PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2012 Fisheries Management Survey Report

Medina Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Medina Reservoir were surveyed using electrofishing in 2012 and gill netting in 2013. Historical data are presented with the 2012-2013 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: Medina Reservoir (5,410 acres) was constructed in 1913 and is located on the Medina River in Medina and Bandera counties, Texas. It was built for irrigation water supply. Boat angler access is adequate when water level is within 40 feet of conservation pool elevation (CP) with one public boat ramp and two private ramps available. Currently, the reservoir is over 80 feet below CP and about 950 acres in size. Boat access is limited to one private boat ramp and a four-wheel drive vehicle is recommended. Most of the shoreline (75%) is characterized as rock bluff or rocks and gravel. The reservoir contained no aquatic vegetation in 2012.

Management History: Important sport fish include Largemouth Bass, Palmetto Bass, White Bass, and Channel Catfish. All species have been managed under statewide regulations and Florida Largemouth Bass fingerlings were last stocked in 2005. Palmetto Bass were stocked on an irregular basis due to variable availability.

- **Fish Community**
  - **Prey species:** Gizzard Shad and sunfish spp. were the primary prey species. Relative abundance of both has decreased since 2010 which was coincident with the water level decrease.
  - **Catfishes:** Blue Catfish relative abundance and population size structure remained consistent. Channel and Flathead Catfishes were present, but in lower abundance.
  - **White Bass:** White Bass relative abundance was low in 2013 and down compared to relative abundance in 2011, likely a result of declining water levels negatively impacting reproduction and recruitment.
  - **Palmetto bass:** Palmetto Bass relative abundance has declined considerably which was most likely caused by lack of stocking and declining water level.
  - **Largemouth bass:** Largemouth Bass relative abundance was substantially decreased in 2012 compared to previous sampling years due to reduced littoral habitat caused by the water level decline.

- **Management Strategies:** Stock Palmetto and Largemouth Bass if the water level increases to within 40 feet of CP. Inform the public about the negative impacts of aquatic invasive species. Conduct regularly scheduled gill net and electrofishing surveys in 2016-2017. Conduct additional gill net and electrofishing surveys in 2014-2015 if water level increases to within 40 feet of CP.

INTRODUCTION

This document is a summary of fisheries data collected from Medina Reservoir in 2012-2013. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2012-2013 data for comparison.

Reservoir Description

Medina Reservoir (5,410 acres) was constructed in 1913 and is located on the Medina River in Medina and Bandera counties, Texas. It was originally built to support downstream agricultural irrigation needs. The San Antonio Water System recently entered into an agreement with the reservoir controlling authority resulting in increased water releases from the reservoir to meet San Antonio water needs. The reservoir is characterized as deep, having an average depth of 46 feet, and relatively infertile with a secchi depth that exceeds 6 feet. Water level ranged from near CP in 2008 to about 80 feet below CP in spring 2013. At 80 feet below CP the reservoir is about 950 acres in size which is roughly 1/5 of its size when at CP. Most of the shoreline (75%) is characterized as rock bluff or rocks and gravel. Boat docks occur along 24% of the shoreline when the reservoir is near CP. The reservoir contained no aquatic vegetation in 2012. Other descriptive characteristics for Medina Reservoir are in Table 1.

Angler Access

Medina Reservoir has one public boat ramp and two private boat ramps (Table 2). The public ramp is located near the middle of the reservoir in Bandera County. One of the private ramps is near the dam and the other is in the upper end of the reservoir. Only the private boat ramp near the dam was operational in spring 2013 and it required use of 4-wheel drive vehicle. Bank-angling opportunity is very limited, occurring at only the public ramp when water level is within 40 feet of CP.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Myers and Dennis 2009) included:

1. Palmetto Bass are a popular game fish in this reservoir and need to be stocked to maintain a fishery because they do not reproduce.
   Action: Palmetto Bass were stocked in 2011. A stocking scheduled for 2013 was cancelled due to the extreme low water level.

Harvest regulation history: All species have always been managed with statewide regulations. Current regulations are found in Table 3.

Stocking history: Florida Largemouth Bass were stocked in 1976-1978, 2003, and 2005. Palmetto Bass have been stocked since 1977, but stockings have been sporadic since 2000. Smallmouth Bass and Walleye were introduced several decades ago but have not been collected in sampling gear for many years. The complete stocking history is in Table 4.

Vegetation/habitat management history: There has been no significant vegetation or habitat management on this reservoir.

Water transfer: No interbasin transfers are known to exist.

METHODS

Fishes were collected by electrofishing (1.5 hour at 18, 5-min stations) and gill netting (5 net nights at 5 stations). Five instead of 10 net nights/stations were used in 2013 because of the extreme low water level reducing reservoir size to about 950 acres. 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 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).

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). 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. Ages of 17 Palmetto Bass collected in 2011 were determined using otoliths according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011) to calculate mean age at 18 inches total length (TL, minimum size limit).

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 from 2005 through 2012 and by electrophoresis for previous years.

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

RESULTS AND DISCUSSION

Habitat: A structural habitat survey scheduled for fall 2012 was not conducted because of the extreme low water level. One was last conducted in 2005 (Myers and Dennis 2005; Table 5). During gill net and electrofishing sampling in 2011-2012 no aquatic vegetation was observed in the reservoir.

Prey species: Electrofishing CPUE of Gizzard Shad was 56.7 fish/h in 2012 which was similar to CPUE in 2004 and 31% greater than CPUE in 2008 (Figure 2). Gizzard Shad IOV was 65 in 2012 which was more than double the IOV in 2004 and 2008. This suggests that the proportion of the Gizzard Shad population that is a sufficient size to be forage for predator fishes has increased over time. Electrofishing CPUE of Bluegill was 94.7 fish/h in 2012 which was 66% less than CPUE in 2008 and 34% less than CPUE in 2004 (Figure 3). All Bluegill collected in 2012 were <6 inches total length (TL; PSD = 0) indicating Bluegill are likely an important forage. In addition, Threadfin Shad and Redbreast, Green, and Redear Sunfishes also provide a source of forage to the predators in the reservoir (Appendix A).

Blue Catfish: Gill net CPUE of Blue Catfish was 1.8 fish/nn in 2013 which was similar to CPUE in 2011 and 2009 (Figure 4). Likewise, Blue Catfish population size structure in 2013 was similar to population size structure in 2011 and 2009, with PSD ranging from 33-60. Mean relative weights for Blue Catfish ranged between 80 and 93 in 2013 which was similar to WR in 2011 and 2009.

Channel Catfish: Gill net CPUE of Channel Catfish was 0.2 fish/nn in 2013 which was less than 1.7 fish/nn in 2011 and 0.8 fish/nn in 2009 (Figure 5). Only one Channel Catfish was collected in 2013, thus comparisons of population size structure and mean relative weights from the most recent sampling year to previous sampling years is not legitimate. In previous sampling years, Channel Catfish PSD ranged from 33-45 and mean relative weights ranged from 82-105.

White Bass: Gill net CPUE of White Bass was 2.2 fish/nn in 2013 which was 27% below CPUE in 2011 and similar to CPUE in 2009 (Figure 6). All White Bass collected in 2013 were legally harvestable (>10 inches; PSD = 100), whereas PSD ranged from 67-80 in previous sampling years. Mean relative weights for legally harvestable fish ranged from 80-90 for the three sampling years with exception of one 19 inch fish having a relative weight below 60.

Palmetto Bass: Gill net CPUE of Palmetto Bass was 0.4 fish/nn in 2013 which was 89% lower than CPUE in 2011 and 93% lower than CPUE in 2009 (Figure 7). Only two Palmetto Bass were collected in 2013 and both were shorter than the minimum length limit (>18 inches). Dramatically lower relative abundance (i.e CPUE) in 2013 was likely a result of deterioration in habitat (extreme low water level) and only one stocking occurring since 2009. Historically (2009-2011), mean relative weights declined with fish length and PSD ranged from 70-97. Palmetto Bass (N= 17) collected in 2011 ranging in length from 17-19 inches averaged 3.2 years old.

Largemouth Bass: Electrofishing CPUE of Largemouth Bass was 27.3 fish/h in 2012, which was 76% lower than CPUE in 2008 and 55% lower than CPUE in 2004 (Figure 8). The substantial decline in water level since 2010 has severely decreased the quantity and quality of littoral habitat, and in turn, negatively impacted Largemouth Bass abundance. Population size structure was similar in the three sampling years with PSD ranging from 26-50 and PSD-P ranging from 2-4. Mean relative weights were likewise similar across the three sampling years ranging from 75-90. Florida Largemouth Bass influence and genotypes were 58% and 3% respectively in 2012 which were in line with historic FLMB introgression metrics (Table 5).

Fisheries management plan for Medina Reservoir, Texas

Prepared – July 2013.

ISSUE 1: Palmetto Bass have been a popular game fish in Medina Reservoir since their introduction. Annual stocking of Palmetto Bass is required to sustain the population and maintain a fishery. A reduced stocking rate is appropriate because of the frequency and magnitude of water level fluctuations and the resulting negative impacts on habitat and forage.

MANAGEMENT STRATEGY

1. Stock Palmetto Bass fingerlings annually at 5 fish/acre if water level rises to within 40 feet of CP.

ISSUE 2: The substantial decline in water level since 2010 has negatively impacted the quantity and quality of littoral habitat and Largemouth Bass population abundance.

MANAGEMENT STRATEGIES

1. Stock Florida Largemouth Bass fingerlings at 50 fish/acre when water level is within 40 feet of CP.

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 additional gill net and electrofishing surveys to be conducted in 2014-2015 to address and evaluate management strategies associated to Issues 1-2 above. Regularly scheduled gill net and electrofishing surveys will be conducted in 2016-2017.

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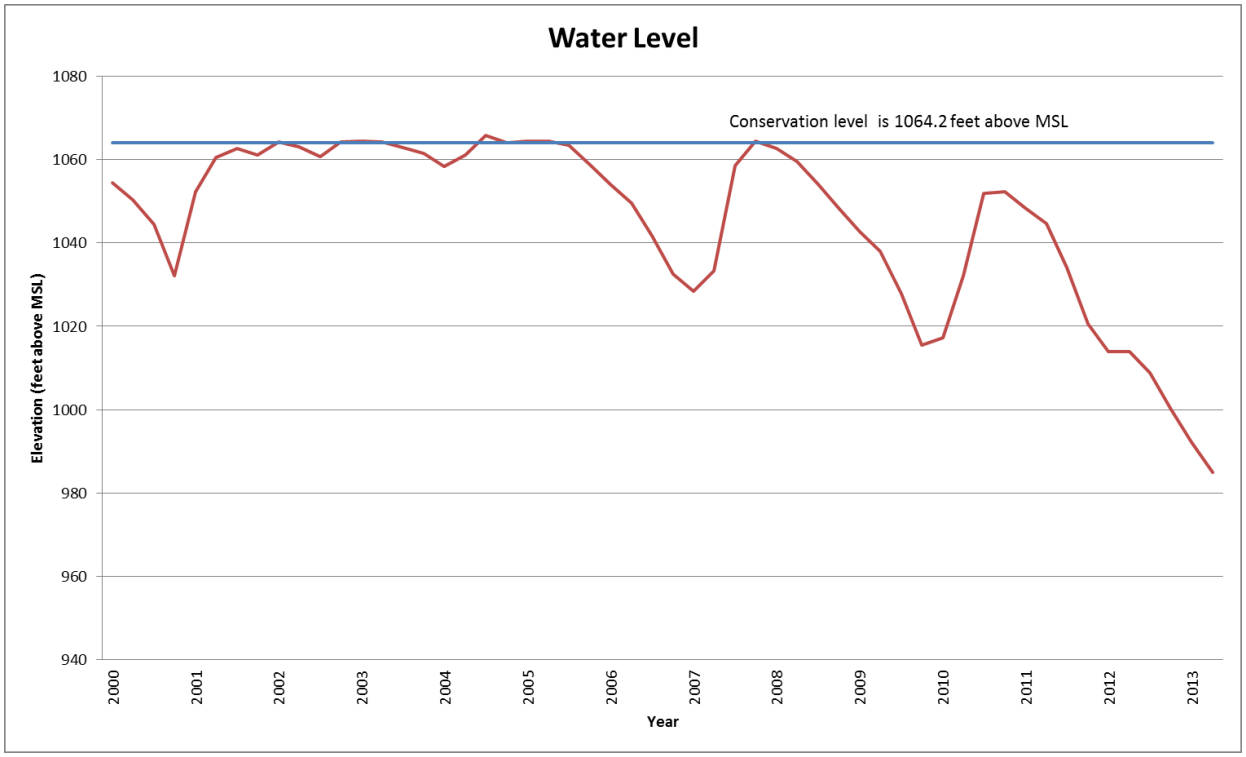


Figure 1. Mean daily water level elevations in feet above mean sea level (MSL) recorded for Medina Reservoir, Texas. Conservation level is 1064.2 feet above MSL.

Table 1. Characteristics of Medina Reservoir, Texas.

Characteristic	Description
Year constructed	1913
Controlling authority	Bexar Medina Atascosa Counties Water Improvement District No. 1
County	Medina and Bandera
Reservoir type	Main stream
Shoreline Development Index (SDI)	10.5
Conductivity	388 µS/cm

Table 2. Boat ramp characteristics for Medina Reservoir, Texas, August, 2012. Reservoir elevation at time of survey was 55 feet below conservation pool.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Bandera County Park	29.56438 -98.95469	Y	10	unknown	Concrete ramp out of water. Extension is not practical because of distance required to reach water at current level
Red's Cove	29.54719 −98.92784	N	15	unknown	Concrete ramp out of water. Boat launching is still possible.
Pop's Place	29.63918 −98.96771	N	15	unknown	Out of water

Table 3. Harvest regulations for Medina 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, Palmetto	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Largemouth	5	14-inch minimum
Crappie: White and Black, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history in Medina Reservoir, Texas from 1967 – 2012. Size categories are: FRY < 1 inch; FGL = 1-3 inches; ADL = adults; blank indicates size at stocking is unknown.

Species	Year	Number Stocked	Size
Bass, Florida Largemouth	2005	271,158	Fingerling
Bass, Florida Largemouth	2003	276,179	Fingerling
Bass, Florida Largemouth	1978	99,901	Fingerling
Bass, Florida Largemouth	1977	59,950	Fry
Bass, Florida Largemouth	1976	65,000	Fingerling
Bass, Largemouth	1971	70,000	
Bass, Largemouth	1967	7,500	
Bass, Palmetto	2011	28,180	Fingerling
Bass, Palmetto	2008	54,586	Fingerling
Bass, Palmetto	2007	23,859	Fingerling
Bass, Palmetto	2005	81,265	Fingerling
Bass, Palmetto	2004	42,281	Fingerling
Bass, Palmetto	2002	42,146	Fingerling
Bass, Palmetto	2000	5,550	Fingerling
Bass, Palmetto	1999	41,897	Fingerling
Bass, Palmetto	1998	56,304	Fingerling
Bass, Palmetto	1997	83,971	Fingerling
Bass, Palmetto	1996	85,900	Fingerling
Bass, Palmetto	1995	92,700	Fingerling
Bass, Palmetto	1994	61,300	Fingerling
Bass, Palmetto	1983	55,450	
Bass, Palmetto	1979	59,968	
Bass, Palmetto	1977	60,400	
Bass, Smallmouth	1988	106,594	Fry
Bass, Smallmouth	1988	78	Adult
Bass, Smallmouth	1987	22,630	Fingerling
Bass, Smallmouth	1979	51,725	
Bass, Smallmouth	1977	60,850	
Catfish, Blue	1975	3,000	
Catfish, Blue	1974	186,750	
Catfish, Channel	2007	185,271	Fingerling
Catfish, Channel	1967	2,750	
Walleye	1974	134,750	
Walleye	1973	640,000	
Warmouth	1967	47,000	

Gizzard Shad

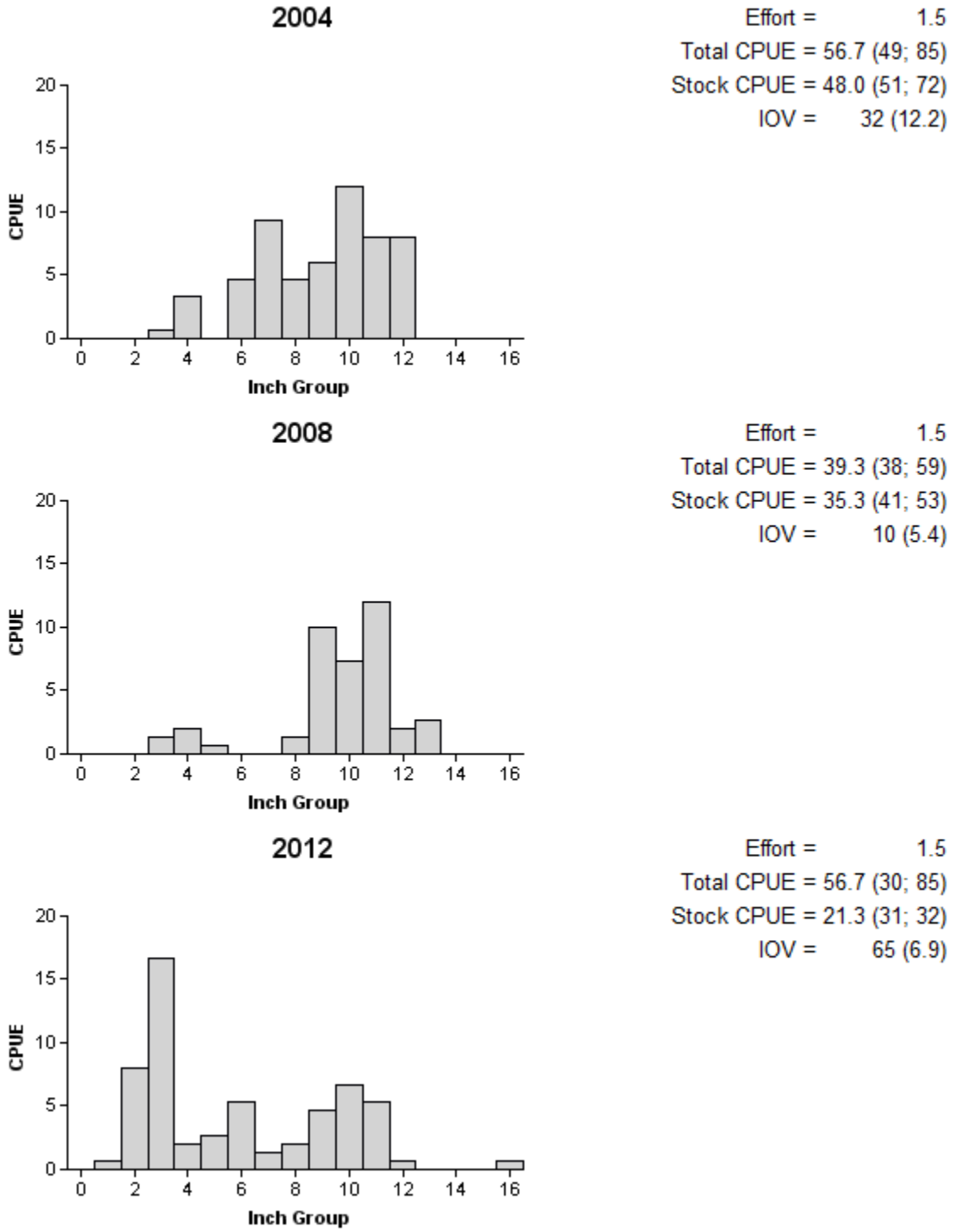


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Medina Reservoir, Texas, 2004, 2008, and 2012.

Bluegill

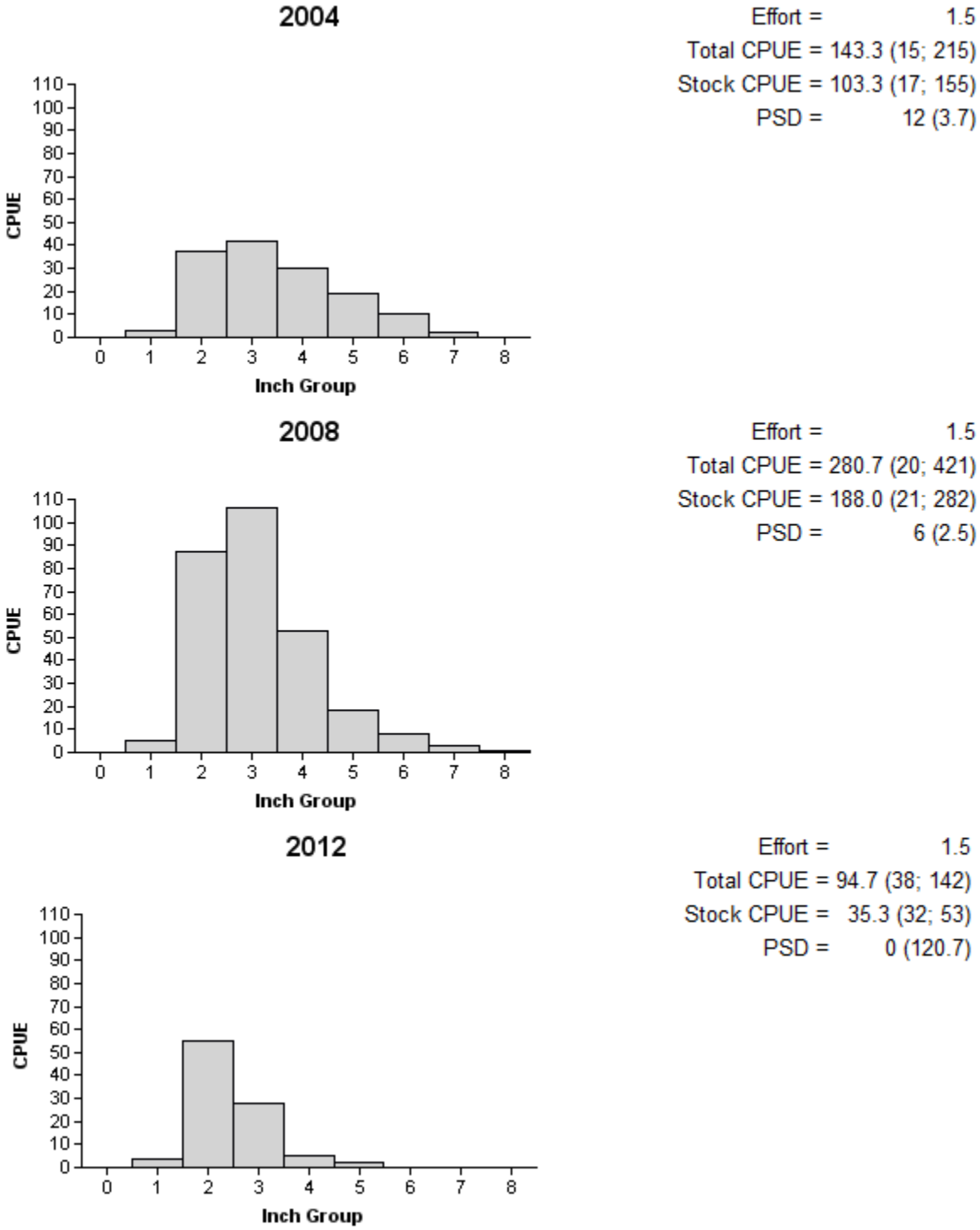


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Medina Reservoir, Texas, 2004, 2008, and 2012

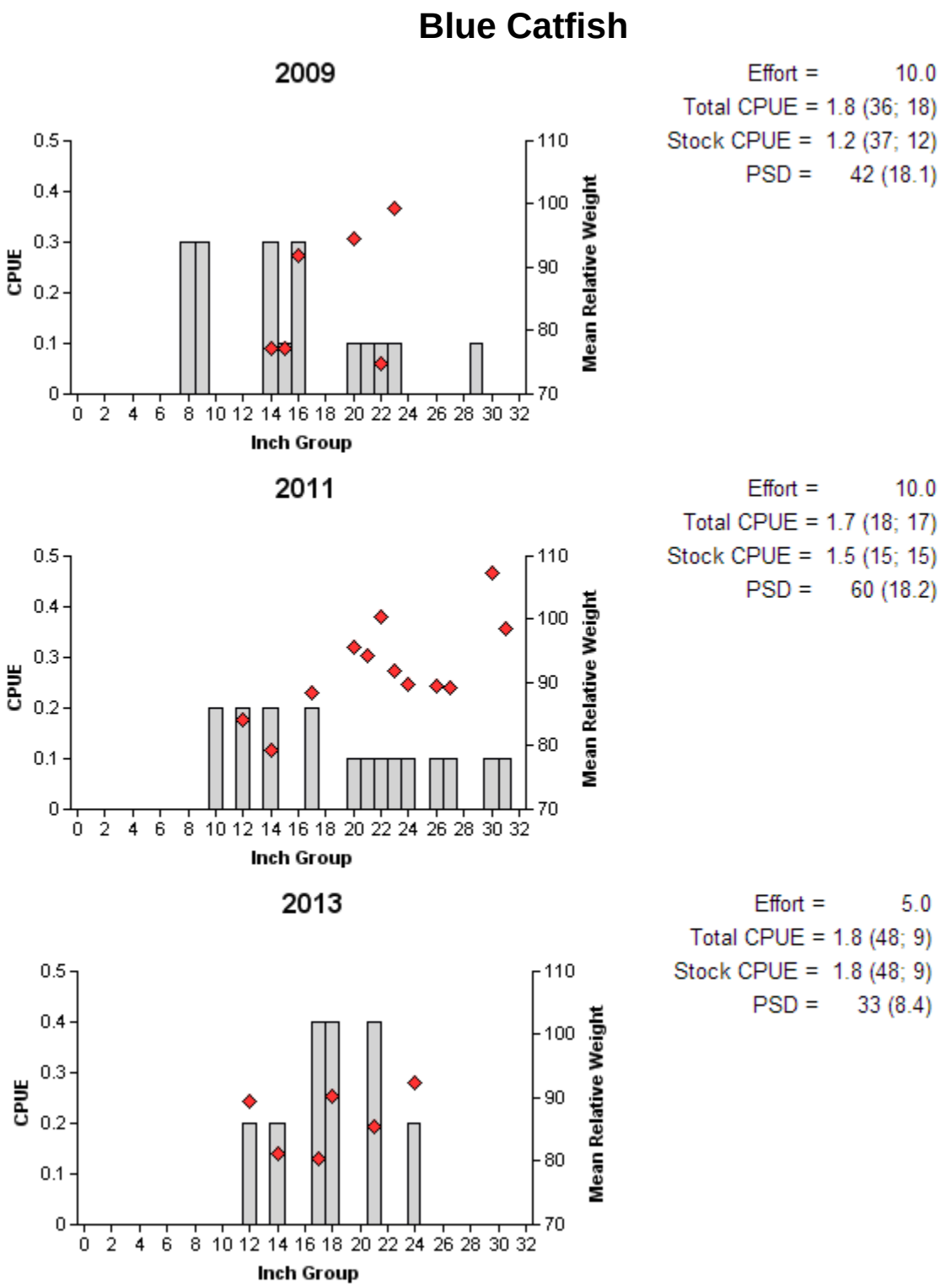


Figure 4. Number of Blue Catfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Medina Reservoir, Texas, 2009, 2011 and 2013. Diamonds represent relative weight.

Channel Catfish

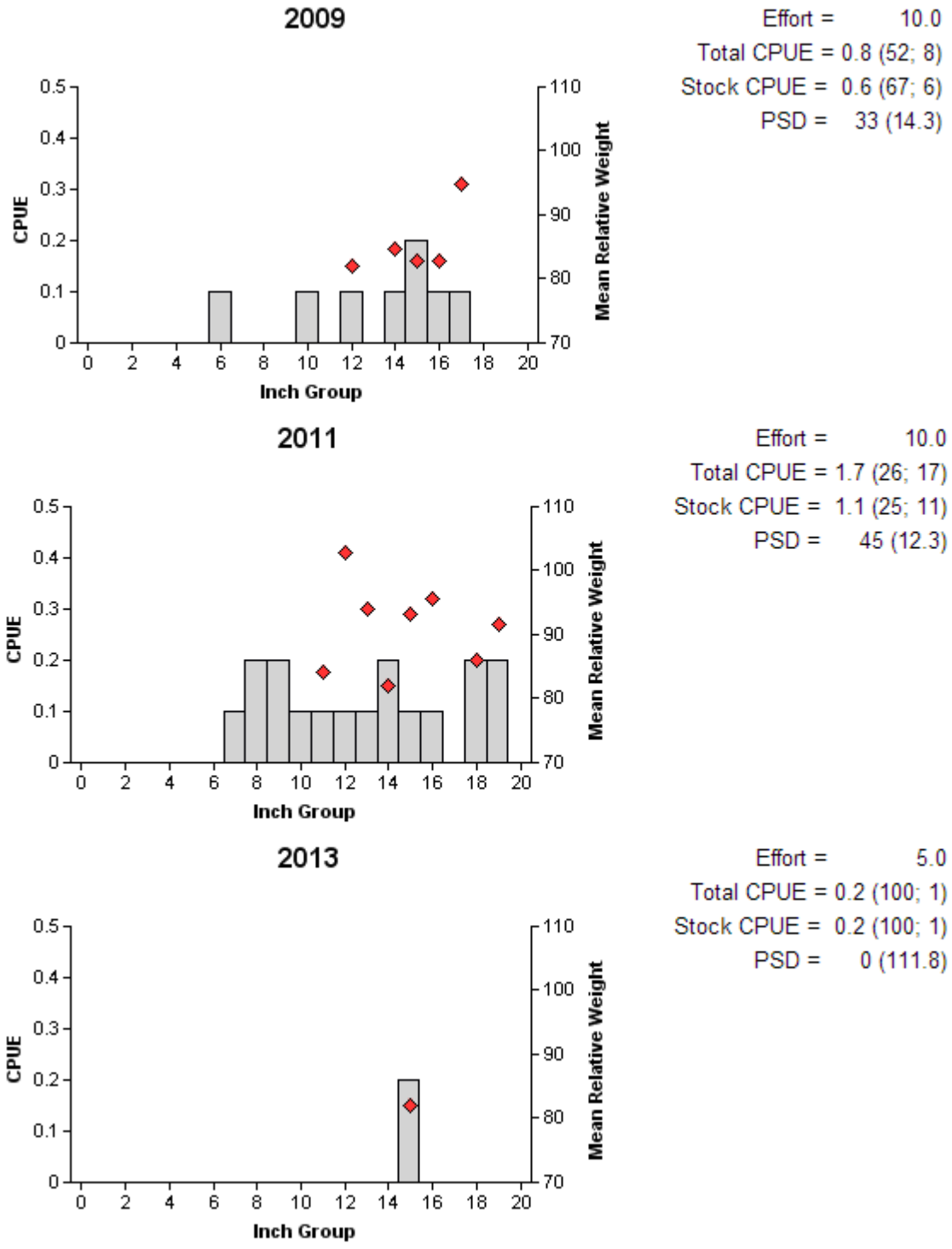


Figure 5. Number of Channel Catfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Medina Reservoir, Texas, 2009, 2011 and 2013. Diamonds represent relative weight.

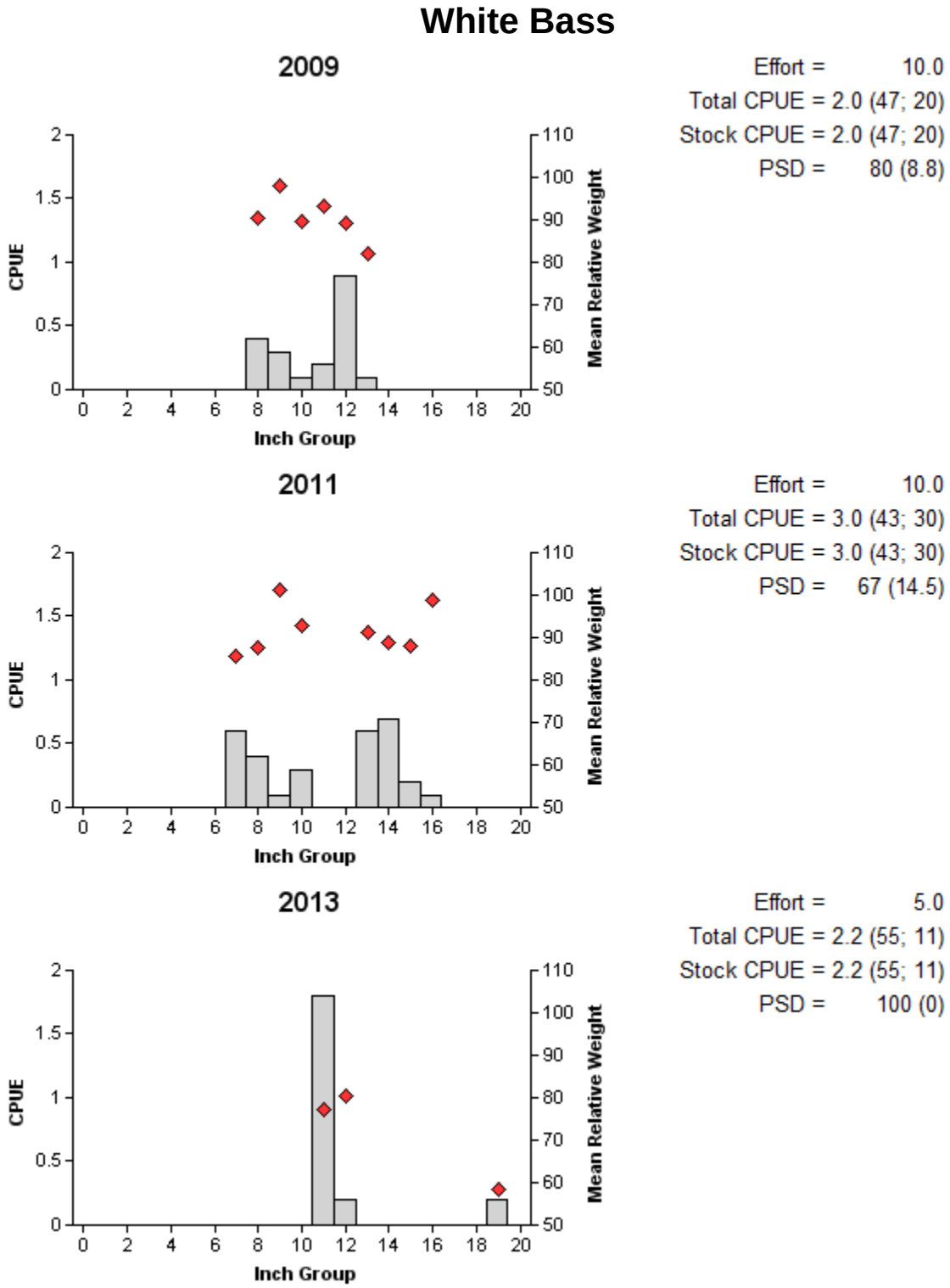


Figure 6. Number of White Bass caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Medina Reservoir, Texas, 2009, 2011, and 2013. Diamonds represent relative weight.

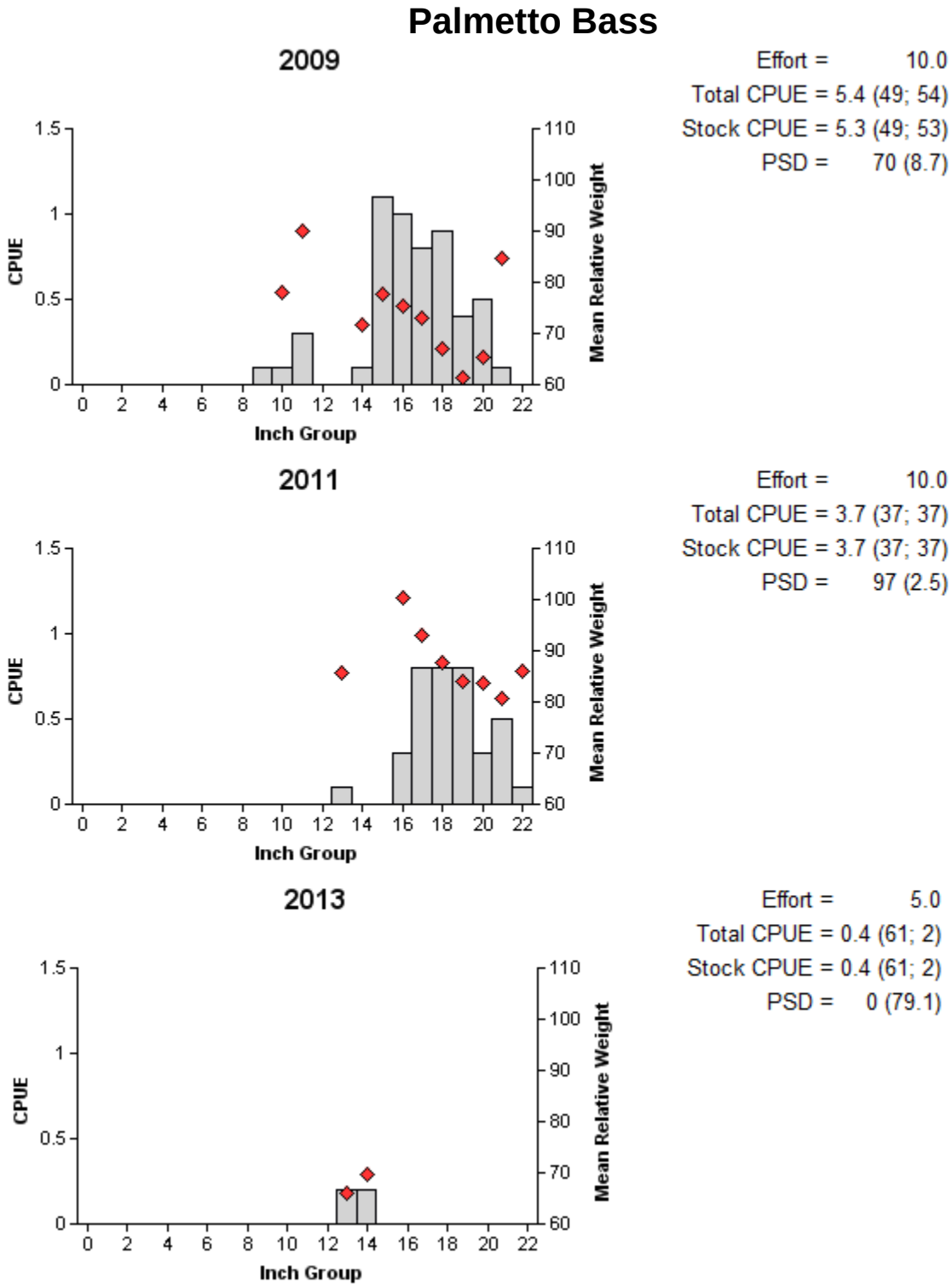


Figure 7. Number of Palmetto Bass caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Medina Reservoir, Texas, 2009, 2011, and 2013. Diamonds represent relative weight.

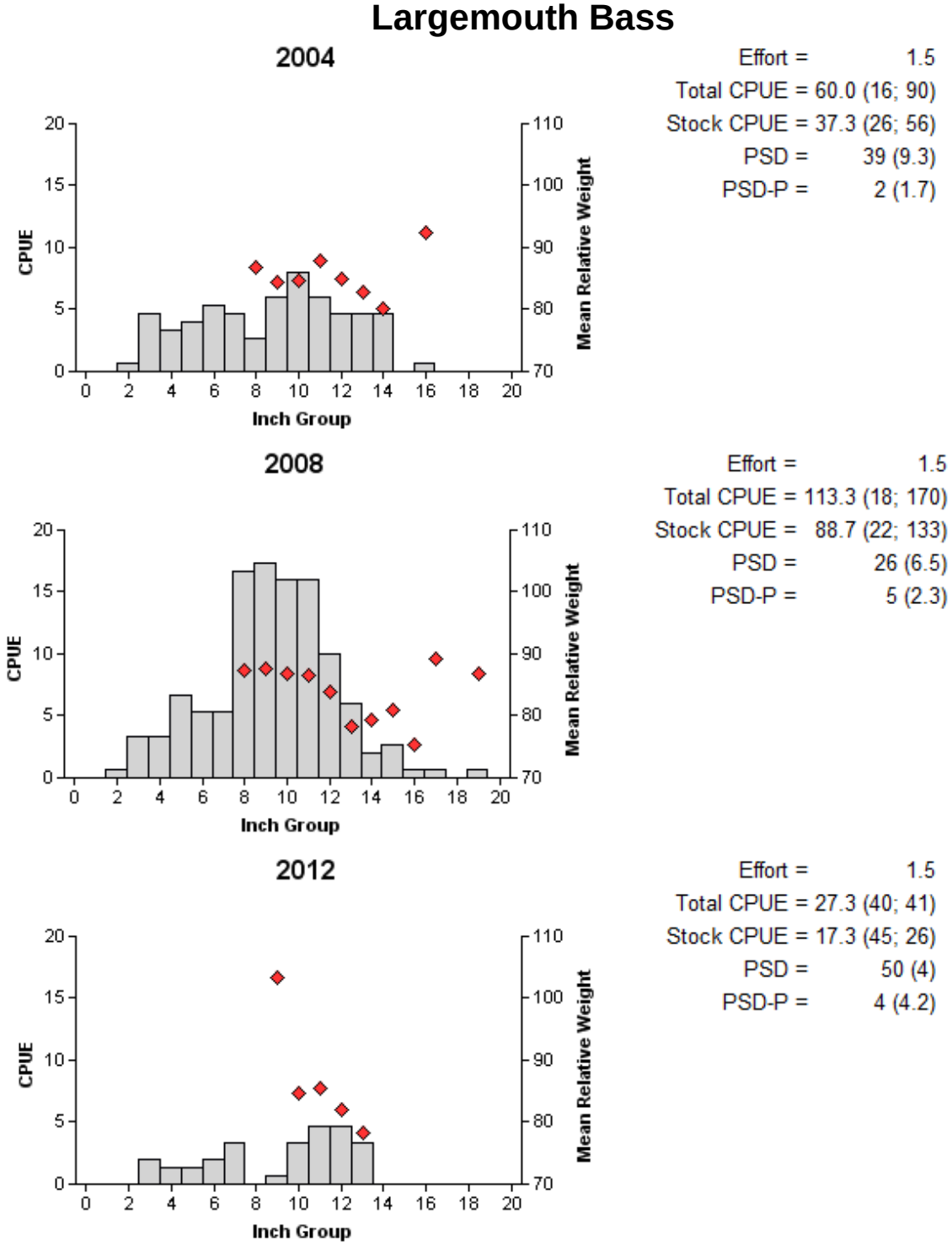


Figure 8. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Medina Reservoir, Texas, 2004, 2008, and 2012. Diamonds represent relative weight.

Largemouth Bass

Table 5. Results of electrophoretic analysis of age-0 Largemouth Bass collected by electrofishing from Medina Reservoir, Texas, in selected years from 1990 to 2012. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition and genotype was determined using electrophoresis prior to 2005 and micro-satellite DNA analysis since 2005.

Year	Sample size	Number of fish			% FLMB alleles	% FLMB
		FLMB	Intergrade	NLMB		
1990	43	4	34	5	50.0	9.3
1994	30	5	25	0	63.3	16.7
1997	30	0	26	4	44.2	0.0
2000	24	5	19	0	66.7	20.8
2004	30	8	20	2	63.3	26.7
2012	30	1	29	0	58.0	3.0

Table 6. Proposed sampling schedule for Medina Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring and electrofishing in the fall. Standard surveys are denoted by S and additional surveys, which are water level dependent, are denoted by A.

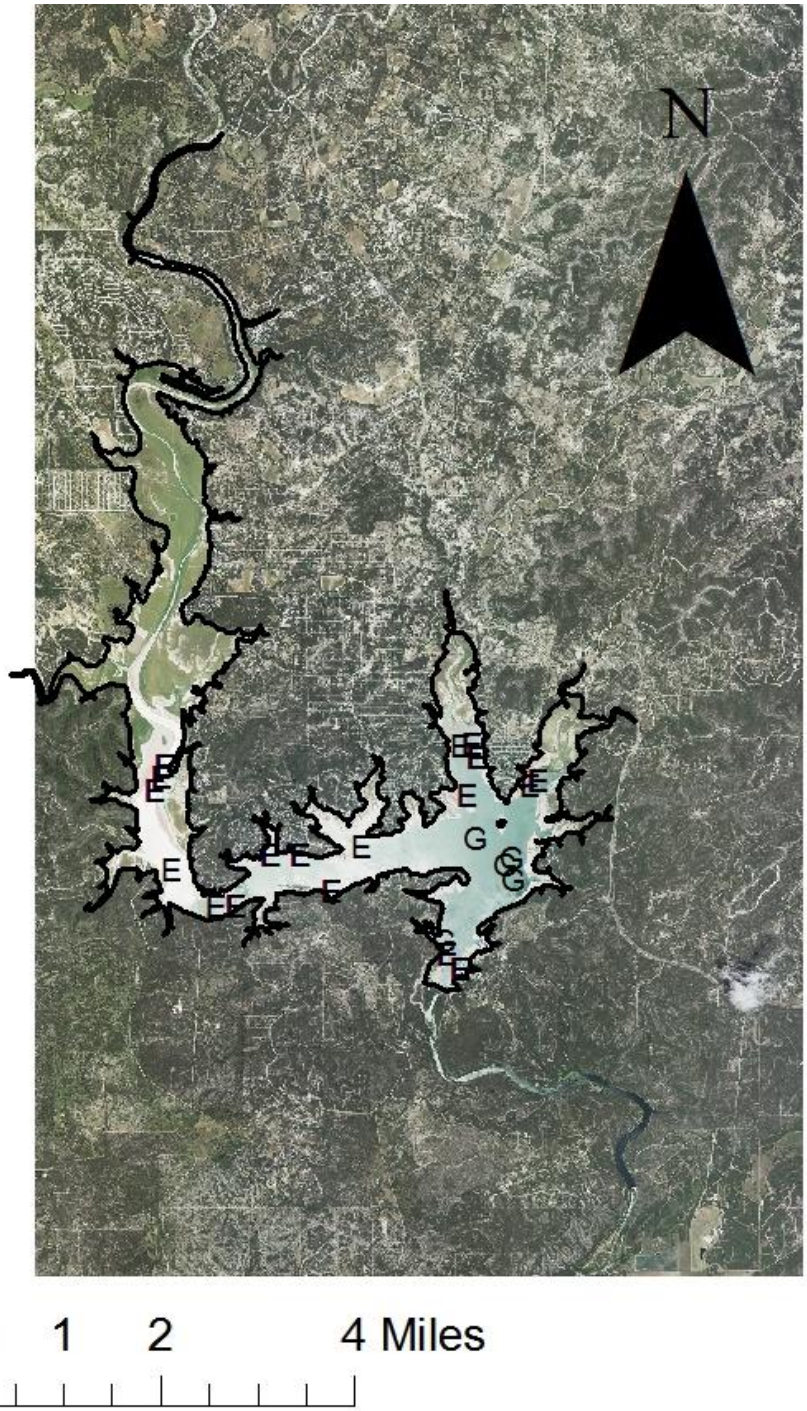
			Habitat				
Year	Electrofishing	Gill net	Structural	Vegetation	Access	Creel survey	Report
2013-2014							
2014-2015	A	A					
2015-2016							
2016-2017	S	S		S	S		S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Medina Reservoir, Texas, 2012-2013. Sampling effort was 1 hour for electrofishing and 5 net nights for gill netting.

Species	Gill Netting		Electrofishing	
	N	CPUE	N	CPUE
Longnose Gar	59	11.8		
Gizzard Shad			85	56.7
Threadfin Shad			3	2.0
Common Carp	7	1.4		
Gray Redhorse	1	0.2		
Blue Catfish	9	1.8		
Channel Catfish	1	0.2		
Flathead Catfish	4	0.8		
White Bass	11	2.2		
Palmetto Bass	2	0.4		
Redbreast Sunfish			73	48.7
Green Sunfish			42	28.0
Bluegill	1	0.2	142	94.7
Redear Ssunfish			3	2.0
Largemouth Bass			41	27.3
White Crappie	3	0.6		

APPENDIX B



Location of sampling sites, Medina Reservoir, Texas, 2012-2013. Gill net and electrofishing stations are indicated by , G, and E, respectively. Water level was approximately 65 feet low during electrofishing and 81 feet low during gill netting.