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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2012 Fisheries Management Survey Report

Wichita Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Wichita Reservoir were not surveyed in 2012-13 report year because of extremely low water elevations caused by prolonged drought. This resulted in the lone boat ramp being well above the waterline and unusable. Fish populations were surveyed using dual-cod trap nets in 2010 and in 2011 using gill nets. Historical data are presented with the data for comparison. This report summarizes the results of the surveys and contains a reservoir management plan based on those findings.

- **Reservoir Description:** Wichita Reservoir is a 1,224-acre municipal reservoir owned and operated by the City of Wichita Falls for flood control and recreation. The dam and most of the reservoir is in Wichita County and the southern portion is in Archer County. The reservoir was built in 1901, impounding Holliday Creek, a tributary to the Wichita River. Mean depth is 4.5 feet and maximum depth is 9.5 feet. Angler and boat access is adequate when reservoir elevation is within 1 foot of conservation pool. Habitat includes large stands of native emergent vegetation when full. In March of 2004 a toxic golden alga event killed approximately 7,700 fish of which 93% were non-game fish. In March of 2007 another event occurred with an estimated 15,000 fish dying, almost all were non-game species. In February of 2009 a golden alga event killed an estimated more than 200,000 fish including many game fish. In early 2012, golden alga again impacted the reservoir along with two major kills later in the year caused by extremely low water conditions.
- **Management History:** Historically important sport fish include Channel Catfish, White Bass, Palmetto Bass, and White Crappie. The 2009 management plan recommended rebuilding prey species, Palmetto Bass, White Crappie, and Largemouth Bass populations through stocking. Threadfin Shad were stocked in 2009, Bluegill in 2009 and 2010, Channel Catfish in 2009, Florida Largemouth Bass in 2009 and northern Largemouth Bass in 2010, Palmetto Bass in 2010, and White Crappie in 2010.
- **Fish Community**
 - The 2012 electrofishing and trap net survey, and the 2013 gill net survey could not be conducted because extreme low reservoir elevation made launching a boat impossible. As a result, the current status of the fish population is unknown.
 - **Catfishes:** In 2011, catfish abundance was over three times the historical average.
 - **White Bass:** White bass have not been documented in the reservoir since 2005.
 - **Palmetto Bass:** The 2011 survey had the second highest catch rate observed at this reservoir.
 - **White Crappie:** The 2010 dual-cod trap net survey had the highest catch rate observed at this reservoir.
- **Management Strategies:** Continue monitoring the reservoir for golden alga. Survey the reservoir every four years. Work closely with the City of Wichita Falls' Lake Wichita Study Committee.

INTRODUCTION

This document is a summary of fisheries data collected from Wichita Reservoir in 2009-2011. Fish populations in Wichita Reservoir were not surveyed in 2012-13 report year because of extremely low water elevations caused by prolonged drought. This resulted in the lone boat ramp being well above the waterline and unusable. 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 also presented for comparison purposes.

Reservoir Description

Wichita Reservoir is a 1,224-acre municipal reservoir owned and operated by the city of Wichita Falls for flood control and recreation. The dam is on the city limit line for Wichita Falls in Wichita County and a portion of the reservoir is in Archer County. The reservoir was built in 1901, impounding Holliday Creek, a tributary to the Wichita River. Originally, the lake was 2,200 acres and was built as a municipal water supply reservoir. After alternative water supplies were developed, Wichita Falls initiated a project with the Corps of Engineers to control flooding below the reservoir. This project culminated in a new spillway being completed in August 1995 which is 4.7 feet lower than the original one. This reduced the surface acreage to 1,224 acres, mean depth to 4.5 feet and maximum depth to 9.5 feet. In an effort to sustain recreational use, the City of Wichita Falls diverts water from the local irrigation district to maintain elevation at or near spillway level. When reservoir is near full, habitat includes relatively large stands of bulrush *Scirpus spp.* In March of 2004 a toxic golden alga event killed approximately 7,700 fish of which 93% were non-game fish. In March of 2007 another event occurred with an estimated 15,000 fish (primarily non-game species) dying. In February of 2009, a much larger golden alga event killed greater than 200,000 fish, including many game fish. In early 2012, another major kill occurred caused by a toxic golden alga bloom. Also in 2012, a prolonged drought significantly decreased water levels driving water temperatures and dissolved oxygen to lethal levels, resulting in two fish kill events. As of April, 2013, the reservoir was 4.7 feet below full pool. Other descriptive characteristics for Wichita Reservoir are in Table 1.

Angler Access

Wichita Reservoir has a one lane boat ramp that was unusable for boat access in 2012 because the end of the boat ramp was above the waterline. Extending the ramp is not feasible. Additional boat ramp characteristics are in Table 2. Shoreline access is considered good with public access at the ramp, along the dam where a new fishing pier was erected, and at the city park located on the reservoir.

Management History

Previous management issues and actions: Management issues and actions from the previous survey report (Howell and Mauk 2009) included:

1. Following a large golden alga caused fish kill in 2009, there was a need to rebuild the prey species populations according to survey results.

Action: Reestablished the prey base by stocking 780 Threadfin Shad in 2009 and stocking a total of 179,921 Bluegill in 2009-2010. We also performed a spring 2010 electrofishing survey to determine if Gizzard Shad had survived the kill which they had.

2. Significant populations of Channel Catfish and Carp survived as documented during the May 2009 gill net survey. No other game fish species were observed.

Action: Stocked an additional 110,341 Channel Catfish to supplement the existing population. Stocked 113,456 Florida Largemouth Bass in 2009 and 129,592 Largemouth Bass in 2010. In 2010, we stocked 8,795 Palmetto Bass and 605 adult White Crappie.

3. Uncertainty existed as to whether or not Threadfin Shad populations can be successfully introduced and survive the winter of 2009-10. Threadfin Shad are known to winter kill if water temperatures are cold enough.

Action: An electrofishing trip was made in spring of 2010 to determine if the introduced Threadfin Shad survived and reproduced in 2009. Abundant Gizzard Shad were found but Threadfin Shad were not observed. We believe Threadfin did not survive. Since there were abundant Gizzard Shad, we believe additional stockings of Threadfin Shad are not warranted.

4. White Crappie and Palmetto Bass have historically done well at Lake Wichita and are important to anglers. The 2009 fish kill severely depressed the abundance of both species so plans were made to stock both species..

Action: In 2010, stocked 605 adult White Crappie and 8,795 fingerling Palmetto Bass into the reservoir.

5. Golden alga has had devastating effects on Wichita Reservoir fish populations over the years. The TPWD's Golden Alga Task Force was looking for a site for golden alga research and Wichita Reservoir might be a good candidate.

Action: Discussed Wichita with the committee but it was not chosen as a research site.

Harvest regulation history: Sport fish species in Wichita Reservoir are currently managed under statewide regulations (Table 3).

Stocking history: After the golden alga caused fish kill of 2009 ended, stockings of channel catfish, Florida strain largemouth bass, bluegill, and threadfin shad occurred. In 2010, palmetto bass, bluegill, white crappie, and largemouth bass were stocked. The complete stocking history is shown in Table 4.

Vegetation/habitat management history: There is no history of vegetation issues at this reservoir. Brush piles were last installed in 2011 near the old pavilion posts.

Water transfers: There are no interbasin water transfers occurring at the reservoir.

METHODS

Fishes were collected by gill netting (10 net nights at 10 stations) in 2011, and dual-cod trap netting (3 net nights at 3 stations) in 2010. Calculated catch per unit effort for gill and dual-cod trap nets, as the number of fish caught per net night (fish/nn). All survey sites were randomly selected and the surveys were conducted according to standardized Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). The reservoir was inaccessible during 2012-13 and scheduled surveys were cancelled.

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). Palmetto bass PSD was calculated according to Dumont and Neely (2011). 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.

RESULTS AND DISCUSSION

Habitat: A physical habitat survey was conducted August, 2012 and indicated the littoral zone habitat consisted entirely of natural shoreline with some rock riprap. The reservoir was extremely low at time of survey and there was no aquatic vegetation in the reservoir (Table 5).

Prey species: A 2012 electrofishing survey was not completed as scheduled because extreme low reservoir elevations made launching a boat impossible.

Channel Catfish: A 2013 gill netting survey was not completed as scheduled because extreme low reservoir elevations made launching a boat impossible. The 2011 gill net survey revealed the highest abundance (5.6/nn) of all surveys and was well above the historical average (1.5/nn; Fig.1). Three major fish kills occurred during 2012 and many dead catfish were observed. It is expected that the population has been negatively impacted by these events.

White Bass: A 2013 gill netting survey was not completed as scheduled because extreme low reservoir elevations made launching a boat impossible. No white bass have been observed in the last three surveys. They were last observed in 2005.

Palmetto Bass: A 2013 gill netting survey was not completed as scheduled because extreme low reservoir elevations made launching a boat impossible. The 2011 survey catch rate was 9.8/nn (Fig. 2) which is well above the historical average of 2.7/nn. Three major fish kills occurred during 2012 and many dead palmetto bass were observed. It is expected that the population has been negatively impacted by these events.

Largemouth Bass: A 2012 electrofishing survey was not completed as scheduled because extreme low reservoir elevations made launching a boat impossible. Three major fish kills occurred during 2012 and many dead largemouth bass were observed. It is expected that the population has been negatively impacted by these events

White Crappie: A 2012 trap netting survey was not completed as scheduled because of the extreme low reservoir elevations that made launching a boat impossible. The 2010 dual-cod trap net survey had a catch rate of 49.0/nn, which was the highest ever observed (Fig. 3). Three major fish kills occurred during 2012 and many dead white crappie were observed. It is expected that the population has been negatively impacted by these events.

Fisheries management plan for Wichita Reservoir, Texas

Prepared – July 2013

ISSUE 1: Lake Wichita was hit by a devastating golden alga induced fish kill in 2012, followed by two other kills caused by extreme high water temperatures and low dissolved oxygen that resulted from extreme low water levels. As of April 2013, the reservoir is 4.7 feet below full pool. The reservoir is void of habitat and has silted in. It has had other golden alga fish kills in the past. These problems make having a viable, sustained fishery very difficult under present conditions.

MANAGEMENT STRATEGIES

1. Take advantage of the extreme low reservoir conditions and look into developing partnerships to renovate the waterbody by dredging and habitat work.
2. Investigate alternative water sources that are not prone to golden alga blooms or high salinities. Currently Lake Diversion water feeds the reservoir to keep the reservoir near constant pool, but this has not always been the case. At one time Holiday Creek was the sole source of water which has low chloride concentrations that inhibit golden alga blooms.

ISSUE 2: The public boating access (Lake Wichita boat ramp) was impeded by low water level in 2012 and continues to be in 2013. The boat ramp cannot be extended because the lake bottom levels out at the end of the ramp with no access to deeper water.

MANAGEMENT STRATEGY

1. Discuss with the city of Wichita Falls about dredging the end of the ramp so it is usable when the reservoir elevation drops more than a foot in elevation from 976 mean sea level.

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. Contact and educate marina owners 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.

ISSUE 4: Lake Wichita is an extremely old reservoir with siltation, water quantity, water quality, and fish habitat issues.

MANAGEMENT STRATEGY

1. Serve on the city of Wichita Falls' Lake Wichita Study Committee as a non-voting member and

actively work on a plan that addresses each of the issues keeping Lake Wichita from being a viable fisheries resource.

SAMPLING SCHEDULE JUSTIFICATION:

Routine monitoring will be conducted in 2016-2017 to continue monitoring species population trends.

LITERATURE CITED

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- Guy, C. S., R. M. Neuman, D. W. Willis, and R. O. Anderson. 2007. Proportional size distribution (PSD): a further refinement of population size structure index terminology. Fisheries 32(7): 348.
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Table 1. Characteristics of Wichita Reservoir, Texas.

Characteristic	Description
Year constructed	1901
Controlling authority	City of Wichita Falls
Counties	Wichita and Archer
Reservoir type	Tributary
Shoreline development index (SDI)	2.5
Conductivity	2,800 $\mu\text{S}/\text{cm}$
Secchi disc reading	25 cm

Table 2. Boat ramp characteristics for Wichita Reservoir, Texas, August, 2012.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Lake Wichita Boat Ramp	33.84078 -98.53159	Y	30	974	Out of water. Extension is not feasible

Table 3. Harvest regulations for Wichita 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, Palmetto	5	18-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 Wichita, Texas. Life stages are fry (FRY), 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)
Bluegill	2009	55,566	AFGL	2.1
	2010	124,355	AFGL	2.2
	Total	179,921		
Channel Catfish	1969	10,000	AFGL	7.9
	1971	50,000	AFGL	7.9
	1972	22,000	AFGL	7.9
	1990	22,319	FGL	2.5
	1995	67,000	FGL	2.0
	2009	110,341	FGL	3.3
	Total	281,660		
Florida Largemouth Bass	1977	20,800	FRY	0.7
	1995	122,000	FGL	1.2
	2009	113,456	FGL	1.8
	Total	256,256		
Largemouth Bass	1966	80,000	UNK	UNK
	1967	75,000	UNK	UNK
	1997	120,000	FGL	1.2
	1998	125,415	FGL	1.4
	2000	131,875	FGL	1.7
	2005	62,271	FGL	1.6
	2006	63,078	FGL	1.7
	2010	129,592	FGL	1.6
	Total	787,231		

Table 4 (continued). Stocking history of Wichita, Texas. Life stages are fry (FRY), 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)
Palmetto Bass (striped X white bass hybrid)	1977	50,000	UNK	UNK
	1984	66,000	FGL	2.0
	1986	33,000	FRY	1.0
	1987	65,925	FRY	1.0
	1988	11,705	FGL	2.0
	1988	55,700	FRY	1.0
	1989	54,359	FGL	1.4
	1994	15,947	FGL	1.7
	1996	18,407	FGL	1.1
	1998	12,374	FGL	1.3
	1999	12,646	FGL	1.5
	2000	14,180	FGL	1.5
	2002	18,447	FGL	1.5
	2003	18,381	FGL	1.6
	2004	19,843	FGL	1.4
	2004	1,169,624	FRY	0.2
	2005	18,666	FGL	1.5
	2007	103	AFGL	7.2
	2007	18,401	FGL	1.4
	2008	9,003	FGL	1.4
2010	8,795	FGL	1.7	
	Total	1,691,506		
Red Drum	1983	95,600	UNK	UNK
	Total	95,600		
Threadfin Shad	2009	780	AFGL	2.6
	Total	780		
White Crappie	2010	392		UNK
	2010	213	ADL	10.0
	Total	605		

Table 5. Survey of structural habitat types, Wichita Reservoir, Texas, 2012. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Natural	11.5 miles	93.5
Rocky	0.8 miles	6.5

Channel Catfish

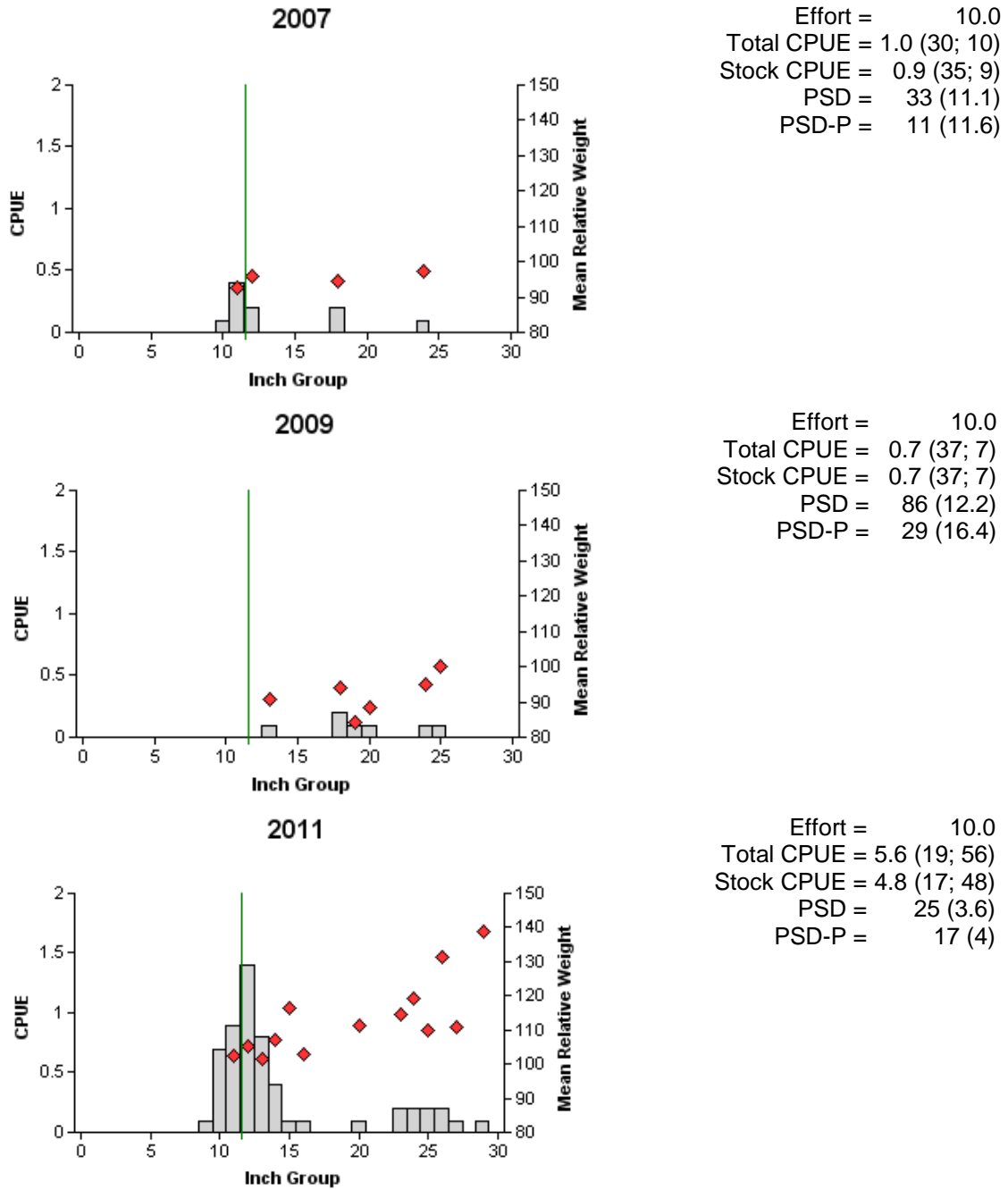


Figure 1. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Wichita Reservoir, Texas, 2007, 2009, and 2011. Line indicates minimum size limit at time of sampling.

Palmetto Bass

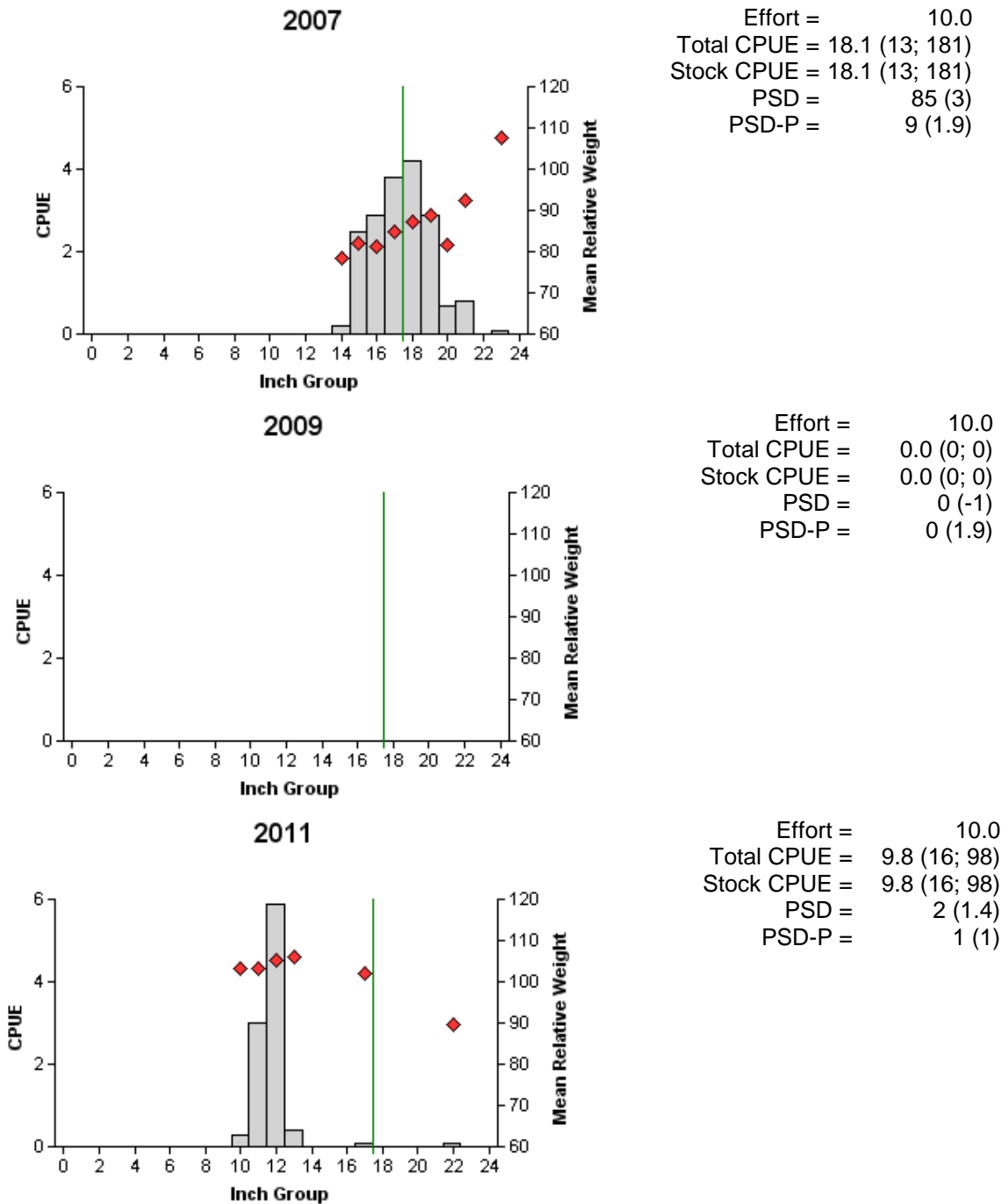


Figure 2. Number of Palmetto Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Wichita Reservoir, Texas, 2007, 2009, and 2011. No Palmetto Bass were sampled in 2009. Line indicates minimum size limit at time of sampling.

White Crappie

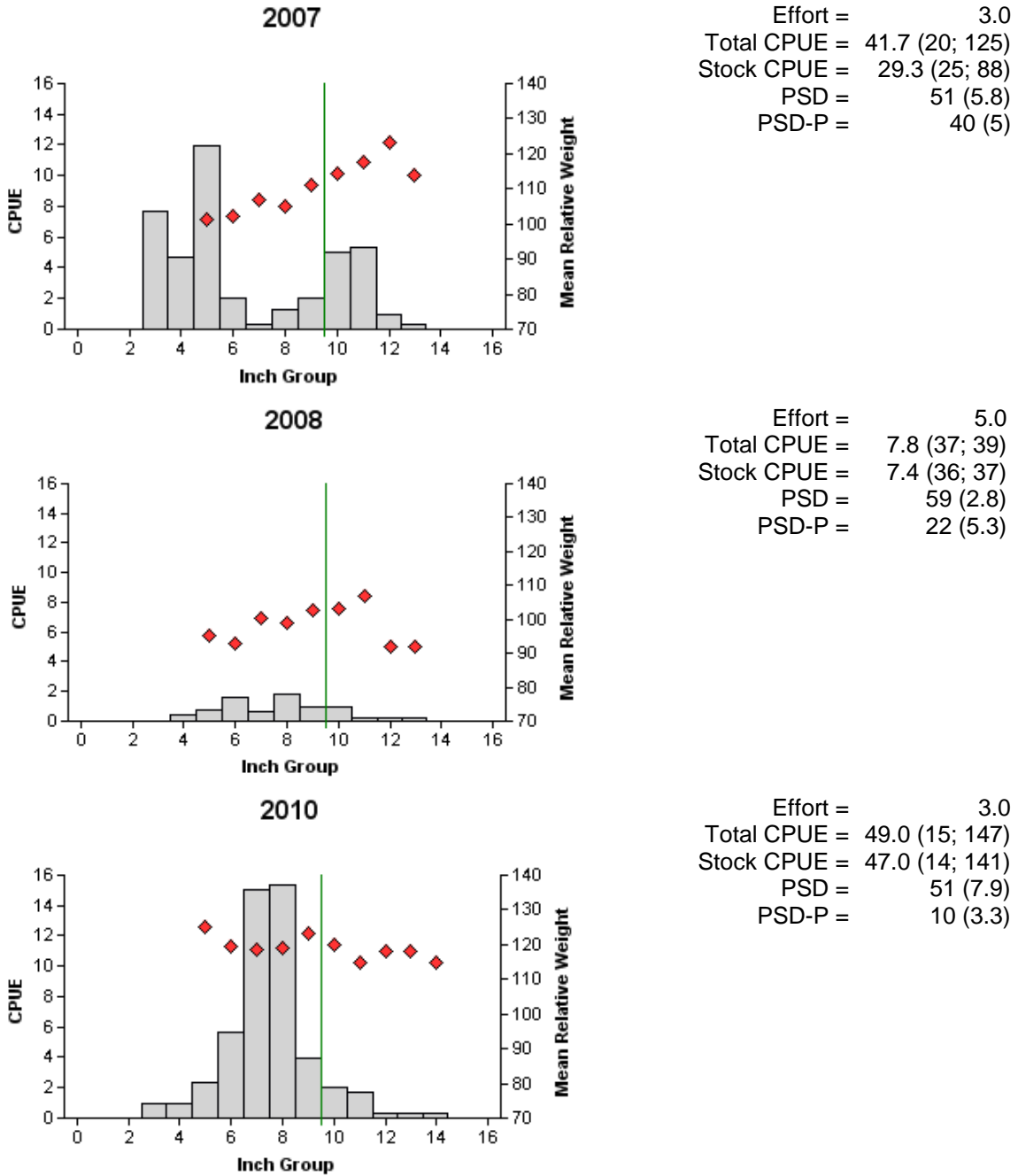


Figure 3. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for dual-cod trap netting surveys, Wichita Reservoir, Texas, 2007, 2008, and 2010. Line indicates minimum size limit at time of sampling.

Table 6. Proposed sampling schedule for Wichita 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 and additional survey denoted by A.

Survey year	Electrofishing Fall(Spring)	Trap net	Gill net	Habitat			Creel survey	Report
				Structural	Vegetation	Access		
2013-2014								
2014-2015								
2015-2016								
2016-2017	S	S	S		S	S		S



Figure 4. Photograph of the Lake Wichita boat ramp.