

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

O. H. Ivie Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in O. H. Ivie Reservoir were surveyed in 2013 using electrofishing and trap netting, and in 2014 using gill netting. Anglers were interviewed from June 2010 to May 2013 during a creel survey. 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:** O. H. Ivie Reservoir is a 19,200-acre impoundment, when full, and is located on the Colorado and Concho Rivers in Concho, Runnels, and Coleman counties, Texas, approximately 55 miles east of San Angelo. Water level fluctuations are common; the reservoir was approximately 43 feet below conservation pool during the 2013-2014 sampling period. In April 2014, reservoir surface area totaled 3,142 acres. Habitat features consisted of standing timber, rocks, and flooded saltcedar.
- **Management History:** Important sport fish include Largemouth Bass, White Bass, White Crappie, and catfishes. Annual electrofishing and creel surveys have been conducted since 2001 to evaluate the effectiveness of the 2001 Largemouth Bass length limit change (from 18-inch minimum length and 5-fish bag to a 5-fish bag, 2 of which may be <18 inches). Annual aquatic vegetation surveys have been conducted to monitor changes in hydrilla coverage. A variety of fish species have been stocked in the reservoir including Threadfin Shad; Bluegill; Channel, Blue and Flathead Catfishes; Florida Largemouth Bass; Smallmouth Bass; White Crappie; and Walleye. Walleye stockings were discontinued after failing to produce a fishery.
- **Fish Community**
 - **Prey species:** Gizzard shad increased from the previous two samples, but Bluegill decreased. Approximately two thirds of Gizzard Shad were available to existing predators. Threadfin Shad continued to be present in the reservoir. A low percentage of anglers targeted Bluegill.
 - **Catfishes:** Blue Catfish gill netting catch rate was much higher in 2014 than in previous surveys, whereas Channel Catfish gill netting catch rate was lower. Flathead Catfish were present in low abundance. Directed effort by anglers was much higher for Channel Catfish than for Blue Catfish; however the creel survey did not account for trotline/jugline anglers that utilize the reservoir. Most legal-sized Channel Catfish that anglers caught were harvested.
 - **White Bass:** White Bass gill netting catch rate, size structure, and body condition were good in 2014 and better than in previous surveys. Angler catch rate was also higher than in the past. White Bass up to 17 inches in length were documented in the creel survey.
 - **Largemouth Bass:** Largemouth Bass electrofishing catch rate in 2013 was slightly less than the 15-year average of 71/h. Body condition was slightly better in 2013 than in the previous two years. Electrofishing catch rate of 18-inch-plus fish was low. The majority of O. H. Ivie anglers targeted Largemouth Bass, and the percentage of legal-size fish released was high.
 - **Smallmouth Bass:** Very few Smallmouth Bass have been collected in recent electrofishing surveys and no anglers targeted them specifically during this survey period. However, anglers have reported catching a few Smallmouth Bass in recent creel surveys.
 - **White Crappie:** Trap netting CPUE of White Crappie was higher in 2013 than in previous years, and more legal-sized crappie were available to anglers.
- **Management Strategies:** Remove special harvest regulation on Smallmouth Bass. Collect additional information on catfish and catfish anglers using non-traditional surveys. Work with authorities to prevent spread of invasive species in O. H. Ivie Reservoir. Conduct electrofishing and trap netting surveys in 2015/2016 and 2017/2018, and gill netting and vegetation surveys in 2017/2018.

INTRODUCTION

This document is a summary of fisheries data collected from O. H. Ivie 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 with the 2013-2014 data for comparison.

Reservoir Description

O. H. Ivie Reservoir is a 19,200-acre impoundment, when full, and was constructed in 1990 on the Colorado and Concho rivers. It is located in Concho, Runnels, and Coleman counties approximately 55 miles east of San Angelo and is operated and controlled by the Colorado River Municipal Water District (CRMWD). Primary water uses included municipal water supply and recreation. O. H. Ivie Reservoir was eutrophic with a mean TSI chl-*a* of 47.26, which was higher than previous samples (Texas Commission on Environmental Quality 2011). Habitat at time of sampling consisted of rocks, flooded timber, and saltcedars. Historically, native aquatic plants have been documented in the reservoir. Hydrilla, a non-native, was first discovered in O. H. Ivie Reservoir in 1997. The water level remained near conservation pool elevation from impoundment in 1990 through 1998, but declined 26 feet from May 1998 to November 2004. Water level increased in 2005 and 2007, but has declined since. The reservoir was 43 feet below conservation pool during the 2013-2014 sampling period (Figure 1) and surface acreage was slightly over 3,000. A large rain event in late May 2014 brought the surface acreage to 5,175. Other descriptive characteristics for O. H. Ivie Reservoir are in Table 1.

Angler Access

Boat access consisted of four public boat ramps and several private boat ramps. Three public ramps and all private ramps were unavailable to anglers in 2013 because the end of the boat ramp was out of water. Extensions of these ramps are unfeasible according to CRMWD. The May 2014 rain event caused two of the closed public ramps to become available again. Additional boat ramp characteristics are in Table 2. Shoreline access is restricted to CRMWD parks.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Farooqi et al. 2010) included:

1. Conduct annual electrofishing surveys through 2013 to monitor Largemouth Bass population trends following the 2001 length limit change and conduct Category 4 Largemouth Bass age collection in 2013 to facilitate population modeling.
Action: Annual electrofishing surveys were conducted through 2013. Age and growth analysis was postponed due to the likely overriding effects of fluctuating water level on the population.
2. Conduct annual aquatic vegetation surveys and recommend treatment if necessary.
Action: Aquatic vegetation surveys were conducted in August 2010 through 2013 to monitor coverage of hydrilla. No treatment was necessary.
3. Conduct annual creel surveys through 2013.
Action: Creel surveys were conducted from June 2010 through May 2013.

Harvest regulation history: From 1990 to 2001, Largemouth Bass were managed with an 18-inch minimum length limit (MLL). The MLL was changed in 2001 to no length limit, but only two <18 inches could be kept per day. The latter was implemented to alleviate stockpiling and improve growth of Largemouth Bass measuring 14 to 18 inches. Smallmouth Bass have been managed with an 18-inch MLL. Current regulations are in Table 3.

Stocking history: The majority of Florida Largemouth Bass stockings were carried out between 1989 and

2001. The last stocking was in 2012. Threadfin Shad; Blue, Channel, and Flathead Catfish; Bluegill; Smallmouth Bass; and White Crappie were introduced in 1990. Walleye were stocked 3 times from 1991 to 1994, but failed to produce a fishery. The complete stocking history is in Table 4.

Vegetation/habitat management history: O. H. Ivie Reservoir has supported a mix of aquatic vegetation species. Hydrilla was first discovered in O. H. Ivie Reservoir in 1997, and has remained in varied amounts since. No attempts have been made to control this invasive species since fluctuating water levels have kept it within an acceptable amount of coverage in most years, and it has yet to impact boater access.

Water transfer: O. H. Ivie Reservoir is primarily used for municipal water supply for the cities of Midland, San Angelo, and Abilene, Texas and several smaller communities. Colorado River Municipal Water District is the controlling authority and supplier to these municipalities. Two permanent pump stations move water to the cities' treatment plants via pipeline. No interbasin water transfers are known to occur.

METHODS

Fish were collected by electrofishing (1.5 hours at 18, 5-min stations), gill netting (5 net nights at 5 stations), and trap netting (10 net nights at 10 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 survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

An annual access-point creel survey was conducted during daylight hours from June 2010 to May 2013; the survey targeted rod-and-line anglers only. Angler interviews were conducted on 5 weekend days and 4 weekdays per quarter to assess angler use and fish catch/harvest statistics in accordance with the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

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

Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Micro-satellite DNA analysis was used to determine genetic composition of individual fish.

A vegetation survey using the random-point method was conducted annually from 2010 to 2013 according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

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

RESULTS AND DISCUSSION

Habitat: A structural habitat survey was last conducted in 2009 (Farooqi *et al.* 2010) and no significant human alterations have been made to the shoreline since that survey. O. H. Ivie Reservoir supported a mix of aquatic vegetation species until 2011; dropping water level corresponded with a lack of aquatic vegetation in 2012 and 2013 surveys (Table 5).

Creel: Directed fishing effort by anglers from June 2012 to May 2013 was highest for Largemouth Bass (69%), followed by anglers fishing for anything (11%), and White Crappie (10%) (Table 6). Total fishing

effort for all species at O. H. Ivie Reservoir was 68,634 h, and anglers spent an estimated \$712,220 on directed expenditures (Table 7). Anglers traveled from eight different states and many zip codes during the survey years, especially in 2010-2011 when 163 different zip codes were reported in the creel survey. There were 129 and 99 zip codes reported in 2011-2012 and 2012-2013, respectively.

Prey species: Electrofishing CPUE of Gizzard Shad in 2013 was 275.3/h. Index of vulnerability for Gizzard Shad was 69, indicating that approximately two thirds were available to existing predators. This statistic has increased over the past several years (Figures 2, 3). Total CPUE of Gizzard Shad more than doubled from 2012 to 2013 (Figure 3).

Electrofishing CPUE of Bluegill in 2013 was 74.7/h, which was lower than 2010-2012 (Figures 4, 5). Size structure shifted slightly towards more large fish by 2013 (Figure 5).

Directed angler effort for Bluegill was very low (Table 8). Total catch per angler-hour ranged from 0.50 to 1.72. Harvest was also very low (Table 8), and anglers harvested Bluegill that were 6 to 8 inches in length. All of the creel data for Bluegill were extremely variable and based on very small sample sizes.

Blue Catfish: Gill netting CPUE of Blue Catfish was 5.4/nn in 2014, much higher than in 2006 (0.3/nn) and 2010 (0.6/nn; Figure 6). Fish up to 29 inches in length were collected in 2014.

Rod-and-reel angling effort directed towards Blue Catfish was low in 2012-2013 (149 h; RSE = 113), and previous years showed even less directed effort (17 h in 2011-2012 and 0 h in 2010-2011). Low sample size precludes any useful creel statistics. However, anecdotal reports from anglers indicate that a substantial trotline/jugline fishery may exist.

Channel Catfish: The gill net CPUE of Channel Catfish was low in 2014 (0.6/nn), similar to 2006 and 2010 (Figure 7). The largest fish captured in 2014 gill nets was 17 inches in length.

Directed rod-and-reel fishing effort for Channel Catfish was 2,265 h in 2013 (Table 9); this was similar to previous years, and considerably higher than directed rod-and-reel effort for Blue Catfish. Total harvest ranged from 0.06/acre to 0.10/acre (Table 9). A low percentage of legal-sized Channel Catfish were released by anglers (6% to 13%). Harvested fish ranged in length from 12 to 27 inches (Figure 8).

Flathead Catfish: This species was present in the reservoir in low numbers. Total gill netting CPUE for Flathead Catfish was 0.1/nn in 2006, 0.2/nn in 2010, and 0.6/nn in 2014. In 2012-2013, rod-and-reel anglers spent 65 h (RSE = 167) pursuing Flathead Catfish, but there was no directed effort towards this species recorded in 2011-2012 or 2010-2011. Anecdotal reports from anglers indicate that a trotline/jugline fishery exists.

White Bass: The White Bass population improved on several fronts in 2014 compared to 2010 and 2006. Total CPUE increased from 3.1/nn (2006) to 4.7/nn (2010) to 8.0/nn (2014; Figure 9). Size structure shifted towards more large fish as shown by PSD = 88 in 2014 (Figure 9). More fish were available to be legally harvested, as CPUE-10 increased from 1.5/nn (2006) to 3.1/nn (2010) to 6.8/nn (2014). Also, fish body condition (indicated by W_t) improved overall (Figure 9).

Angler catch rate increased substantially in 2012-2013 compared to previous years (Table 10). Directed effort was 3,646 h in 2014, higher than effort in 2011-2012 (2,452 h) and lower than 2010-2011 (5,845 h). Just over half (55%, Table 10) of legal-sized White Bass were released after they were caught. Harvested White Bass observed in the creel surveys ranged from 10 to 17 inches in length (Figure 10).

Largemouth Bass: Electrofishing CPUE of Largemouth Bass in 2013 (63.3/h, Figure 12), was similar to 2011 (60.0, Figure 11) and slightly lower than O. H. Ivie's 15-year average (71/h). Electrofishing CPUE in 2010 was much higher (146.5/h), mostly due to the abundance of 3-inch bass in the sample (Figure 11). Total CPUE was lower in 2012 (22.7/h), along with CPUE of stock-sized bass (14.0/h, Figure 12). However, larger fish made up a greater proportion of the 2012 sample (PSD = 86, Figure 12). At the time of

the 2012 electrofishing survey the reservoir had just experienced a sharp rise of 14 vertical feet in a late-September flash flood event (Figure 1). This may have caused an artificially low catch rate of Largemouth Bass, as lots of newly-inundated brush made it difficult to reach shallow areas in the electrofishing boat.

Mean relative weights rose slightly in 2013 versus the previous year (Figure 12). Over the past nine years, mean relative weights below 90 were common for all size categories, with the exception of 2005 and 2007 when all size categories had mean relative weights between 90 and 106, and in 2010 and 2011 when 8-11.9 inch bass had mean relative weights between 92 and 96 (Figure 13). The reservoir experienced rising or steady water level in spring 2005, 2007, and 2010, whereas all other spring seasons during this time saw dropping water level (Figure 1). It appears that the sustained higher water levels in 2005 and 2007 benefitted body condition across the entire population, and the shorter-term, steady water level of spring 2010 benefitted the smaller sizes of bass.

The beneficial effect of spring 2010 can also be seen in the abnormally high catch rate of sub-stock-length bass in the fall 2010 electrofishing sample (Figure 11), as well as the phenomenal 2009-2010 ShareLunker season. Between January and April 2010, there were 11 entries into the ShareLunker program (each entry weighed over 13 lbs) from O. H. Ivie, including a new 16.08-lb lake record.

Largemouth Bass in O. H. Ivie were highly influenced by Florida Largemouth Bass genetics (85% Florida alleles), although the percentage of pure Florida Largemouth Bass has declined since 2004 (Table 11).

Creel statistics showed high directed angling effort towards Largemouth Bass in each year, ranging from 47,849 to 122,971 h. In 2010-2011 and 2012-2013, most of the black bass angling effort was by non-tournament anglers; in 2011-2012 the effort was about the same for both bass angler types (Table 12). Angler catch rate was 0.2-0.3/h in each year. Non-tournament harvest of Largemouth Bass was low, ranging from 0.02 to 0.03/acre.

Although angling effort was higher in 2010/2011, more Largemouth Bass were caught and released by both tournament and non-tournament anglers in 2011/2012, especially fish less than 4 lbs (Table 12) or under 21 inches (Figure 14).

Tournament anglers retained bass from 10 to 28 inches in length, and number of fish weighed-in was estimated between 2,430 to 4,588 fish in each year (Figure 14). Non-tournament anglers harvested an estimated 622 fish in 2010-2011, 318 fish in 2011-2012, and 663 fish in 2012-2013. These fish were between 12 and 23 inches in length (Figure 15).

Smallmouth Bass: Smallmouth Bass were stocked in 1990 and have occasionally been encountered in surveys since then. None have been captured in TPWD surveys since fall 2010, when three Smallmouth Bass were caught in the electrofishing survey. Anglers did not specifically target Smallmouth Bass during the June to May creel surveys of 2010/2011, 2011/2012, and 2012/2013, but they did catch some (N = 148, RSE = 592; N = 64, RSE 568, and N = 149, RSE =418, respectively). The current lake record fish, weighing 5.32 lbs, was caught in 2009.

White Crappie: Trap net CPUE of White Crappie was 4.8/nn in 2013, which was higher than in 2009 and similar to 2011 (Figure 16). Also, CPUE of stock-size and legal-size fish slightly increased over that time period (Figure 16). Size structure in 2013 was good (PSD = 79, Figure 16), and crappie up to 13 inches in length were collected. Mean relative weights were mostly above 90 in fall 2013, indicating good body condition.

Crappie was one of the most popular sport fish species among O. H. Ivie anglers (Table 6). Anglers spent an estimated 6,941 h fishing for crappie at O. H. Ivie Reservoir in 2012-2013, which was higher than 2011-2012 and about the same as 2010-2011 (Table 13). Catch per hour was highest in 2012-2013 as well (1.3; Table 13). Anglers harvested most of the legal-sized fish they caught, with less than 10% being released each year (Table 13). Size of harvested White Crappie ranged from 10 to 16 inches in total length, and more 13-inch-plus fish were harvested in 2012-2013 than in the previous years (Figure 17). An estimated 4,504 White Crappie were harvested in 2012-2013.

Fisheries management plan for O. H. Ivie Reservoir, Texas

Prepared – July 2014.

ISSUE 1: Smallmouth Bass have been managed under an 18-inch MLL throughout the reservoir's history. This species maintains a small population in the reservoir; however, directed angler effort and catch rates for Smallmouth Bass are extremely low in creel surveys. Keeping this special restriction on Smallmouth Bass at O.H. Ivie is unwarranted since the fishery is minimal.

MANAGEMENT STRATEGY

1. Change the minimum length limit on Smallmouth Bass to the statewide regulation of 14 inches.

ISSUE 2: Anecdotal reports from O. H. Ivie anglers suggest that catfish populations may be more abundant and provide a more-popular fishery than what our traditional surveys suggest.

MANAGEMENT STRATEGIES

1. Collect additional data on Channel, Blue, and Flathead Catfish populations using non-traditional gears such as low-frequency electrofishing or jug-lines.
2. Collect data on passive-gear angling for catfish species at the reservoir with a special creel survey in 2017/2018.

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.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes electrofishing and trap netting in 2015/2016 and 2017/2018, and gill netting and special catfish creel survey in 2017/2018 (Table 13). Electrofishing and trap netting surveys are necessary every other year to monitor changes in abundance and size structure of the popular Largemouth Bass and White Crappie fisheries. Gill netting surveys are only necessary every four years at this point to ensure presence or absence of White Bass. Additional sampling using non-traditional gears for catfish will be conducted as determined.

LITERATURE CITED

- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- Farooqi, M., M. Scott and C. Bonds. 2010. Statewide freshwater fisheries monitoring and management program survey report for O.H. Ivie Reservoir, 2009. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.
- DiCenzo, V. J., M. J. Maceina, and M. R. Stimert. 1996. Relations between reservoir trophic state and Gizzard Shad population characteristics in Alabama reservoirs. *North American Journal of Fisheries Management* 16:888-895.
- Guy, C. S., R. M. Neumann, D. W. Willis, and R. O. Anderson. 1999. Proportional size distribution (PSD): a further refinement of population size structure index terminology. *Fisheries* 22 (7):348.
- Texas Commission on Environmental Quality. 2011. Trophic classification of Texas reservoirs; 2010 Texas water quality inventory and 303(d) list (November 18, 2011). 18 pp.
- United States Geological Survey (USGS). 2014. National water information system: Web interface. Available: <http://waterdata.usgs.gov/tx/nwis> (July 2014).

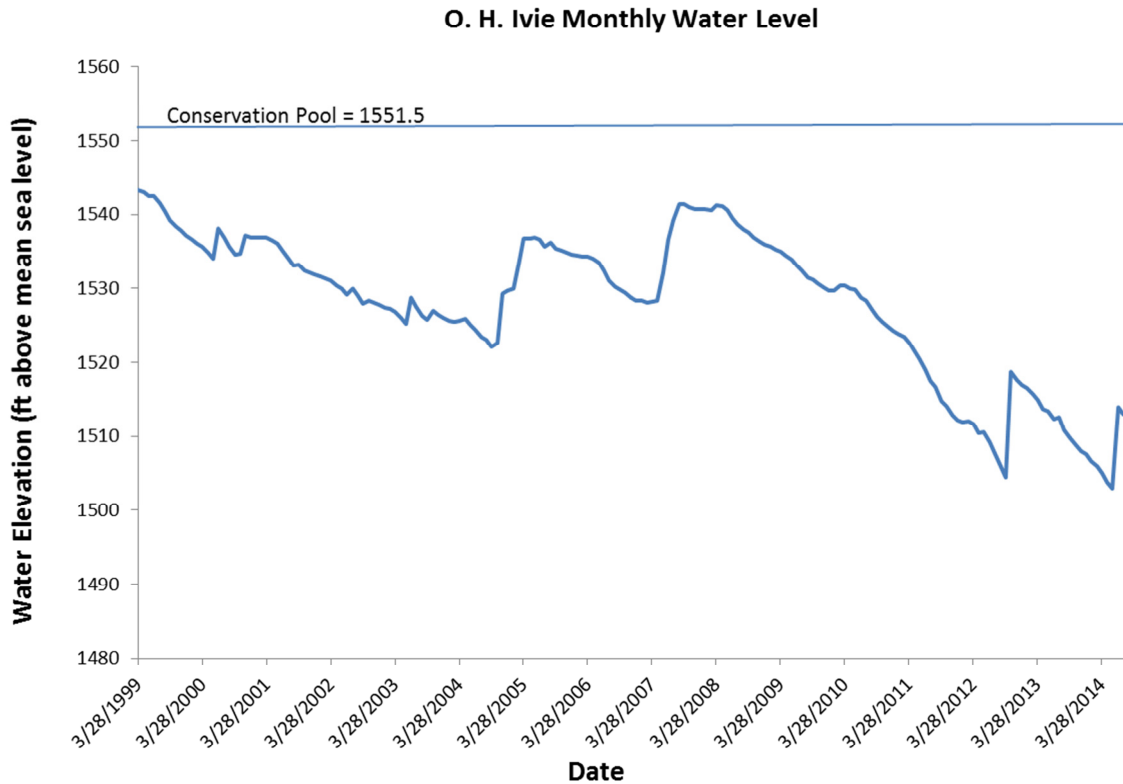


Figure 1. Monthly water level elevations in feet above mean sea level recorded for O. H. Ivie Reservoir, Texas (1999-2014).

Table 1. Characteristics of O. H. Ivie Reservoir, Texas.

Characteristic	Description
Year constructed	1990
Controlling authority	Colorado River Municipal Water District
Counties	Concho, Runnels, and Coleman
Reservoir type	Mainstream
Shoreline Development Index (SDI)	10.6
Conductivity	1,500-2,000 $\mu\text{S}/\text{cm}$

Table 2. Boat ramp characteristics for O. H. Ivie Reservoir, Texas, July 2014. Reservoir elevation at survey was 1513 feet above mean sea level.

Boat Ramp	Latitude Longitude (d° m' s)	Public	Parking Capacity (N)	Elevation at end of boat ramp (ft)	Condition
Kennedy	31° 31' 53.1 N 99° 38' 26.1 W	Y	110	1500	Good
Concho (west)	31° 33' 19.0 N 99° 42' 42.2 W	Y	110	1505	Good
Concho (southwest)	31° 33' 14.7 N 99° 42' 40.4 W	Y	(shared with Concho west)	1530	Out of water. Extension not feasible
Padgitt	31° 34' 36.1 N 99° 40' 42.1 W	Y	85	1504	Good

Table 3. Harvest regulations for O. H. Ivie 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, White	25	10 – inch minimum
Bass, Smallmouth	3	18 – inch minimum
Bass, Largemouth	5	No limit (2 may be < 18 inches)
Crappie: White and Black, their hybrids and subspecies	25 (in any combination)	10 – inch minimum

Table 4. Stocking history of O. H. Ivie Reservoir, Texas. FRY = ≤1 inch; FGL = fingerling (1-3 inches); ADL = adults.

Species	Year	Number	Size
Threadfin Shad	1990	300	ADL
Coppernose Bluegill	1990	332,548	FGL
Bluegill	1991	103,335	FGL
Blue Catfish	1990	194,510	FGL
	1991	192,381	FGL
	Total	386,891	
Channel Catfish	1990	195,561	FGL
	1991	194,875	FGL
	1996	250	ADL
	1999	250	ADL
	Total	390,936	
Flathead Catfish	1990	3,013	FRY
Smallmouth Bass	1990	120,802	FGL
Florida Largemouth Bass	1989	3,610	FGL
	1990	495,845	FRY
	1991	1,920,593	FGL
	1991	633	ADL
	1992	50	ADL
	1999	31,496	FGL
	1999	250	ADL
	2001	19,968	FGL
	2010	275,344 ¹	FGL
	2011	34,064 ²	FGL
	2012	3,271 ²	FGL
	Total	2,739,646	
White Crappie	1990	122,638	FGL
	1991	183,661	FGL
	Total	306,299	
Walleye	1991	2,495,000	FRY
	1992	860,000	FRY
	1994	400,000	FRY
	Total	3,755,000	

¹ 8,143 were ShareLunker offspring

² All were ShareLunker offspring

Table 5. Survey of aquatic vegetation, O. H. Ivie Reservoir, Texas, 2010-2013. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2010	2011	2012	2013
Native submersed*	1689 (17.8)	619 (10.5)	0 (0)	0 (0)
Non-native				
Hydrilla (Tier III)	2346 (24.8)	258 (4.4)	0 (0)	0 (0)

* Illinois pondweed, sago pondweed, marine naiad

Table 6. Percent directed angler effort by species for O. H. Ivie Reservoir, Texas, June 2010 – May 2013.

Species	2010/2011	2011/2012	2012/2013
Blue Catfish	0.0	0.1	0.2
Channel Catfish	1.0	2.7	3.3
White Bass	3.9	3.3	5.3
Bluegill	1.0	0.1	0.1
Black Bass	4.3	1.7	0.9
Largemouth Bass	77.8	85.0	68.9
White Crappie	5.2	1.6	10.1
Anything	6.8	5.6	11.1

Table 7. Total fishing effort (h) for all species and total directed expenditures at O. H. Ivie Reservoir, Texas, 2010-2013 Survey periods were from 1 June through 31 May. Relative standard error is in parentheses.

Creel statistic	2010/2011	2011/2012	2012/2013
Total fishing effort	149,842 (15)	74,337 (20)	68,634 (22)
Total directed expenditures	\$1,583,538 (21)	\$949,276 (25)	\$712,220 (32)

Gizzard Shad

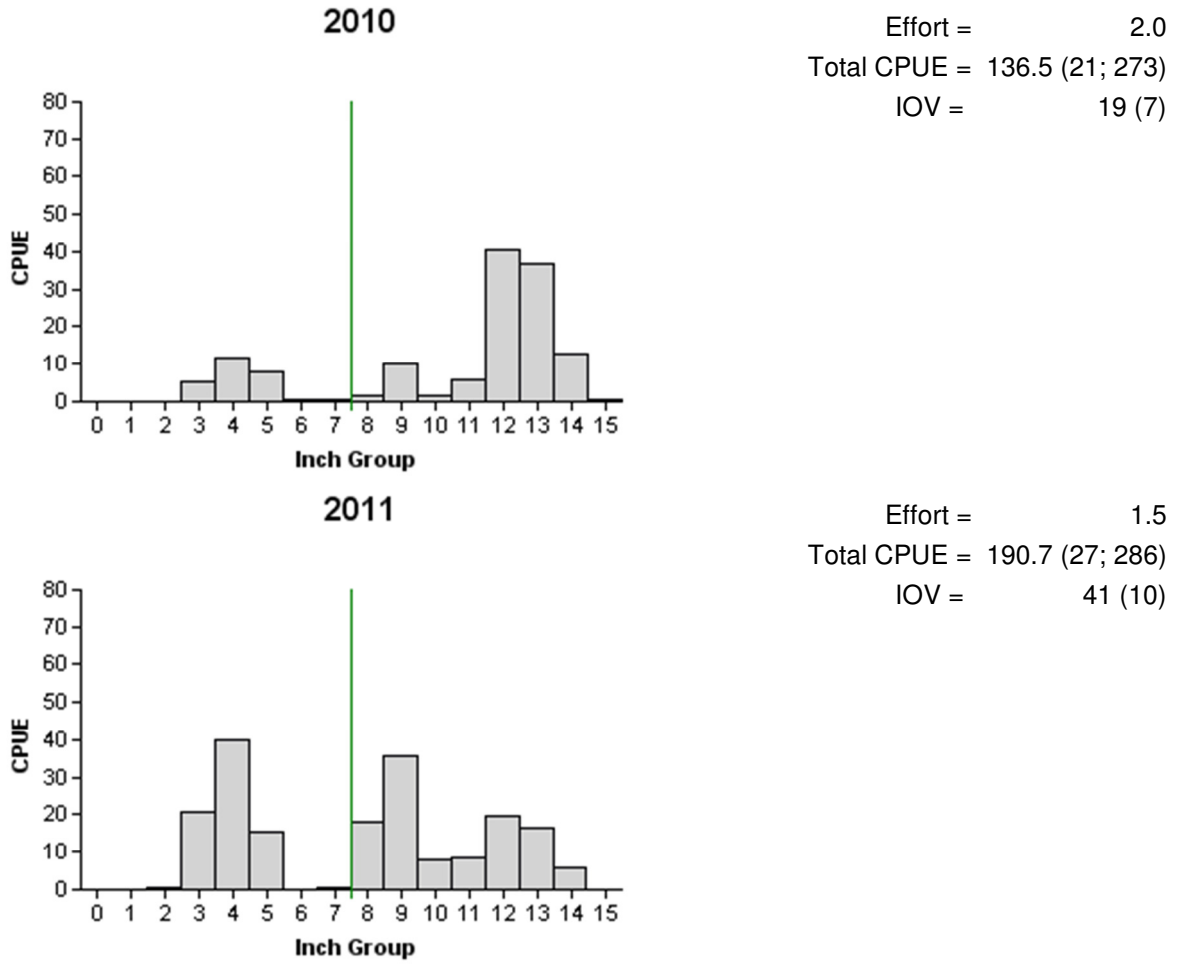
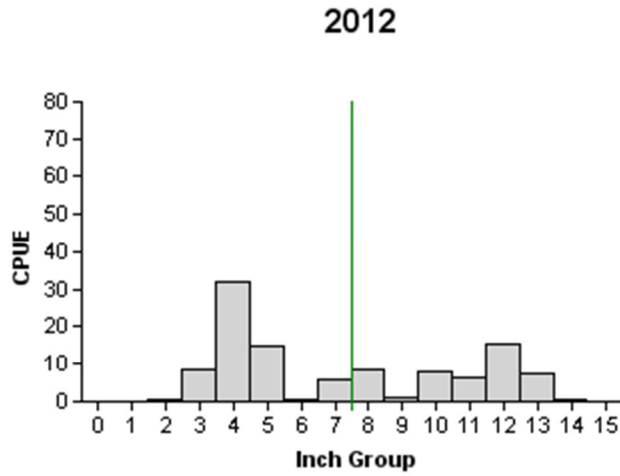
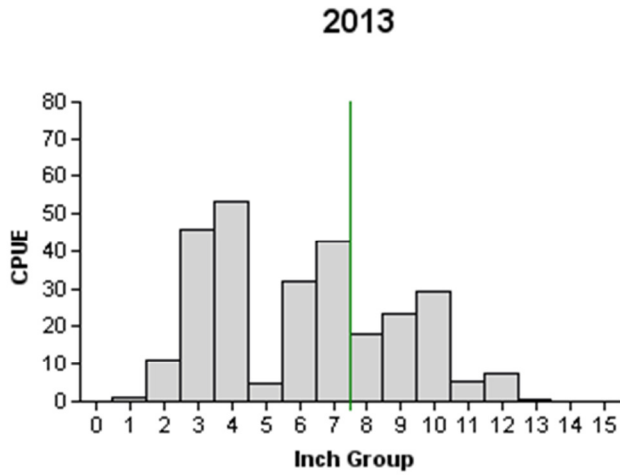


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, O. H. Ivie Reservoir, Texas, 2010 and 2011. Vertical line represents the size above which Gizzard Shad are not available as prey.

Gizzard Shad



Effort = 1.5
 Total CPUE = 111.3 (36; 167)
 IOV = 57 (20)



Effort = 1.5
 Total CPUE = 269.3 (27; 404)
 IOV = 71 (12)

Figure 3. 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, O. H. Ivie Reservoir, Texas, 2012 and 2013. Vertical line represents the size above which Gizzard Shad are not available as prey.

Bluegill

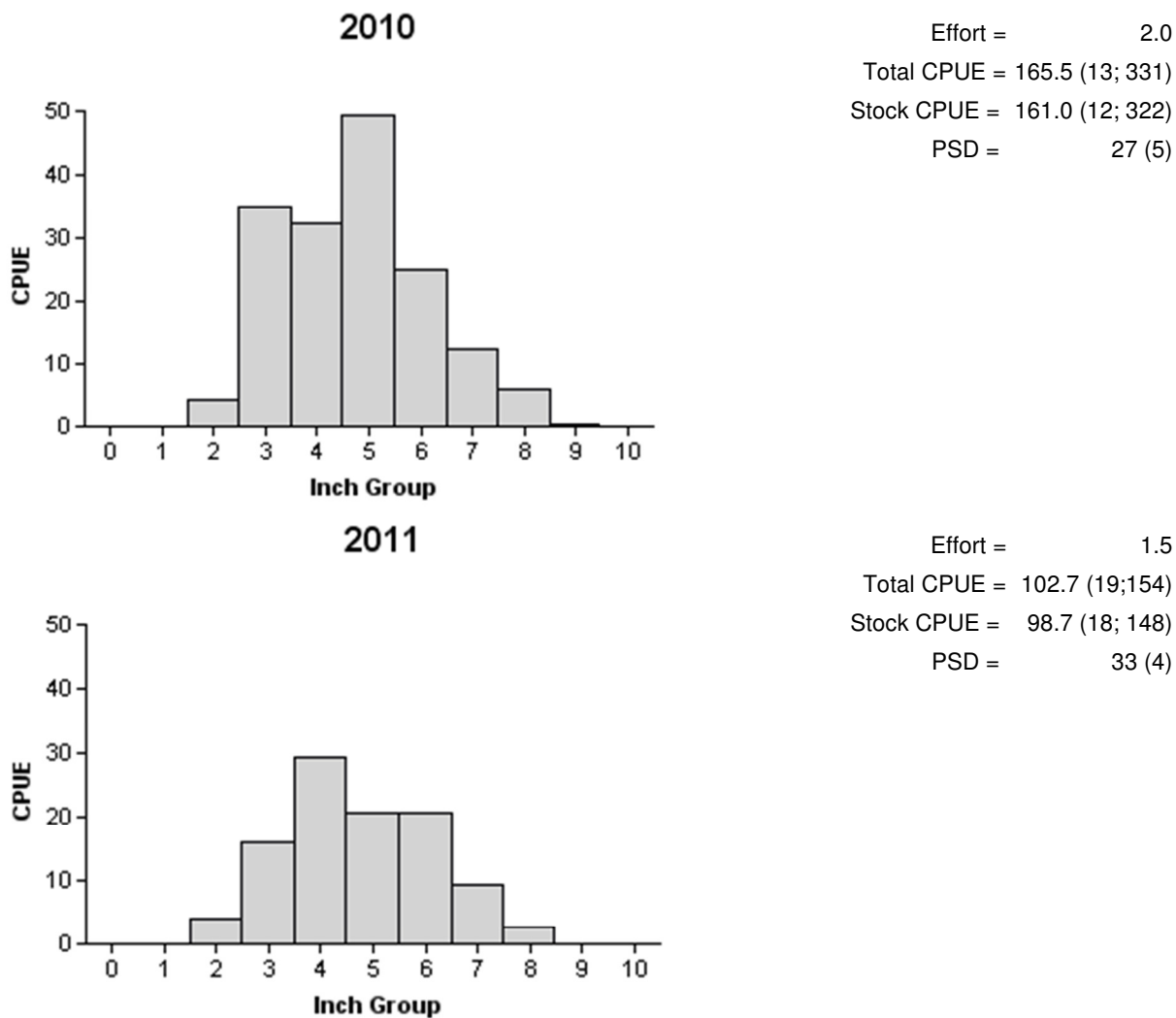


Figure 4. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, O. H. Ivie Reservoir, Texas, 2010 and 2011.

Bluegill

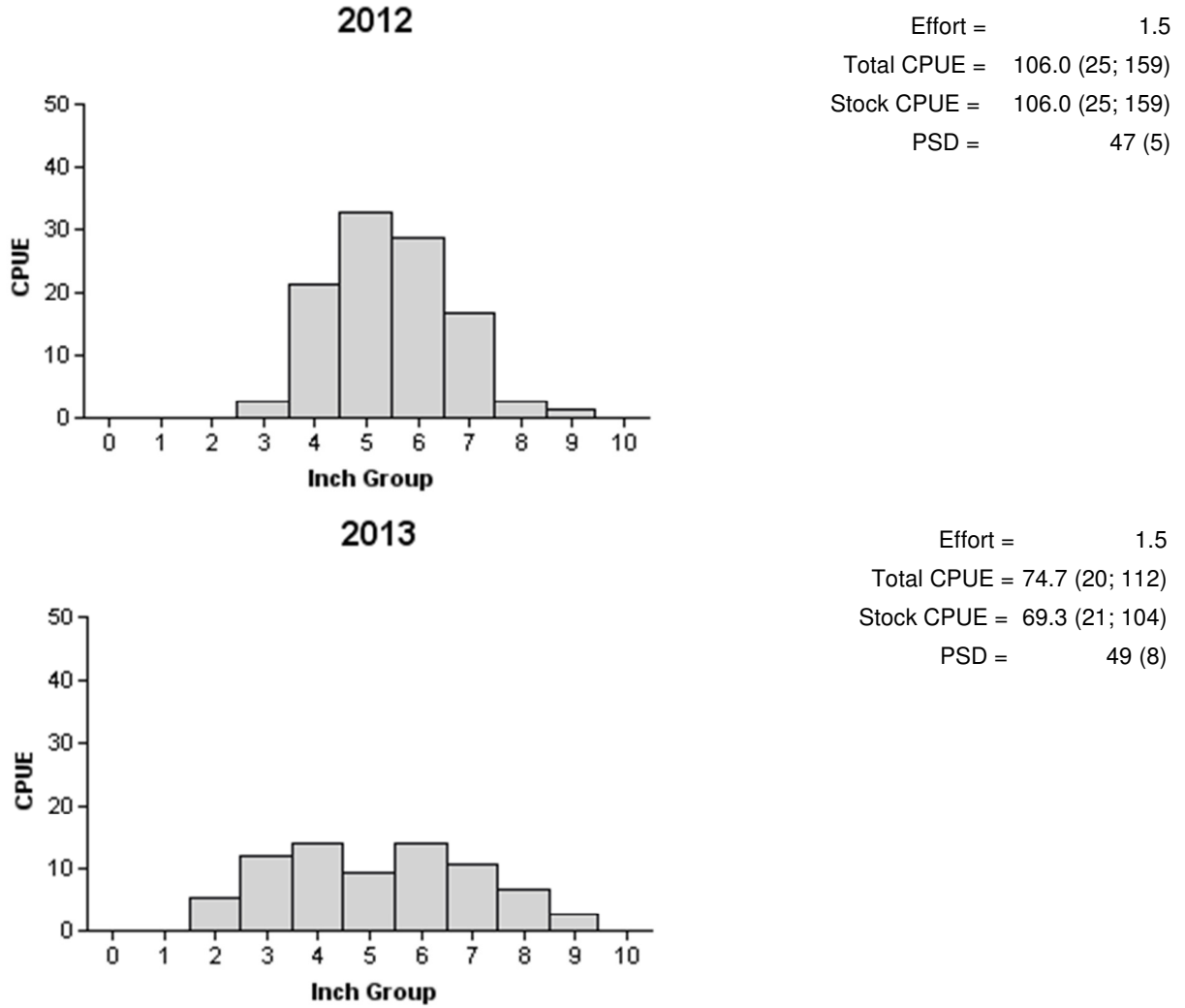


Figure 5. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, O. H. Ivie Reservoir, Texas, 2012 and 2013.

Table 8. Creel survey statistics for Bluegill at O. H. Ivie Reservoir from June 2010 through May 2013. Total catch per hour is for anglers targeting Bluegill and total harvest is the estimated number of Bluegill harvested by all anglers. Relative standard errors (RSE) are in parentheses.

	2010/2011	2011/2012	2012/2013
Directed effort (h)	1,443 (61)	99 (162)	74 (156)
Directed effort/acre	0.17 (61)	0.02 (162)	0.01 (156)
Total catch per hour	0.50 (363)	1.48 (146)	1.72 (127)
Total harvest	172 (333)	100 (247)	115 (339)
Harvest/acre	0.02 (333)	0.02 (247)	0.02 (339)
Percent legal released	76	32	10

Blue Catfish

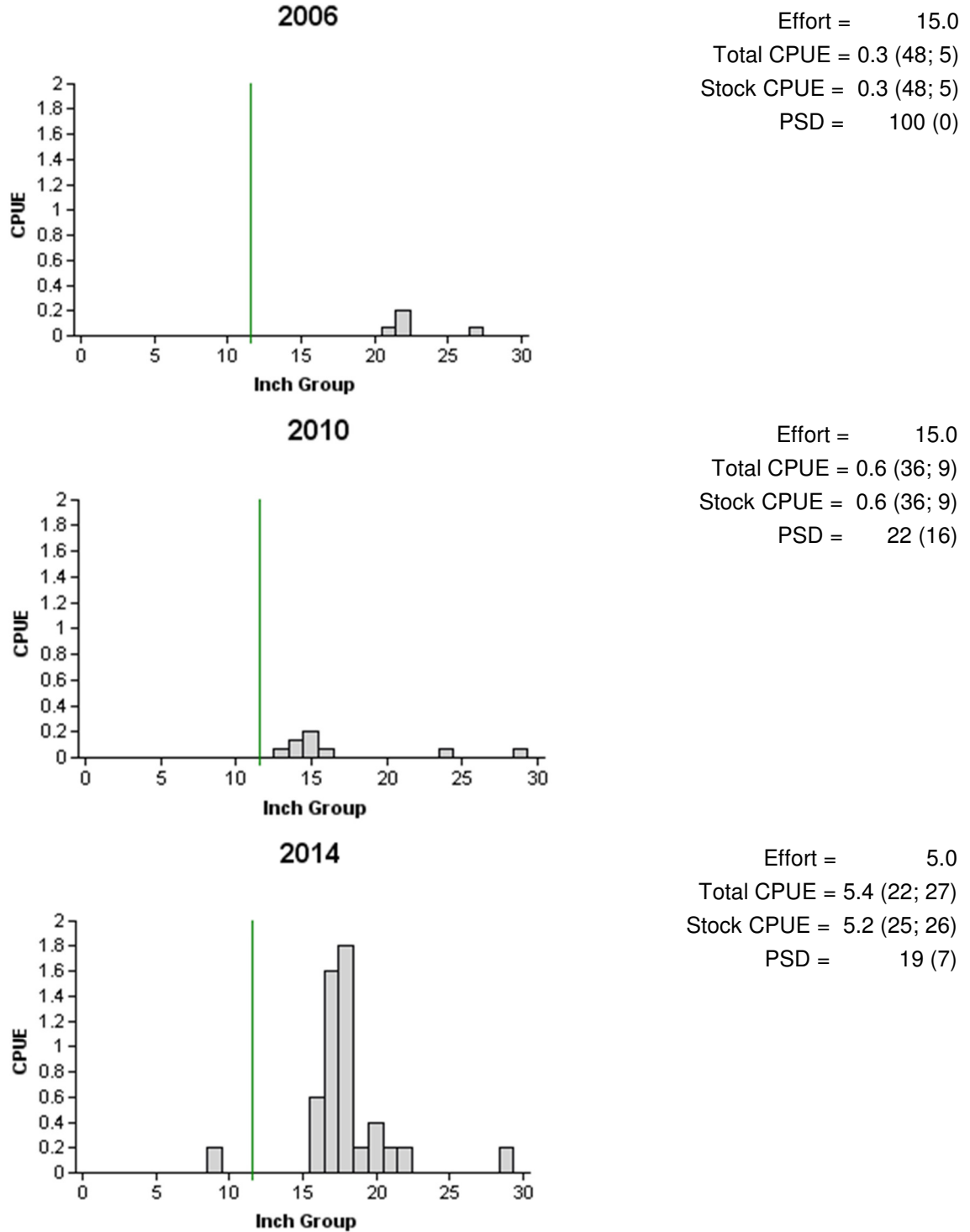


Figure 6. Number of Blue Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, O. H. Ivie Reservoir, Texas, 2006, 2010, and 2014. Vertical line represents minimum length limit.

Channel Catfish

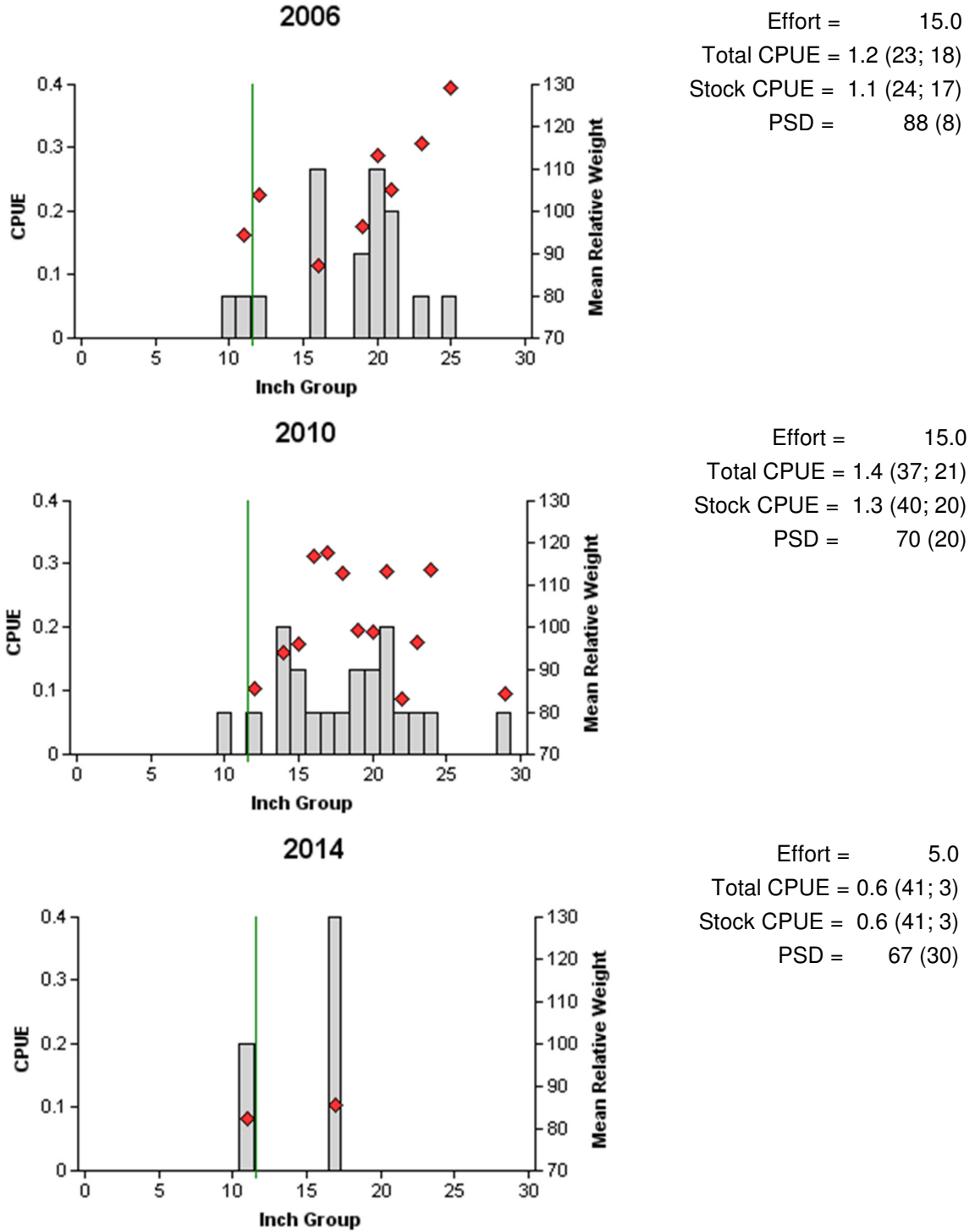


Figure 7. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, O. H. Ivie Reservoir, Texas, 2006, 2010, and 2014. Vertical line represents minimum length limit.

Channel Catfish

Table 9. Creel survey statistics for Channel Catfish at O. H. Ivie Reservoir from June 2010 through May 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	2010/2011	2011/2012	2012/2013
Directed effort (h)	1,537 (46)	2,013 (41)	2,265 (43)
Directed effort/acre	0.18 (46)	0.37 (41)	0.44 (43)
Total catch per hour	1.9 (45)	0.76 (43)	1.21 (46)
Total harvest	1,608 (37)	1,194 (47)	1,936 (49)
Harvest/acre	0.19 (37)	0.22 (47)	0.38 (49)
Percent legal released	6	13	11

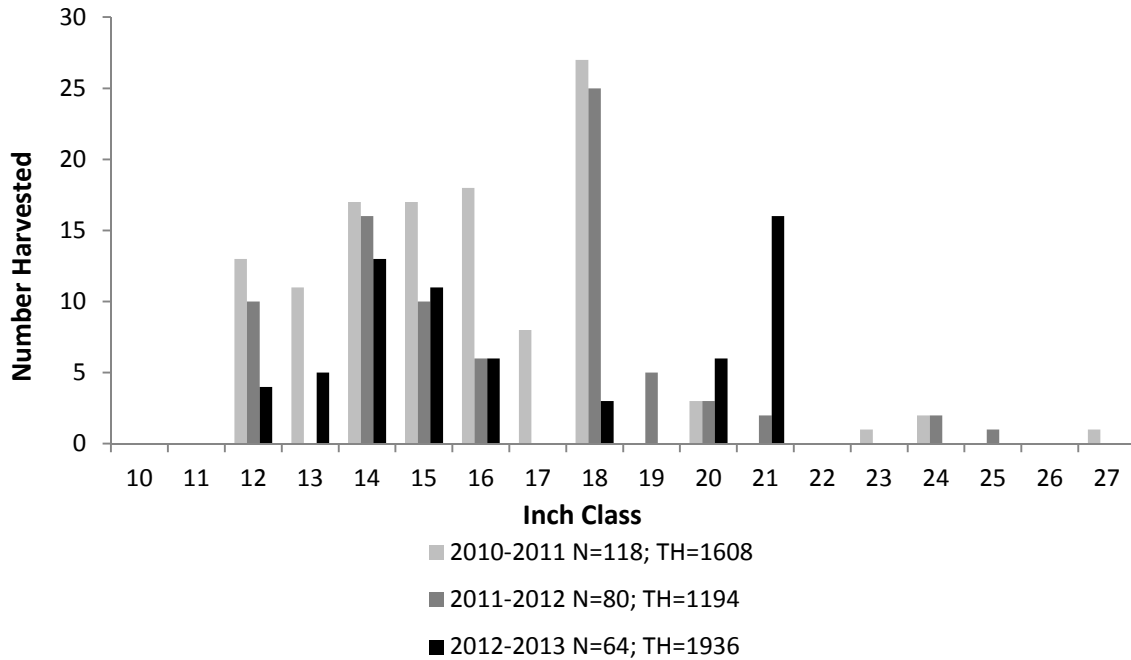


Figure 8. Length frequency of harvested Channel Catfish observed during creel surveys at O. H. Ivie Reservoir, Texas, June 2010 through May 2013, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

White Bass

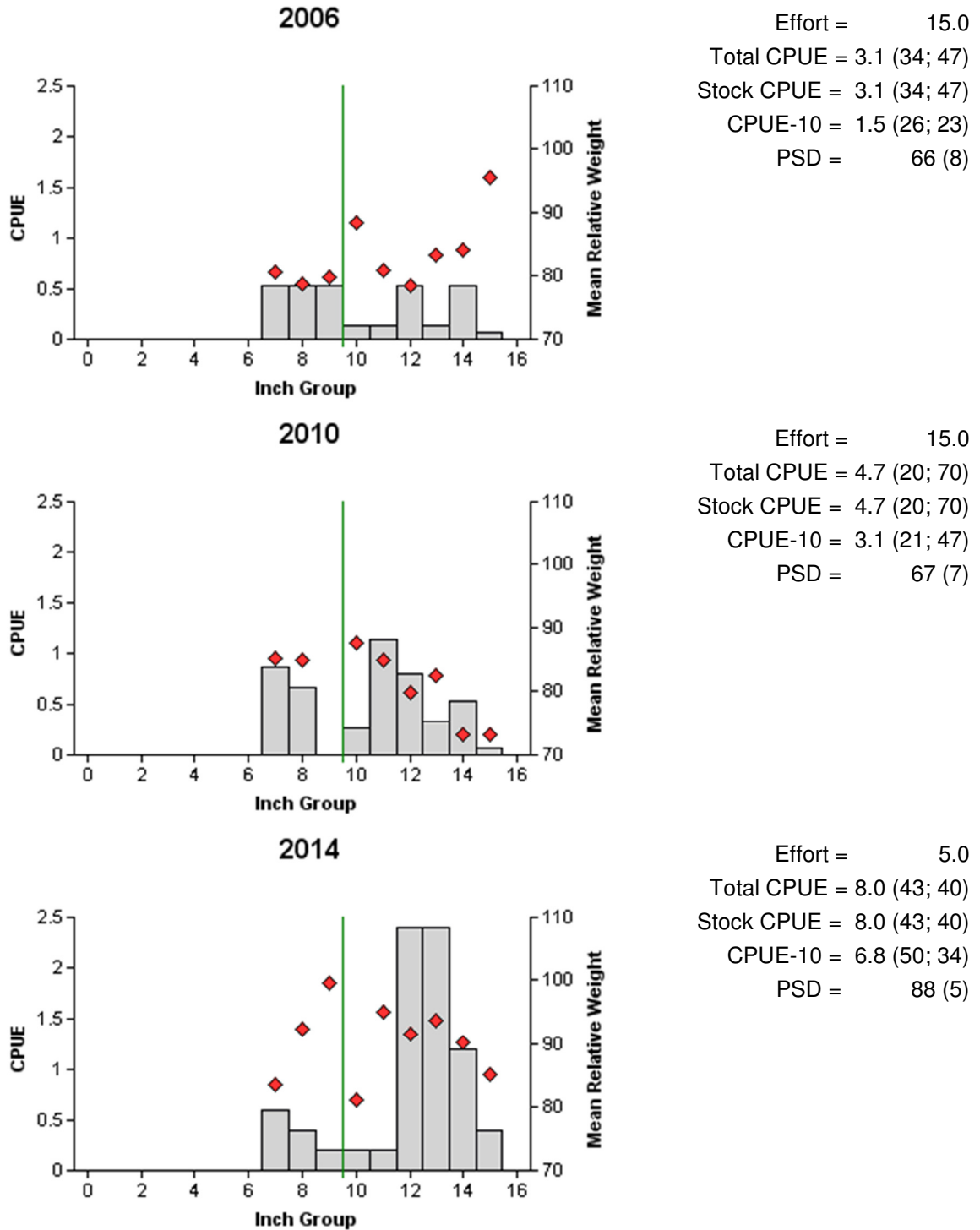


Figure 9. Number of White Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, O. H. Ivie Reservoir, Texas, 2006, 2010, and 2014. Vertical line represents the minimum length limit.

White Bass

Table 10. Creel survey statistics for White Bass at O. H. Ivie Reservoir from June 2010 through May 2013. Total catch per hour is for anglers targeting White Bass and total harvest is the estimated number of White Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	2010/2011	2011/2012	2012/2013
Directed effort (h)	5,845 (29)	2,452 (38)	3,646 (40)
Directed effort/acre	0.67 (29)	0.46 (38)	0.71 (40)
Total catch per hour	1.84 (27)	2.05 (29)	4.49 (40)
Total harvest	2,867 (34)	2,506 (39)	3,133 (45)
Harvest/acre	0.33 (34)	0.47 (39)	0.60 (45)
Percent legal released	44	37	55

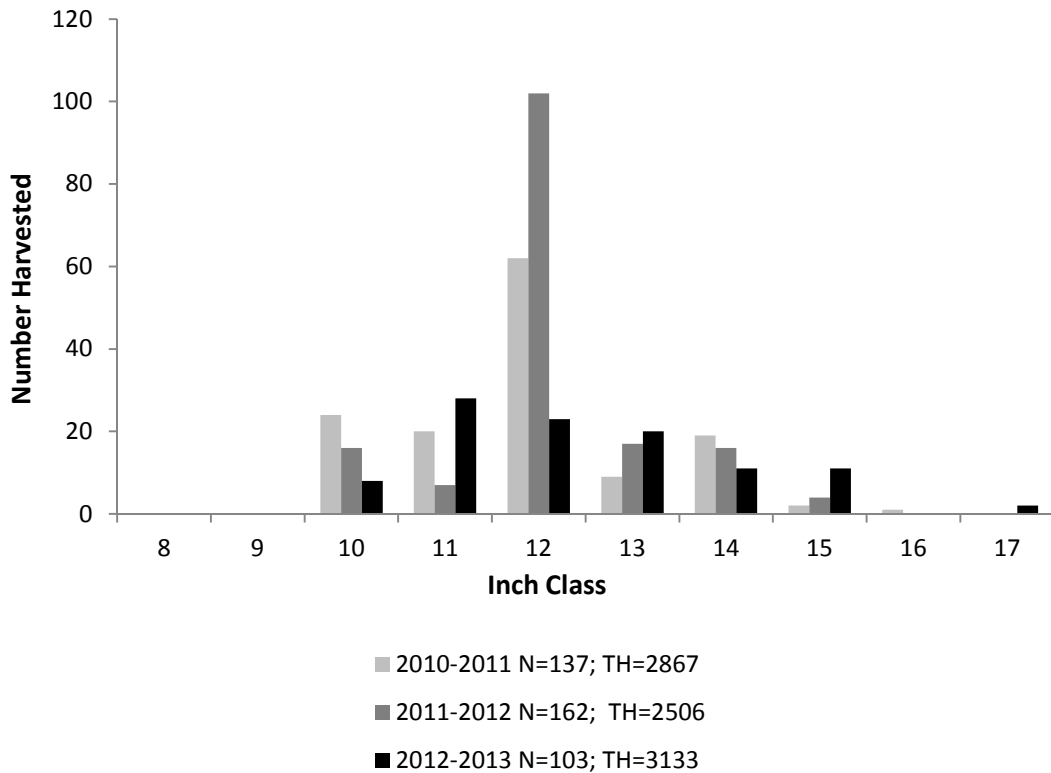
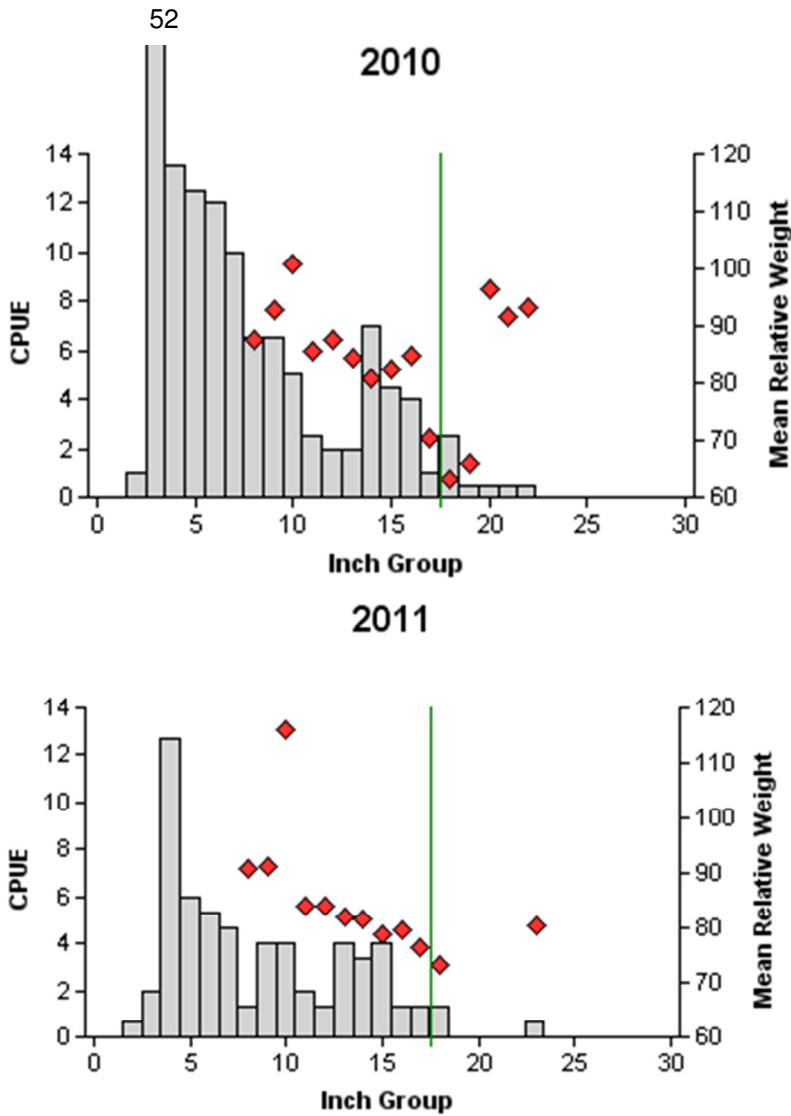


Figure 10. Length frequency of harvested White Bass observed during creel surveys at O. H. Ivie Reservoir, Texas, June 2010 through May 2013, all anglers combined. N is the number of harvested White Bass observed during creel surveys and TH is the total estimated harvest for the creel period.

Largemouth Bass



Effort =	2.0
Total CPUE =	146.5 (20; 293)
Stock CPUE =	45.5 (15; 91)
CPUE-18 =	4.5 (27; 9)
PSD =	55 (6)
PSD-P =	31 (6)
PSD-M =	3 (2)

Effort =	1.5
Total CPUE =	60.0 (20; 90)
Stock CPUE =	28.7 (17; 43)
CPUE-18 =	2.7 (58; 4)
PSD =	60 (7)
PSD-P =	30 (5)
PSD-M =	2 (2)

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, O. H. Ivie Reservoir, Texas, 2010 and 2011. Vertical line represents the length limit demarcation.

Largemouth Bass

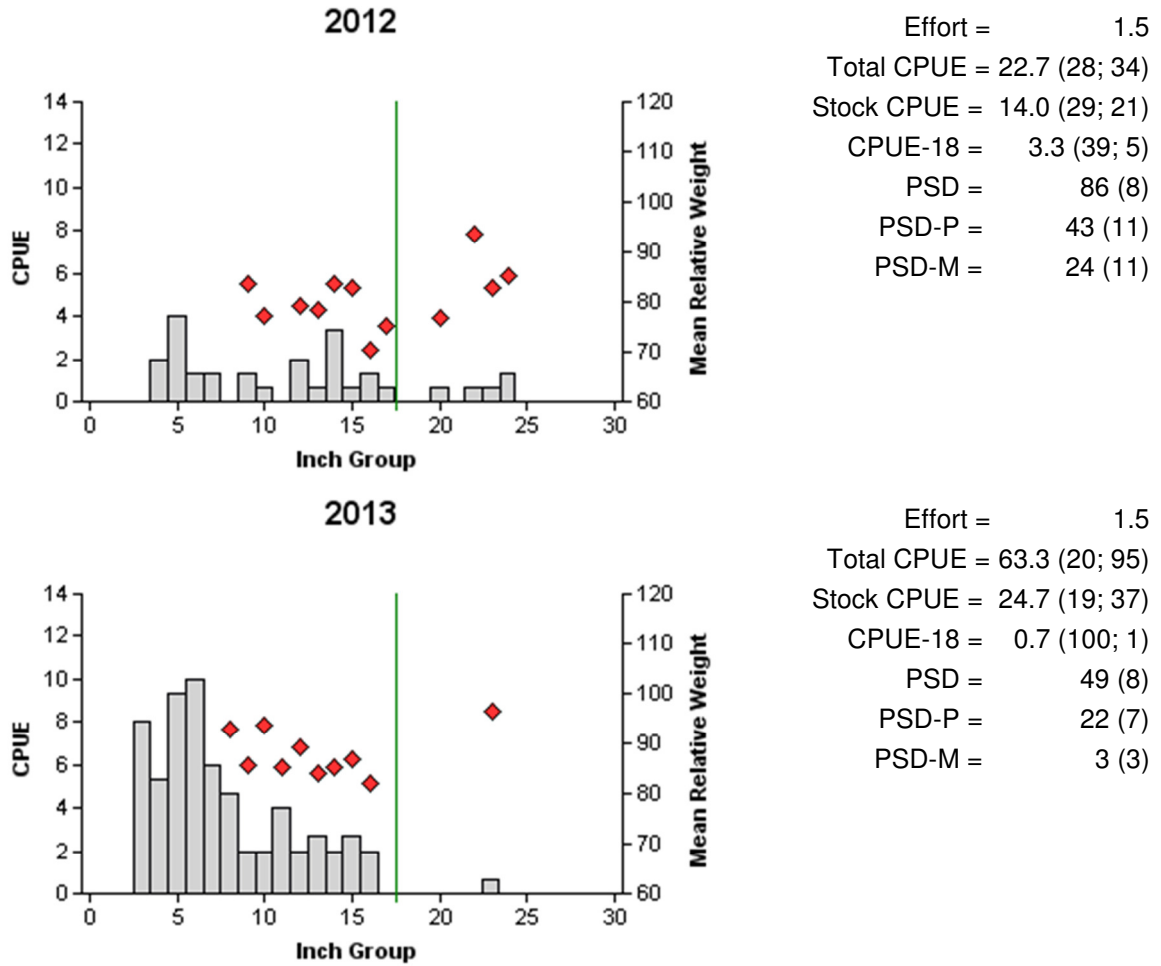


Figure 12. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, O. H. Ivie Reservoir, Texas, 2012 and 2013. Vertical line represents the length limit demarcation.

Largemouth Bass

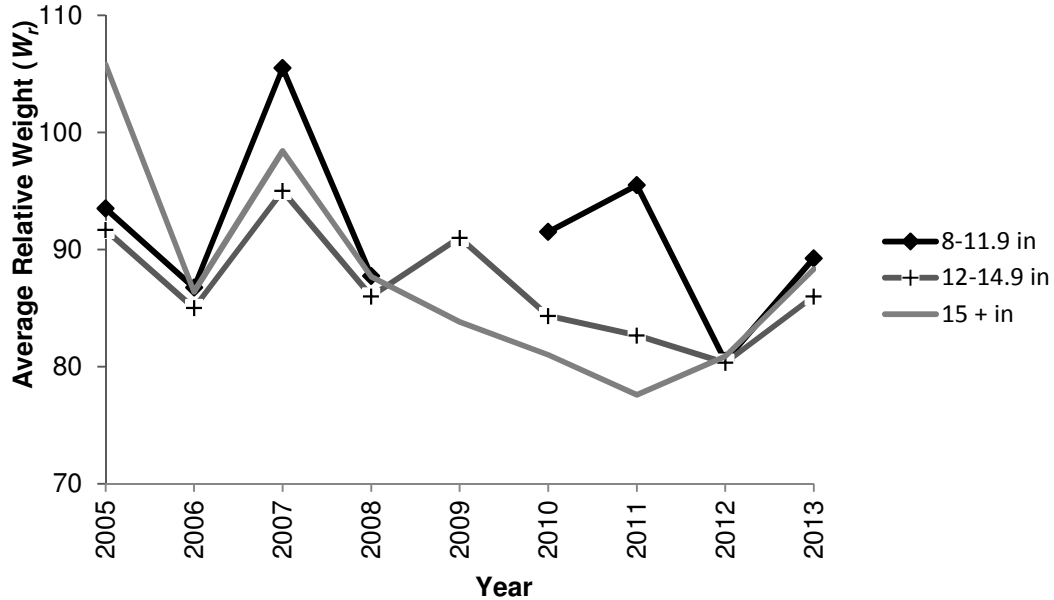


Figure 13. Average relative weights of Largemouth Bass at O. H. Ivie Reservoir, grouped by size category, from 2005 through 2013.

Table 11. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, O. H. Ivie Reservoir, Texas, 2004, 2005, and 2013. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

Year	Sample size	Number of fish			% FLMB alleles	% FLMB
		FLMB	Intergrade	NLMB		
2004	30	17	12	0	86	59
2005	95	23	72	0	76	24
2013	30	5	25	0	85	17

Largemouth Bass

Table 12. Creel survey statistics for Largemouth Bass at O. H. Ivie Reservoir from June 2010 through May 2013. Catch rate is for all anglers targeting Largemouth Bass. Harvest is partitioned by the estimated number of fish harvested by non-tournament anglers and the number of fish retained by tournament anglers for weigh-in and release. The estimated number of fish released by weight category is for non-tournament anglers targeting Largemouth Bass. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	2010/2011	2011/2012	2012/2013
Directed angling effort (h)			
Tournament	25,408 (20)	32,860 (24)	15,486 (32)
Non-tournament	97,563 (16)	31,594 (21)	32,363 (21)
All black bass anglers combined	122,971 (16)	64,454 (21)	47,849 (23)
Angling effort/acre	14.2 (16)	12.0 (21)	9.3 (23)
Catch rate (number/h)	0.2 (23)	0.3 (26)	0.2 (29)
Harvest			
Non-tournament harvest	622 (38)	318 (28)	663 (51)
Harvest/acre	0.07 (38)	0.06 (28)	0.13 (51)
Tournament weigh-in and release	2,430 (36)	4,588 (41)	2,304 (63)
Release by weight			
<4.0 lbs	8,125 (41)	16,601 (45)	5,769 (63)
4.0-6.9 lbs	1,323 (49)	617 (63)	608 (72)
7.0-9.9 lbs	426 (62)	178 (89)	246 (70)
≥ 10.0 lbs	89 (75)	72 (112)	0 (0)
Percent legal released (non-tournament)	97	93	90

Largemouth Bass

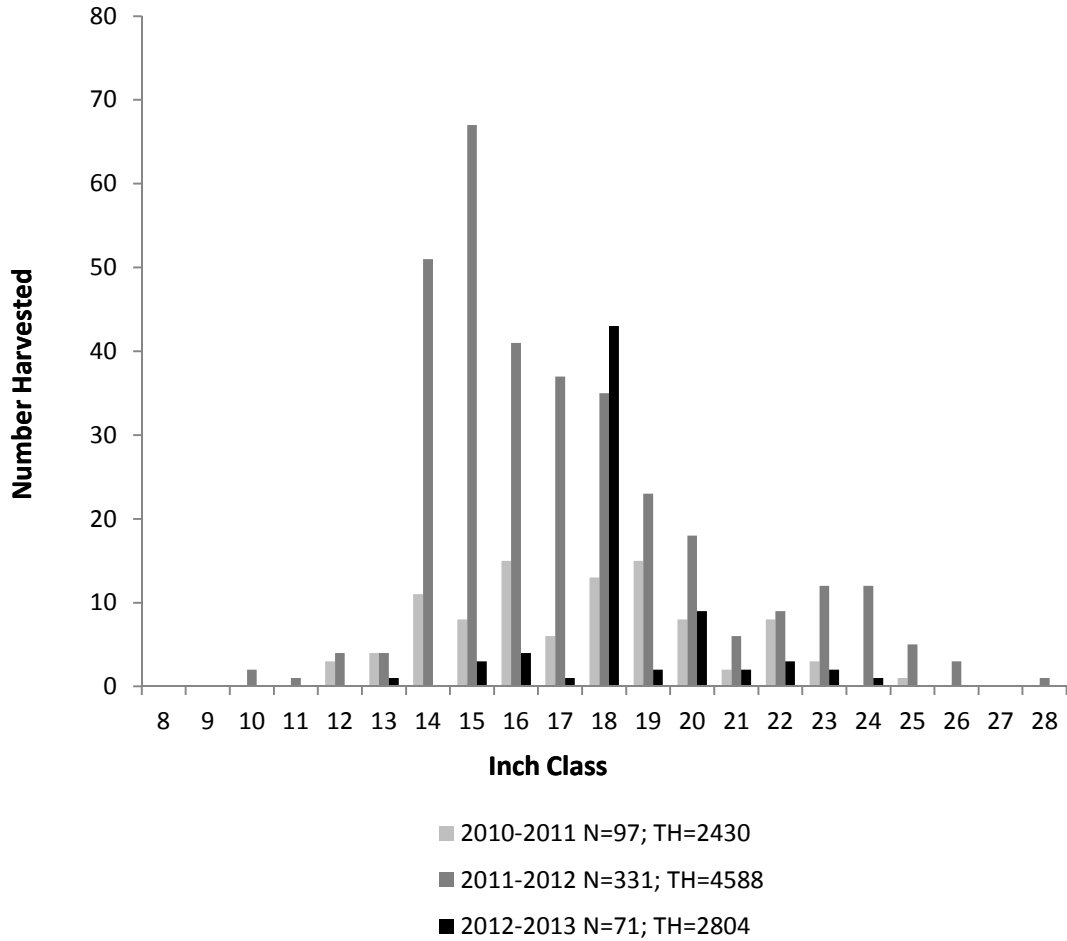


Figure 14. Length frequency of tournament caught-and-released Largemouth Bass observed during creel surveys at O. H. Ivie Reservoir, Texas, June 2010 through May 2013, all anglers combined. N is the number of Largemouth Bass observed during creel surveys, and TH is the estimated tournament harvest for the creel period.

Largemouth Bass

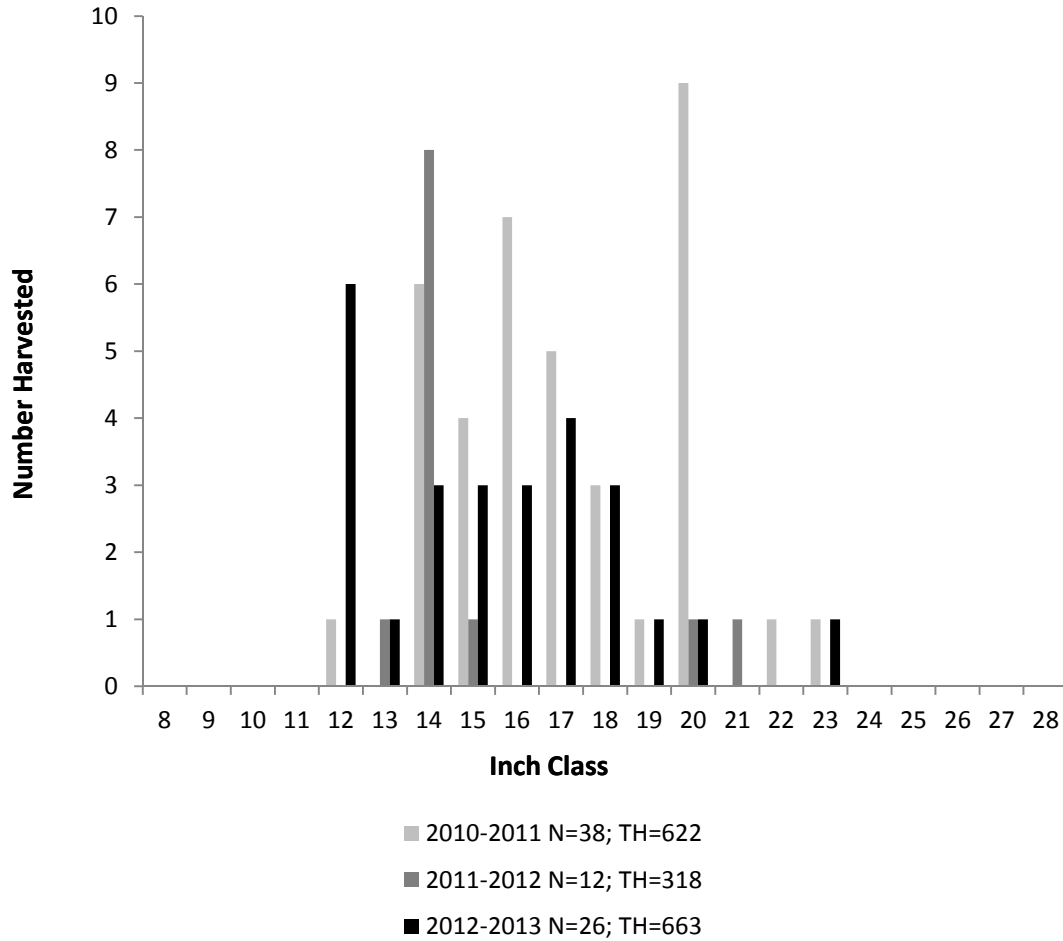


Figure 15. Length frequency of non-tournament harvested Largemouth Bass observed during creel surveys at O. H. Ivie Reservoir, Texas, June 2010 through May 2013, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the estimated non-tournament harvest for the creel period.

White Crappie

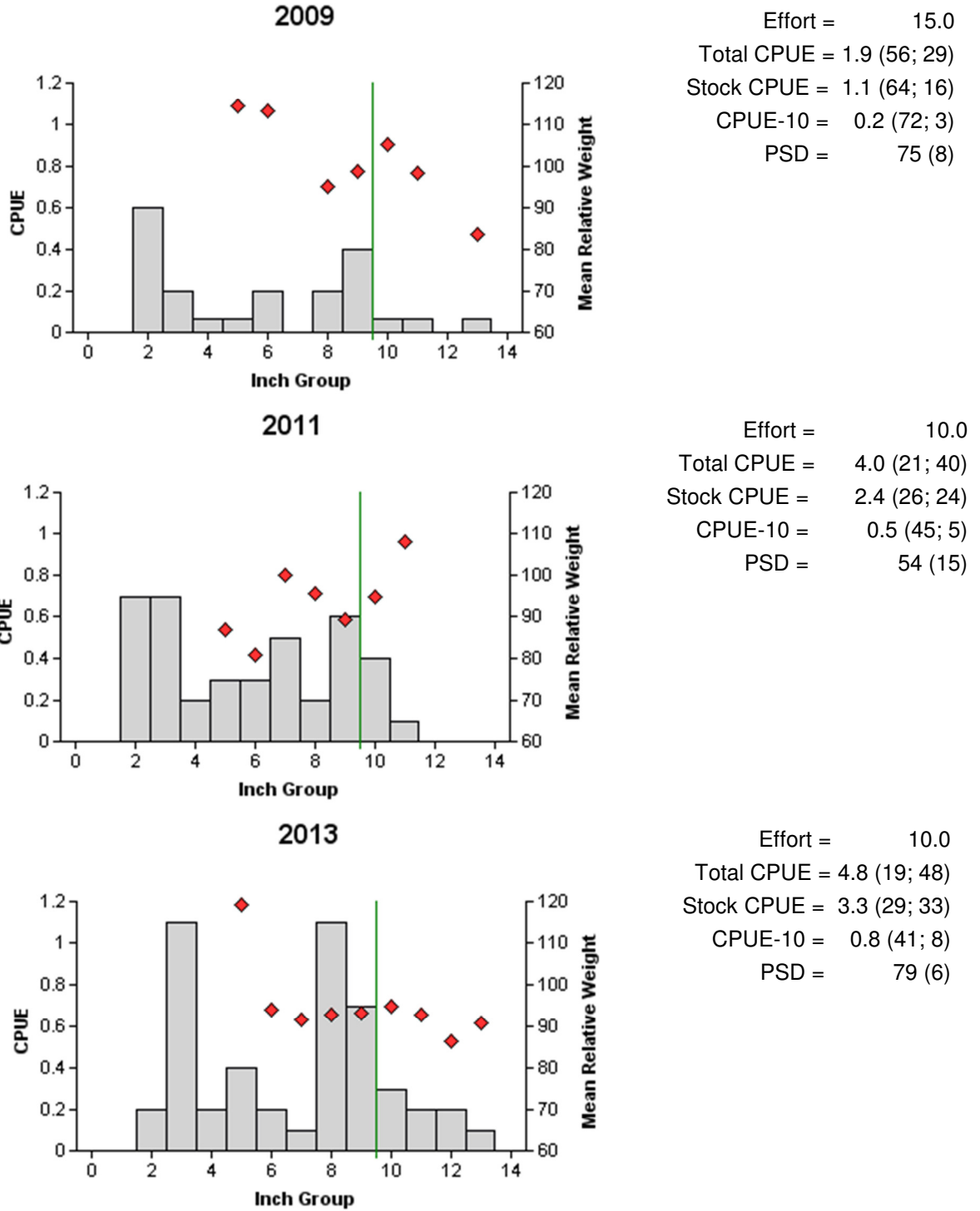


Figure 16. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, O. H. Ivie Reservoir, Texas, 2009, 2011, and 2013. Vertical line represents the minimum length limit.

White Crappie

Table 13. Creel survey statistics for White Crappie at O. H. Ivie Reservoir from June 2010 through May 2011, June 2011 through May 2012, and June 2012 through May 2013. Total catch per hour is for anglers targeting White Crappie and total harvest is the estimated number of White Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	2010/2011	2011/2012	2012/2013
Directed effort (h)	7,784 (25)	1,160 (49)	6,941 (36)
Directed effort/acre	0.9 (25)	0.2 (49)	1.3 (36)
Total catch per hour	0.7 (30)	0.8 (72)	1.3 (35)
Total harvest	2298 (36)	668 (70)	4504 (44)
Harvest/acre	0.26 (36)	0.12 (70)	0.88 (44)
Percent legal released	6	9	8

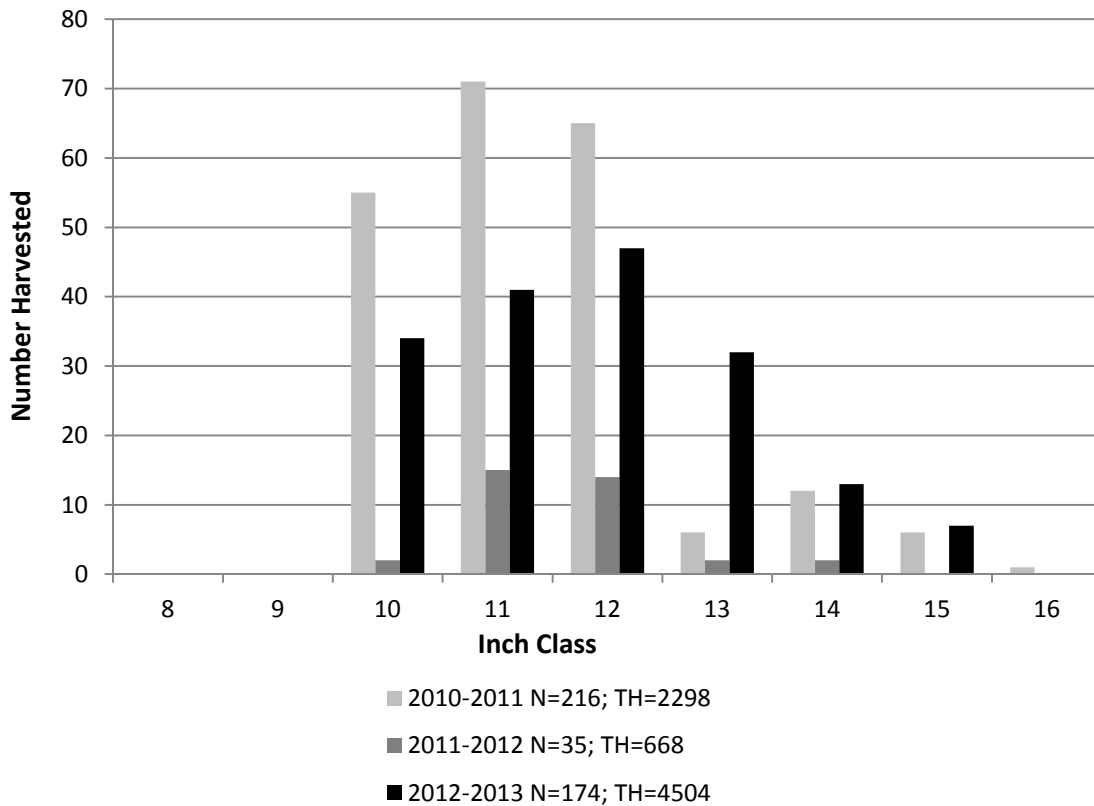


Figure 17. Length frequency of harvested White Crappie observed during creel surveys at O. H. Ivie Reservoir, Texas, June 2010 through May 2013, all anglers combined. N is the number of harvested White Crappie observed during creel surveys and TH is the total estimated harvest for the creel period.

Table 14. Proposed sampling schedule for O. H. Ivie 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. Creel survey will be a special evaluation of passive-gear catfish anglers. Standard survey denoted by S and additional survey denoted by A.

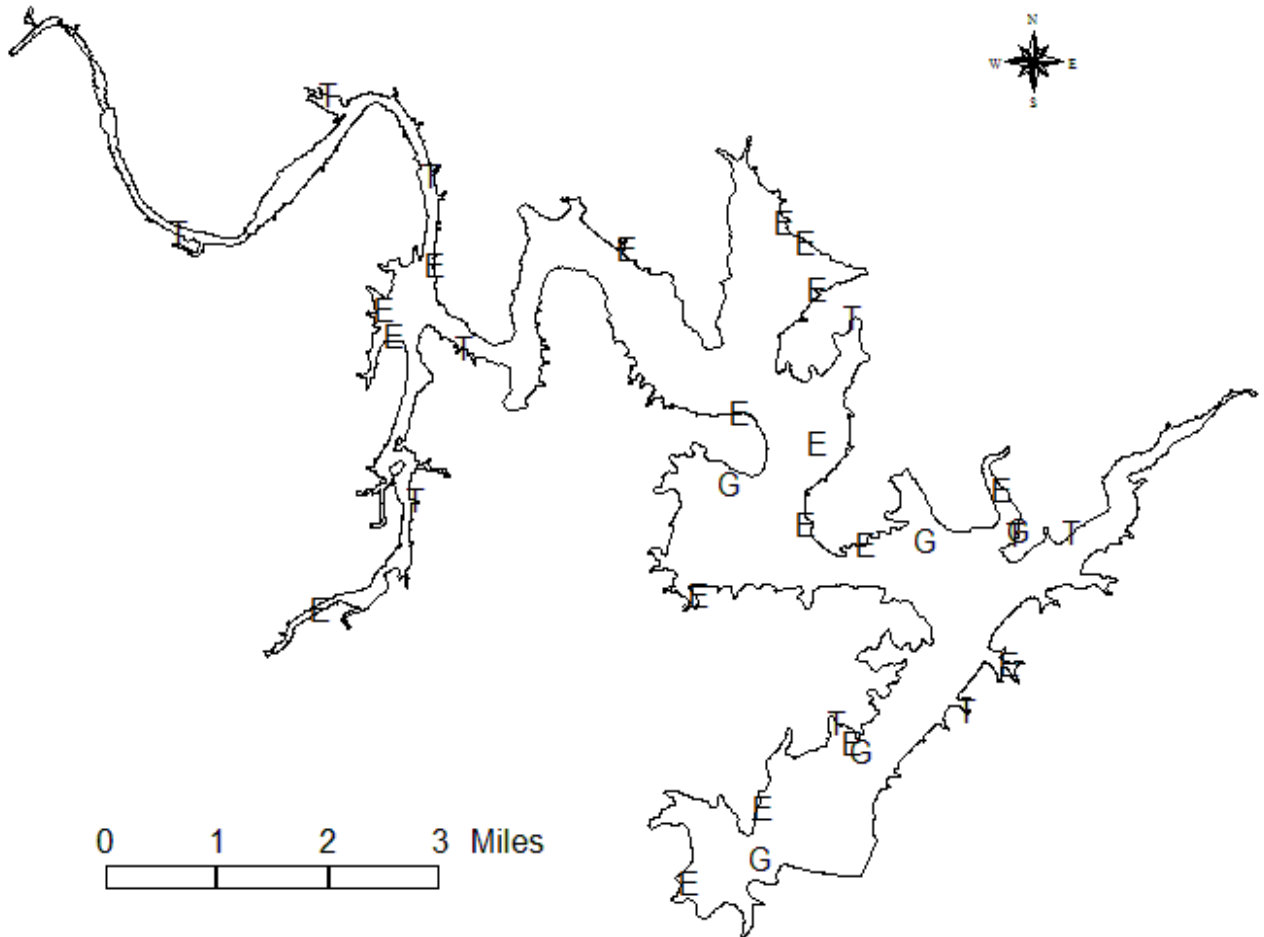
Survey year	Electrofishing	Trap net	Gill net	Habitat			Creel	Report
				Structural	Vegetation	Access		
2014-2015								
2015-2016	A	A						
2016-2017								
2017-2018	S	S	S		S	S	A	S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected by all gear types from O. H. Ivie Reservoir, Texas, 2013-2014. Sampling effort was 5 net nights for gill netting, 10 net nights for trap netting and 1.5 hours for electrofishing.

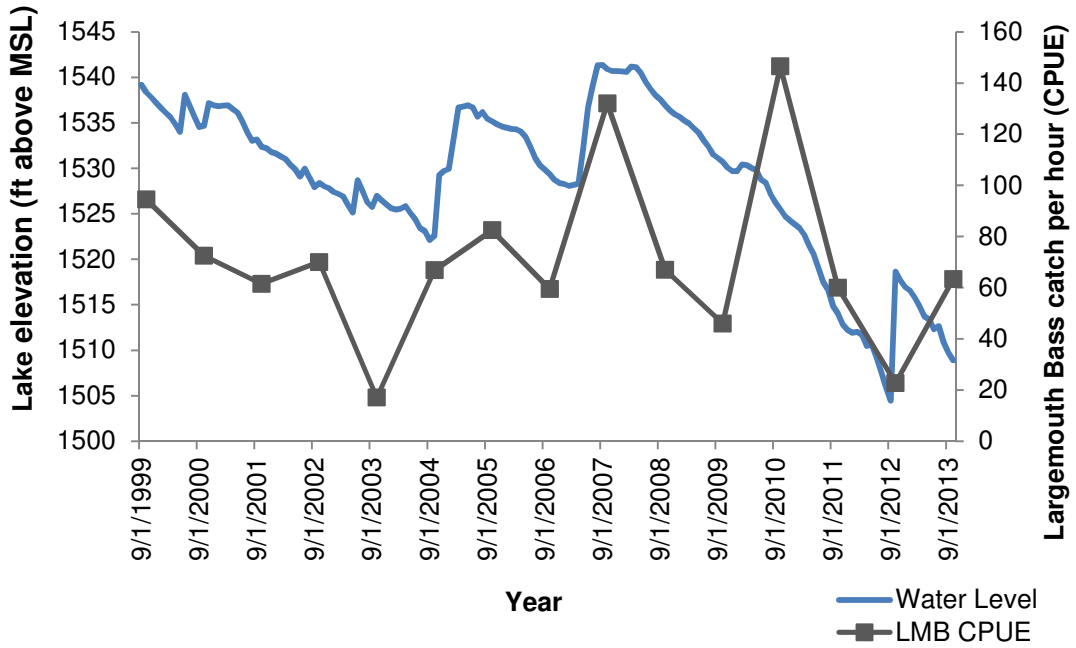
Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Longnose Gar	25	5.0				
Gizzard Shad	85	17.0			404	269.3
Threadfin Shad					19	12.7
Common Carp	10	2.0				
River Carpsucker	6	1.2				
Blue Catfish	27	5.4				
Channel Catfish	3	0.6				
Flathead Catfish	3	0.6				
White Bass	40	8.0				
Green Sunfish					7	4.67
Warmouth					3	2.0
Bluegill			28	2.8	112	74.7
Longear Sunfish			10	1.0	25	16.7
Largemouth Bass	4	0.8			95	63.3
White Crappie	7	1.4	48	4.8		
Black Crappie			2	0.2		
Freshwater Drum	12	2.4				

APPENDIX B



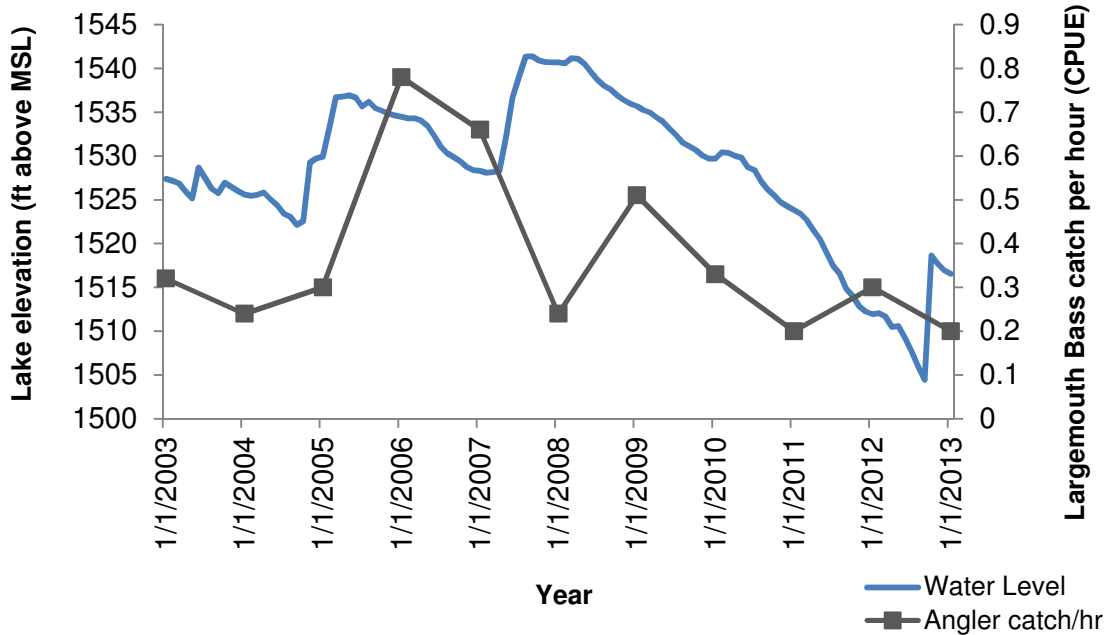
Location of sampling sites, O. H. Ivie Reservoir, Texas, 2013-2014. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was approximately 43 feet below conservation pool at time of sampling and reservoir area was approximately 4,073 acres.

APPENDIX C



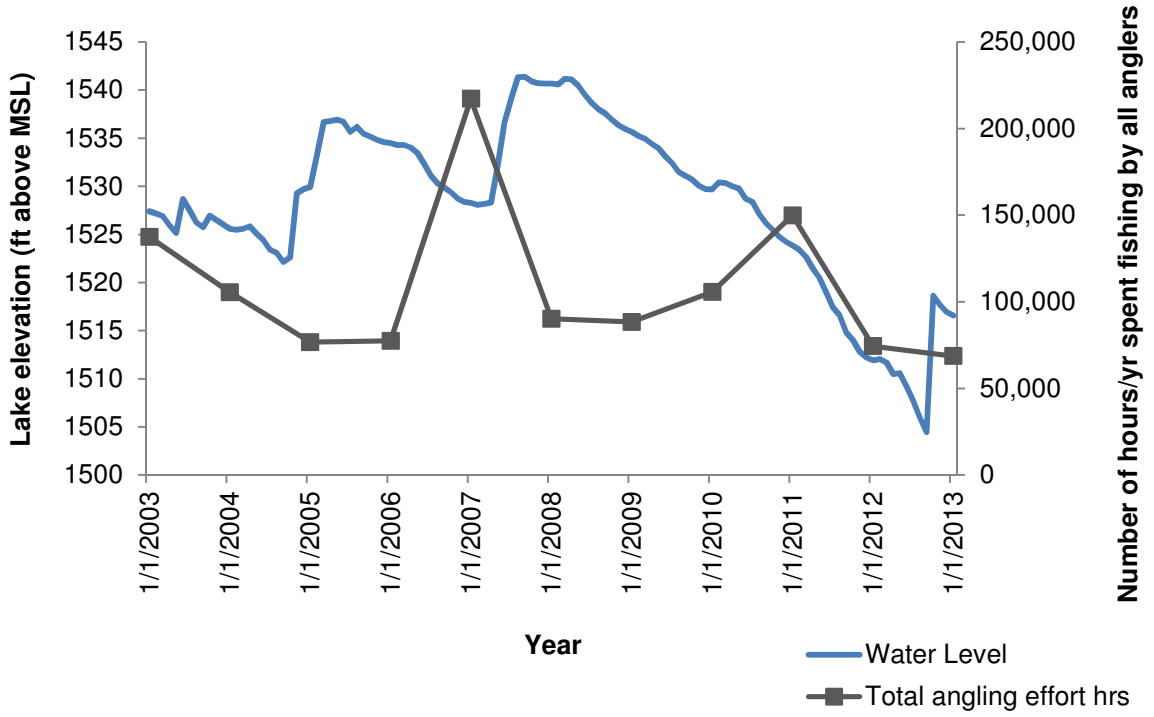
O. H. Ivie Reservoir water level trend and Largemouth Bass electrofishing catch per unit effort (CPUE) from 1999 through 2013

APPENDIX D



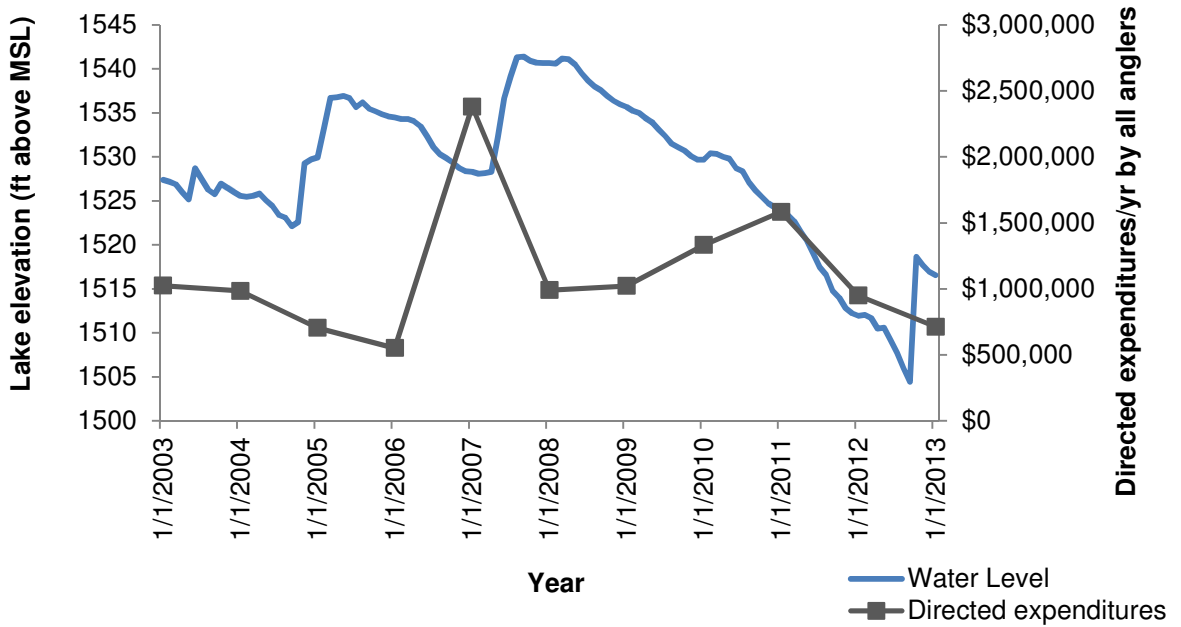
O. H. Ivie Reservoir water level trend and Largemouth Bass angler catch rate per hour of effort from 2003 through 2013.

APPENDIX E



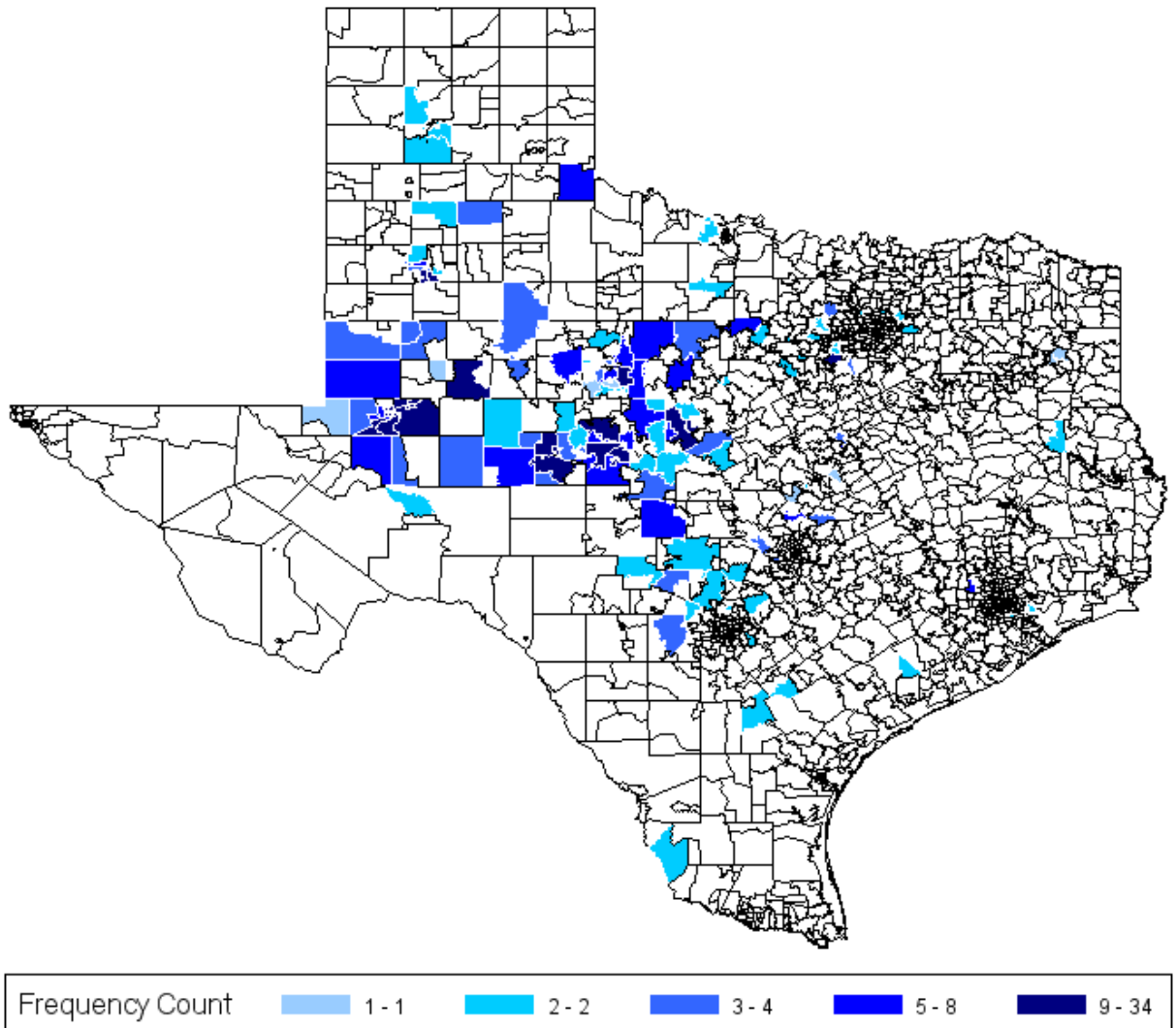
O. H. Ivie Reservoir water level trend alongside annual total angling effort hours from 2003 through 2013.

APPENDIX F



O. H. Ivie Reservoir water level trend alongside annual directed expenditures by anglers from 2003 through 2013.

Appendix G



Texas zip codes from which anglers traveled to fish at O. H. Ivie Reservoir in 2010-2011. Anglers also traveled from Arkansas, Louisiana, Missouri, and New Mexico during that year.