

PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-4

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2013 Fisheries Management Survey Report

Alan Henry Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Alan Henry Reservoir were surveyed in 2013 using electrofishing and trap netting and in 2014 using gill netting. Historical data are presented with the 2013-2014 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:** Alan Henry Reservoir was constructed in 1993 on the South Fork of the Double Mountain Fork of the Brazos River. It is located 6 miles east of Justiceburg in Garza County, Texas. At conservation pool (2,220 feet above mean sea level; FMSL), Alan Henry Reservoir is a 2,884-acre impoundment. The reservoir is owned by the City of Lubbock, Lubbock County, Texas and is currently used for recreational purposes and as a water supply. Alan Henry Reservoir first filled to capacity in October 2004, and the water level remained within 5 feet of conservation pool until 2011 when it began a steady decline to approximately 14 feet below conservation pool at sampling in 2013 and 2014. Productivity of Alan Henry Reservoir was characterized as low. Habitat features consisted of flooded terrestrial vegetation, rocks, and very small amounts of native submerged aquatic plants.
- **Management History:** Sport fish in the reservoir included Blue Catfish, Channel Catfish, Flathead Catfish, Alabama Bass, Largemouth Bass, and White Crappie. Alabama Bass were managed with restrictive harvest regulations since their introduction in 1996 until September 1, 2011 in order to establish a viable population. Largemouth Bass harvest regulations were liberalized with the allowance of 2 fish under the 18 inch minimum length limit in 2002 to promote recruitment of fish into size classes larger than the 18 inch minimum length limit. Alan Henry Reservoir has produced 25 entries into the ShareLunker program since 2000.
- **Fish Community**
 - **Prey species:** Gizzard Shad and Bluegill are the primary prey species in the reservoir, but their relative abundance is low.
 - **Catfishes:** Blue Catfish were present in the reservoir. Only one Blue Catfish was collected in the 2014 gill net survey. Channel Catfish were the most abundant catfish species surveyed; however, catch rates continued to indicate low relative abundance. The catch rate for the 2014 gill net survey was lower than previous surveys. The majority of Channel Catfish sampled were larger than the 12-inch minimum length limit. One Flathead Catfish was collected in the 2014 gill net survey. The Flathead Catfish catch rate remained similar to previous surveys and indicated low relative abundance.
 - **Black basses:** From 2001 to 2011 electrofishing catch rates of Alabama Bass have shown a general increase; however, catch rates have declined from 41.0/h in 2011 to 12.0/h in 2013. A new state record of 5.62 lbs. was caught on January 15, 2011. Largemouth Bass catch was low with the majority of fish sampled being less than 15 inches in length. Of the fish sampled, two were greater than 18 inches.
 - **Crappie:** Two White Crappie were collected during the 2013 trap net survey, but both fish were smaller than the 10 inch minimum length limit.
- **Management Strategies:** Continue annual electrofishing surveys to monitor Alabama Bass and Largemouth Bass populations. Conduct an extensive black bass electrofishing survey in 2015.

INTRODUCTION

This document is a summary of fisheries data collected from Alan Henry Reservoir in 2013-2014. 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 for comparison.

Reservoir Description

Alan Henry Reservoir is a 2,884-acre impoundment on the South Fork of the Double Mountain Fork of the Brazos River. It is located 6 miles east of Justiceburg, Garza County, Texas. The reservoir is owned by the City of Lubbock, Lubbock County, Texas and is operated by the Brazos River Authority. The reservoir is used for recreational purposes and as a water supply. Alan Henry Reservoir first filled to capacity in October of 2004, and the water level remained within 5 feet of conservation pool until 2011 (Figure 1). Since 2011 there has been a steady decline in water level due to pumping by the municipal supply and evaporation; at the time of sampling the lake level was approximately 14 feet below conservation pool (Figure 1). Alan Henry Reservoir is characterized as a deep reservoir with low productivity; Trophic State Index (TSI) ranks the reservoir as the third clearest lake in Texas with a secchi mean of 10.9 feet and a Secchi TSI of 42.76 (Texas Commission on Environmental Quality 2011). Since impoundment of the reservoir, secchi disk readings have shown wide fluctuations from a low of 1.3 feet to a high of 15.4 feet; however, most historic secchi disk readings range from 6-13 feet. At the time of sampling, the habitat consisted primarily of boulder, rock, and flooded terrestrial vegetation. Boat access was limited to one public boat ramp at the Sam Wahl Recreation Area operated by the City of Lubbock. Due to the physical characteristics of the shoreline, shoreline access is limited to a floating fishing dock and a few areas adjacent to the public ramp. The fishing dock is the only handicap-specific facility. Other descriptive characteristics for Alan Henry Reservoir are in Table 1.

Angler Access

Alan Henry Reservoir has one public boat ramp and four private boat ramps. The public ramp, located at the Sam Wahl Recreation Area, was available for use by anglers throughout the survey period. Additional boat ramp characteristics are in Table 2. Shoreline access is limited to the public boat ramp area and the fishing dock located at the Sam Wahl Recreation Area.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Clayton and Munger 2010) included:

1. Propose to simplify black bass regulation to, "For black bass and their hybrids there is no MLL; however, only 2 may be less than 18 inches. Daily bag = 5 in any combination."
Action: On September 1, 2011 the black bass regulation was simplified to the above regulation.
2. Conduct age and growth analysis in 2013 to evaluate impact of September 1, 2002 harvest regulation on size structure of Largemouth Bass.
Action: Due to a low CPUE during the 2013 survey; age and growth analysis was postponed to potentially conduct a more extensive black bass survey in fall 2014 and spring 2015, including a category 4 age and growth analysis described in the *TPWD Inland Fisheries Assessment Procedures for Age Estimation and Related Analyses*.

Harvest regulation history: Sport fishes in Alan Henry Reservoir are currently managed with statewide regulations with the exceptions of Alabama Bass, and Largemouth Bass (Table 3). Until September 1, 1997, Largemouth Bass were managed under a 3 fish daily bag and 18 inch minimum length limit, and Smallmouth Bass were managed under a 5 fish daily bag limit and 14 inch minimum length limit. Alabama Bass were introduced to Alan Henry in 1996. On September 1, 1997, the harvest regulation for Smallmouth Bass and Alabama Bass changed to a 3 fish daily bag in aggregate and 18 inch minimum length limit. The harvest regulation for Largemouth Bass was then changed to a 5 fish daily bag and 18 inch-minimum length limit. On September 1, 2002, the Largemouth Bass harvest regulation changed from a 5 fish daily bag and 18 inch minimum length limit, to a no minimum length limit and 5 fish bag with no more than 2 Largemouth Bass under 18 inches. On September 1, 2011 the black bass regulation was simplified to, "For black bass and their hybrids there is no MLL; however, only 2 may be less than 18 inches". The daily bag was changed to include 5 black bass in any combination.

Stocking history: Stocking of Alan Henry Reservoir began in 1993 with the introductions of Gizzard Shad, Blue Catfish, Channel Catfish, Smallmouth Bass, Florida Largemouth Bass, and White Crappie. Alabama Bass were introduced to Alan Henry Reservoir in 1996. The complete stocking history is available in Table 4.

Vegetation/habitat management history: Alan Henry Reservoir has no vegetation/ habitat management history.

Water transfer: Alan Henry Reservoir is primarily used for municipal water supply and recreation. One permanent pumping station on the reservoir transfers water to the Southwest Water Reclamation Plant in Lubbock, Texas. As part of Lubbock's Strategic Water Supply Plan, the city has proposed to divert storm water and treated city effluent from the North Fork of the Double Mountain Fork of the Brazos River (the natural drainage for the City of Lubbock) to the South Fork (the natural drainage for Alan Henry Reservoir), thereby increasing water availability for the City of Lubbock; this proposal has not yet been approved.

METHODS

Fishes were collected by electrofishing (1 hour at 12, 5-min stations), gill netting (5 net nights at 5 stations), and trap netting (5 net nights at 5 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for gill and trap nets, as the number of fish per net night (fish/nn). All electrofishing and gill netting survey sites were randomly selected, and trap netting survey sites were biologist selected on a stratified criteria; locations were chosen based on water depths between 5-20 feet and located near flooded timber. Shoreline habitat was surveyed by circumnavigating the reservoir and marking GPS locations of changes in habitat type. GPS locations were then imported into ArcGIS software which was used to calculate amount of each habitat type. All surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), as defined 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 statistics and for creel statistics

Source for water level data was the United States Geological Survey (USGS 2014).

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of natural shoreline, boulder, and terrestrial vegetation (Table 5). Aquatic vegetation observed in the lake consisted of a small 60 square foot area of pondweed at the Sam Wahl boat ramp, and five cattails near the Ince Cove boat ramp.

Creel: Directed fishing effort by anglers was highest for black bass species combined (39.7 %), followed by Largemouth Bass (25.6 %), and White Crappie (21.0 %) (Table 6). Total fishing effort for all species at Alan Henry Reservoir was 33,882.5 h from March, 2013 to May 2013, and anglers spent an estimated \$369,303 on trip expenditures (Table 7).

Prey species: In 2013 electrofishing catch rate of Gizzard Shad was 49.0/h. Gizzard Shad IOV was 16, indicating that the majority were of sizes too large for existing predators; this was similar to IOV estimates from 2012 (IOV=17) and 2011 (IOV=16) (Figure 2). Total CPUE of Gizzard Shad in 2013 (CPUE=49.0/h) was also similar to 2012 (CPUE=47.0/h) and 2011 (CPUE=49.0/h) surveys (Figure 2). Bluegill were present in low abundance; the total CPUE of Bluegill in 2013 was 1.0/h (Figure 3).

Blue Catfish: The gill net catch rate for Blue Catfish has remained low. Historically only one or two Blue Catfish were collected during gill net surveys. One Blue Catfish was collected during the 2014 survey; it measured 32 inches and had good body condition (Figure 4).

Channel Catfish: Catch rates for Channel Catfish have historically been low; however, they are the most abundant catfish species in the reservoir. Total CPUE for the 2014 gill net survey was 1.2/nn; similar to the total CPUE for 2012 (1.6/nn) but lower than 2010 (3.4/nn). Although relative abundance remained low, the majority of fish sampled were available to anglers for legal harvest (Figure 5). Directed fishing effort, catch per hour, and total harvest for Channel Catfish showed a minimal catfish fishery (Table 8). Creel data collected from March, 2013 through May, 2013 showed that harvest was minimal with only 10 fish measured during the 2013 creel period (Figure 6).

Flathead Catfish: Flathead Catfish continued to have low relative abundance. The gill net catch rate was 0.2/nn. This was similar to 2010 (0.4/nn) and no Flathead Catfish were collected in 2012 (Figure 7).

Alabama Bass: Electrofishing catch rate of Alabama Bass decreased from 41.0/h in 2011 to 21.0/h in 2012, and to 12.0/h in 2013 (Figure 8). Size structure was dominated by small individuals with all fish sampled measuring 12 inches or less. Body condition was similar in 2011, 2012, and 2013 with relative weights for most size classes averaging between 60 and 80 (Figure 8). Catch rates between 2001 and 2011 have shown a generally increasing trend until 2012 and 2013 CPUE (Figure 9). Size structure from 2001 to 2013 was dominated by smaller individuals; few fish over 15 inches were sampled (Figure 9). The 2009 creel survey reported the first directed effort specifically targeting Alabama Bass (74.2 hours). The 2011 and 2013 creel surveys continued to show a small amount of directed angler effort for Alabama Bass (132.94 hours and 70.07 hours respectively) (Table 9). Although total catch of Alabama Bass by anglers has increased from an estimated 4,772 in 2009 to 13,625 in 2013, harvest remains low (Table 9). Increased catch rate with a low percent legal/release indicates that few fish over 18 inches are available to anglers. Twenty-three Alabama Bass measuring between 14 and 24 inches were reported during the 2013 creel survey (Figure 10).

Largemouth Bass: The electrofishing catch rate of Largemouth Bass was 9.0/h in 2013; this was a decline from 2012 (51.0/h) and 2011 (24.0/h) (Figure 11). Relative weight in 2013 ranged between 60 and 90 and was similar to body condition in previous surveys (Figure 11). Catch rates between 2001 and 2013 show a decreasing trend, and the current largemouth regulation implemented September 1, 2002 did not result in an increase in CPUE of largemouth over 18 inches (Figure 12). Creel survey data from 2011 shows Largemouth Bass as the dominant species sought by anglers (42.3 %). In 2013, directed angler effort for Largemouth Bass dropped to 25.6 percent making it the second most popular species category (Table 10). Low electrofishing CPUE and low angler catch rates indicate a low relative abundance of Largemouth Bass. Thirteen Largemouth Bass ranging from 14 to 24 inches were

measured during the 2013 creel survey, and there was a total estimated harvest of 187 fish (Figure 13); the majority of fish measured were less than 18 inches.

White Crappie: Trap net location appeared to greatly influence CPUE. Randomly selected trap net sites in 2009 resulted in a CPUE of 0.3/nn; much lower than in 2005 (27.6/nn) where sites were biologist selected (Figure 14). The stratified design did not improve CPUE for 2013 (0.4/nn) (Figure 14). Creel survey data from 2011 shows a decline in directed angler effort from 2009 (7,628.49 hours) to 2011 (3,185.76 hours), and a rebound in 2013 (7,111.38 hours) (Table 11). There were 82 crappie ranging between 10 and 20 inches measured during the 2013 creel survey, and an estimated total harvest of 1,115 crappie (Figure 15).

Fisheries management plan for Alan Henry Reservoir, Texas

Prepared – July 2014

ISSUE 1: Declining CPUE of forage species, black basses, and Channel Catfish, and poor body condition of black basses appear to be the result of the reservoir's low productivity. Black bass are the most popular sport fish in Alan Henry (25.6% of angler effort for Largemouth Bass and 39.7% of angler effort for any black bass species). Managing sport fish populations given low productivity is a major concern in this reservoir, but general monitoring data indicate black bass and forage populations cannot support quality fishing opportunities.

MANAGEMENT STRATEGY

1. Use electrofishing to collect 200-400 Largemouth Bass and Alabama Bass (Category 4 age and growth) in fall 2014 and spring 2015 to evaluate black bass harvest regulations with modeling analysis of growth, recruitment, and mortality.
2. Investigate the possibility of introducing alternative forage species and actively managing forage species.
3. Conduct a creel survey spring 2015 and 2017 emphasizing weekend and afternoon time periods.

ISSUE 2: 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.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes additional electrofishing in fall 2014, 2015, and 2016, and spring 2015 and 2017. Creel sampling will occur March through May in 2015 and 2017, and a full survey in 2017/2018 (Table 12). Annual electrofishing surveys are necessary to maintain consistent data for trend information on this heavily used black bass fishery and to develop a more detailed analysis of black bass population dynamics. Trap netting will be conducted using biologist-selected stations.

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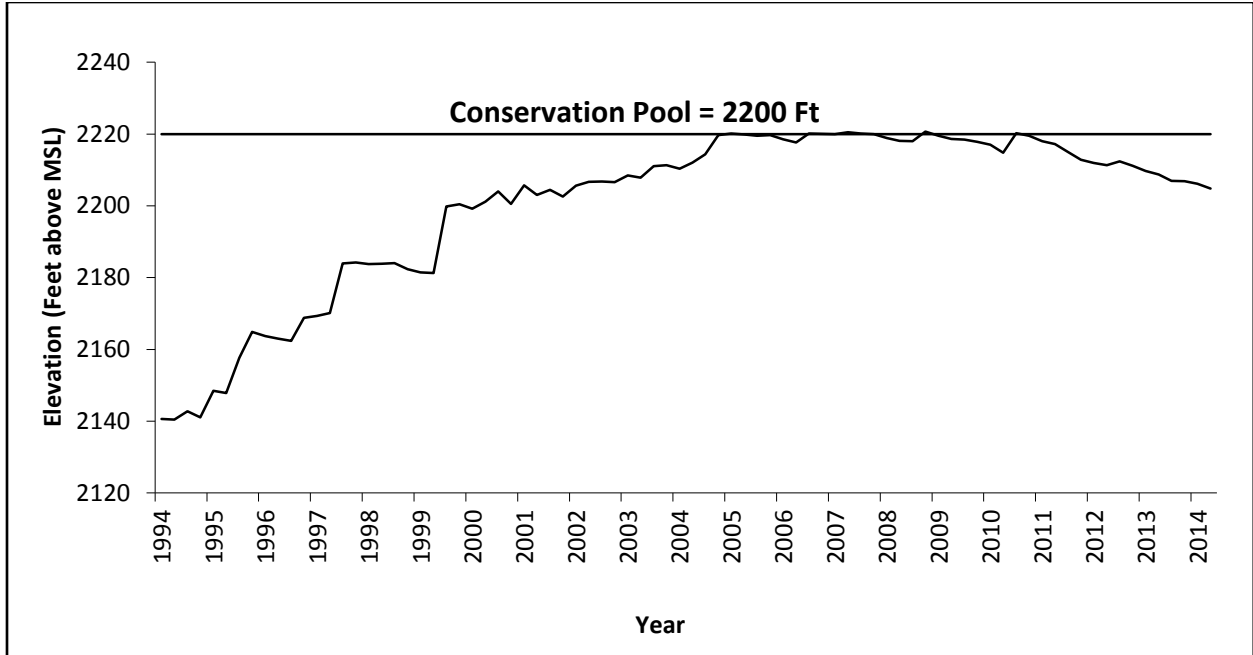


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Alan Henry Reservoir, Texas. Source of water level data was the United States Geological Survey (USGS 2014).

Table 1. Characteristics of Alan Henry Reservoir, Texas.

Characteristic	Description
Year constructed	1993
Controlling authority	City of Lubbock and Brazos River Authority
County	Garza
Reservoir type	Mainstream
Mean depth (ft)	40.0
Maximum depth (ft)	100.0
Watershed (mi ²)	394
Shoreline Development Index (SDI)	15.15
Conductivity	1,452 μ mhos/cm

Table 2. Boat ramp characteristics for Alan Henry Reservoir, Texas, August, 2013. Reservoir elevation at time of survey was 2010 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Sam Wahl Area	33.048837 -101.082143	Y	100	UNK	Excellent, no access issues
Ince Cove	33.055091 -101.082363	N	50	UNK	Neighborhood ramp, out of water
Private Ramp 1	33.032184 -101.035520	N	1	UNK	Private ramp, out of water
Private Ramp 2	33.041601 -101.030371	N	3	UNK	Private ramp, no access issues
Private Ramp 3	33.045845 -101.042714	N	3	UNK	Private ramp, out of water
Dam	33.063718 -101.052036	N	5	UNK	City owned restricted access ramp, no use issues

Table 3. Harvest regulations for Alan Henry Reservoir, Texas.

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: Alabama and Largemouth in aggregate	5	None (only 2 < 18 inches)
Crappie: White and Black, hybrids, and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Alan Henry Reservoir, Texas. FGL = fingerling; ADL = adults.

Species	Year	Number Stocked	Size
Shad, Gizzard	1993	80	ADL
Catfish, Blue	1993	143,564	FGL
	1994	143,004	FGL
	Total	286,568	
Catfish, Channel	1993	143,951	FGL
	1994	32,013	FGL
	Total	175,964	
Bass, Smallmouth	1993	72,021	FGL
	1994	75,650	FGL
	Total	147,671	
Bass, Alabama	1996	150	ADL
Bass, Florida Largemouth	1993	144,124	FGL
	1993	149	ADL
	1994	144,000	FGL
	1994	351	ADL
	2009	144,082	FGL
	2011	143,879	FGL
	2013	145,819	FGL
Total	722,404		
Bass, ShareLunker Largemouth	2004	3,038	FGL
	2005	10,000	FGL
	2006	7,184	FGL
	Total	20,222	
Crappie, White	1993	67,042	FGL

Table 5. Survey of structural habitat types using GPS circumnavigation method, Alan Henry Reservoir, Texas, 2013. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Natural	33.8 miles	54.0
Boulder	25.6 miles	40.9
Rock Bluff	3.2 miles	5.1
Standing Timber	88.9 acres	3.2

Table 6. Percent directed angler effort by species March, 2009 through May, 2009, March 2011, through May, 2011, and March, 2013 through May, 2013 for Alan Henry Reservoir, Texas.

Species	2009	2011	2013
Catfishes	0.0	0.4	0.0
Channel Catfish	2.9	1.1	1.1
Black basses	31.4	36.7	39.7
Alabama Bass	0.1	0.5	0.2
Largemouth Bass	36.9	42.3	25.6
White Crappie	13.4	10.9	21.0
Anything	15.3	8.1	12.4

Table 7. Total fishing effort (h) for all species and total directed expenditures March, 2009 through May, 2009, March, 2011 through May, 2011, and March, 2013 through May, 2013 Alan Henry Reservoir, Texas.

Creel statistics	2009	2011	2013
Total fishing effort - hours	56,814.5	29,302.4	33,882.5
Total directed expenditures	\$457,510	\$356,312	\$369,303

Gizzard Shad

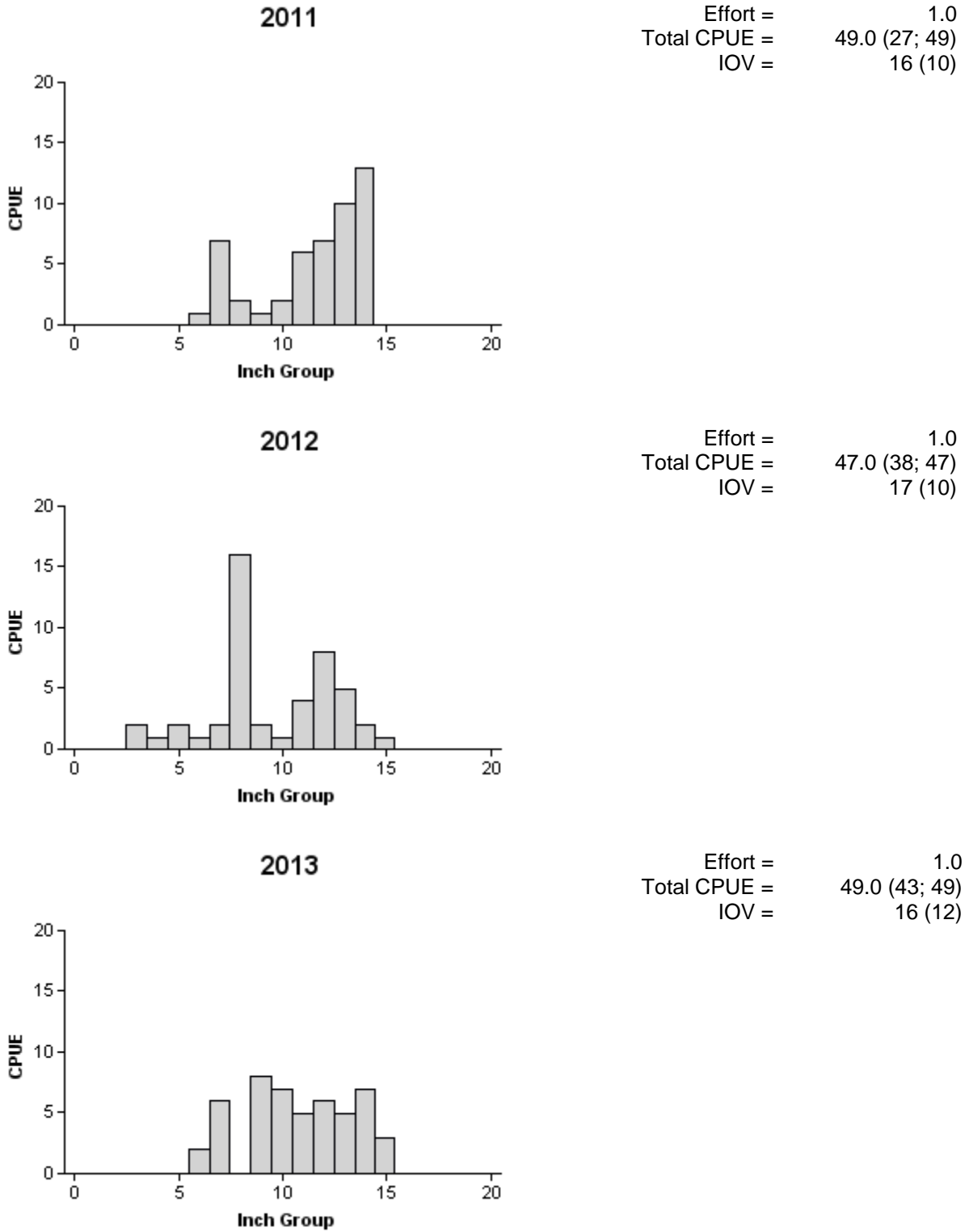
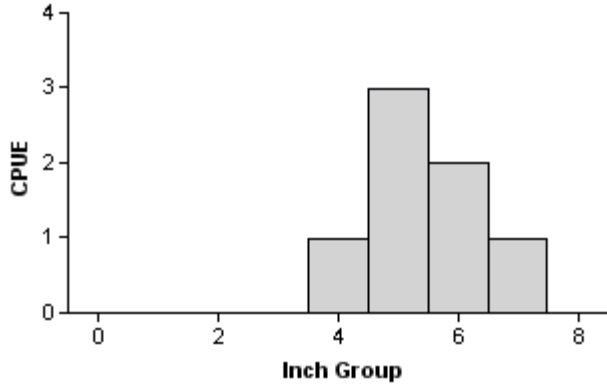


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2011, 2012, and 2013.

Bluegill

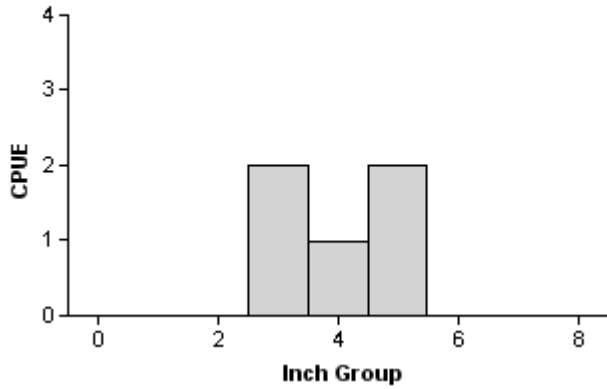
2011

Effort = 1.0
 Total CPUE = 7.0 (58; 7)
 PSD = 43 (13)



2012

Effort = 1.0
 Total CPUE = 5.0 (62; 5)
 PSD = 0 (69)



2013

Effort = 1.0
 Total CPUE = 1.0 (100; 1)
 PSD = 0 (105)

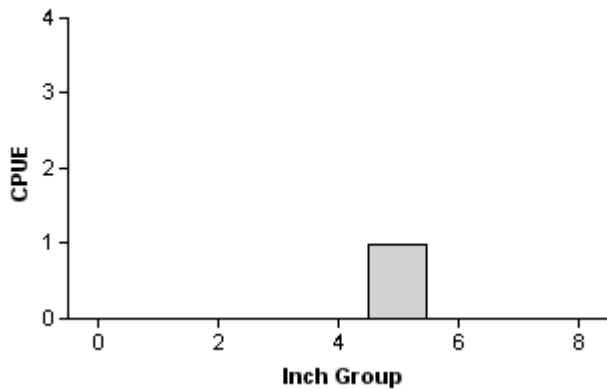
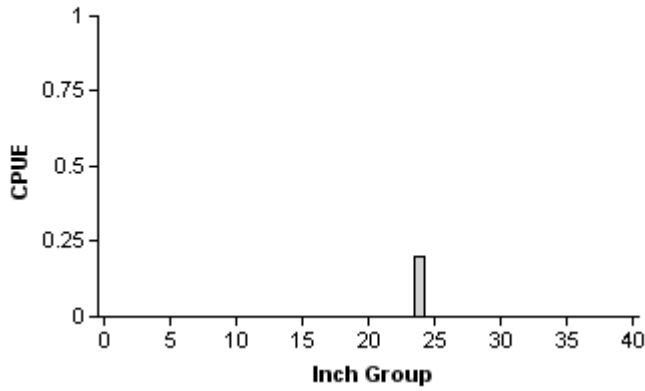


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2011, 2012, and 2013.

Blue Catfish

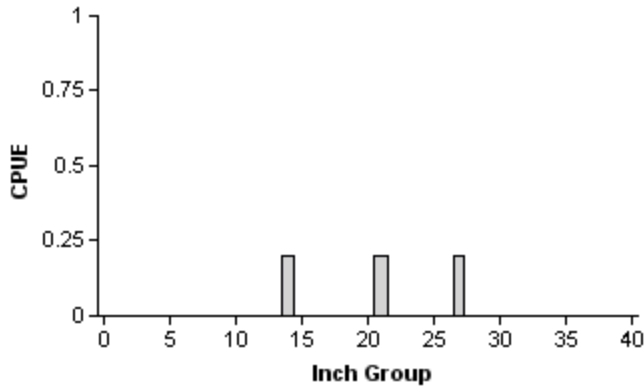
2010

Effort = 5.0
 Total CPUE = 0.2 (100; 1)
 PSD = 100 (0)



2012

Effort = 5.0
 Total CPUE = 0.6 (41; 3)
 PSD = 67 (30)



2014

Effort = 5.0
 Total CPUE = 0.2 (100; 1)
 PSD = 100 (0)

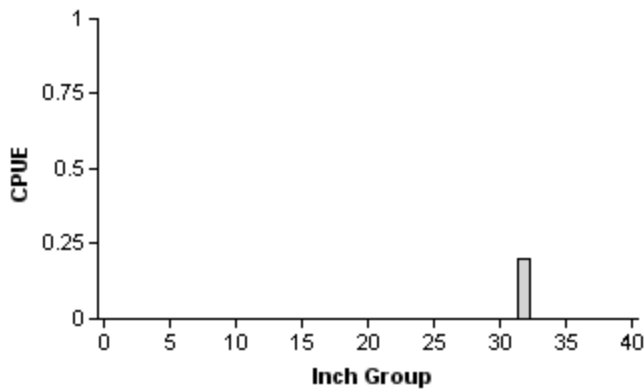


Figure 4. Number of Blue Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Alan Henry Reservoir, Texas, 2010, 2012, and 2014. Horizontal line represents a relative weight of 100.

Channel Catfish

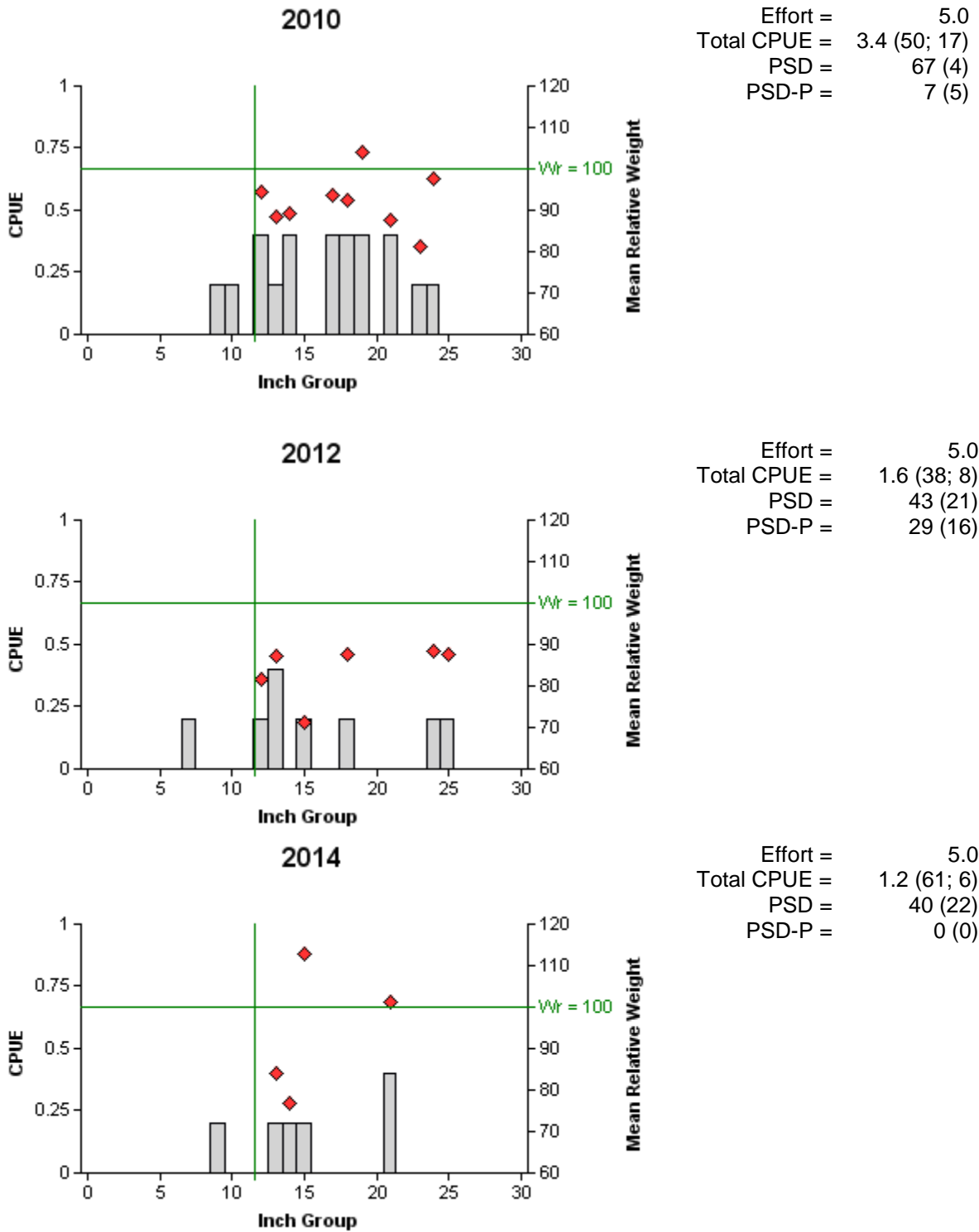


Figure 5. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Alan Henry Reservoir, Texas, 2010, 2012, and 2014. Vertical line indicates minimum length limit of 12 inches, and horizontal line represents a relative weight of 100.

Channel Catfish

Table 8. Creel survey statistics for Channel Catfish at Alan Henry Reservoir from March through May 2009, 2011, and 2013. Total catch per hour is for anglers targeting Channel Catfish and total harvest is the estimated number of Channel Catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	2009	2011	2013
Directed effort (h)	1,652 (39)	332 (66)	361 (77)
Directed effort/acre	0.6 (39)	0.12 (66)	0.13 (77)
Total catch per hour	0.1 (71)	0.36 (89)	0.44 (108)
Total catch	471 (131)	185 (196)	310 (185)
Total harvest	253 (82)	134 (127)	136 (103)
Harvest/acre	0.1 (82)	0.06 (127)	0.04 (103)
Percent legal released	81.8	20.0	20.0

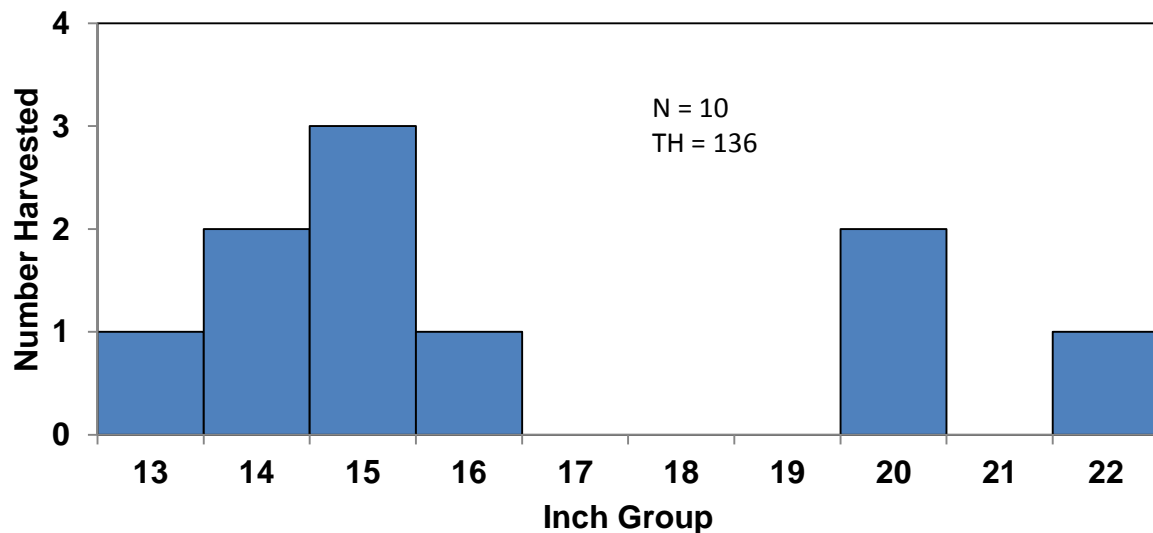
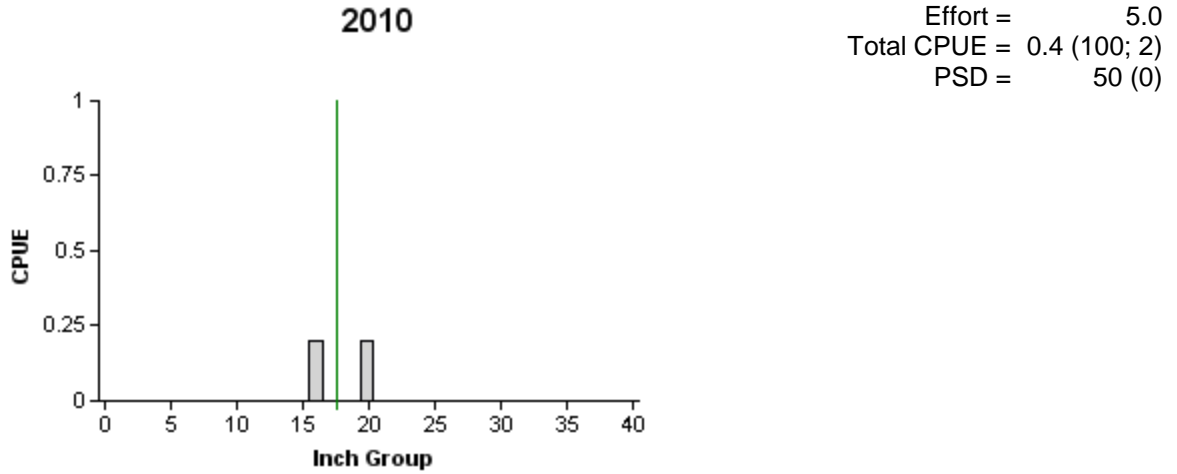


Figure 6. Length frequency of harvested Channel Catfish observed during creel survey at Alan Henry Reservoir, Texas, March 2013 through May, 2013, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

Flathead Catfish



No Flathead Catfish were sampled in 2012

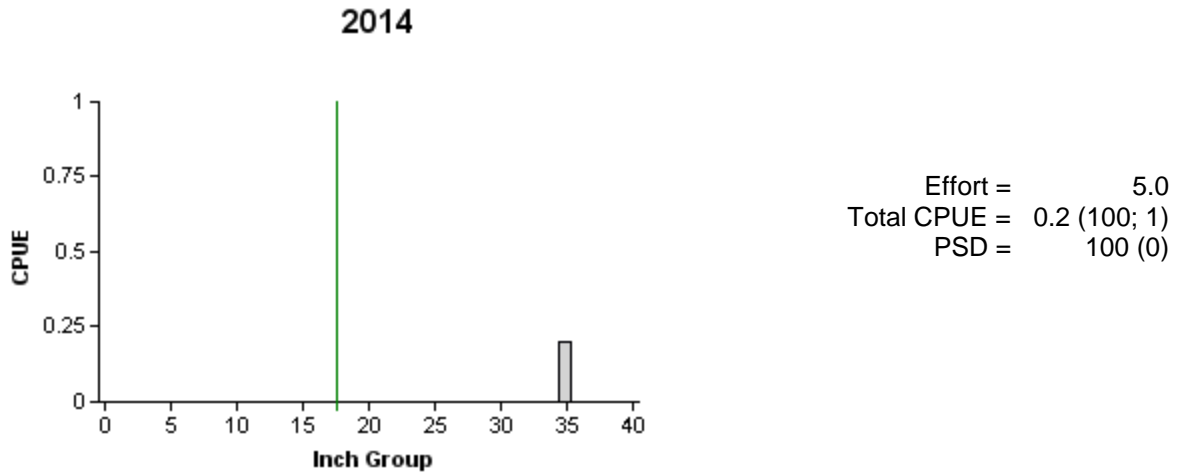
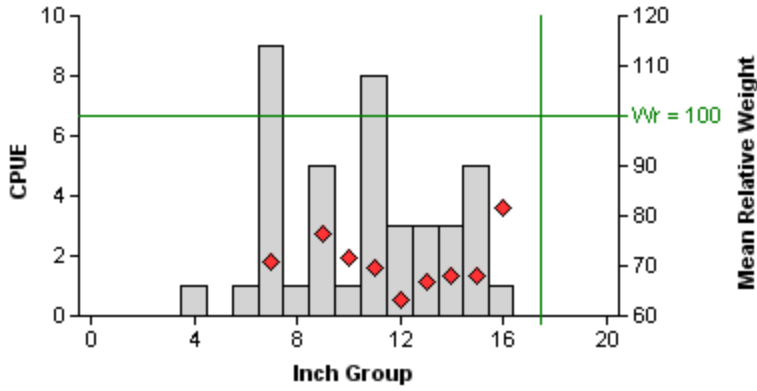


Figure 7. Number of Flathead Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Alan Henry Reservoir, Texas, 2010, 2012, and 2014. Vertical line indicates a minimum length limit of 18 inches, and horizontal line represents a relative weight of 100.

Alabama Bass

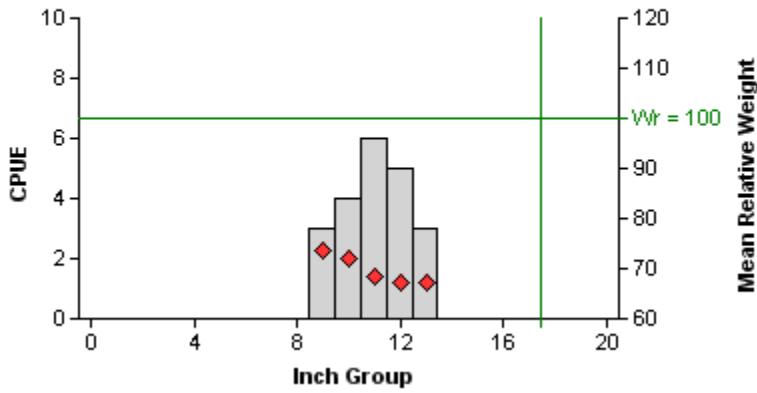
2011

Effort = 1.0
 Total CPUE = 41.0 (25; 41)
 PSD = 59 (9)



2012

Effort = 1.0
 Total CPUE = 21.0 (42; 21)
 PSD = 67 (9)



2013

Effort = 1.0
 Total CPUE = 12.0 (43; 12)
 PSD = 73 (17)

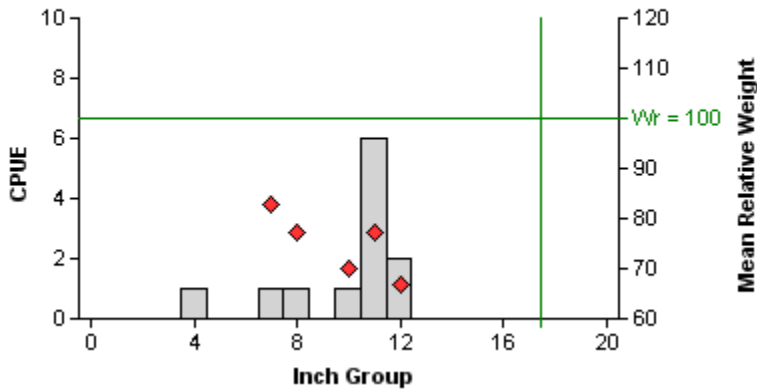


Figure 8. Number of Alabama Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2011, 2012, and 2013. Vertical line indicates length limit of 18 inches, and horizontal line represents a relative weight of 100.

Alabama Bass

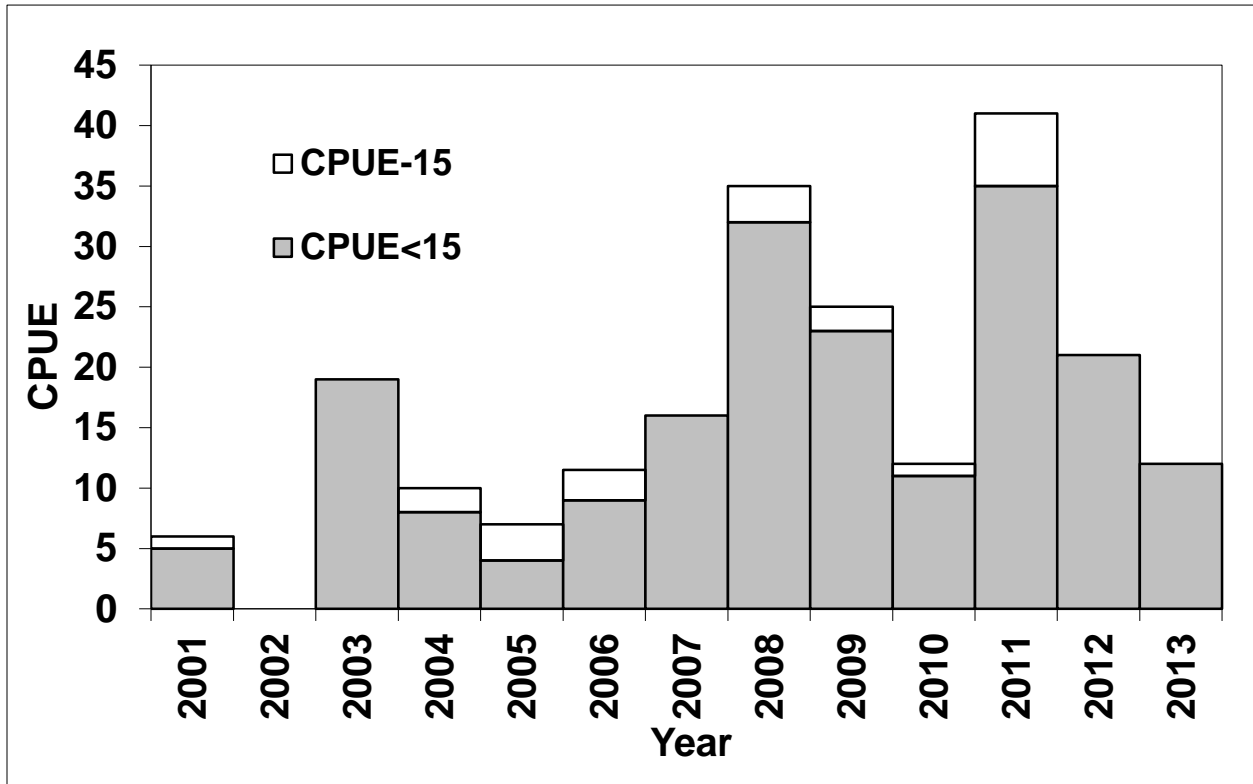


Figure 9. Number of Alabama Bass less than 15 inches caught per hour (CPUE<15, gray bars) and number of Alabama Bass greater than or equal to 15 inches caught per hour (CPUE-15, white bars) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2001 – 2013.

Table 9. Creel survey statistics for Alabama Bass at Alan Henry Reservoir from March through May, 2009, 2011, and 2013, where total catch per hour is for anglers targeting Alabama Bass and total harvest is the estimated number of Alabama Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistics	2009	2011	2013
Directed effort (h)	74 (191)	133 (100)	70 (167)
Directed effort/acre	0.03 (191)	0.05 (100)	0.02 (167)
Total catch per hour	0.00 (0)	0.45 (0)	0.00 (0)
Total catch	4,772 (39)	9,468 (26)	13,625 (29)
Total harvest	75.1 (90)	198 (86)	313 (17)
Harvest/acre	0.03 (90)	0.07 (86)	0.01 (17)
Percent legal released	2.7	1.2	0.5*

*Alabama Bass harvest regulation changed from 18 inch minimum length to no minimum length on September 1, 2011. To maintain consistency with data an 18 inch minimum length limit was used to calculate percent legal released in 2013.

Alabama Bass

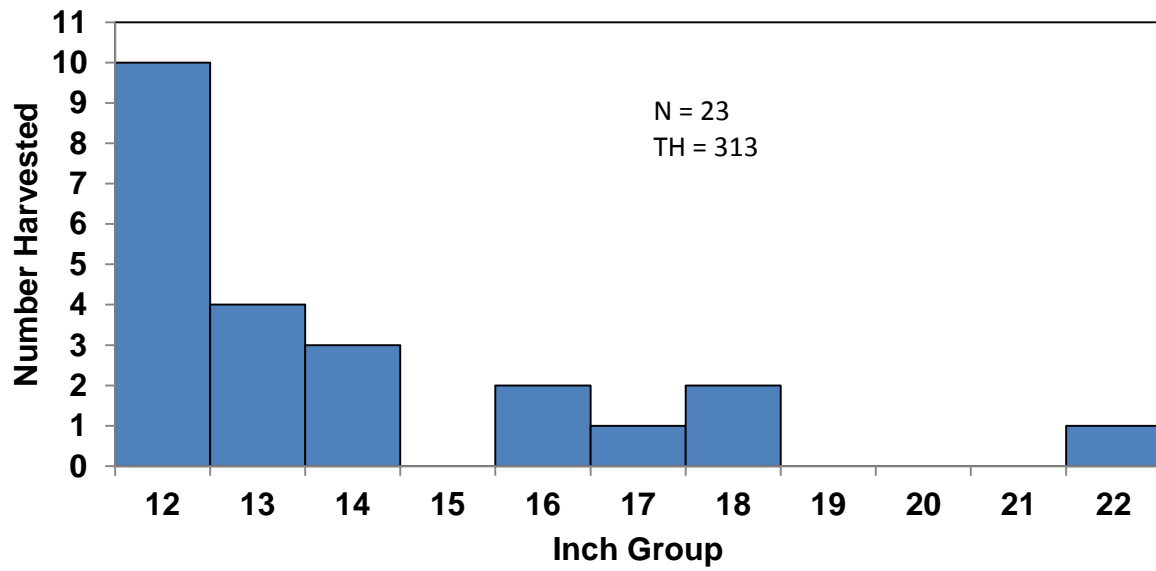
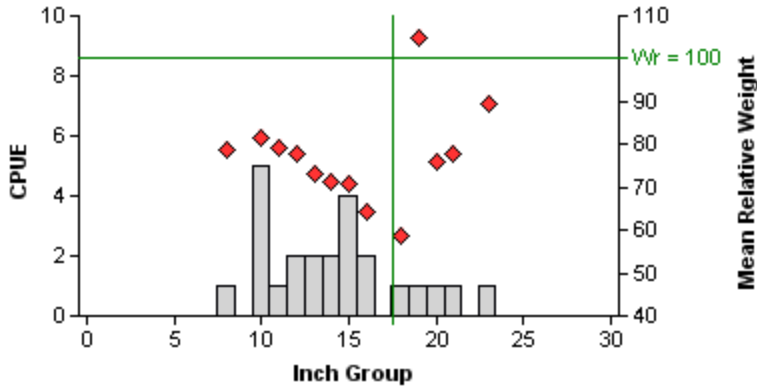


Figure 10. Length frequency of harvested Alabama Bass observed during creel survey at Alan Henry Reservoir, Texas, March, 2013 through May, 2013, all anglers combined. N is the number of harvested Alabama Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

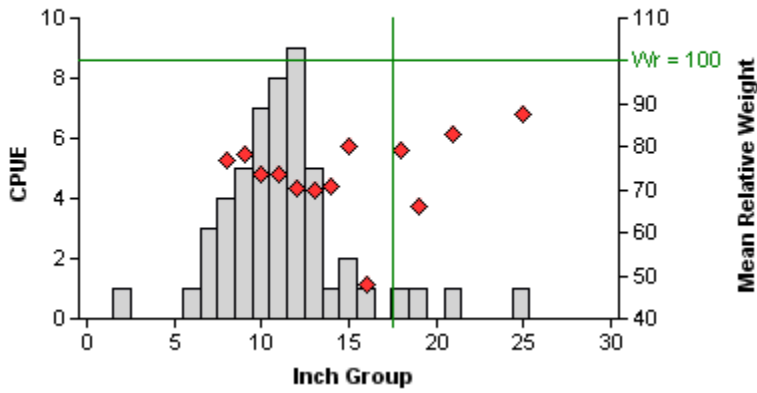
Largemouth Bass

2011



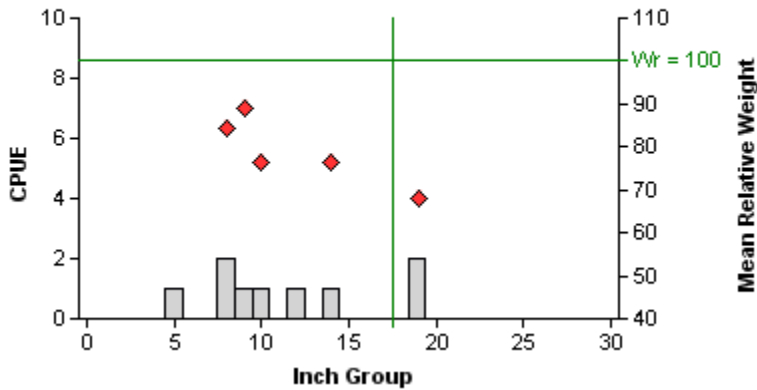
Effort = 1.0
 Total CPUE = 24.0 (27; 24)
 Stock CPUE = 24.0 (27; 24)
 CPUE-18 = 5.0 (46; 5)
 PSD = 71 (8)

2012



Effort = 1.0
 Total CPUE = 51.0 (20; 51)
 Stock CPUE = 46.0 (19; 46)
 CPUE-18 = 4.0 (43; 4)
 PSD = 48 (6)

2013



Effort = 1.0
 Total CPUE = 9.0 (37; 9)
 Stock CPUE = 8.0 (43; 8)
 CPUE-18 = 2.0 (67; 2)
 PSD = 50 (13)

Figure 11. 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, Alan Henry Reservoir, Texas, 2011, 2012, and 2013. Vertical line represents length of 18 inches, and horizontal line represents relative weight of 100.

Largemouth Bass

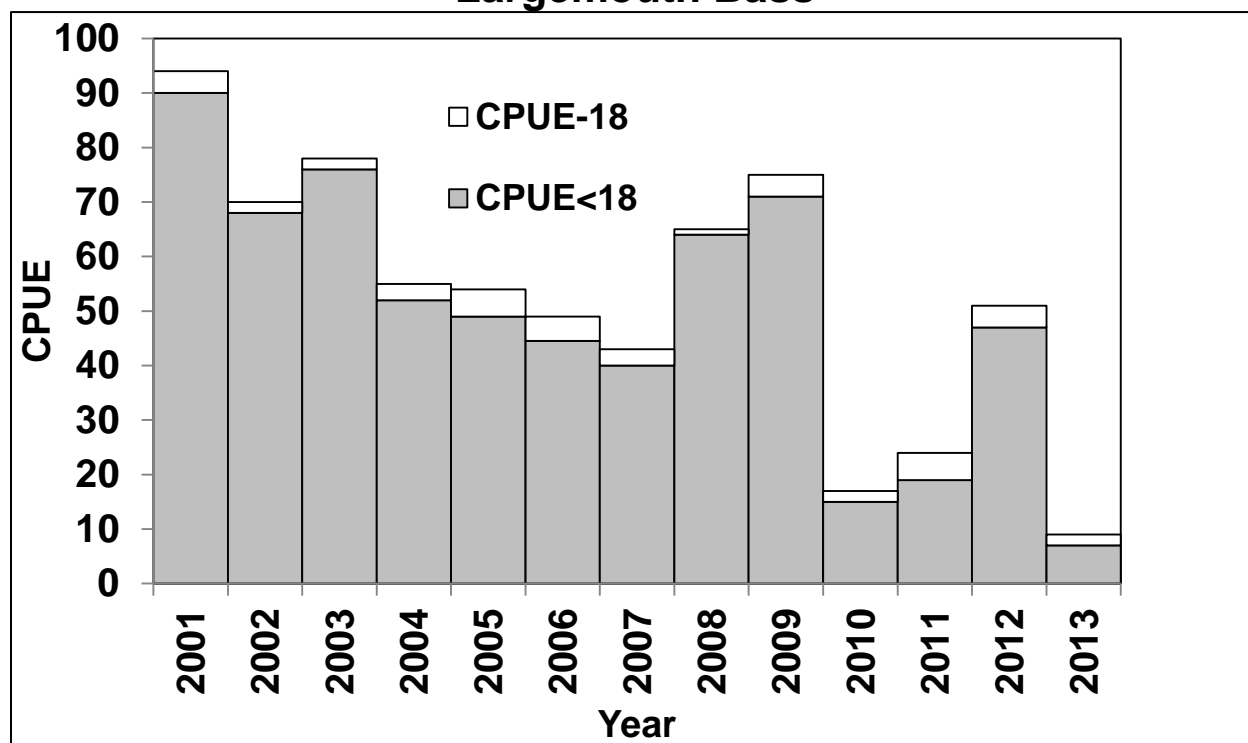


Figure 12. Number of Largemouth Bass less than 18 inches caught per hour (CPUE<18, bars) and number of Largemouth Bass greater than or equal to 18 inches caught per hour (CPUE-18, white bars) for fall electrofishing surveys, Alan Henry Reservoir, Texas, 2001 – 2013.

Table 10. Creel survey statistics for Largemouth Bass at Alan Henry Reservoir from March through May, 2009, 2011, and 2013, where total catch per hour is for anglers targeting Largemouth Bass and total harvest is the estimated number of Largemouth Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses

Creel Survey Statistics	2009	2011	2013
Directed effort (h)	20,947 (20)	12,382 (23)	8,681 (30)
Directed effort/acre	7.3 (20)	4.29 (23)	3.01 (30)
Total catch per hour	0.39 (13)	0.34 (0)	0.16 (27)
Total catch	17,931 (27)	8,019 (22)	6,667 (31)
Total harvest*	26 (32)	1,231 (41)	187 (53)
Harvest/acre	0.01 (32)	0.43 (41)	0.06 (53)
Percent legal released	14.3	8.5	5.6

*Largemouth Bass harvest regulation changed from 18 inch minimum length to no minimum length on September 1, 2002. To maintain consistency with data an 18 inch minimum length limit was used to calculate percent legal released.

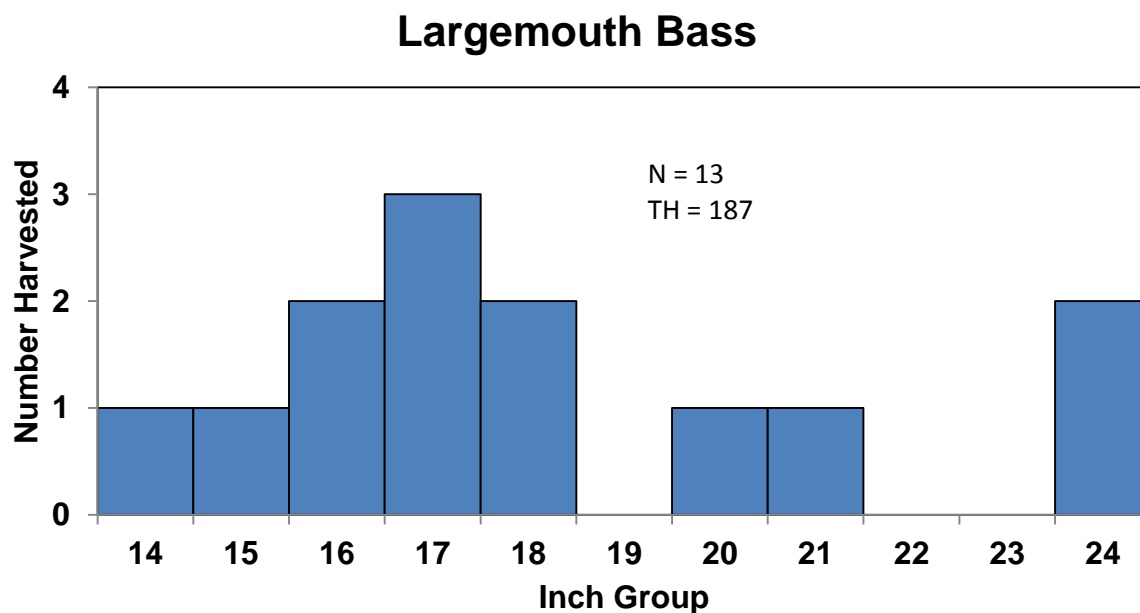


Figure 13. Length frequency of harvested Largemouth Bass observed during creel survey at Alan Henry Reservoir, Texas, March, 2013 through May, 2013, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

White Crappie

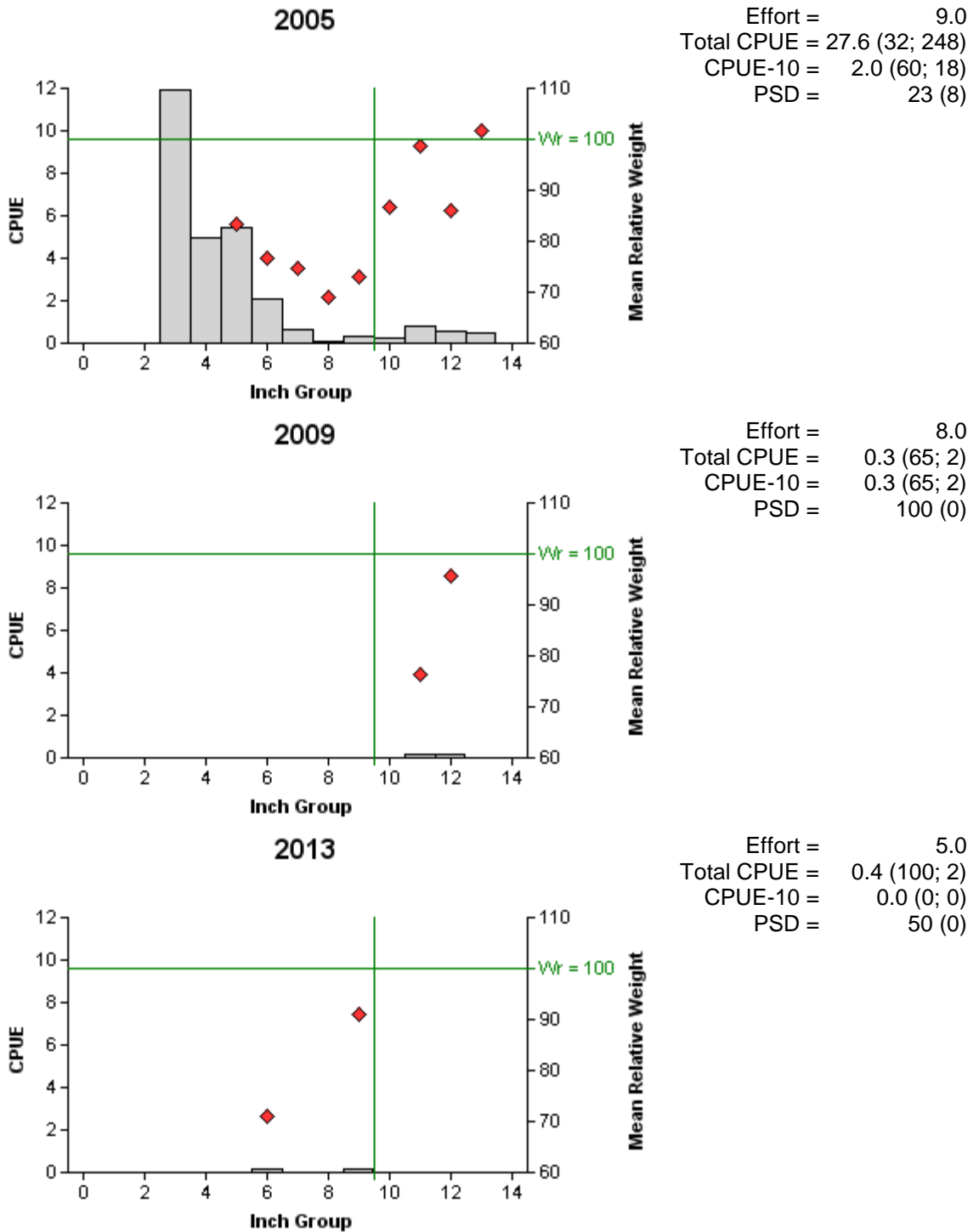


Figure 14. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Alan Henry Reservoir, Texas, 2005, 2009, and 2013. Randomly selected sites were used in the 2009 survey and biologist selected sites were used in the 2005 and 2013 surveys. Vertical line represents length of 10 inches, and horizontal line represents relative weight of 100.

Table 11. Creel survey statistics for White Crappie at Alan Henry Reservoir from March, 2009 through May, 2009, 2011, and 2013, where 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 Statistics	2009	2011	2013
Directed effort (h)	7,628 (23)	3,186 (28)	7,111 (28)
Directed effort/acre	2.65 (23)	1.11 (28)	2.47 (28)
Total catch per hour	0.30 (42)	0.41 (20)	0.27 (32)
Total catch	4,700 (33)	2,308 (35)	2,958 (37)
Total harvest	1,520 (35)	836 (41)	1,115 (51)
Harvest/acre	0.53 (35)	0.29 (41)	0.39 (51)
Percent legal released	7.5	15.9	19.8

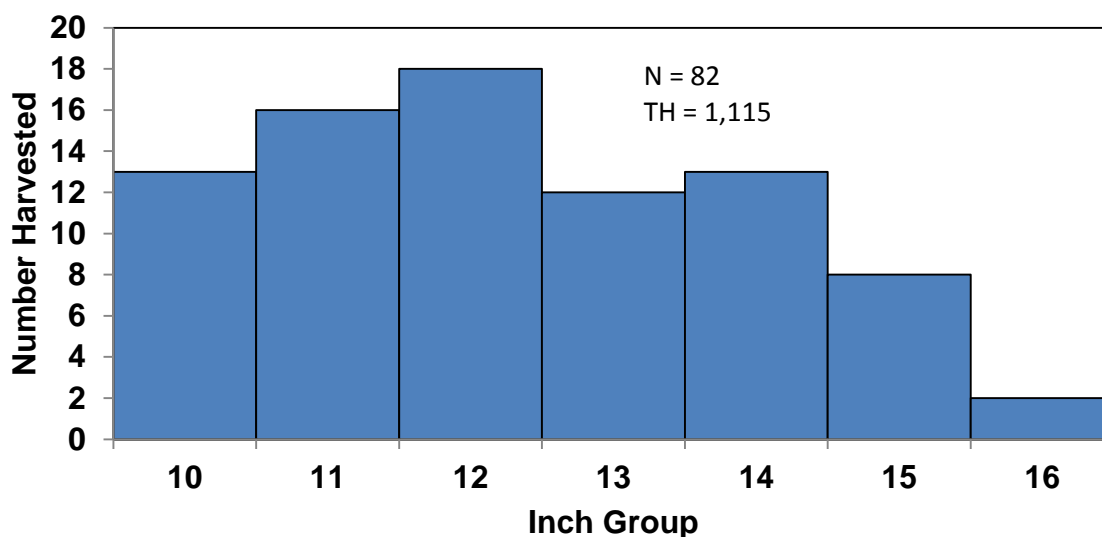


Figure 15. Length frequency of harvested White Crappie observed during creel survey at Alan Henry Reservoir, Texas, March, 2013 through May, 2013, all anglers combined. N is the number of harvested White Crappie observed during the creel surveys, and TH is the total estimated harvest for the creel period.

Table 12. Proposed sampling schedule for Alan Henry 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. Spring electrofishing surveys will also be conducted in 2015 and 2017. Standard survey denoted by S and additional survey denoted by A.

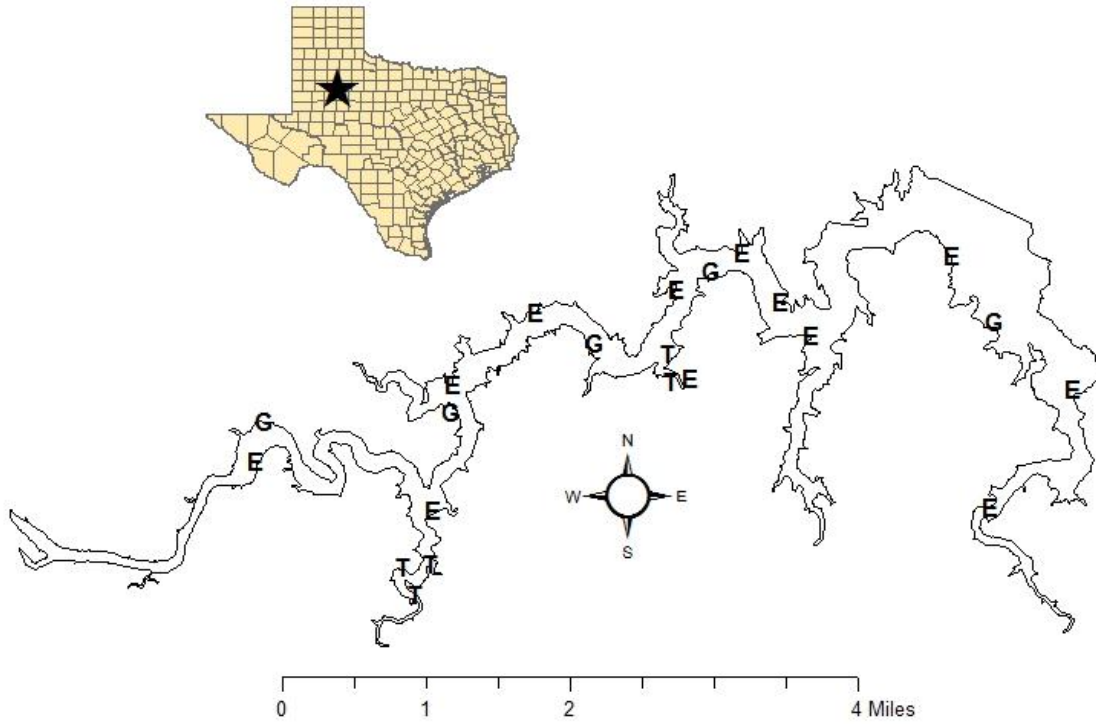
Survey Year	Electrofishing	Trap Net	Gill Net	Creel Survey	Report
Fall 2014-Spring 2015	A			A	
Fall 2015-Spring 2016	A				
Fall 2016-Spring 2017	A			A	
Fall 2017-Spring 2018	S	A	S		S

APPENDIX A

Number (N) and catch-per-unit-effort (CPUE) of all target species collected from all gear types from Alan Henry Reservoir, Texas, 2013-2014. Sampling effort was 1 h for electrofishing, 5 net nights for gill nets, and 5 net nights for trap nets.

Species	Electrofishing		Gill Netting		Trap Netting	
	N	CPUE	N	CPUE	N	CPUE
Longnose Gar			13	2.6		
Gizzard Shad	49	49.0	18	3.6		
Common Carp	7	7.0				
River Carpsucker			13	2.6		
Blue Catfish			1	0.2		
Channel Catfish	1	1.0	6	1.2		
Flathead Catfish			1	0.2		
Green Sunfish	2	2.0				
Bluegill	1	1.0			3	0.6
Alabama Bass	12	12.0	10	2.0		
Largemouth Bass	9	9.0	6	1.2		
White Crappie			4	0.8	2	0.4
Freshwater Drum	2	2.0				

APPENDIX B



Location of sampling sites, Alan Henry Reservoir, Texas, 2013-2014. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was approximately 14 feet below conservation pool at time of sampling.