PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2015 Fisheries Management Survey Report

Nocona Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Nocona Reservoir were surveyed in 2015 using electrofishing and trap netting. Habitat was surveyed in 2015. Historical data are presented with the 2015 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:** Nocona Reservoir is a 1,362-acre impoundment of Farmers Creek, a tributary of the Red River, in Montague County. From July 2010, to May 2015, water level remained below conservation elevation (827.5 ft-msl). On June 18, 2015, the elevation peaked at 833.45 ft-msl, 5.95 feet above conservation elevation and has remained near conservation level. Habitat features consisted mainly of rocky shoreline, and native emergent vegetation.

- **Management History:** Important sport fishes include Largemouth Bass and White Crappie. Blue and Channel Catfish as well as White Bass are available to anglers. The management plan from the 2011 survey report included recommendations to promote the Largemouth Bass and White Crappie fisheries and educate the controlling authority of invasive species dangers.

- **Fish Community**
  - **Prey species:** Electrofishing catch rate of Gizzard Shad was the highest on record. Prey-size Gizzard Shad (7-inch group and below) abundance greatly improved. Electrofishing catch rates of Bluegill were well above average. The 2015 flooding provided excellent spawning conditions for the forage base. However, Threadfin Shad were not collected for the first time since 1999 and are a missing component for a diverse forage community.

  - **Catfishes:** Blue and Channel Catfish were not sampled during this survey. They are present and available to anglers.

  - **Temperate basses:** White Bass were not sampled during this survey. They are present in low abundance and available to anglers. Stocking of Palmetto Bass was discontinued in 1997, and they are no longer considered present in Nocona Reservoir.

  - **Largemouth Bass:** Electrofishing catch rate of Largemouth Bass was well above the average (91.9/h) and they were in excellent condition. Largemouth Bass had an excellent spawn due to the 2015 flooding. Although few legal bass were collected, the successful spawn in 2015 will provide excellent fishing in the future. The Florida Largemouth Bass genetic influence has declined.

  - **White Crappie:** Trap net catch rate of White Crappie was a record. The crappie were in good condition and growth rates were good. The 2015 flood also provided excellent spawning conditions. There were good numbers of legal size fish available to the anglers.

Management strategies: Based on current information, Nocona Reservoir should continue to be managed with existing fish harvest regulations. Threadfin Shad adults will be stocked to re-establish this important component of the forage base. Florida Largemouth Bass stockings were recommended to increase growth potential in the Largemouth Bass population. Inform the North Montague County Water Supply District about new exotic species threats to Texas waters, and work with them to display appropriate signage, and educate constituents.

INTRODUCTION

This document is a summary of fisheries data collected from Nocona Reservoir in 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 species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2015 data for comparison.

Reservoir Description

Nocona Reservoir is a 1,362-acre impoundment on Farmers Creek, a tributary of the Red River, in Montague County. The North Montague County Water Supply District constructed it in 1961 for municipal water supply and recreation. The average depth is 17 feet with a maximum depth of 44 feet. On February 27, 2015 water level was 14.4 feet below conservation elevation (827.5 ft-msl), which was the end of an elevation decline since July 2010 (Figure 1). On June 18, 2015, the elevation peaked at 833.45 ft-msl, which was 5.95 feet above conservation elevation. Since that time, the water level has remained near conservation level. The reservoir has a drainage area of approximately 94 square miles and a shoreline length of 24 miles. Nocona Reservoir was eutrophic with a mean TSI chl-*a* of 48.66, which is slightly higher than the 2008 mean of 47.48 (Texas Commission on Environmental Quality 2008 & 2011). A TSI chl-a below 45 is considered mesotrophic; hence, the reservoir was moderately productive. Habitat at time of sampling consisted of rocky shoreline, and native emergent and submerged vegetation. Standing timber was also present. Eurasian watermilfoil, a non-native aquatic plant, was also present, but in small quantities. Other descriptive characteristics for Nocona Reservoir are in Table 1.

Angler Access

Nocona Reservoir has three public boat ramps with parking, boarding piers, and ample illumination. Shoreline access is limited to the public parks adjacent to the boat ramp areas. There is a fishing dock in Joe Benton Park. Further information about Nocona Reservoir and its facilities can be found at the Texas Parks & Wildlife Department (TPWD) website (www.tpwd.texas.gov). Additional boat ramp characteristics are in Table 2.

Management History

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

1. The improved sport fishery in Nocona Reservoir needs to be publicized, especially Largemouth Bass and White Crappie.
   Action: The sport fishery was promoted whenever possible.
2. Cooperate with North Montague County Water Supply District personnel to post appropriate signage on invasive species, especially zebra mussels, at access points around the reservoir. Educate North Montague County Water Supply District personnel about other invasive species.
   Action: Staff educated personnel with the North Montague County Water Supply District on invasive species. A zebra mussel sampler was installed in the reservoir.

Harvest regulation history: Sport fishes in Nocona Reservoir have always been managed with statewide regulations (Table 3).

Stocking history: Nocona Reservoir was stocked in 1976 with 8,500 adult Threadfin Shad (Table 4). In 2003 another 1,295 adult Threadfin Shad were stocked to re-establish their population. Florida Largemouth Bass fingerlings were stocked at 57/acre in 1981 and 56/acre in 1982. ShareLunker Largemouth Bass fingerlings (2,220) were stocked in 2010 after a ShareLunker Largemouth Bass was caught in spring of 2010. From 1983 through 1997, 104,256 Palmetto Bass fingerlings were stocked.

Vegetation/habitat history: Nocona Reservoir supported mostly native emergent vegetation (Table 5).

Other fish habitat consisted of rocky shoreline and native submerged vegetation (Table 6). Historically, non-native Eurasian watermilfoil was common and problematic (Hysmith and Moczygemba 1994 and 1997). Currently it occupies less than 0.1 acre and is not problematic (Table 5).

Water Transfer: Nocona Reservoir is primarily used for municipal water supply, recreation, and to a lesser extent, flood control. Nocona Reservoir receives no water from, nor transfers any water to another water body.

METHODS

Surveys were conducted to achieve sampling objectives in accordance with the objective-based sampling (OBS) plan for Nocona Reservoir (TPWD, Inland Fisheries Division, unpublished manual revised 2015). Primary components of the OBS plan are listed in Table 7. All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Electrofishing – Largemouth Bass, Sunfishes, and Gizzard and Threadfin Shad were sampled for by electrofishing (1.4 hours at 17, 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.

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). Ages for White Crappie were determined using otoliths from 13 randomly selected fish (range 9.0 to 10.9 inches).

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.

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 (*Wr*)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics.

Habitat – A structural habitat survey was conducted in 2015. Vegetation survey was conducted in 2015 to monitor status of Eurasian water milfoil and native aquatic vegetation. Habitat was assessed with a modified digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Water level – Source for water level data was the United States Geological Survey (2016).

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of native emergent vegetation, and rocky shoreline (Table 6). Native emergent vegetation provided good habitat and has expanded since July 2010 because of the prolonged drought, which allowed wetland plants to grow in exposed basin areas, especially black willow. This vegetation was flooded when the reservoir levels increased in 2015.

Prey species: Electrofishing catch rates of Gizzard Shad and Bluegill were 783.5/h and 216.7/h, respectively. Index of vulnerability (IOV) for Gizzard Shad was the highest in the past three surveys (Figure 2), probably due to spring 2015 flooding, which provided excellent spawning conditions. The electrofishing CPUE of 216.7 for Bluegill was the second highest on record and above the lake average (Figure 3 and Appendix C). Threadfin Shad were not collected by any method and were considered extirpated from Nocona Reservoir. The cold winters of 2013 and 2014 probably had an effect on their demise. However, the excellent reproduction of Gizzard Shad, Bluegill and other sunfishes provide an

adequate forage base.

Catfishes: Historical gill net catch rates for Blue and Channel Catfish have always been low for Nocona Reservoir (Appendix C). A creel survey in 2009 indicated there was very little directed angler effort for either species (Moczygemba and Hysmith 2012). Therefore, no sampling was conducted for these species.

Temperate basses: Historical gill net catch rates for White Bass have always been low (Appendix C). Due to the small watershed, spawning success has been very low. The angler directed effort from a 2009 creel survey was very low (0.8%; Moczygemba and Hysmith 2012). The White Bass fishery was considered negligible, so no sampling was attempted for this species.

Largemouth Bass: Electrofishing total CPUE (121.4/h) was similar to the 2011 collection (Figure 4, Appendix C). However, stock CPUE was much lower than previous surveys (Figure 4). Over the past three surveys (Figure 4), the PSD has decreased from a high of 35 (2008) to 18 (2015). No Largemouth Bass greater than 17 inches total length were collected. Sub-stock CPUE dramatically increased due the highly successful spawn of 2015, which was directly related to conditions in Nocona Reservoir after the 2015 spring floods. Relative weight of Largemouth Bass was above or near 100 for all inch classes due to the abundant forage.

The Florida Largemouth Bass genetic influence has been decreasing since 2003 (Table 8). There were no pure Florida Largemouth Bass collected for the first time since genetic sampling began, and the percent Florida Largemouth Bass alleles dropped to 24, which was also the lowest since genetic sampling began. Trophy Largemouth Bass are not uncommon from the reservoir. A ShareLunker (13.34 pounds) was donated in 2010, and the reservoir record (13.4 pounds) was caught in 1997. Previous electrofishing surveys have collected six Largemouth Bass over 8 pounds and one over 10 pounds. The Florida Largemouth Bass genetic influence in the Largemouth Bass population could be increased with a stocking of Florida Largemouth Bass. The Largemouth Bass size structure should improve in the future with increased reservoir levels, plentiful forage, and the abundant 2015 year-class.

White Crappie: Trap net CPUE of 45.7/nn (Figure 5) for White Crappie was a record and well above the reservoir's average CPUE of 20.7/nn (Appendix C). The sample indicated the 2015 spawn was very successful with young of the year (YOY) making up 63% of the catch (Figure 5). Flooded reservoir conditions in 2015 increased habitat available to YOY. Legal White Crappie make up 8.5% of the sample. Average relative weight was adequate with fish greater than 10 inches exhibiting W*r*'s near 100. Once again this was the result of abundant forage. Growth was excellent (Figure 6); average age at 10 inches (9.0 to 10.9 inches) was 1.2 years (N = 13; range = 1 – 2 years).

Fisheries management plan for Nocona Reservoir, Texas

Prepared – July 2016.

ISSUE 1: Although forage for Nocona Reservoir is adequate, Threadfin Shad, an important component of the forage base, is missing. Cold winters in the past few years have apparently extirpated them from the reservoir. They have been re-introduced into the reservoir several times and have diversified available forage for sport fishes.

MANAGEMENT STRATEGIES

1. Stock adult Threadfin Shad at 1/acre minimum during the 2016 spawning season.
2. Evaluate success of Threadfin Shad stocking by electrofishing in fall of 2016.
3. Stock adult Threadfin Shad at 1/acre minimum during the 2017 spawning season if 2016 stocking was unsuccessful.

ISSUE 2: Florida Largemouth Bass were introduced in 1981 and 1982. The Florida Largemouth Bass genetic influence on Largemouth Bass population has been decreasing since 2003. Current DNA analysis indicated the genetic composition of the Largemouth Bass population was 24% Florida Largemouth Bass alleles, the lowest since testing began. No pure Florida Largemouth Bass were identified in the sample, which also has not happened since testing began. Nocona Reservoir has produced several trophy bass ($\geq$ 8 pounds), one ShareLunker (13.34 pounds) in 2010, and the water body record (13.4 pounds) in 1997. Electrofishing samples have produced six trophy Largemouth Bass with one going over 10 pounds.

MANAGEMENT STRATEGIES

1. Stock Florida Largemouth Bass at 100/acre in 2017 and 2018 to increase the percent Florida Largemouth Bass alleles in the Largemouth Bass population.
2. Check genetic makeup of Largemouth Bass population less than two years old during fall 2019 electrofishing sample.

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 North Montague County Water Supply District personnel to post appropriate signage at access points around the reservoir.
2. Contact and inform the North Montague County Water Supply District personnel about invasive species, and provide them with posters, literature, etc… so that they can educate their reservoir's visitors.
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) future inter-basin water transfers to facilitate potential invasive species responses.
6. Check zebra mussel sampler.

Objective-Based Sampling Plan and Schedule for Nocona Reservoir 2017-2020

Sport fish, forage fish, and other important fishes: Sport fishes in Nocona Reservoir include Blue and Channel Catfish, White Bass, Largemouth Bass, and White Crappie. Known important forage species include Gizzard and Threadfin Shad and Bluegill.

Low-density fisheries:

White Bass: Due to low abundance and little or no directed angling effort and harvest, White Bass are considered a negligible fishery and will not be monitored by gill nets.

Catfishes: Blue and Channel Catfish are considered a negligible fishery due to low abundance and marginal directed angling effort and harvest, and will not monitored by gill nets.

Survey objectives, fisheries metrics, and sampling objectives:

Largemouth Bass: Based on a creel survey from March 1 – May 31, 2009, directed angling effort indicated Largemouth Bass were the most-sought sport fish in Nocona Reservoir. Largemouth Bass are managed with the statewide 14-in MLL and five fish daily bag limit regulation. Trend data on CPUE-S, size structure, and body condition have been collected at multi-year intervals since 1996 with fall nighttime electrofishing. Continuation of trend data with nighttime electrofishing every four years in the fall should allow for determination of any large-scale changes in the Largemouth Bass population that may invite further investigation. In 2015, nighttime fall electrofishing produced a CPUE-S of 35.5 with a RSE of 19. A minimum of 12 randomly selected 5-min electrofishing sites will be sampled in 2019, but sampling will continue at random sites until 50 stock-size fish are collected and the RSE of CPUE-S is $\leq$ 25 (the anticipated effort to meet both sampling objectives is 17 stations with 80% confidence). Additional random stations will be sampled in the event extra sampling is necessary. If failure to achieve either objective has occurred after one night of sampling and objectives can be attained with 6-12 additional random stations, another night of effort will be expended. A category-2 age analysis of 13 Largemouth Bass between 13.0 and 15.0 inches total length, randomly collected during electrofishing, will be conducted to determine age of minimum-length-limit fish. Percent Florida Largemouth Bass alleles in the Largemouth Bass population dropped to its lowest level since Florida Bass were stocked in 1981. Florida Largemouth Bass fingerlings will be stocked in 2017 and 2018 to increase percent Florida Largemouth Bass alleles. To determine percent Florida Largemouth Bass alleles, a genetics study will be conducted on 30 Largemouth Bass of any age, randomly collected during electrofishing.

White Crappie: A 2009 spring-quarter creel survey indicated White Crappie angling comprised 31% of total angling effort and were the second most-sought species. White Crappie are managed with the statewide 10-in MLL and 25 fish daily bag limit regulation. Continuation of multi-year trend data collection on White Crappie with single-cod trap netting every four years in the fall should allow for determination of any large-scale changes in the White Crappie population. Single-cod trap net surveys in 2015 produced 169 stock-size and larger White Crappie with a CPUE-Stock RSE of 23. However it took 10 net-nights to accomplish the goal of general population monitoring for abundance, size structure, and body condition. A category-2 age analysis of 13 White Crappie between 9.0 and 11.0 inches total length, collected during trap netting, will be conducted to determine age of minimum-length-limit fish. A minimum of five randomly selected single-cod trap netting stations will be sampled in fall 2019, but sampling will continue at random sites until 50 stock-size fish are collected and the CPUE-Stock RSE is $\leq$ 25 (the anticipated effort to meet both objectives is five net-nights). If failure to achieve either objective after five net-nights additional sampling will be conducted.

Prey species: Bluegill along with Gizzard and Threadfin Shad are the primary forage at Nocona Reservoir. Like Largemouth Bass, trend data on CPUE-total and size structure of Bluegill and Gizzard Shad have been collected at multi-year intervals since 1996 with fall electrofishing. CPUE-total was also calculated for Threadfin Shad. The Bluegill and Gizzard Shad populations appear to be in good shape,

providing excellent forage for predator species. However, Threadfin Shad appear to have been extirpated. Re-introduction will be attempted in 2016 and, if needed, 2017. A presence or absence electrofishing survey will be conducted in fall of 2016 to determine success of 2016 Threadfin Shad stocking. Continuation of multi-year trend data with nighttime electrofishing every four years in the fall will allow for determination of any large-scale changes in the shad and Bluegill populations that may invite further investigation. A minimum of 12 randomly selected 5-min electrofishing sites will be sampled in 2019, but sampling will continue in conjunction with Largemouth Bass sampling and/or until sufficient numbers for Bluegill PSD and IOV (50 fish) have been collected. No additional effort will be expended to achieve an RSE $\leq$ 25 for CPUE-stock of Bluegill and Gizzard Shad. Instead, Largemouth Bass body condition (relative weight of Largemouth Bass $\geq$ 8") can provide information on forage abundance, vulnerability, or both, relative to predator density.

Sampling Schedule: Table 9 summarizes the proposed sampling schedule for Nocona Reservoir from 2016 to 2020.

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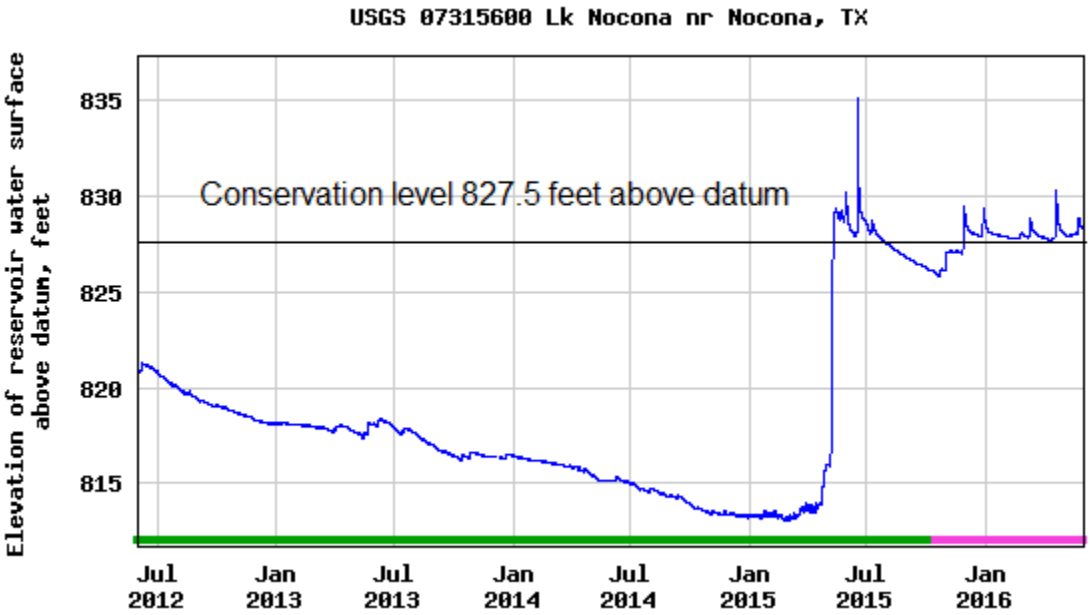


Figure 1. Water level elevations in feet above mean sea level (msl) recorded for Nocona Reservoir, June 2012 to May 2016.

Table 1. Characteristics of Nocona Reservoir, Texas.

Characteristic	Description
Year constructed	1961
Controlling authority	North Montague County Water Supply District
County	Montague
Reservoir type	Offstream
Shoreline development index	9.3
Conductivity	707 µmhos/cm

Table 2. Boat ramp characteristics for Nocona Reservoir, Texas, October, 2015. Reservoir elevation at time of survey was 826.16 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Weldon Robb	33.86151 -97.65984	Y	40	818.66	Excellent, extension not feasible.
Joe Benton	33.87873 -97.65749	Y	40	817.16	Excellent, extension is feasible.
Boone	33.88087 -97.64581	Y	20	818.16	Excellent, no access issues.

Table 3. Harvest regulations for Nocona Reservoir.

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

Table 4. Stocking history of Nocona Reservoir, Texas. Life stages are fingerlings (FGL), advanced fingerlings (AFGL), adults (ADL), and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species mean total length (Mean TL; in) is given. For years where there were multiple stocking events for a particular species and life stage the mean TL is an average for all stocking events combined.

Species	Year	Number	Life Stage	Mean TL (in)
Florida Largemouth Bass	1981	75,600	FGL	2.0
	1982	73,692	FGL	2.5
	Total	149,292		
Tiger Muskellunge (Northern Pike X Muskellunge)	1976	747	FGL	UNK
	Total	747		
Palmetto Bass (Striped X White Bass hybrid)	1983	16,362	UNK	UNK
	1994	23,700	FGL	1.6
	1995	29,439	FGL	1.3
	1996	20,055	FGL	1.9
	1997	14,700	FGL	1.3
	Total	104,256		
ShareLunker Largemouth Bass	2010	2,220	FGL	2.5
	Total	2,220		
Threadfin Shad	1976	8,500	ADL	2.9
	1984	1,500	ADL	3.0
	1985	700	ADL	3.0
	2003	1,295	ADL	3.1
	2016	1,500	ADL	2.6
	Total	13,495		

Table 5. Survey of aquatic vegetation, Nocona Reservoir, Texas, 2003 – 2015. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2003	2007	2011	2015
Native emergent	5.8(0.4)	66.2(5.0)	66.2(5.0)	135.0(10.2)
Native floating leaved	4.1(0.3)	<0.1(<0.1)		0.1(<0.1)
Native submerged		1.0(<0.1)	1.0(<0.1)	6.1(0.5)
Non-Native Eurasian water milfoil (Tier III)*		1.0(<0.1)	1.0(<0.1)	<0.1(<0.1)

*Tier III is watch status.

Table 6. Survey of structural habitat types, Nocona Reservoir, Texas, 2015. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Bulkhead	0.5 miles	2.1
Natural	22.2 miles	92.5
Rocky	1.3 miles	5.4
Standing timber	5 acres	0.4
Piers and docks	2.2 acres	0.2

Table 7. Objective-based sampling plan components for Nocona Reservoir, Texas, 2015.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Abundance	CPUE – stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Genetics	% FLMB	N = 30, any age
Bluegill [a]	Abundance	CPUE – Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
Gizzard Shad [a]	Abundance	CPUE – Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
	Prey availability	IOV	N ≥ 50
Trap netting			
Crappie	Abundance	CPUE- stock	RSE-Stock $\leq$ 25
	Size structure	PSD, length frequency	N $\geq$ 50 stock
	Age-and-growth	Age at 10 inches	N = 13, 9.0 – 10.9 inches

[a] No additional effort was expended to achieve an RSE ≤ 25 for CPUE of Bluegill and Gizzard Shad if not reached from designated Largemouth Bass sampling effort. Instead, Largemouth Bass body condition provided information on forage abundance, vulnerability, or both relative to predator density.

Gizzard Shad

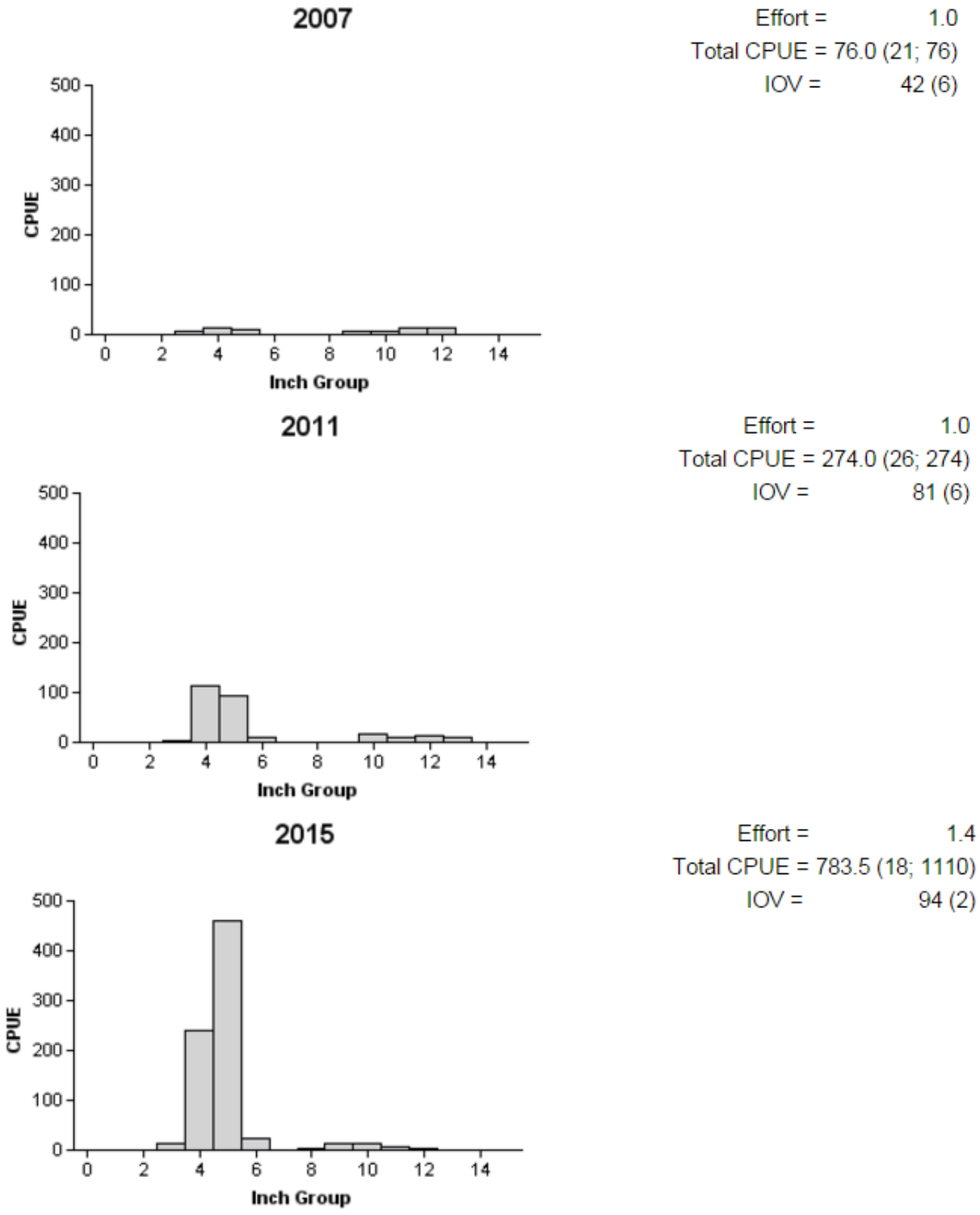


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Nocona Reservoir, Texas 2007, 2011, and 2015.

Bluegill

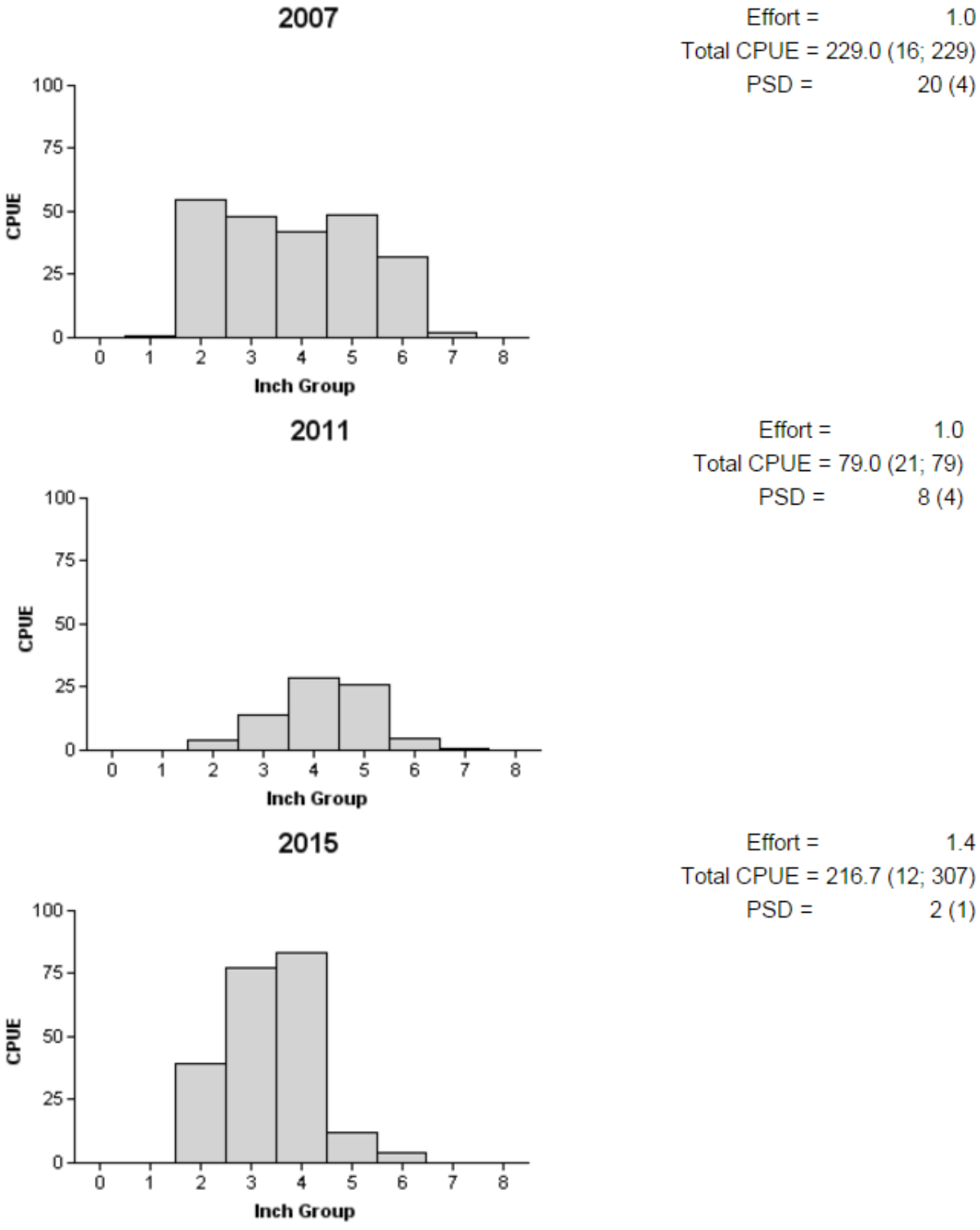


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Nocona Reservoir, Texas, 2007, 2011, and 2015.

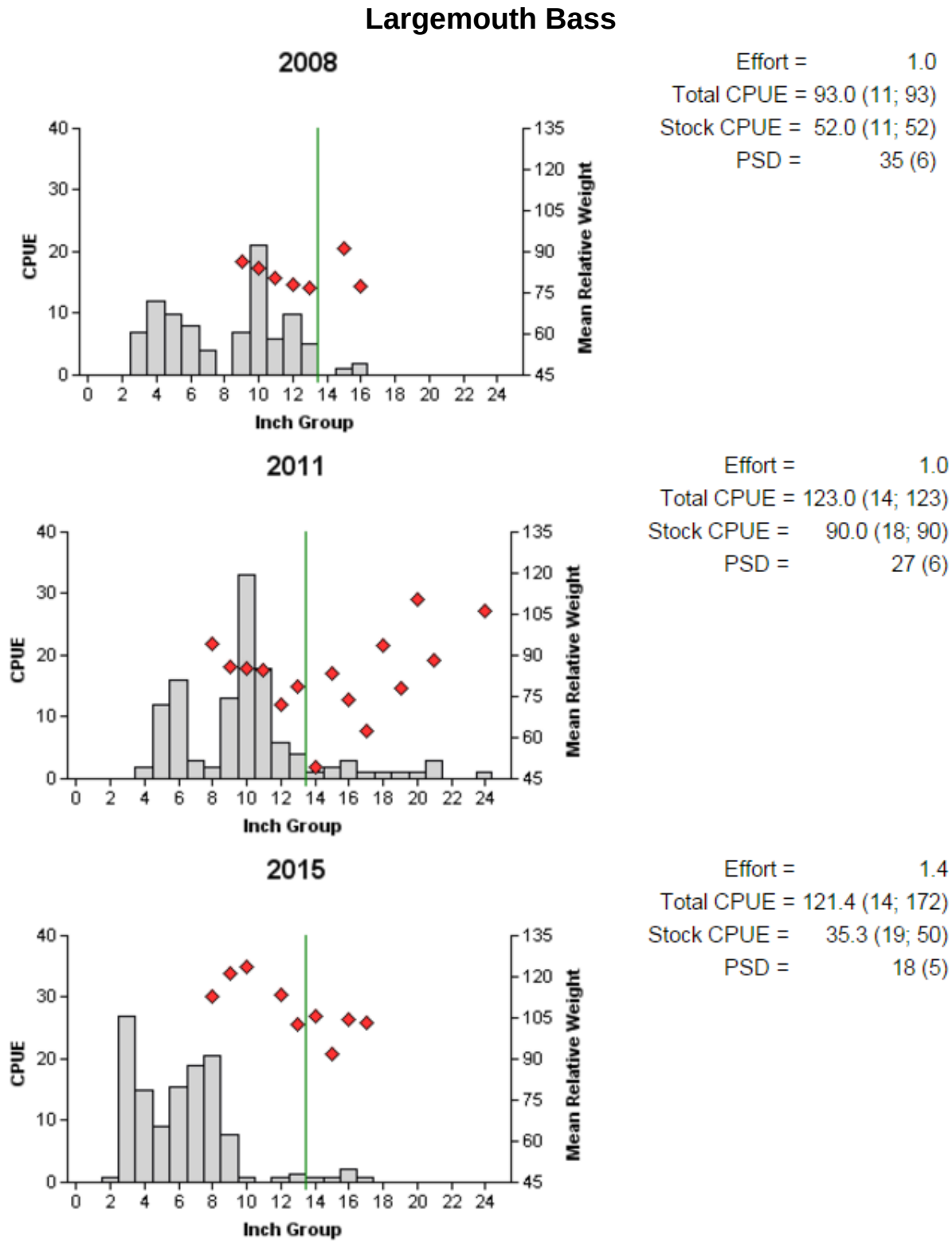


Figure 4. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Nocona Reservoir, Texas, 2008, 2011, and 2015. Vertical lines represent length limit at time of collection.

Table 8. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Nocona Reservoir, Texas, 1988, 1996, 1999, 2003, 2007, and 2015. 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.

		Number of fish				
Year	Sample size	FLMB	Intergrade	NLMB	% FLMB alleles	% pure FLMB
1988	33	4	21	8	34.0	12.0
1996	29	4	21	4	54.3	13.8
1999	34	9	24	1	63.2	26.4
2003	30	6	24	0	63.3	20.0
2007	30	2	22	6	39.6	6.7
2015	30	0	26	4	24.0	0.0

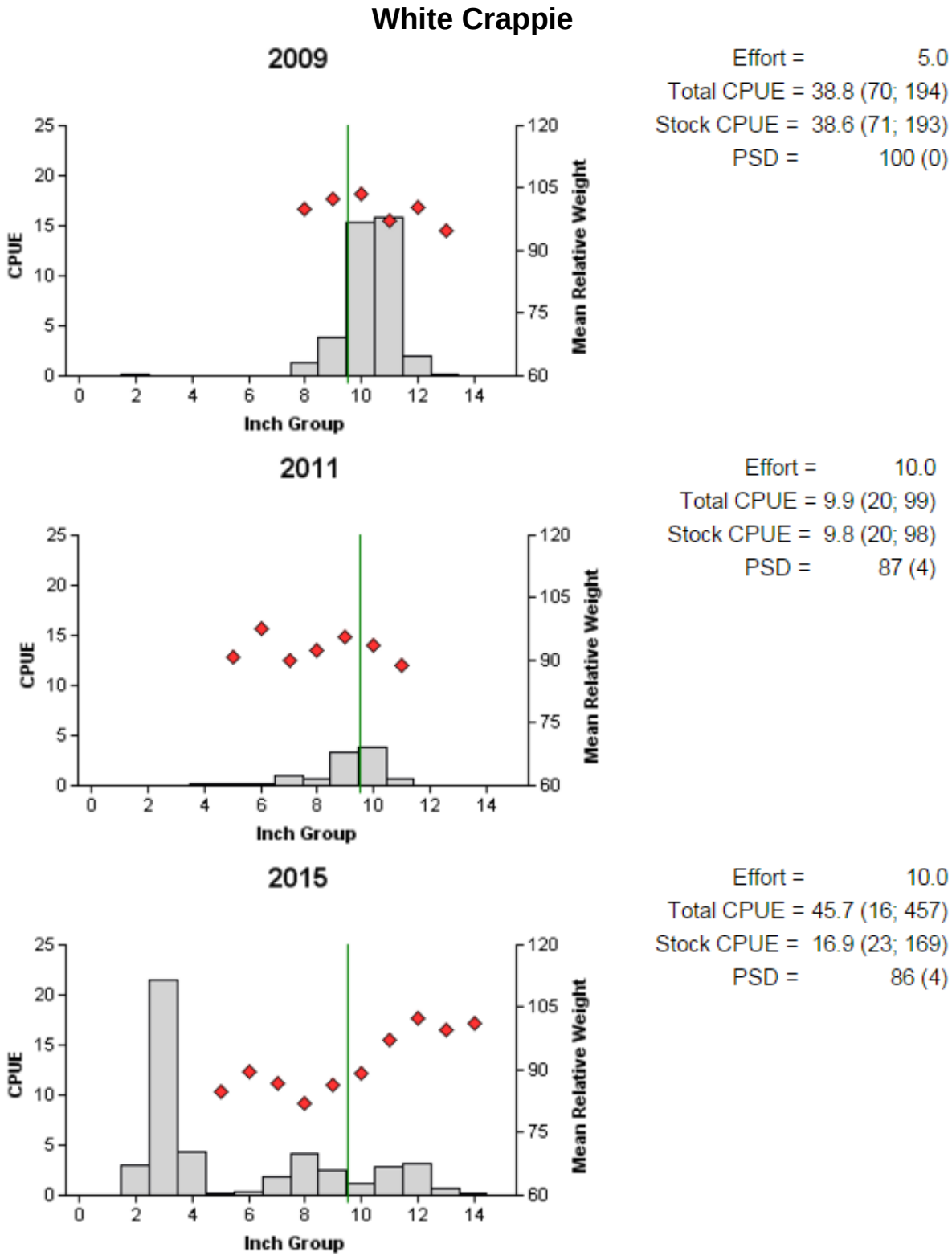
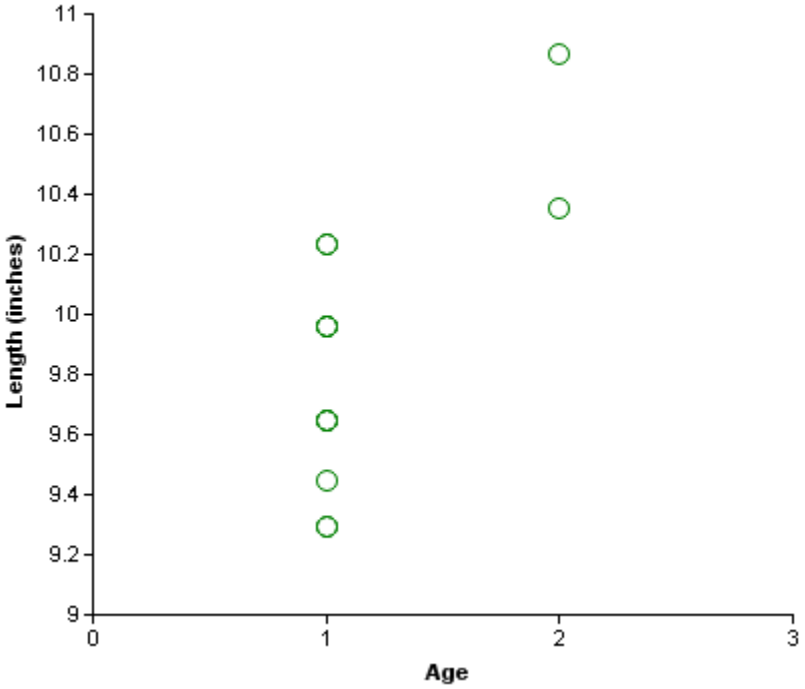


Figure 5. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Nocona Reservoir, Texas, 2009, 2011, and 2015. Vertical lines represent length limit at time of collection.



Average Total Length (inches)	Year Class	Number
9.76	2014	11
10.61	2013	2

Figure 6. Length at age for White Crappie collected from trap netting at Nocona Reservoir, Texas, November 2015.

Table 9. Proposed sampling schedule for Nocona Reservoir, Texas. Survey period is June through May. Electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S. Additional survey denoted by A.

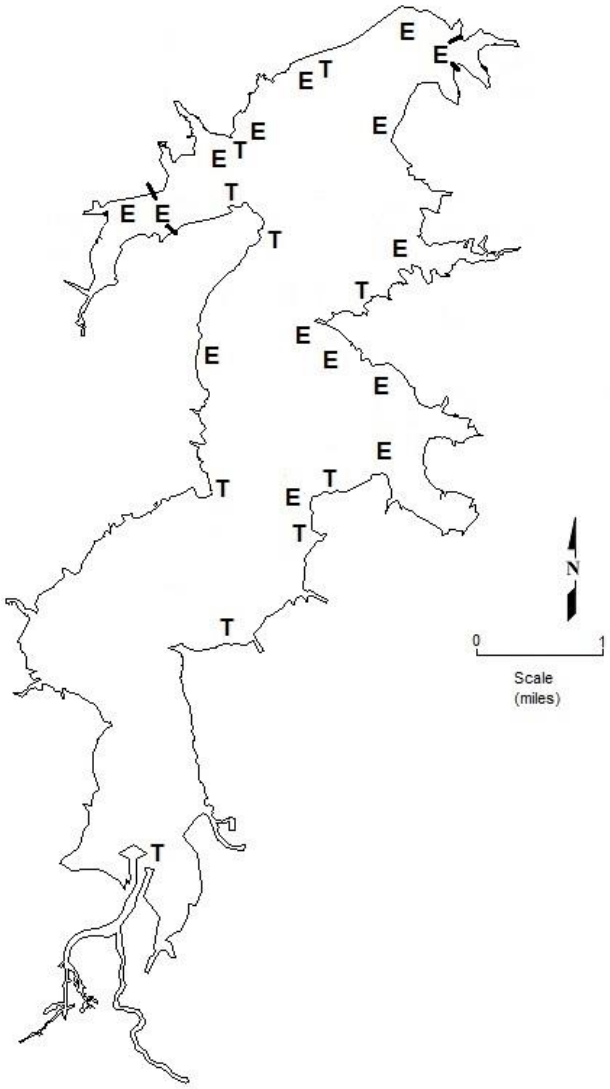
				Habitat				
Survey year	Electrofish Fall	Trap net	Gill net	Structural	Vegetation	Access	Creel survey	Report
2016-2017	A							
2017-2018								
2018-2019								
2019-2020	S	S			S	S		S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Nocona Reservoir, Texas, 2015.

	Trap Netting		Electrofishing	
Species	N	CPUE	N	CPUE
Gizzard Shad			1110	783.5
Green Sunfish			6	4.2
Warmouth			2	1.4
Bluegill			307	216.7
Longear Sunfish			88	62.1
Redear Sunfish			2	1.4
Largemouth Bass			172	121.4
White Crappie	457	45.7		

APPENDIX B



Location of sampling sites, Nocona Reservoir, Texas, 2015. Trap netting and electrofishing are indicated by T and E, respectively. Water level was at conservation level during trap netting and one foot below conservation for electrofishing.

APPENDIX C

Catch rates (CPUE) of targeted species by gear type for Nocona Reservoir, Texas, 1996, 1999, 2003- 2005, 2007-2009, 2011, and 2015.

		Year										
Gear	Species	1996	1999	2003	2004[a]	2005[b]	2007[c]	2008[a,d]	2009[d]	2011	2015[e]	**Avg.**
Gill Net	Blue Catfish	6.8	4.4	1.4		1.8	0.8			1.4		**2.8**
(fish/net night)	Channel Catfish	1.8	1.0	5.0		2.0	2.4			3.6		**2.6**
	Flathead Catfish	0.4	0.0	0.2		0.0	0.2			0.4		**0.2**
	White Bass	1.4	1.8	1.4		2.0	0.6			0.2		**1.2**
	Palmetto Bass	2.6	13.2	0.0		2.6	0.4			0.0		**3.1**
Electrofisher	Gizzard Shad	120.7	362.0	177.0		80.0	76.0			274.0	783.5	**267.6**
(fish/hour)	Threadfin Shad	0.0	0.0	138.0		22.0	656.0			1284.0	0.0	**300.0**
	Green Sunfish	10.0	3.0	5.0			10.0			1.0	4.2	**5.5**
	Warmouth	4.7	2.0	0.0			2.0			3.0	1.4	**2.7**
	Bluegill	36.0	41.0	100.0			229.0			79.0	216.7	**117.0**
	Longear Sunfish	4.0	7.0	30.0			70.0			11.0	62.1	**30.7**
	Redear Sunfish	4.0	3.0	6.0			9.0			3.0	1.4	**4.4**
	Largemouth Bass	129.3	80.0	70.0	72.0	48.0	90.0	93.0		123.0	121.4	**91.9**
Trap Net (fish/net night)	White Crappie	28.4	16.0	17.8			5.4	3.2	38.8	9.9	45.7	**20.7**

[a]Bass only electrofishing survey.
[b]Bass and shad only electrofishing survey.
[c]Electrofishing survey was conducted using a 7.5 Smith-Root GPP (Gas Powered Pulsator). Electrofishing surveys prior to 2007 were conducted using a Smith-Root 5.0 GPP.
[d]Additional crappie survey.
[e]Began using objective based sampling.