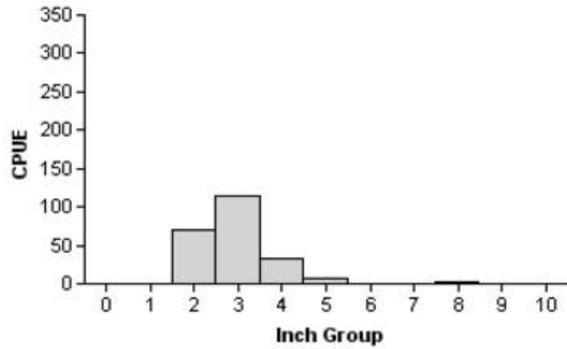
2012

Effort = 1.0
 Total CPUE = 707.0 (13; 707)
 PSD = 4 (2)



2014

Effort = 1.0
 Total CPUE = 227.0 (11; 227)
 PSD = 2 (1)



2016

Effort = 1.0
 Total CPUE = 234.0 (22; 234)
 PSD = 10 (3)

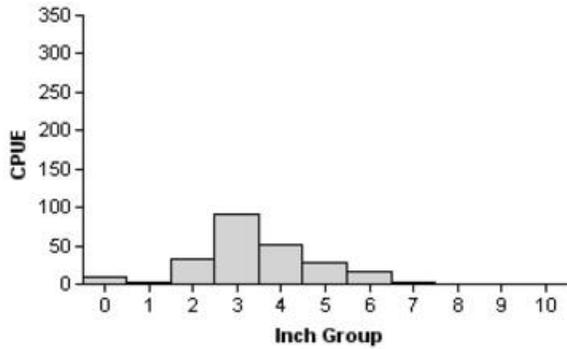


Figure 2. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Puritis Creek State Park Lake, Texas, 2012, 2014, and 2016.

Channel Catfish

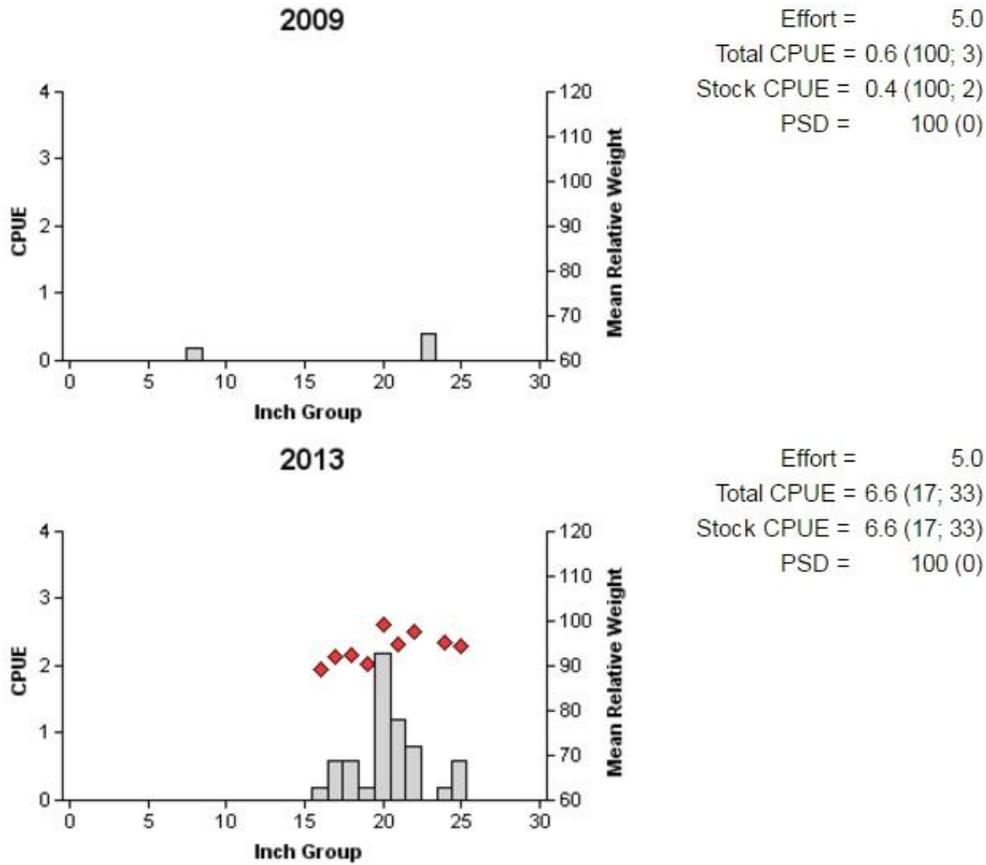


Figure 3. Number of Channel Catfish caught per gill net night (CPUE, bars), mean relative weight (diamonds) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net survey, Puritus Creek State Park Lake, Texas, 2009 and 2013.

Channel Catfish

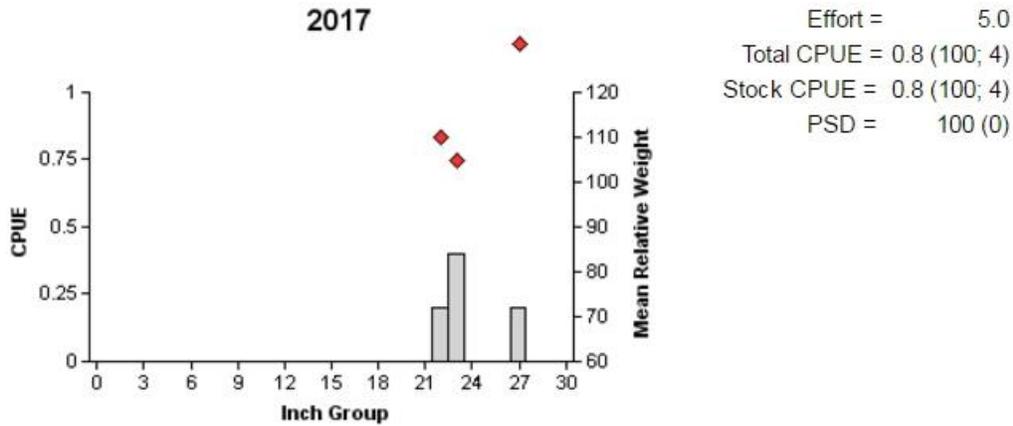


Figure 4. Number of Channel Catfish caught per hoop net series (CPUE, bars), mean relative weight (diamonds) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net survey, Puritus Creek State Park Lake, Texas, 2017.

Channel Catfish

Table 9. Creel survey statistics for Channel Catfish at Purtis Creek State Park Lake, Texas, from December 2014 through May 2015. 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	
	2014/2015	
Surface area (acres)	349	
Directed effort (h)	580 (39)	
Directed effort/acre	1.66 (39)	
Total catch per hour	0.28 (61)	
Total harvest	26 (148)	
Harvest/acre	0.07 (148)	
Percent legal released	83.0	

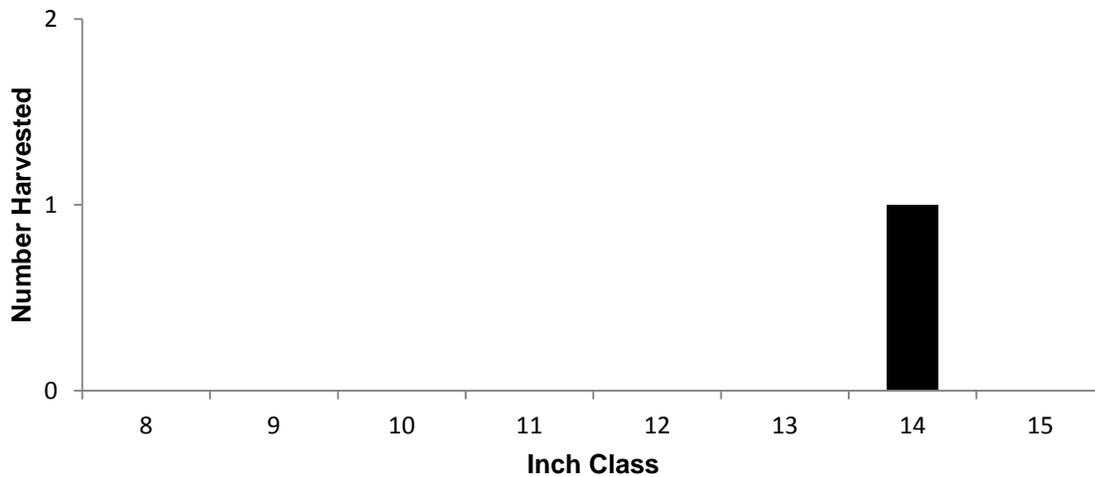


Figure 5. Length frequency of harvested Channel Catfish observed during creel survey at Purtis Creek State Park Lake, Texas, December 2014 through May 2015, all anglers combined. N is the number of harvested Channel Catfish observed during the creel, and TH is the total estimated harvest for the creel period.

White Bass

Table 10. Creel survey statistics for White Bass at Purtil Creek State Park Lake, Texas, from December 2014 through May 2015. No anglers reported directly targeting White Bass; total catch per hour was not calculated. Total harvest is the estimated number of White Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year	
	2014/2015	
Surface area (acres)	349	
Directed effort (h)	0	
Directed effort/acre	0	
Total catch per hour	N/A	
Total harvest	10 (59)	
Harvest/acre	0.03 (59)	
Percent legal released	12.0	



■ 2014/2015 N= 2; TH = 10

Figure 6. Length frequency of harvested White Bass observed during creel survey at Purtil Creek State Park Lake, Texas, December 2014 through May 2015, all anglers combined. N is the number of harvested White Bass observed during the creel, and TH is the total estimated harvest for the creel period.

Largemouth Bass

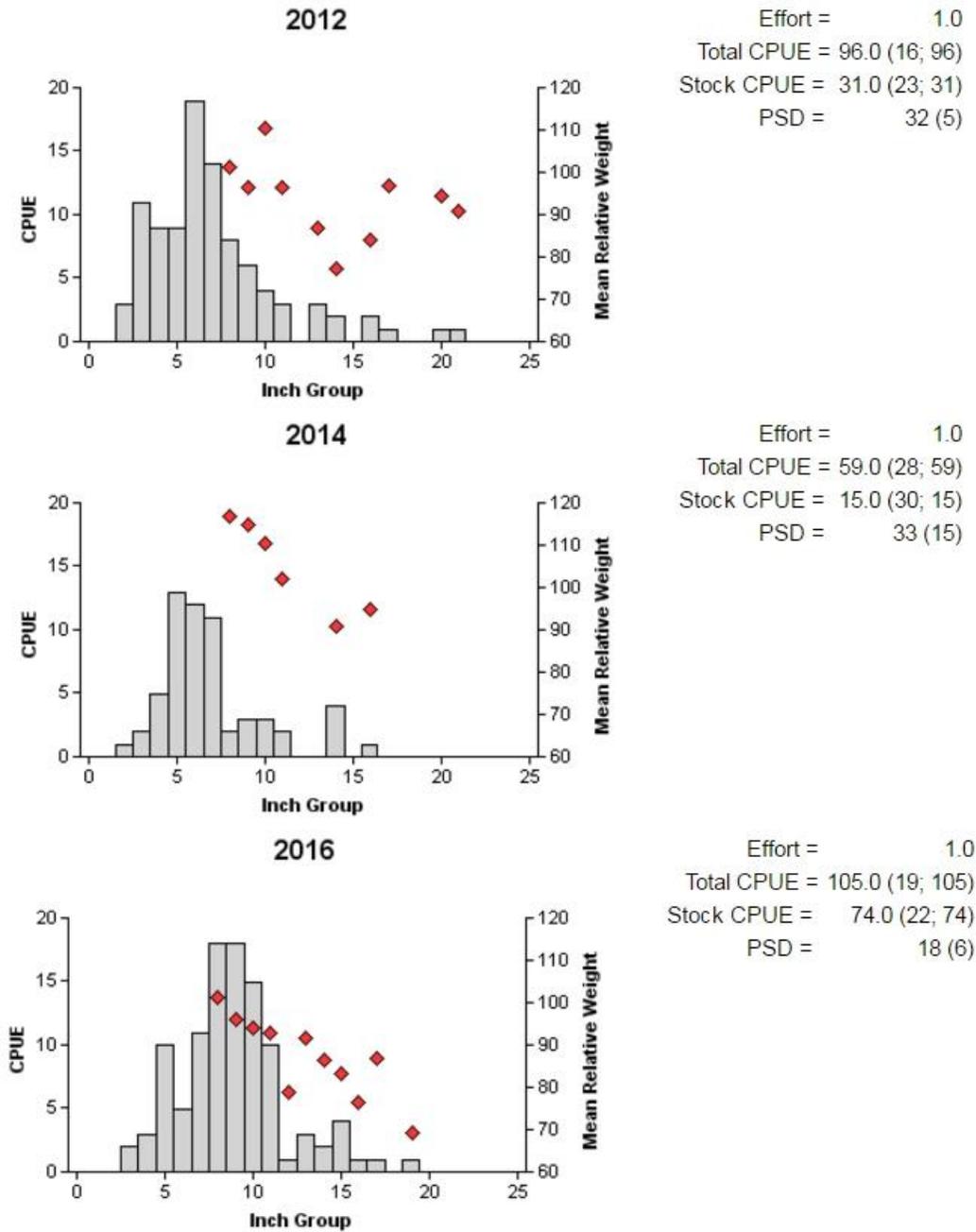
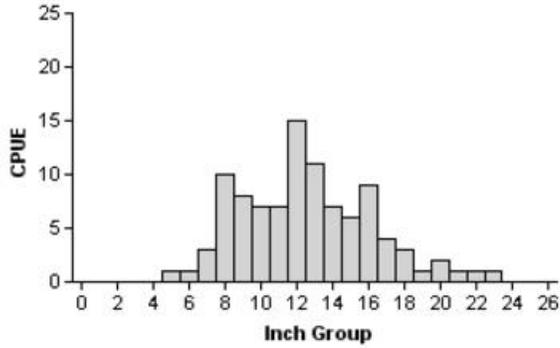


Figure 7. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Puritus Creek State Park Lake, Texas, 2012, 2014, and 2016.

Largemouth Bass

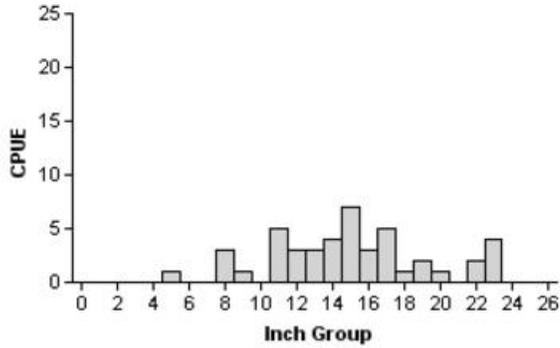
2013

Effort = 1.0
 Total CPUE = 98.0 (18; 98)
 Stock CPUE = 93.0 (18; 93)
 PSD = 66 (6)



2015

Effort = 1.0
 Total CPUE = 45.0 (18; 45)
 Stock CPUE = 44.0 (19; 44)
 PSD = 80 (7)



2017

Effort = 1.0
 Total CPUE = 160.0 (11; 160)
 Stock CPUE = 150.0 (13; 150)
 PSD = 67 (6)

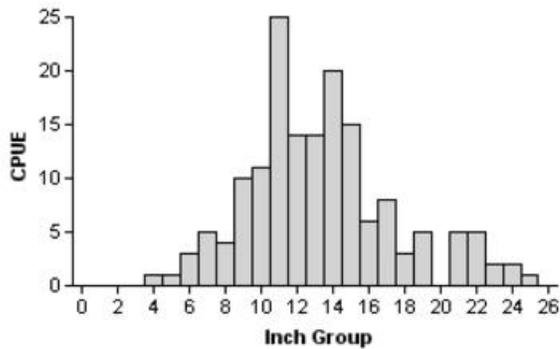


Figure 8. Number of Largemouth Bass caught per hour (CPUE, bars), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring electrofishing surveys, Puritis Creek State Park Lake, Texas, 2013, 2015, and 2017.

Largemouth Bass

Table 11. Creel survey statistics for Largemouth Bass at Purtil Creek State Park Lake, Texas, from December 2014 through May 2015. Catch rate is for all anglers targeting Largemouth Bass. The estimated number of fish released by weight category is for anglers targeting Largemouth Bass. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year	
	2014/2015	
Surface area (acres)		349
Directed effort (h)		1558 (34)
Directed effort/acre		4.46 (34)
Total catch per hour		0.35 (46)
Total Harvest		0
Harvest/acre		-
Release by weight		
<4.0 lbs		752 (59)
4.0-6.9 lbs		79 (76)
7.0-9.9 lbs		-
≥10.0 lbs		15 (106)
Percent legal released		N/A

White Crappie

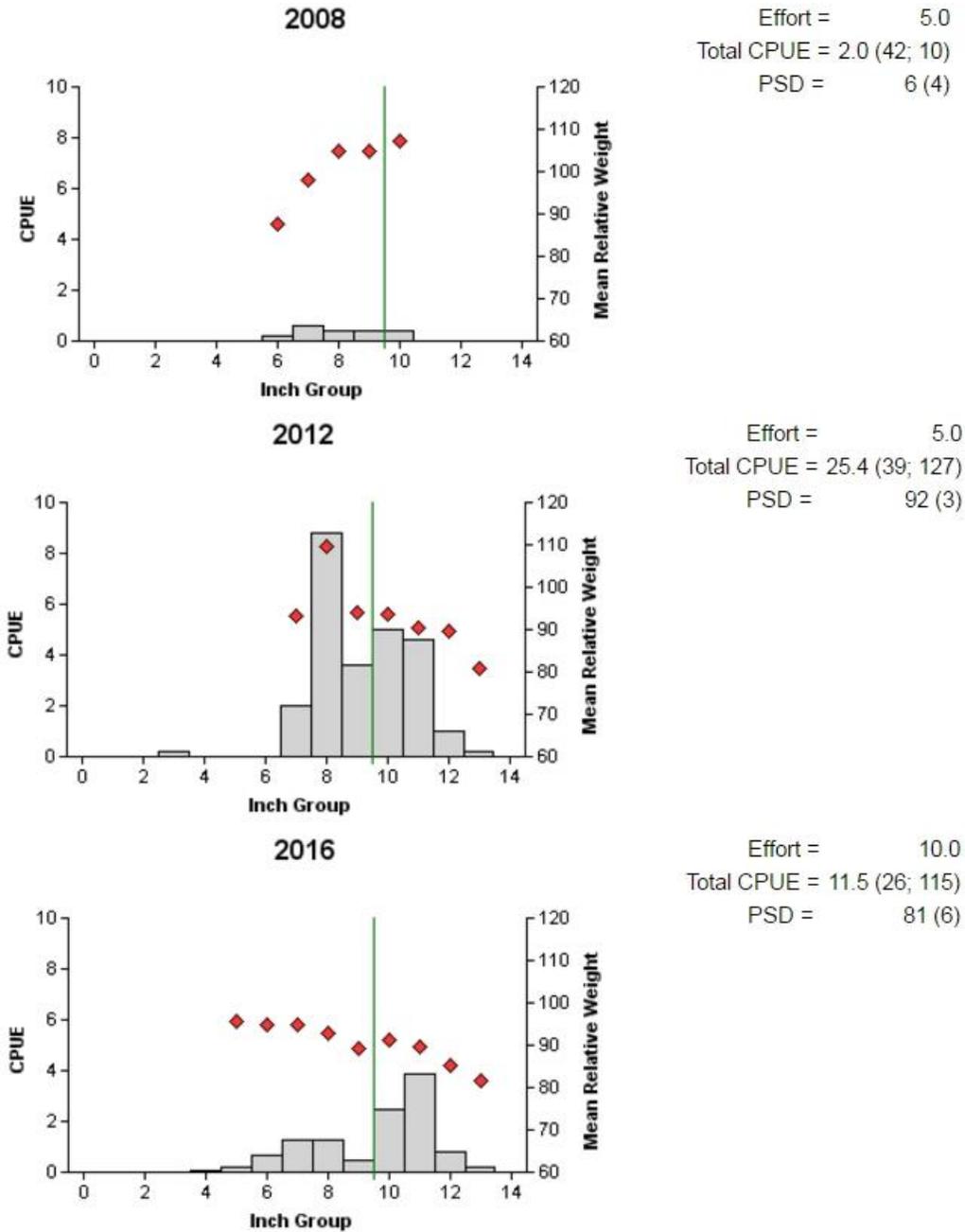


Figure 9. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Puritis Creek State Park Lake, Texas, 2008,2012, and 2016. Vertical line indicates minimum length limit.

Crappie

Table 12. Creel survey statistics for White Crappie at Purtil Creek State Park Lake, Texas, from December 2014 through May 2015. Total catch per hour is for anglers targeting White Crappie and total harvest is the estimated number of White Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year	
	2014/2015	
Surface area (acres)	349	
Directed effort (h)	1,347 (32)	
Directed effort/acre	3.86 (32)	
Total catch per hour	0.26 (69)	
Total harvest	179 (57)	
White Crappie	175 (52)	
Black Crappie	4 (289)	
Harvest/acre	2.05 (49)	
Percent legal released	9	

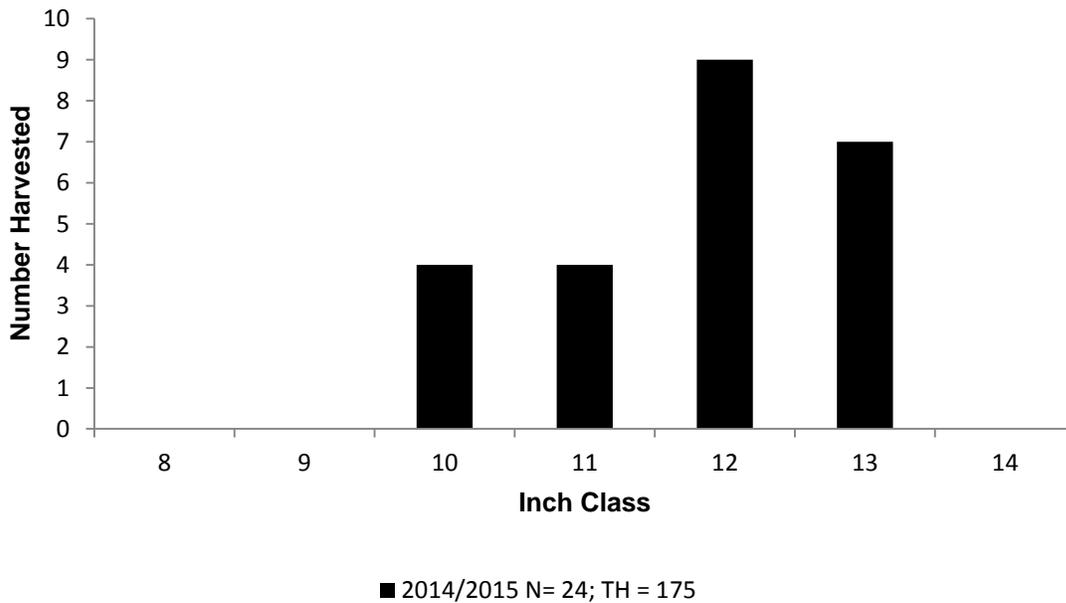


Figure 10. Length frequency of harvested White Crappie observed during creel surveys at Purtil Creek State Park Lake, Texas, December 2014 through May 2015, all anglers combined. N is the number of harvested White Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Crappie

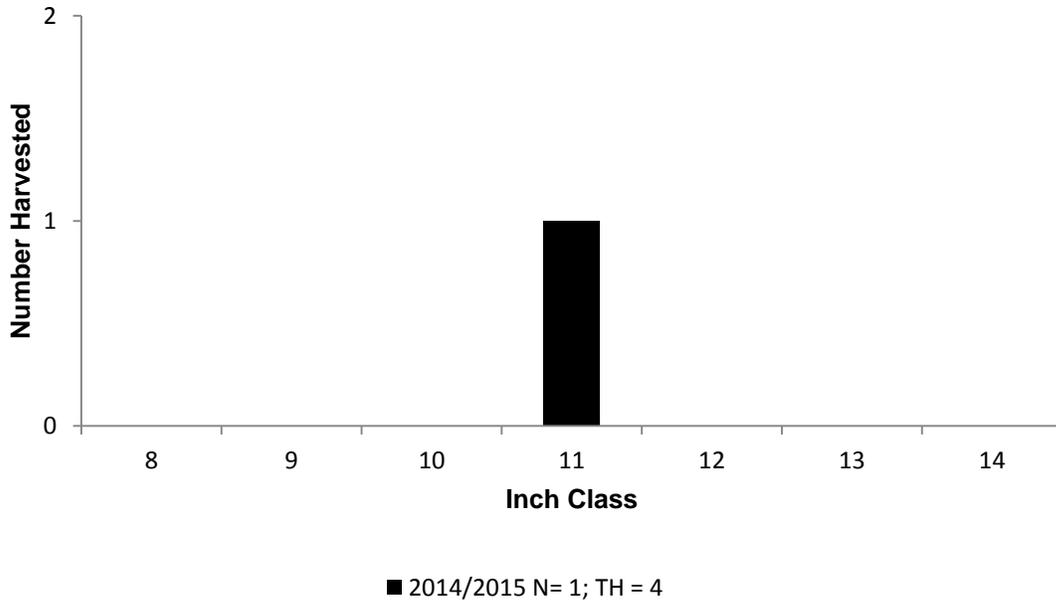


Figure 11. Length frequency of harvested Black Crappie observed during creel surveys at Purtils Creek State Park Lake, Texas, December 2014 through May 2015, all anglers combined. N is the number of harvested Black Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 13. Proposed sampling schedule for Purtil Creek State Park Lake, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

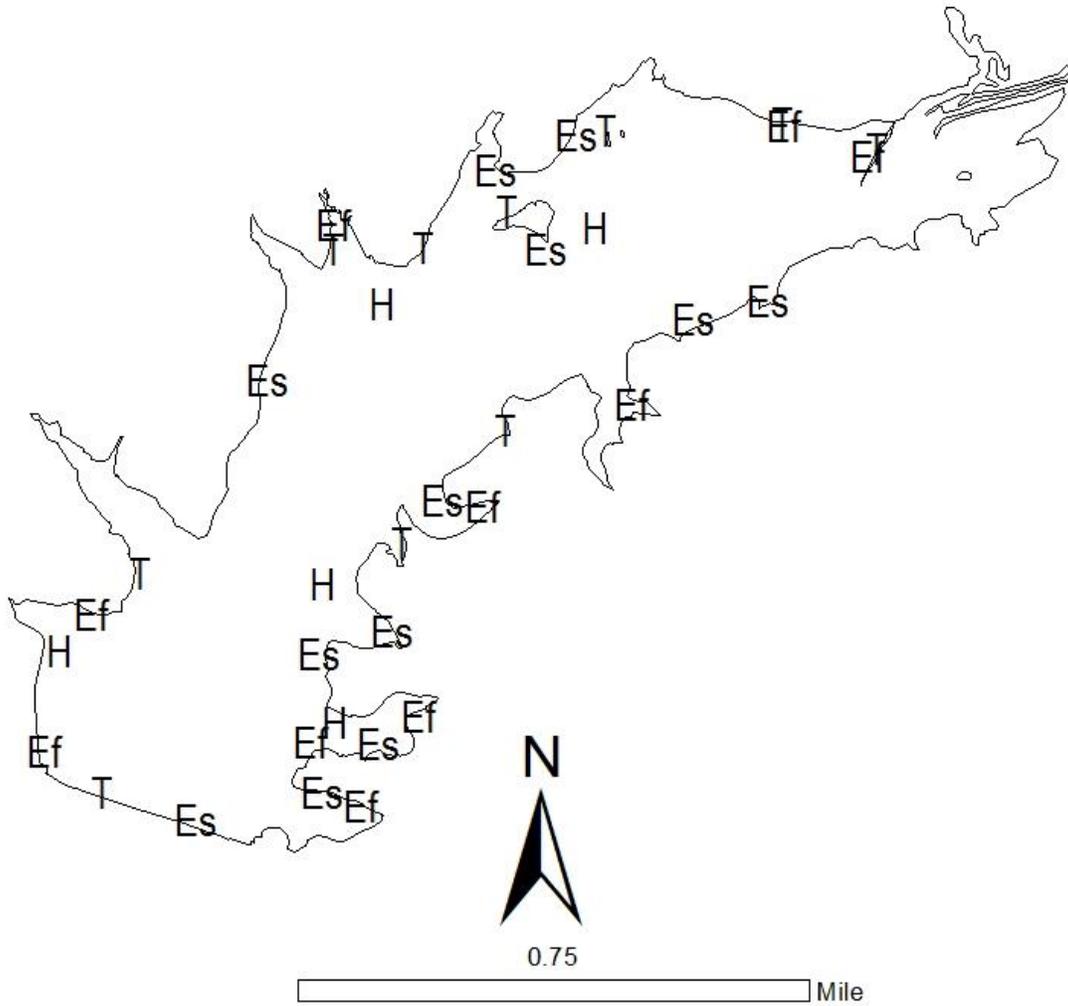
Survey year	Electrofishing Fall(Spring)	Trap net	Hoop Net	Vegetation	Access	Report
2017-2018						
2018-2019	A(A)			A		
2019-2020						
2020-2021	S(A)	S	S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Purvis Creek State Park Lake, Texas, 2016-2017. Sampling effort was 5 nets for hoop netting, 10 net nights for trap netting, and 1 hour for electrofishing.

Species	Hoop Netting		Trap Netting		Electrofishing Fall		Electrofishing Spring	
	N	CPUE	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					167	167		
Threadfin Shad					135	135		
Channel Catfish	4	0.8						
Redbreast Sunfish					88	88		
Warmouth					7	7		
Bluegill					234	234		
Longear Sunfish					1	1		
Redear Sunfish					35	35		
Largemouth Bass					105	105	160	160
White Crappie			115	11.5				
Black Crappie			11	1.1				

APPENDIX B



Location of sampling sites, Purvis Creek State Park Lake, Texas, 2016-2017. Trap net, hoop net, fall electrofishing and spring electrofishing stations are indicated by T, H, Ef, and Es respectively. Water level was near full pool at time of sampling.