

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

Ray Hubbard Reservoir

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July 31, 2013

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Ray Hubbard Reservoir were surveyed in 2009, 2010, 2011, and 2012 using electrofishing, 2011 and 2013 using gill netting, and 2009 and 2012 using trap netting. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Ray Hubbard Reservoir is a 22,745-acre impoundment constructed on the East Fork of the Trinity River by the City of Dallas in 1968 to provide water for municipal, industrial, and recreational purposes. Ray Hubbard Reservoir lies within Dallas, Collin, Rockwall and Kaufman counties. The reservoir is part of the Dallas-Ft. Worth metroplex. The reservoir has a 1,074 square-mile watershed that lies in the Blackland Prairies ecological region. The reservoir is 13 miles long and 3 miles wide (widest point). It contains 452,040 acre feet of water at conservation elevation (435.5 ft-msl), and has a maximum depth of 40 feet. Angler and boat access is adequate. At the time of sampling the fishery habitat was primarily dead trees, emergent vegetation, and eroded banks. Hydrilla (*Hydrilla verticillata*) is present and has historically provided fish habitat and currently has no detrimental effects on access or the fish populations.
- **Management history:** Important sport fish include Largemouth Bass, White Crappie, White Bass, Palmetto Bass, and Blue and Channel Catfish. All species are managed with statewide regulations. Palmetto Bass are requested annually for stocking and provide a popular fishery. The reservoir has a population of large Blue Catfish and has produced ShareLunker Largemouth Bass. Florida Largemouth Bass were stocked annually from 2010-2012.
- **Fish Community**
 - **Prey species:** Threadfin Shad were collected in great abundance. Gizzard Shad were also present in good abundance. Bluegill and Longear sunfish were also very abundant as prey. Bluegill over 6 inches are available for anglers.
 - **Catfishes:** The Blue Catfish population continued to be good with large individuals available for anglers. The relative abundance of Channel Catfish declined since the previous survey. No flathead catfish were sampled during annual gill netting but are present.
 - **Temperate basses:** White Bass catch rates nearly doubled from the previous survey. Palmetto Bass catch rate declined when compared to the previous survey.
 - **Largemouth Bass:** The Largemouth Bass population has remained good over the past several years with good size structure. The Florida Largemouth Bass influence is high.
 - **Crappie:** The White Crappie population returned to near normal abundance compared to previous surveys. Black Crappie catch rates increased.
- **Management Strategies:** Ray Hubbard reservoir has a popular Palmetto Bass fishery. Maintaining the fishery requires annual stockings. Palmetto Bass will be stocked annually with alternating years of fry and fingerlings. Florida Largemouth Bass will also be requested to increase the Florida genetics on the population. Courtesy docks are still needed on several public boat ramps maintained by the City of Dallas. General monitoring with gill netting will be conducted every two years to evaluate Palmetto Bass population. Electrofishing surveys will continue to be conducted annually to monitor Largemouth Bass and prey species populations. Annual exotic vegetation surveys will be conducted to monitor hydrilla abundance.

INTRODUCTION

This document is a summary of fisheries data collected from Ray Hubbard 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 species of 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

Ray Hubbard Reservoir, is a 22,745-acre impoundment constructed on the East Fork of the Trinity River by the City of Dallas in 1968 to provide water for municipal, industrial, and recreational purposes. Ray Hubbard Reservoir is located one-mile east of Rockwall and lies within Dallas, Collin, Rockwall and Kaufman counties. The reservoir is surrounded by urban development and is part of the Dallas-Ft. Worth metroplex. The reservoir has a 1,074 square-mile watershed that lies in the Blackland Prairies ecological region and is primarily used for agricultural and residential development. The reservoir is 13 miles long and 3 miles wide (widest point). It contains 490,000 acre feet of water at conservation elevation (435.5 ft-msl), and has a maximum depth of 40 feet. Angler and boat access is adequate. It is classified as hyper eutrophic by the Texas Commission on Environmental Quality (Texas Commission on Environmental Quality 2011). At the time of sampling the fishery habitat was primarily standing timber, native emergent vegetation, and rocky habitat in the form of riprap. Hydrilla (*Hydrilla verticillata*) is present in the reservoir and provides fish habitat and has not caused problems with access, fish populations, or landowners around the reservoir. Its current abundance is less than one acre.

Angler Access

Ray Hubbard Reservoir has 10 public boat ramps. Six of these ramps are free ramps. The others require a fee. Additional boat ramp characteristics are in Table 2. Shoreline fishing access can be found at Bob Jones, Kennedy, Robertson, Concho, Terry, and Barnes Bridge Parks, Lakeside Park South, and the Hwy 66 boat ramp. There is also a small vessel ramp in Paddle Point Park which is associated with a TPWD paddling trail.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Brock and Hungerford 2008) included:

1. A quality fishery for Palmetto Bass has persisted in Ray Hubbard Reservoir since the stocking program began. The fishery supports several guides targeting Palmetto Bass. Maintenance of the population relies on annual stockings.
 - Action:** Continued requesting Palmetto Bass annually at 10-15 fish per acre. Palmetto Bass fingerlings were stocked in 2009 and 2011, while fry were stocked in 2013.
2. Courtesy docks are still needed at high use ramps to assist anglers with launching and loading of boats.
 - Actions:** The City of Dallas was contacted regarding possible installation of courtesy docks. However no action has been taken to install the structures.
3. The Largemouth Bass population has a history of producing trophy sized fish. Genetic analysis revealed a high FLMB allele frequency but no FLMB genotypes.
 - Actions:** Florida Largemouth Bass were requested and stocked in 2010, 2011, and 2012. Genetic analysis was conducted in fall of 2012 to determine effectiveness of stockings.
4. The White Crappie catch rate in 2008 was well below historic catch rates.
 - Actions:** Trap netting was conducted in the fall of 2009.
5. The exotic species zebra mussel (*Dreissena polymorpha*) has been found in Texoma

Reservoir. Water from Texoma Reservoir is pumped into Lavon Reservoir for water supply purposes. Lavon Reservoir is directly upstream from Ray Hubbard Reservoir and infestation of zebra mussel is possible.

Actions: The City of Dallas and lakeside marinas were contacted regarding the zebra mussel issue. Signs were erected at public ramps. Zebra mussel samplers were placed at various locations around the reservoir.

Harvest regulation history: Sport fish populations in Ray Hubbard Reservoir have been managed with statewide regulations (Table 3).

Stocking history: Ray Hubbard Reservoir has been stocked frequently with Florida Largemouth Bass and sporadically with Palmetto Bass. The complete stocking history is in Table 4.

Vegetation/ habitat management history: No habitat management projects have been conducted on the reservoir. Although present, hydrilla doesn't currently hamper access or cause problems with property owners. No treatments have ever been needed. It's abundance is currently less than one acre. Exotic vegetation surveys have been conducted annually to monitor hydrilla.

Water transfer: Ray Hubbard Reservoir is primarily used as water supply for the City of Dallas. No interbasin transfers exist. Ray Hubbard is downstream of Lavon Reservoir which had zebra mussels in a tributary.

METHODS

Fishes were collected by electrofishing (2.0 hours at 24 5-min stations), trap netting (15 net nights at 15 stations), and gill netting (15 net nights at 15 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/hr) 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).

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 and creel statistics. Otoliths were aged for all Palmetto Bass collected. All procedures were 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 website.

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat survey was last conducted in summer of 2008. At that time the habitat consisted primarily of riprap, native shoreline emergent species and limited floating leaf species, and sporadic stands of hydrilla (Table 5).

Creel Survey: No creel survey was conducted on Ray Hubbard reservoir during survey period. The last creel survey was conducted in 2004-2005.

Prey species: The total electrofishing catch rate of Threadfin Shad in 2012 was 790.5 (Appendix A). Catch rates averaged 837.6/hr from 2009–2012. Catch rates varied from a high of 1,104.0/hr in 2009 to a low of 589.0/hr in 2011. This average catch rate is well above the lake average of 535.4/hr (Appendix C). Gizzard Shad catch rate was 279.0/hr in 2012 (Figure 2). Gizzard Shad catch rates averaged 461.4/hr from 2009-2012, and varied from a high of 704.5/hr in 2010 to a low of 186.0/hr in 2009). This average catch rate is well above the average of 290.6/hr. Index of vulnerability (IOV) improved compared to the previous four year sample average. IOV values averaged 74.3 from 2009 – 2012 (Figure 3). The shad population is very abundant and is capable of supporting multiple sport fish populations. The catch rate of Bluegill was 212.0/hr in 2012 and averaged 154.1/hr from 2009-2012 (Figure 4). This average is close to the average of 154.5/hr. The catch rate of Bluegill 6 inches and longer averaged 49.1/hr from 2009–2012, indicating the population has the potential to provide angling opportunities. The Longear catch rate was 237.5/hr in 2012 and averaged 122.4/hr from 2009–2012 which was near the average of 125.8/hr.

Catfishes: The 2013 total gill netting catch rate of Blue Catfish was 8.3/nn which was an increase from the rate observed in 2011 (2.8/nn) (Figure 5). The average of these years (5.1/nn) was below the lake average of 7.1/nn. Size structure of the Blue Catfish population is very good as indicated by PSD values of 48 and 54, and PSD-P values of 15 and 12.6 observed in 2011 and 2013, respectively. Body conditions of the Blue Catfish sampled were above 85 for most length groups. The total gill netting catch rate of Channel Catfish was 3.6/nn in 2013 which was lower than the previous sample (4.8/nn) in 2011 (Figure 6). This catch rate is also lower than the average of 4.7/nn. Size structure of the population was below average as indicated by PSD and PSD-P values of 18 and 0 respectively. Body conditions of the Channel Catfish sampled were near 90 for most length groups.

Temperate basses: The 2013 total gill netting catch rate of White Bass was 9.1/nn which was above the average of 7.6/nn (Figure 7). This catch rate was also higher than the 2011 catch rate of 4.5/nn. Size structure of the population was good as indicated by the PSD value of 99. The gill netting catch rate of Palmetto Bass was only 0.6/nn in 2013 which was lower than the average of 2.5/nn (Figure 8). This catch rate is higher than the previous catch rate observed in 2011 (0.1/nn). The PSD value of 100 indicates only larger fish are present. In Ray Hubbard, Palmetto Bass reach 18 inches between age 2 and 3 (Figure 9).

Largemouth Bass: The total electrofishing catch rate of Largemouth Bass was 185.5/hr in 2012 and averaged 124.6/hr from 2009-2012 (Figure 10). Catch varied from a high of 185.5/hr in 2012 to a low of 67.5/hr in 2009. This average is almost identical to the average of 124.8/hr. Size structure of the Largemouth Bass population was good as indicated by an average PSD value of 45 and a PSD-14 value of 29 observed from 2009-2012. Body condition in 2012 was at or near optimal for most size classes of fish. Florida Largemouth Bass allele percentage was 47% (Table 6).

Crappies: The total trap netting catch rate of White Crappie was 2.6/nn in 2012, which is well below the average of 8.0/nn and much lower than previous surveys (Figure 11). The supplemental sample collected in 2009 resulted in a catch rate of 5.2/nn which was closer to the reservoir average. The size structure of the population is good as indicated by a PSD value of 65 and PSD-P of 36. The Black Crappie catch rate was 3.5/nn in 2012, which is higher than the 2009 survey (2.9/nn; Figure 12). The size structure of the Black Crappie population is good as indicated by a PSD of 65.

Fisheries management plan for Ray Hubbard Reservoir, Texas

Prepared – July 2013.

ISSUE 1: A quality fishery for Palmetto Bass has persisted in Ray Hubbard Reservoir since the stocking program began. The fishery supports several guides targeting Palmetto Bass. Maintenance of the population relies on annual stockings. Because fingerling availability is sporadic, fry stockings will be conducted to help avoid consecutive years of no fish being stocked. A group of anglers have also raised funds to purchase Sunshine Bass for supplemental stocking.

MANAGEMENT STRATEGIES

1. Request annual stockings of Palmetto Bass alternating between fingerlings and fry.
2. Compare catch rates of fingerlings and fry stockings to determine which has more success.
3. If Sunshine Bass stockings become consistent, conduct genetic analysis on fish caught during sampling to determine ratio of species caught.
4. Continue to develop partnership with fishing enthusiasts to buy supplemental fish for stocking.

ISSUE 2: The Largemouth Bass population has a history of producing trophy sized fish including two ShareLunkers

MANAGEMENT STRATEGIES

1. Request the stocking of FLMB in 2013 and 2014 at a rate of 25/acre to increase chances of producing trophy Largemouth Bass.
2. Conduct genetic analysis of Largemouth Bass samples to determine stocking success in 2016.

ISSUE 3: Zebra mussels are a threat to colonize Ray Hubbard Reservoir. Directly upstream of Ray Hubbard is Lavon Reservoir which has had zebra mussels discovered in one of its tributaries. Several boats have also been launched and later determined to have been infested with zebra mussels.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir where necessary.
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. Maintain and monitor zebra mussel samplers at marinas.

ISSUE 4: The exotic vegetation hydrilla is present in Ray Hubbard Reservoir and its abundance is variable from year to year. It has never caused access problems and no treatment plan has ever been developed for control.

MANAGEMENT STRATEGIES

1. Contact the controlling authority to inform them of possible problems at access points around the reservoir when necessary.
2. Conduct exotic vegetation surveys annually to monitor hydrilla.

SAMPLING SCHEDULE JUSTIFICATION

Ray Hubbard reservoir has a popular Palmetto Bass fishery. Monitoring this popular fishery will be done by conducting gillnet surveys every two years (2015 and 2017). The gillnet surveys will also allow for monitoring of the quality Blue Catfish population. Electrofishing will be conducted annually to monitor prey species and the quality Largemouth Bass population. Trap netting will be conducted in 2016 as part of standard monitoring. An exotic vegetation survey will be conducted annually to monitor hydrilla abundance.

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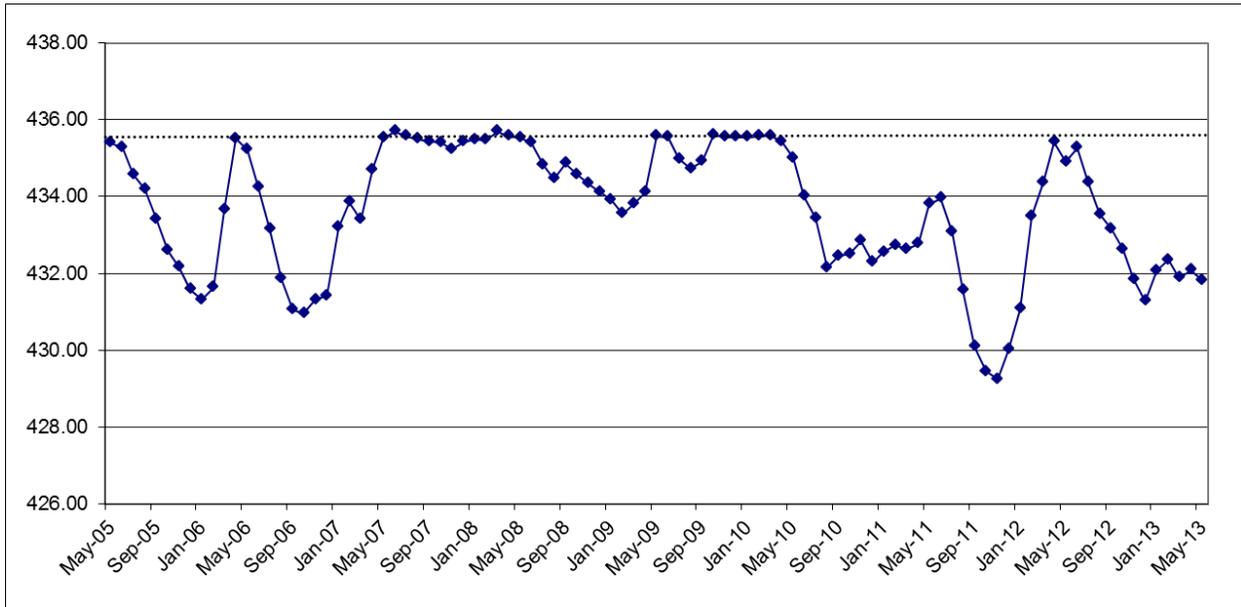


Figure 1. Mean monthly water level elevations in feet above mean sea level (MSL) recorded for Ray Hubbard Reservoir, Texas from May 2005-May 2013. Conservation pool is 435.5 feet above MSL.

Table 1. Characteristics of Ray Hubbard Reservoir, Texas.

Characteristic	Description
Year Constructed	1968
Controlling authority	City of Dallas
Counties	Collin, Dallas; Rockwall; Kaufman
Reservoir type	Mainstream Trinity River
Conductivity	326 umhos/cm

Table 2. Boat ramp characteristics for Ray Hubbard Reservoir, Texas, October, 2012. Reservoir elevation at time of survey was 432.6 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Condition
John Paul Jones Park	32.867 -96.573	Y	35	Good. No courtesy dock
Captains Cove Marina	32.856 -96.545	Y	80	Good
Terry Park	32.8395 -96.50616	Y	50	Good
Chandlers Marina	32.876 -96.4825	Y	150	Good
Robertson Park North	32.8759 -96.52357	Y	60	Adequate. No courtesy dock

Table 2 Continued.

Robertson Park South - West	32.8725 -96.5218	Y	50	Adequate. No courtesy dock
Robertson Park South - East	32.8755 -96.51467	Y	50	Adequate. No courtesy dock
Harbor Bay Marina	32.8966 -96.4816	Y	280	Good
Hwy 66 Boat Ramp	32.9295 -96.474	Y	100	Good
Paddle Point Park	32.8924 -96.5367	Y	25	Good. Gravel ramp for small craft only

Table 3. Harvest regulations for Ray Hubbard Reservoir, Texas.

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

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

Species	Year	Number	Life Stage	Mean TL (in)
Blue Catfish	1990	109,175	FGL	2.0
	1993	399,958	FGL	2.2
	Total	509,133		
Channel Catfish	1971	96,830	AFGL	7.9
	Total	96,830		
Florida Largemouth Bass	1988	64,872	FRY	1.0
	1991	568,891	FGL	1.4
	1996	549,328	FGL	1.4
	2001	501,365	FGL	1.6
	2003	5,000	FGL	1.5
	2006	542,236	FGL	1.7
	2007	543,441	FGL	1.7
	2010	520,551	FGL	1.7
	2011	511,897	FGL	1.6
	2012	573,599	FGL	1.6
Total	4,381,180			
Largemouth Bass	1968	1,471,600	FRY	0.7
	1970	2,003,000	FRY	0.7
	1970	201,000	UNK	UNK
	Total	3,675,600		
Mixed Largemouth Bass	1988	502,897		0.9
	Total	502,897		
Palmetto Bass (Striped X White Bass hybrid)	1976	149,616	UNK	UNK
	1979	114,000	UNK	UNK
	1980	101,800	UNK	UNK
	1982	232,701	UNK	UNK
	1985	271,952	FGL	2.0
	1987	455,017	FRY	1.0
	1988	1,200	AFGL	4.0
	1988	454,647	FRY	1.0
	1989	460,946	FGL	1.3
	1991	235,994	FGL	1.4
	1992	325,185	FGL	1.4
	1993	171,853	FGL	1.6
	1993	940,000	FRY	0.4

Species	Year	Number	Life Stage	Mean TL (in)
	1994	170,027	FGL	1.7
	1994	171,634	FRY	0.9
	1995	346,142	FGL	1.2
	1996	250,702	FGL	1.6
	1999	56,945	FGL	1.3
	2002	172,336	FGL	1.3
	2003	162,993	FGL	1.5
	2004	100,438	FGL	1.3
	2005	216,814	FGL	1.5
	2005	1,501,902	FRY	0.3
	2007	152,637	FGL	1.5
	2008	114,846	FGL	1.6
	2009	107,290	FGL	1.4
	2011	105,118	FGL	1.3
	2013	2,074,929	FRY	0.2
	Total	9,619,664		
Striped bass	1979	111,225	UNK	UNK
	1981	113,482	UNK	UNK
	1983	115,868	UNK	UNK
	1984	338,680	FGL	2.0
	1986	50,800	FGL	2.0
	1986	174,400	FRY	1.0
	1996	11,598	FGL	1.7
	Total	916,053		
Walleye	1976	230,000	FRY	0.2
	1981	19,237	FRY	0.2
	Total	249,237		

Table 5. Survey of structural habitat types, Ray Hubbard Reservoir, Texas, 2008. Shoreline habitat type units are in miles and standing timber and boat docks and marinas are acres.

Habitat type	Estimate	% of total
Boat dock	0.3 miles	0.3
Bulkhead	13.4 miles	12.5
Bulkhead + boat dock	4.3 miles	4.0
Bulkhead + native emergent	0.2 miles	0.2
Gravel + natural	0.4 miles	0.4
Native emergent	1.4 miles	1.3
Native emergent + boat dock	0.8 miles	0.7
Native emergent + exotic not prohibited	0.2 miles	0.2
Native emergent + native floating + native submersed	2.8 miles	2.6
Native emergent + native submersed	0.8 miles	0.7
Native emergent + natural	53.6 miles	49.9
Native emergent + native submersed	0.9 miles	0.8
Native submersed	0.1 miles	0.1
Native submersed + natural	0.1 miles	0.1
Natural	5.0 miles	4.7
Natural + exotic not prohibited	0.3 miles	0.3
Rocky shoreline	19.9 miles	18.5
Rocky shoreline + boat dock	0.3 miles	0.3
Rocky shoreline + gravel + natural	0.2 miles	0.2
Rocky shoreline + native emergent	2.0 miles	1.9
Rocky shoreline + native emergent + natural	0.1 miles	0.1
Rocky shoreline + native submersed	0.3 miles	0.3
Rocky shoreline + natural	0.5 miles	0.5
Standing Timber	3,365 acres	
Boat Dock + marina	108 acres	

Table 6. Survey of non- native aquatic vegetation in Ray Hubbard Reservoir, Texas. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2008	2009	2010	2011	2012
Non-native					
Hydrilla	857 (4.0)	752 (3.5)	-	<1	<1

Gizzard Shad

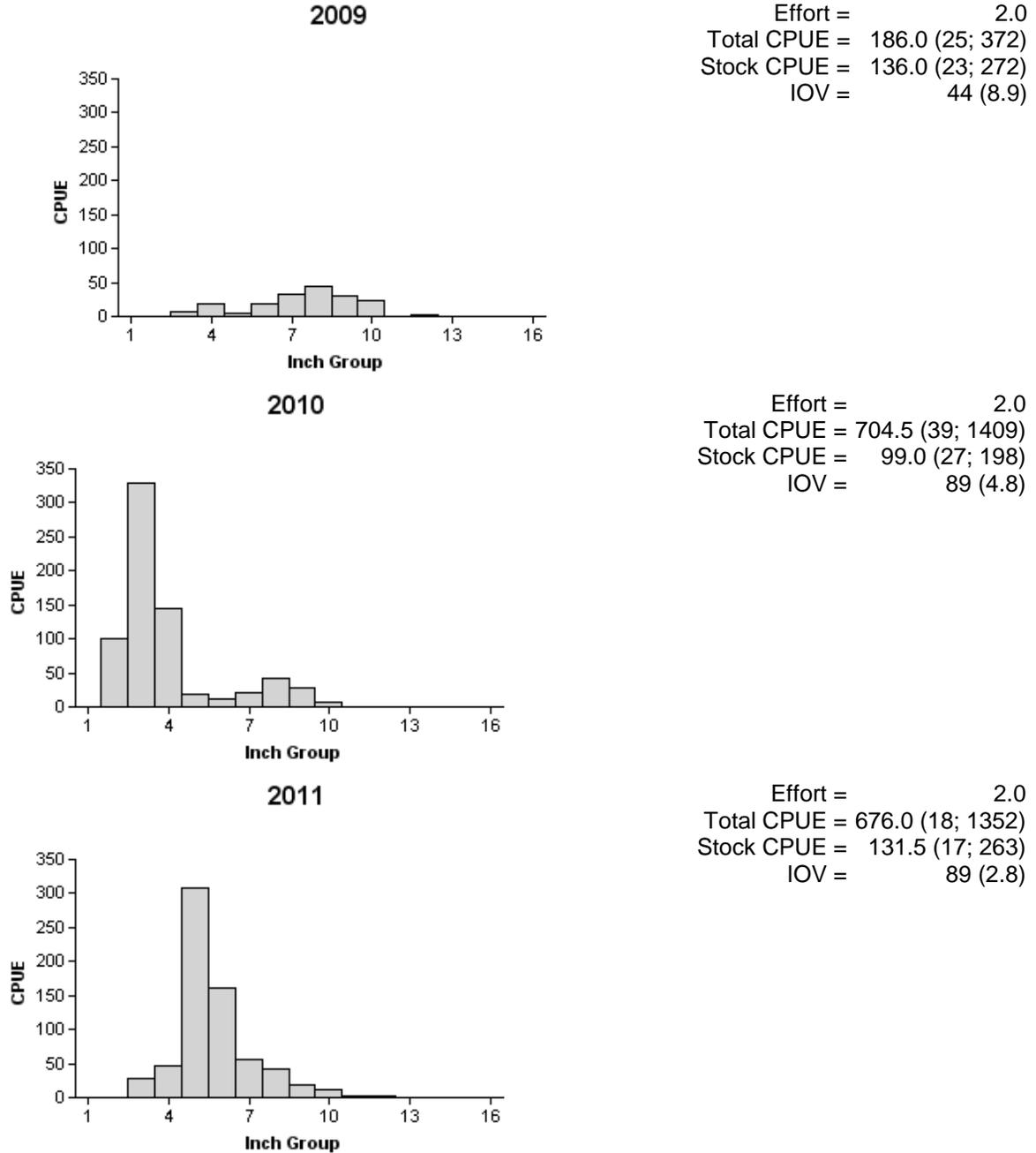


Figure 2. Number of Gizzard Shad caught per hour (CPUE; bars) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Ray Hubbard Reservoir, Texas, 2009, 2010, 2011, and 2012.

Gizzard Shad

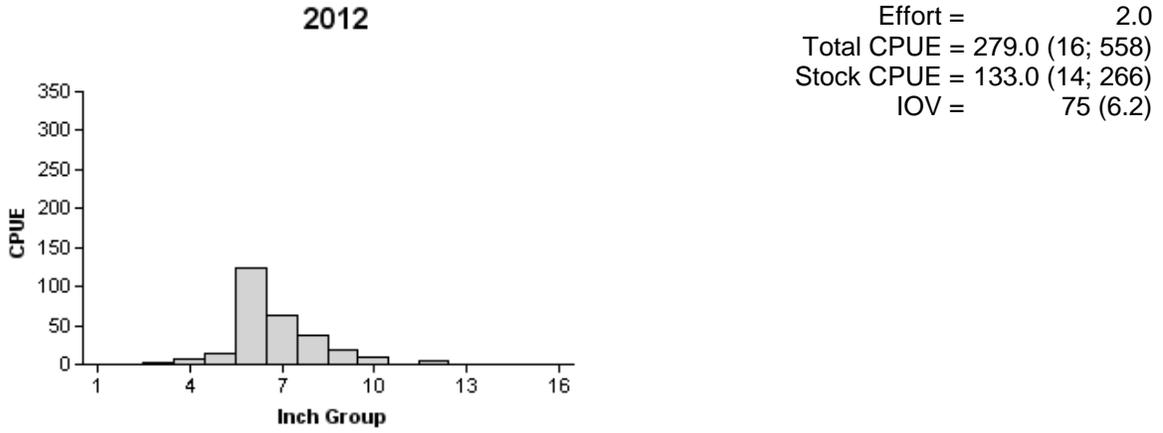


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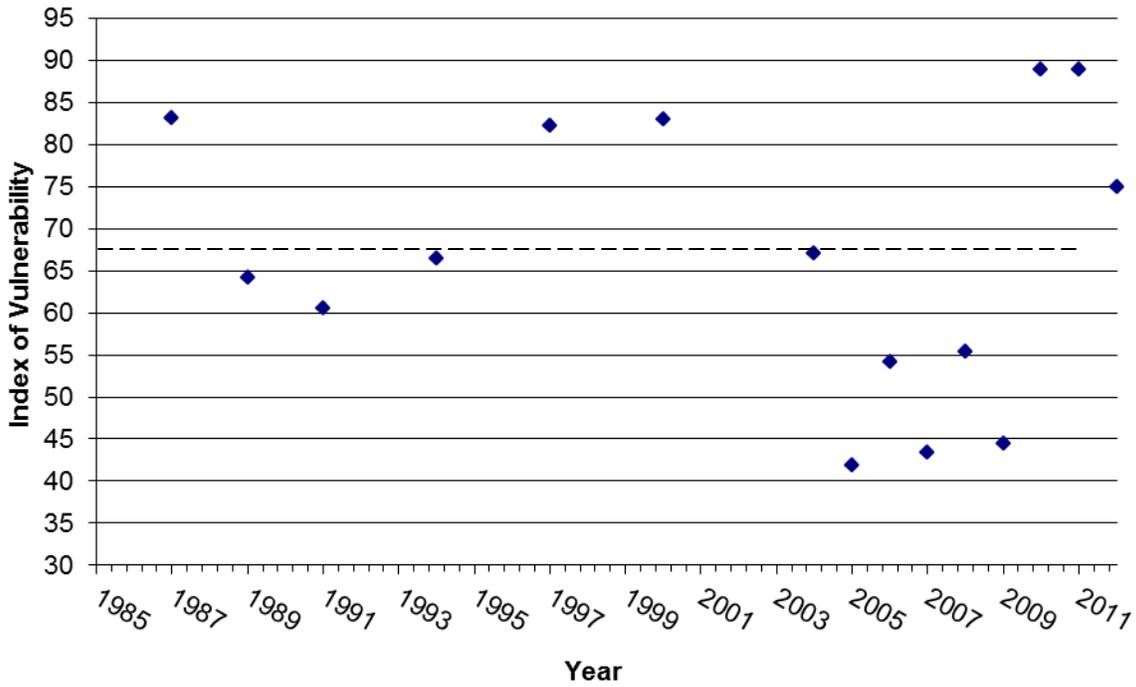
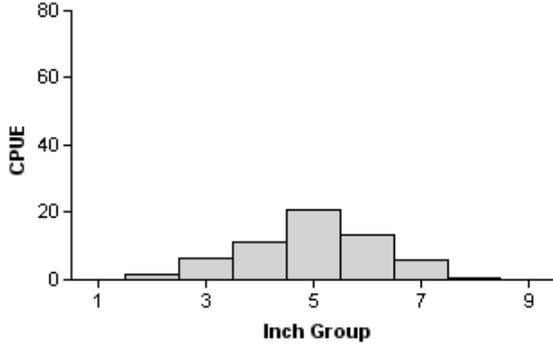


Figure 3. Index of Vulnerability (IOV) for Gizzard Shad caught during fall electrofishing samples at Ray Hubbard Reservoir from 1987-2012. Dashed line represents reservoir average (66.6).

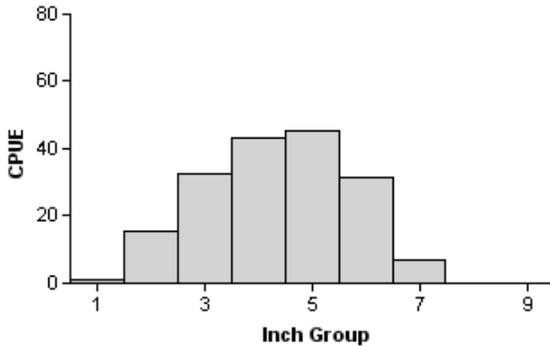
Bluegill

2009



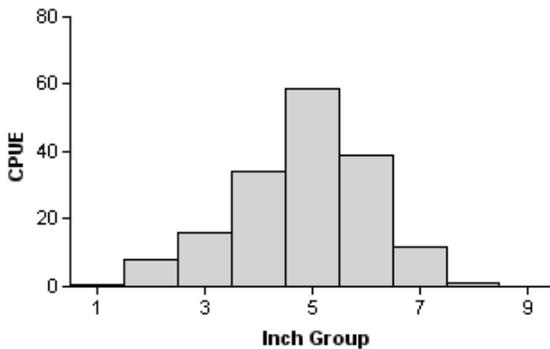
Effort = 2.0
 Total CPUE = 60.0 (30; 120)
 Stock CPUE = 58.5 (30; 117)
 CPUE-6 = 20.0 (36; 40)
 PSD = 34 (8.2)

2010



Effort = 2.0
 Total CPUE = 176.0 (27; 352)
 Stock CPUE = 159.5 (27; 319)
 CPUE-6 = 38.5 (34; 77)
 PSD = 24 (3.9)

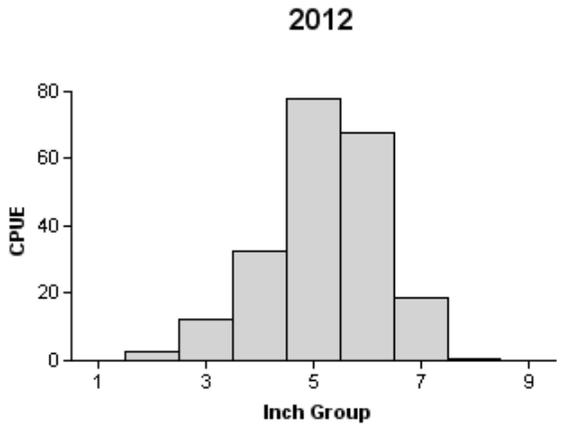
2011



Effort = 2.0
 Total CPUE = 168.5 (31; 337)
 Stock CPUE = 160.0 (31; 320)
 CPUE-6 = 51.5 (33; 103)
 PSD = 32 (2.9)

Figure 4. Number of Bluegill caught per hour (CPUE; bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Ray Hubbard Reservoir, Texas, 2009, 2010, 2011, and 2012.

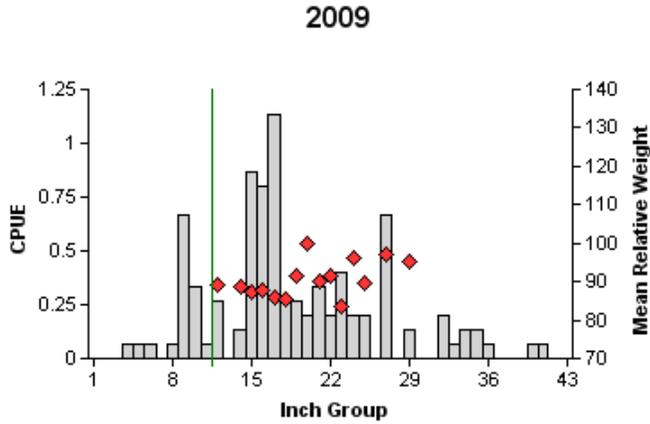
Bluegill



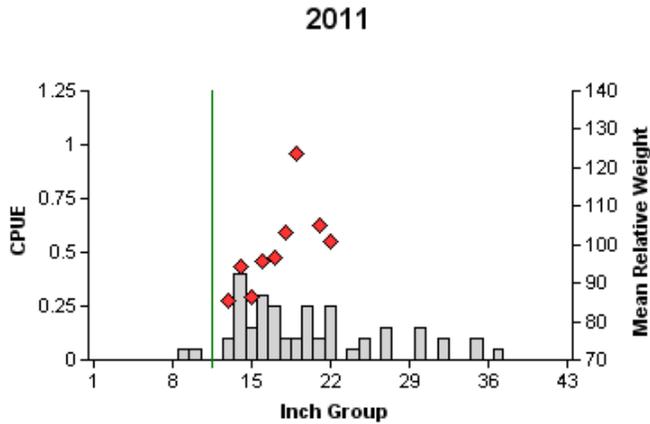
Effort = 2.0
Total CPUE = 212.0 (21; 424)
Stock CPUE = 209.5 (21; 419)
CPUE-6 = 86.5 (21; 173)
PSD = 41 (5.4)

Figure 4 continued.

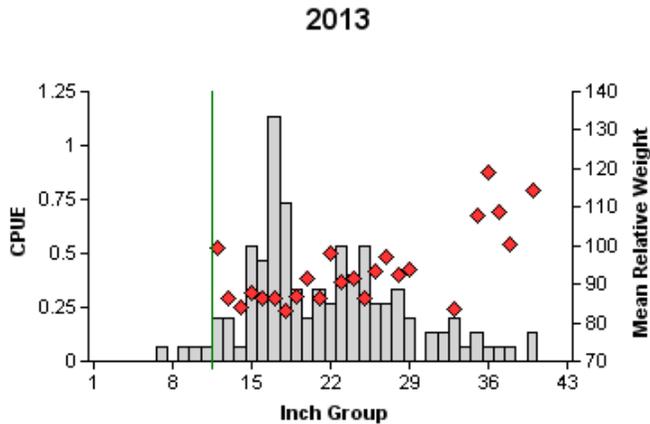
Blue Catfish



Effort = 15.0
 Total CPUE = 8.1 (15; 122)
 Stock CPUE = 6.8 (13; 102)
 PSD = 45 (5.8)
 PSD-P = 11 (3.2)



Effort = 20.0
 Total CPUE = 2.8 (23; 56)
 Stock CPUE = 2.7 (24; 54)
 PSD = 48 (13.5)
 PSD-P = 15 (6.8)



Effort = 15.0
 Total CPUE = 8.3 (18; 124)
 Stock CPUE = 8.0 (18; 120)
 PSD = 54 (7.6)
 PSD-P = 12 (4.3)

Figure 5. Number of Blue Catfish caught per net night (CPUE; bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Ray Hubbard Reservoir, Texas, 2009, 2011, and 2013. Vertical line represents length limit at time of sampling.

Channel Catfish

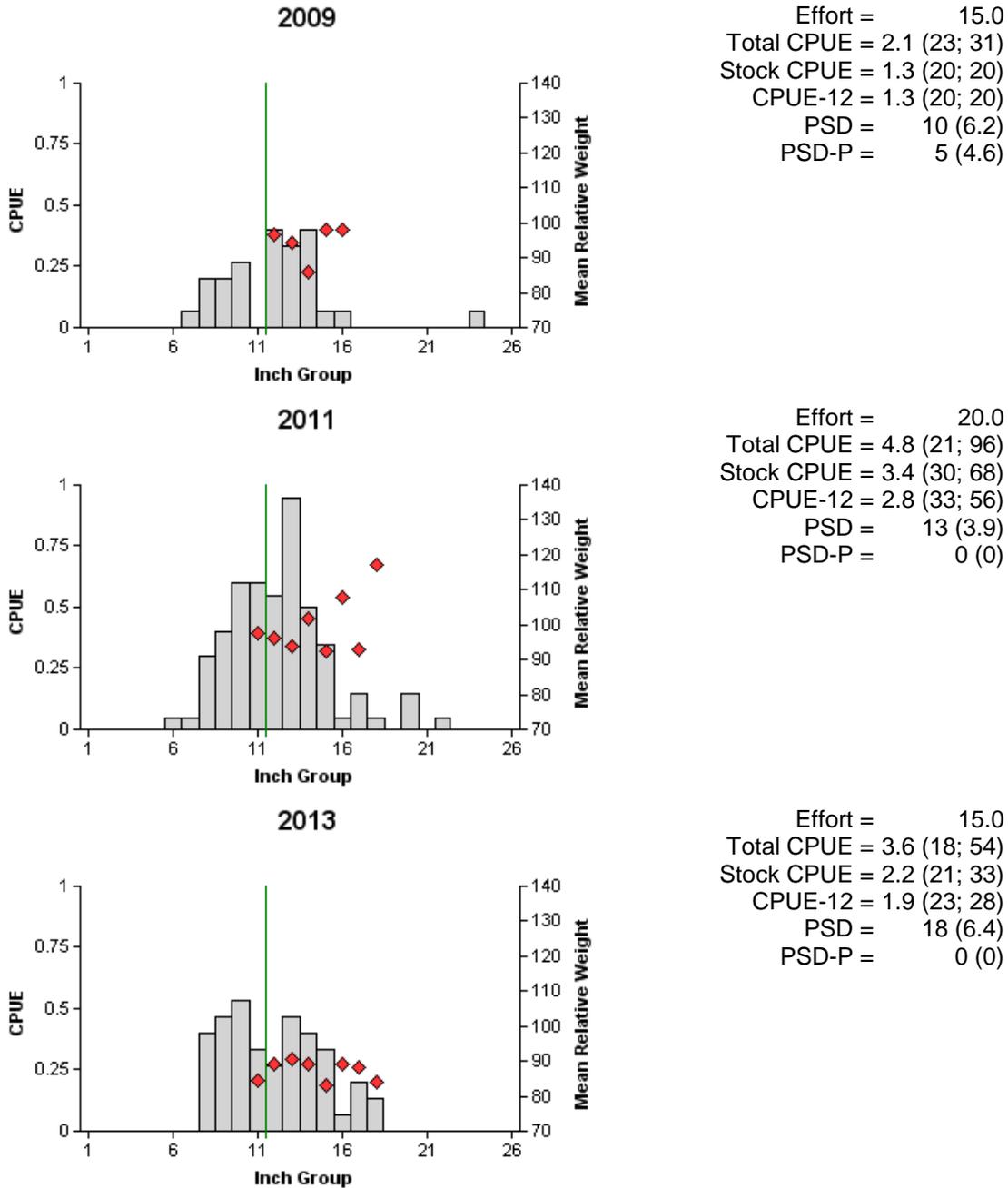


Figure 6. Number of Channel Catfish caught per net night (CPUE; bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Ray Hubbard Reservoir, Texas, 2009, 2011, and 2013. Vertical line represents length limit at time of sampling.

White Bass

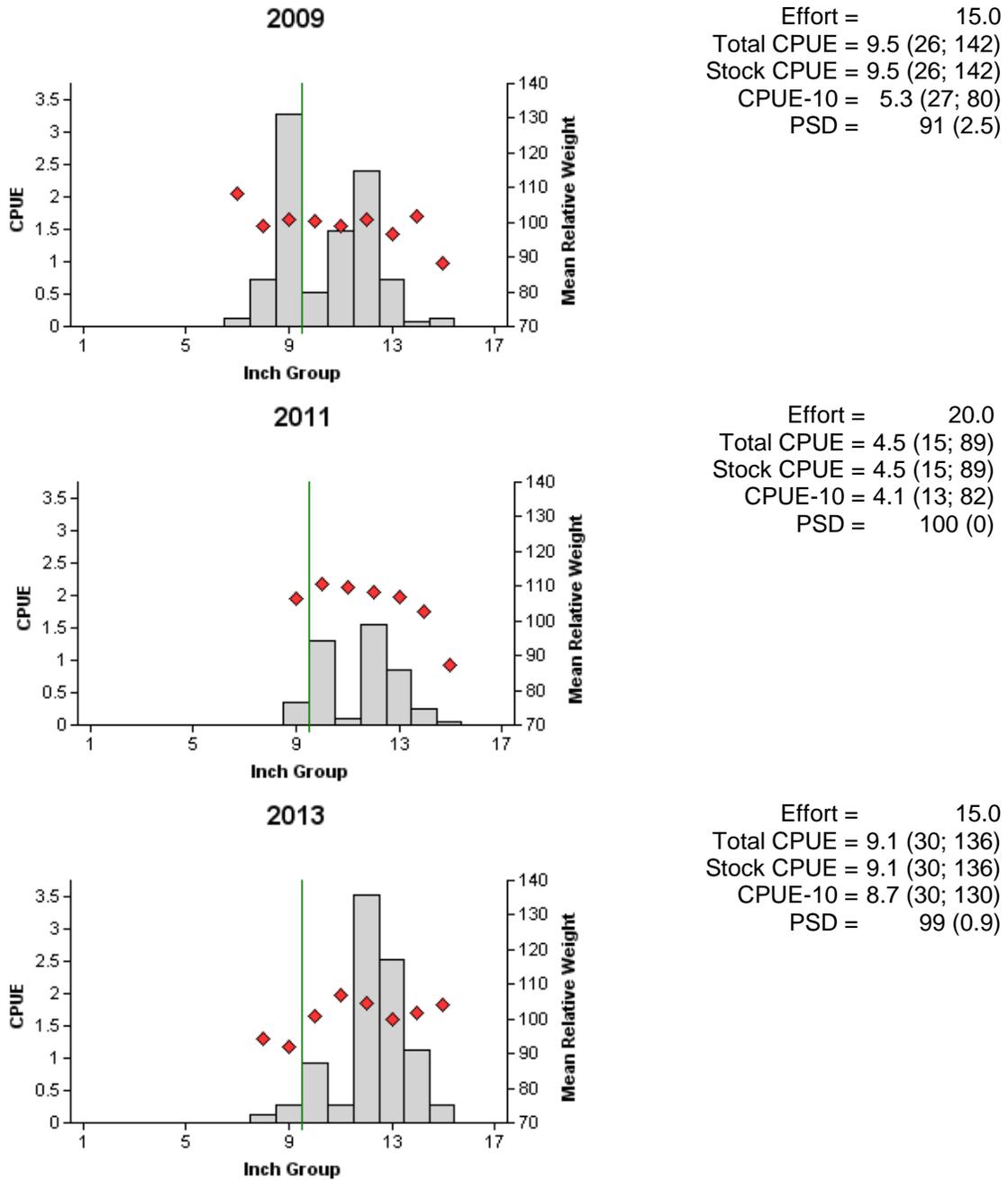
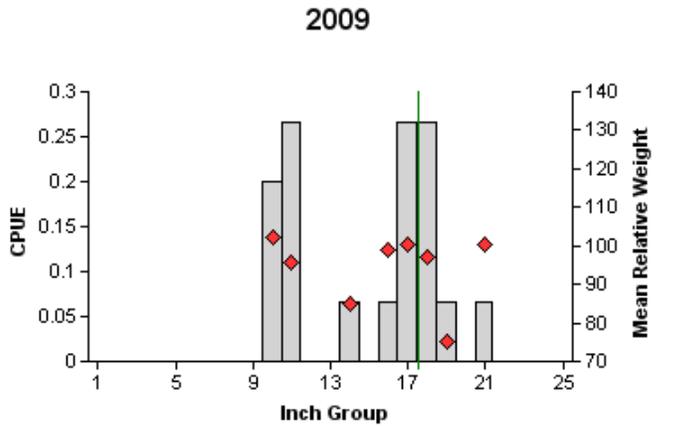
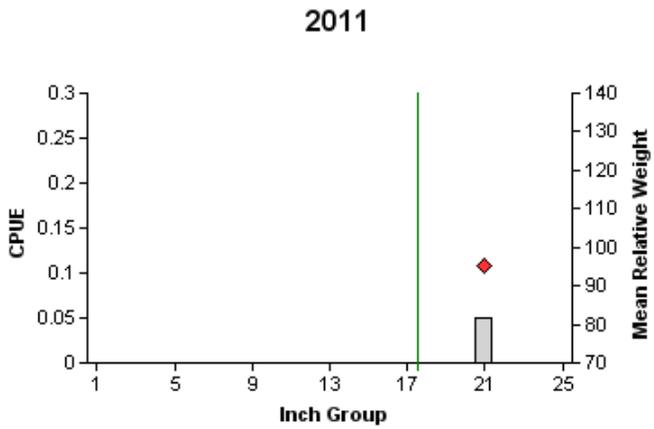


Figure 7. Number of White Bass caught per net night (CPUE; bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Ray Hubbard Reservoir, Texas, 2009, 2011, and 2013. Vertical line represents length limit at time of sampling.

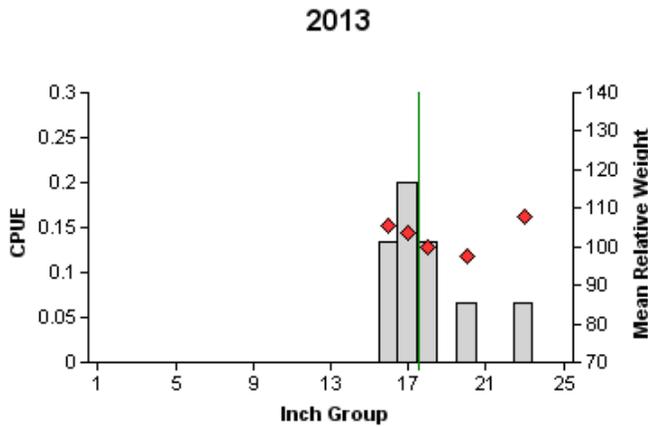
Palmetto Bass



Effort = 15.0
 Total CPUE = 1.3 (49; 19)
 Stock CPUE = 1.3 (49; 19)
 CPUE-18 = 0.4 (59; 6)
 PSD = 58 (20.8)



Effort = 20.0
 Total CPUE = 0.1 (100; 1)
 Stock CPUE = 0.1 (100; 1)
 CPUE-18 = 0.1 (100; 1)
 PSD = 100 (0)



Effort = 15.0
 Total CPUE = 0.6 (32; 9)
 Stock CPUE = 0.6 (32; 9)
 CPUE-18 = 0.3 (44; 4)
 PSD = 100 (0)

Figure 8. Number of Palmetto Bass caught per net night (CPUE; bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Ray Hubbard Reservoir, Texas, 2009, 2011, and 2013. Vertical line represents length limit at time of sampling.

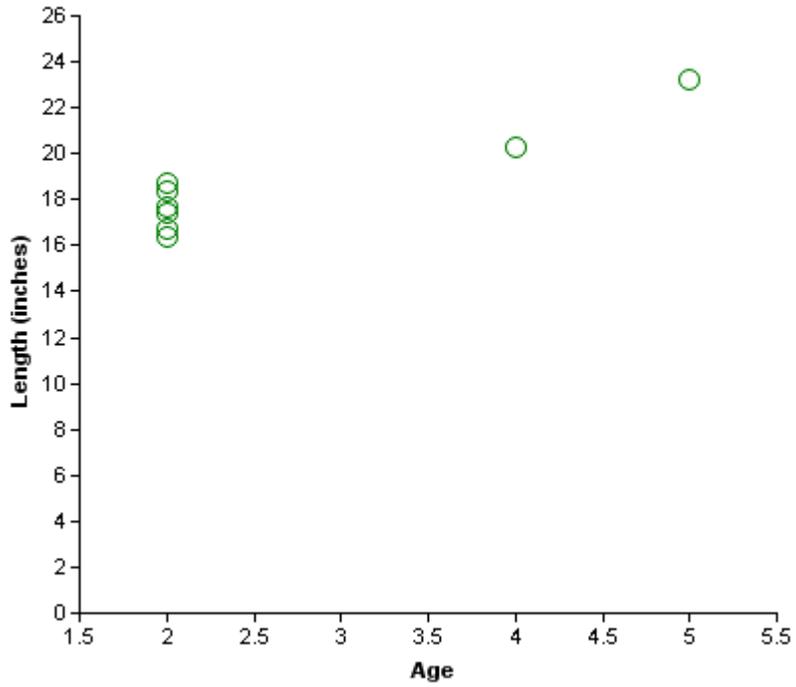


Figure 9. Length at age for Palmetto Bass (sexes combined) collected from gill netting at Ray Hubbard Reservoir, Texas, for spring 2013 (N=9).

Largemouth Bass

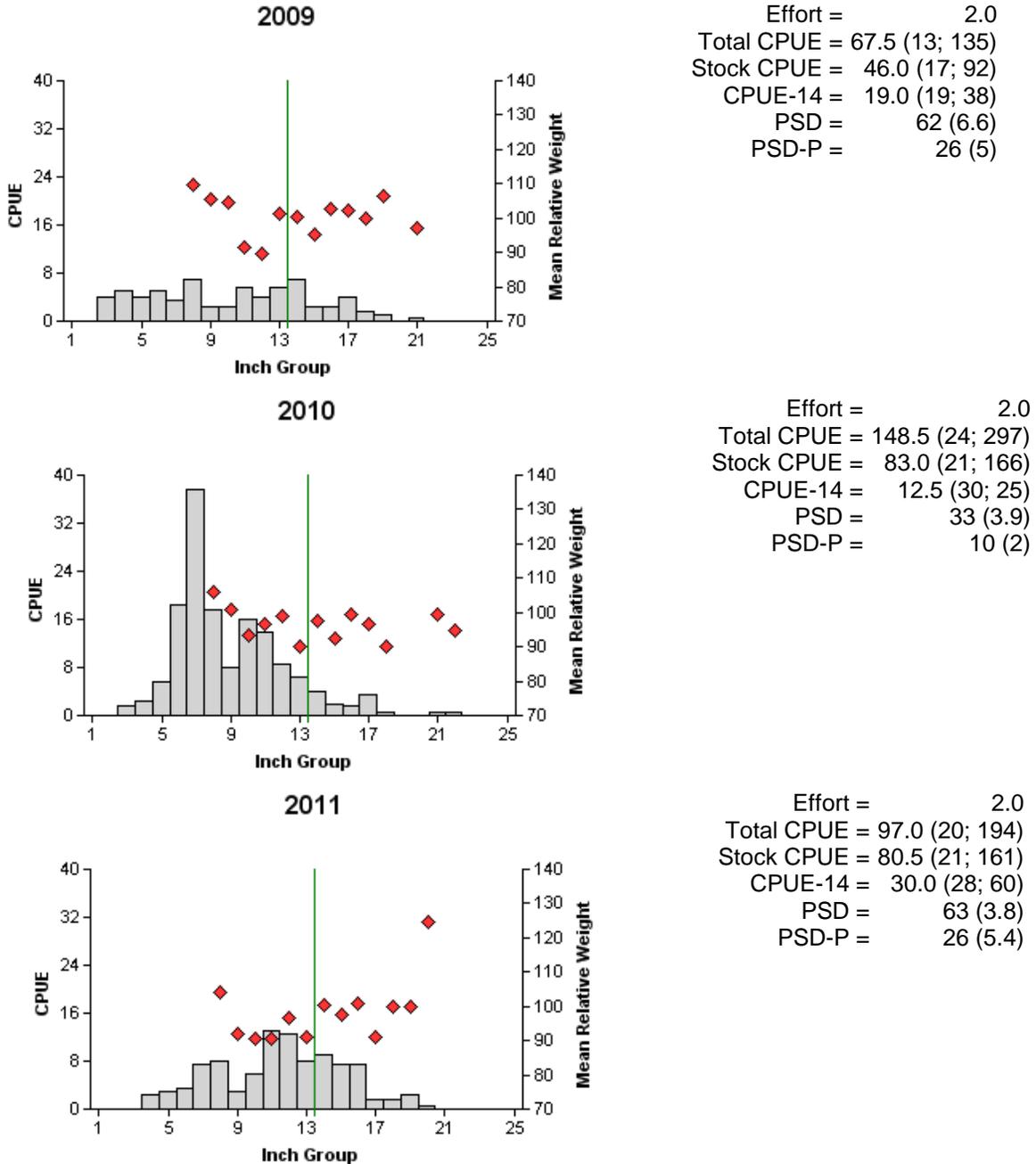


Figure 10. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Ray Hubbard Reservoir, Texas, 2009, 2010, 2011, and 2012. Vertical line represent length limit at time of sampling.

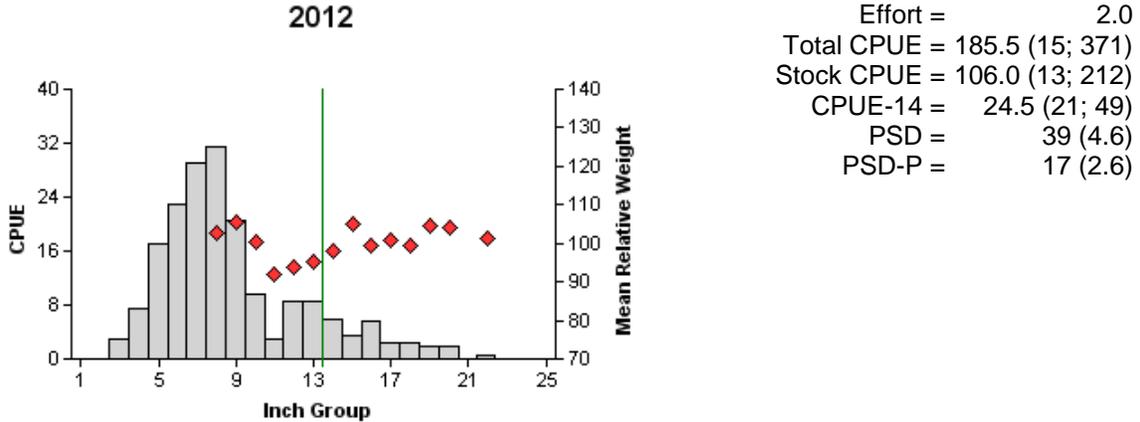


Figure 10 continued.

Table 7. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Ray Hubbard Reservoir, Texas. 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	29	2	22	5	50	7.1
2008	29	0	0	0	43	0
2012	30	4	25	1	47	13

White Crappie

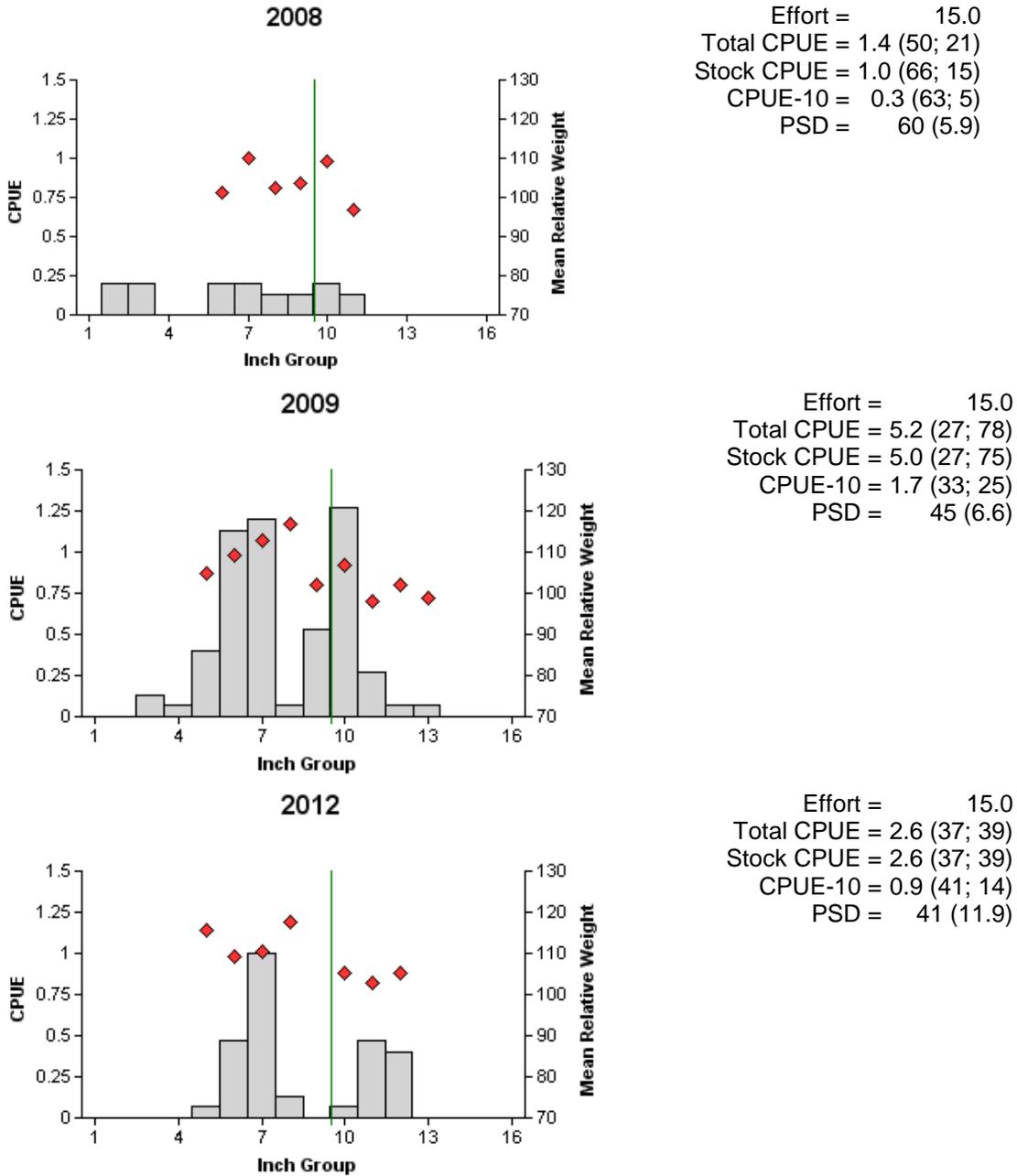


Figure 11. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Ray Hubbard Reservoir, Texas, 2008, 2009, and 2012. Vertical line represents length limit at time of sampling.

Black Crappie

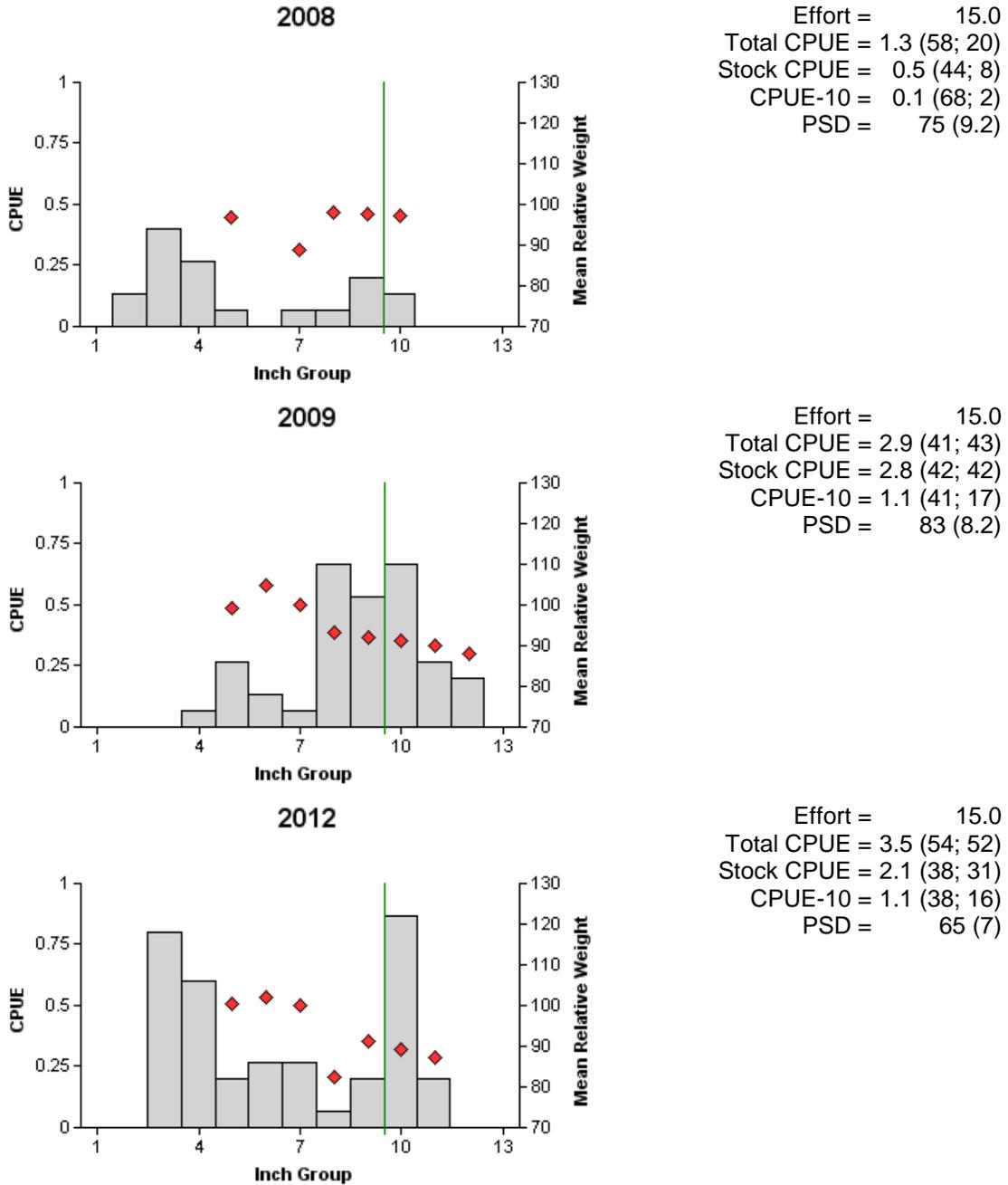


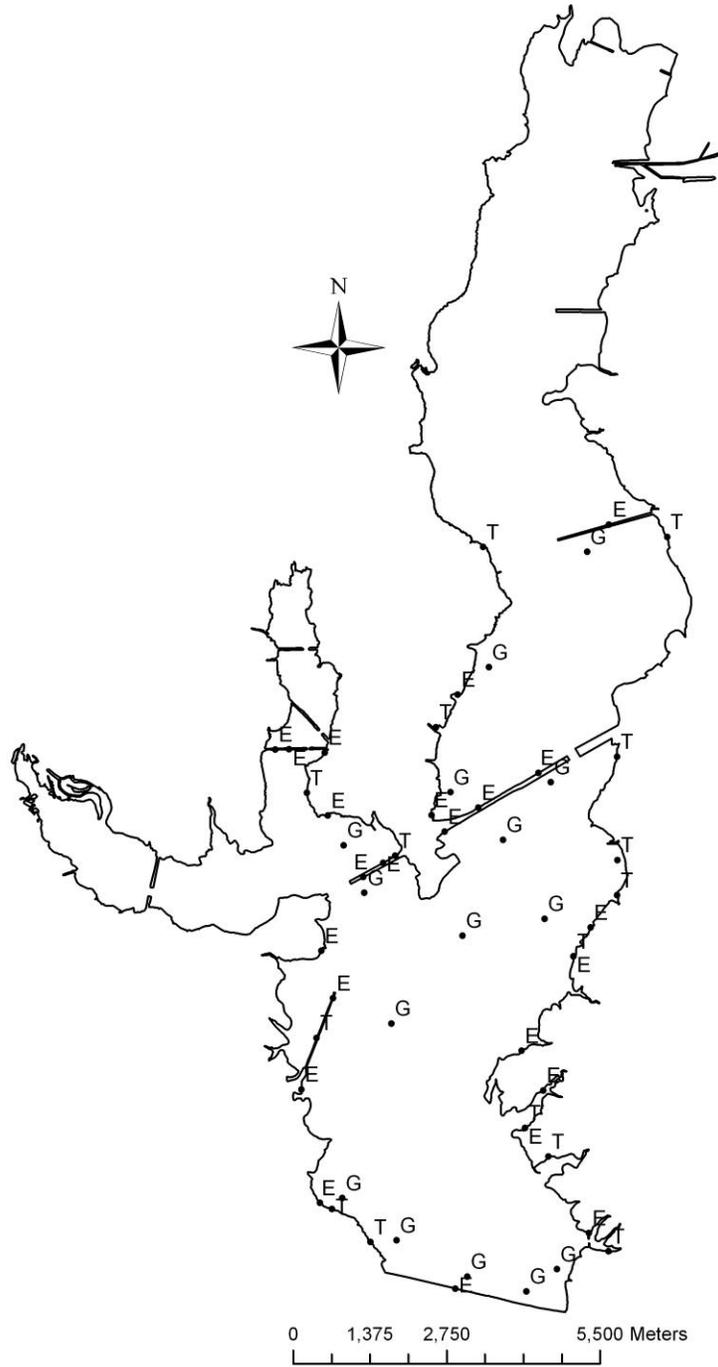
Figure 12. Number of Black Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Ray Hubbard Reservoir, Texas, 2008, 2009, and 2012. Vertical line represents length limit at time of sampling.

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected from all gear types from Ray Hubbard Reservoir, Texas, 2012-2013.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Longnose Gar	1	0.1				
Gizzard Shad	115	7.7			558	279.0
Threadfin Shad					1,581	790.5
Common Carp	2	0.1				
Smallmouth Buffalo	40	2.7				
Blue Catfish	124	8.3				
Channel Catfish	54	3.6				
White Bass	136	9.1				
Yellow bass	282	18.8				
Palmetto Bass	9	0.6				
Bluegill	1	0.1			424	212.0
Longear Sunfish					475	237.0
Redear Sunfish					53	26.5
Largemouth Bass	1	0.1			371	185.5
White Crappie	2	0.1	39	2.6		
Black Crappie		0.1	52	3.5		
Freshwater Drum	3	0.2				

APPENDIX B



Location of sampling sites, Ray Hubbard Reservoir, Texas, 2012-2013. Trap net, gill net, and electrofishing stations, and boat ramps are indicated by T, G, E, and B respectively. Water level was approximately 3 feet below conservation pool at time of sampling.

APPENDIX C

Historical catch rates for targeted species by gear type for Ray Hubbard Reservoir, Texas.

Gear	Species	Year											
		1994	1997	2000	2001	2003	2004	2005	2006	2007	2008	2009	2010
Gill Netting (fish/net night)	Blue Catfish	5.0	13.1		8.3	6.1		10.6		2.3		8.1	
	Channel Catfish	7.6	5.6		5.7	3.9		3.7		5.0		2.1	
	White Bass	11.3	5.7		3.5	11.6		9.1		3.9		9.5	
	Palmetto Bass	7.9	5.1		0.0	0.0		4.1		3.3		1.3	
Electrofishing (fish/hour)	Gizzard Shad	309.0	299.5	177.5	299.5	177.5	243.0	98.0	157.0	188.0	273.5	186.0	704.5
	Threadfin Shad	174.0	100.0	359.5	100.0	359.5	216.5	727.5	251.5	661.5	1195	1104	867.0
	Bluegill	80.5	179.0	96.0	179.0	96.0	100.0	252.0	131.5	161.0	272.0	60.0	176.0
	Longear Sunfish	45.5	263.5	52.0	263.5	52.0	58.0	183.0	81.5	122.0	151.0	84.5	61.5
	Redear Sunfish	0.0	0.0	5.0	0.0	5.0	6.0	30.0	9.5	17.5	11.0	2.0	13.0
	Largemouth Bass	101.0	206.5	96.0	206.5	96.0	65.5	121.5	110.0	139.5	106.5	67.5	148.5
Trap Netting (fish/net night)	White Crappie	9.0	6.1	14.1	6.1	14.1	13.7				1.4	5.2	
	Black Crappie	0.0	5.3	2.3	5.3	2.3	0.9				1.3	2.9	

APPENDIX C continued.

Gear	Species	Year			Ave.
		2011	2012	2013	
Gill Netting (fish/net night)	Blue Catfish	2.8		8.3	7.2
	Channel Catfish	4.8		3.6	4.7
	White Bass	4.5		9.1	7.6
	Palmetto Bass	0.1		0.6	2.5
Electrofishing (fish/hour)	Gizzard Shad	676.0	279.0		290.6
	Threadfin Shad	589.0	790.5		535.4
	Bluegill	168.5	212.0		154.5
	Longear Sunfish	106.0	237.5		125.8
	Redear Sunfish	7.5	26.5		9.5
	Largemouth Bass	97.0	185.5		124.8
Trap Netting (fish/net night)	White Crappie		2.6		8.0
	Black Crappie		3.5		2.6