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FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2012 Fisheries Management Survey Report

Eagle Mountain Reservoir

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TABLE OF CONTENTS

SURVEY AND MANAGEMENT SUMMARY

Fish populations in Eagle Mountain Reservoir were surveyed in 2012 using trap nets, 2013 using gill nets, and electrofished both spring and fall annually from 2009-2013. 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:** Eagle Mountain Reservoir is an 8,504-acre impoundment constructed on the West Fork Trinity River by the Tarrant Regional Water District (TRWD) in 1932 for municipal and industrial purposes. The reservoir is located in northwest Fort Worth. A TXU Energy steam electric generating plant uses reservoir water for cooling. Operations at the electric plant have greatly decreased in recent years. The reservoir is approximately 10 miles long and 3.5 miles wide (widest point), drains 1,970 square miles of watershed and has 200 miles of shoreline. Conservation pool elevation is 649 feet mean-sea-level and storage capacity at conservation pool is 179,880 acre-feet. Angler and boat access is fairly limited. The Texas Parks and Wildlife Department sold a tract of land that was proposed to be developed into a state park on the reservoir to the TRWD in 2008. TRWD has developed some hiking and biking trails but no angler access was incorporated. There is one handicap fishing pier on the reservoir. Fishery habitat consisted primarily of natural banks, rocky shorelines, and boat docks.

- **Management History:** Important sport fish include Largemouth Bass, crappies, White Bass, and Blue and Channel Catfish. All species are managed with statewide regulations. The reservoir has a population of large Blue Catfish. Florida Largemouth Bass were stocked in 2006 and 2007.

- **Fish Community**
  - **Prey species:** Gizzard and Threadfin Shad are in great abundance in the reservoir. Bluegill and Longear Sunfish are also abundant as prey. Some Bluegill over 6 inches are available for anglers.

  - **Catfishes:** The Blue Catfish population continues to increase and produces some large individuals. Blue Catfish condition has also increased. The relative abundance of Channel Catfish has remained high during the past three surveys. Although present, no Flathead Catfish were sampled during 2013 gill netting.

  - **White Bass:** White Bass catch rates decreased greatly from the previous survey.

  - **Black basses:** The Spotted Bass population has remained stable during the last four surveys. The Largemouth Bass population has varied in abundance during the last four surveys but remains high. Size distribution is skewed towards smaller fish.

  - **Crappies:** The White Crappie population has declined over the past three surveys while Black Crappie relative abundance has increased greatly since 2004.

Management Strategies: A 36-day, year-long creel survey will be conducted from May 2016-June 2017. Florida Largemouth Bass will be requested for stocking in 2014 and 2015. Genetic analysis will be conducted in 2016 to evaluate stocking success. General monitoring with gill netting, trap netting, and electrofishing will be conducted in 2016-2017, when the next report will be written.

INTRODUCTION

This document is a summary of fisheries data collected from Eagle Mountain 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

Eagle Mountain Reservoir is an 8,504-acre impoundment constructed on the West Fork Trinity River by the Tarrant Regional Water District (TRWD) in 1932 for municipal and industrial purposes. The reservoir is located in northwest Fort Worth. A TXU Energy steam electric generating plant uses reservoir water for cooling. Operations at the electric plant have decreased in recent years. The reservoir is approximately 10 miles long and 3.5 miles wide (widest point), drains 1,970 square miles of watershed and has 200 miles of shoreline. Conservation pool elevation is 649 feet mean-sea-level and storage capacity is 179,880 acre-feet. Eagle Mountain Reservoir was hypereutrophic with a mean TSI chl-*a* of 61.96 (Texas Commission on Environmental Quality 2011). Angler and boat access is fairly limited. The Texas Parks and Wildlife Department sold a tract of land that was proposed to be developed into a state park on the reservoir to the TRWD in 2008. TRWD has developed some hiking and biking trails but no angler access was incorporated in order to maintain the natural state of the area. TRWD recently renovated the park at Twin Points beginning in the fall of 2009. A two-lane boat ramp with parking for approximately 60 vehicles opened in May of 2013. In the near future, a swimming beach and RV camping will be open to the public. There is one handicap fishing pier on the reservoir. Fishery habitat consisted primarily of natural banks, rocky shorelines, and boat docks. Other descriptive characteristics for Eagle Mountain Reservoir are in Table 1.

Angler Access

Eagle Mountain Reservoir has 11 public boat ramps. Several are not useable during periods of low water. Extension of the ramps may not be feasible unless dredging takes place. Additional boat ramp characteristics are in Table 2. Shoreline access is very limited and restricted to the public boat ramp areas.

Management History

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

Eagle Mountain supports a very popular Largemouth Bass fishery among tournament circuits. With extra attention on this fishery, more data are warranted.

Action: Conducted annual fall and spring bass-only electrofishing surveys from 2009 through 2013. A tier-4 age and growth sample was also conducted during the fall of 2012. The results of those surveys are included in this report.

Eagle Mountain Reservoir has excellent populations of both Blue and Channel Catfish.

Action: Updated the quality of the fishing on TPWD web page for Eagle Mountain to reflect the status.

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

Stocking history: The last stocking of Eagle Mountain Reservoir occurred in 2007 and consisted of Florida Largemouth Bass. The complete stocking history is in Table 4.

Vegetation/habitat management history: Eagle Mountain has limited aquatic vegetation and consists primarily of native emergent species such as lotus, cattail, and some *Scirpus*.

Water transfer: Eagle Mountain Reservoir is primarily used as municipal water supply, and to a lesser extent, flood control. Water can be transferred to Eagle Mountain via a pipeline of mixed water from Cedar Creek and Richland Chambers Reservoirs in East Texas.

METHODS

Fishes were collected by electrofishing (1.5 hours at 18 5-min stations), trap netting (10 net nights at 10 stations), and gill 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/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). 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. Ages were determined on Largemouth Bass using otoliths from 10 fish per millimeter group.

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 website.

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat was last surveyed in 2008 and consisted primarily of natural banks, rocky shorelines, and boat docks (Table 5).

Prey species: The electrofishing catch rate of Threadfin Shad from 2009-2012 has averaged 718.3/hr which is much higher than the reservoir average of 468.2/hr. Over the last four years, the Gizzard Shad electrofishing catch rate has varied from a low of 484.7/hr in 2010 to a high of 765.3/hr in 2011 (Figure 2), which were all above the reservoir average of 477.9/hr. The 2012 CPUE of Gizzard Shad was 612.7/hr. Index of vulnerability for Gizzard Shad varied from 62 to 87 between 2009 and 2012. The 2012 IOV indicated 77% of Gizzard Shad were available to predators. The electrofishing catch rate of Bluegill varied from a low of 150.7 to a high of 272.7/hr (Figure 3) from 2009-2012. The Bluegill population has remained fairly balanced over the past four years, but produces few large fish for anglers. The Longear Sunfish catch rate averaged 125.7/hr between 2009 and 2012 and was above the reservoir average of 116.2/hr.

Catfishes: The gill netting catch rate of Blue Catfish in 2013 of 20.1/nn was the highest ever recorded at Eagle Mountain and well above the reservoir average of 5.8/nn (Figure 4). The CPUE of Blue Catfish in 2009 of 10.3/nn was the second highest observed since first stocked in 1991. Blue Catfish continued to thrive in Eagle Mountain. Mean relative weight varied between 90 and 110.

The gill netting catch rate of Channel Catfish was 6.8 /nn in 2013 which was lower than 2009 (9.3/nn) but similar to 2005 (6.5/nn; Figure 5). All three catch rates were near the reservoir average of 6.7/nn and size structure decreased slightly as PSD dropped from 38 in 2009 to 25 in 2013. The 2012 catch rate of legal Channel Catfish was 2.4/nn.

Temperate Basses: The gill netting catch rates of White Bass have historically been quite variable. The 2013 gill netting survey produced a catch rate of 7.5/nn (Figure 6) which is below the reservoir average of 9.2/nn. Persistent drought or poor timing of gill netting may help explain the drop in catch rate compared to 2009. Size structure of the population was dominated by larger fish as indicated by a PSD value of 88. Mean relative weights remained near optimal for nearly all inch groups.

One lone Yellow Bass was collected during the 2013 gill netting survey marking the first record of the species in Eagle Mountain. The most likely source of introduction is the TRWD pipeline that moves water from Richland-Chambers and Cedar Creek Reservoirs in East Texas. This pipeline also moves water to Benbrook and Arlington Reservoirs which also now have established populations of Yellow Bass.

Black basses: The total electrofishing catch rate of Spotted Bass between 2009 and 2012 varied from a low of 12.0/hr to a high of 16.7/hr but has remained stable (Figure 7). Spotted Bass CPUE has consistently remained lower than the reservoir average of 26.7/hr. Size structure of the Spotted Bass population was fair as indicated by a PSD value of 22.

The total catch per unit effort of Largemouth Bass over the past four years has varied from a low of 96.0/hr in 2009 to a high of 211.3/hr in 2010. The total CPUE of Largemouth Bass in 2012 was 171.3/hr (Figure 8). The three past surveys were higher than the district average of 139.7/hr. Catch per unit effort of Largemouth Bass over 14 inches was good in 2010 (16.7/hr), 2011 (20.7/hr), and 2012 (14.7/hr). The size structure of the population continued to indicate a population made up of mostly sub-legal fish with consistent recruitment. Mean relative weights in 2012 varied from the 90s for fish up to 15 inches and above 100 for fish over 15 inches. A tier-4 age and growth analysis was conducted during the fall of 2012. On average, Largemouth Bass reach the 14-inch minimum length limit between 2 and 3 years (Table 6; Figure 9). The 2012 Florida allele percentage was 44.0% indicating introgression following stocking in 2006 and 2007, but no pure Florida Largemouth Bass were collected (Table 7).

Crappies: The trap netting catch rate of White Crappie has dropped from 3.7/nn in 2004 to 0.6/nn in 2012. Eagle Mountain is well below the district average of 16.7/nn and lower than previous surveys (Figure 10).

The Black Crappie trap netting catch rate of 6.9/nn in 2012 was the highest CPUE ever recorded at Eagle Mountain. As the population of White Crappie has declined, the Black Crappie population has increased. The catch rate of Black Crappie over 10 inches was 4.8.nn in 2012 (Figure 11).

Fisheries management plan for Eagle Mountain Reservoir, Texas

Prepared – July 2013.

ISSUE 1: Largemouth Bass are very important at Eagle Mountain. A spring quarter creel survey in 2002 indicated 55.6% of anglers were seeking Largemouth Bass. As such, increased effort in the form of annual fall and spring electrofishing surveys were conducted over the past four years. A tier-4 age and growth analysis was also conducted. These data allowed us to model various aspects of the fishery. While Florida Largemouth Bass alleles were detected in 44% of the 2012 sample, pure Florida genetics were not detected.

MANAGEMENT STRATEGIES

1. Request Florida Largemouth Bass stocking annually the next two years.
2. Evaluate stocking success in 2016 through DNA analysis.

ISSUE 2: Creel data are outdated as a creel survey has not been conducted at Eagle Mountain since a spring quarter survey was done in 2002.

MANAGEMENT STRATEGY

1. Conduct 36-day annual creel survey at Eagle Mountain from May 2016-June 2017.

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. Zebra mussel larvae have been found in Bridgeport Reservoir, which is directly upstream of Eagle Mountain. 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. Continue to monitor zebra mussels settlement samplers located at all marinas on Eagle Mountain.

SAMPLING SCHEDULE JUSTIFICATION

General monitoring of sport fish species with electrofishing, trap netting, and gill netting will be conducted every four years. Florida Largemouth Bass will be requested for stocking in 2014 and 2015 and genetics analysis will be conducted in 2016 to evaluate stocking success. A 36 day, year-long creel survey will be conducted May 2016-June 2017.

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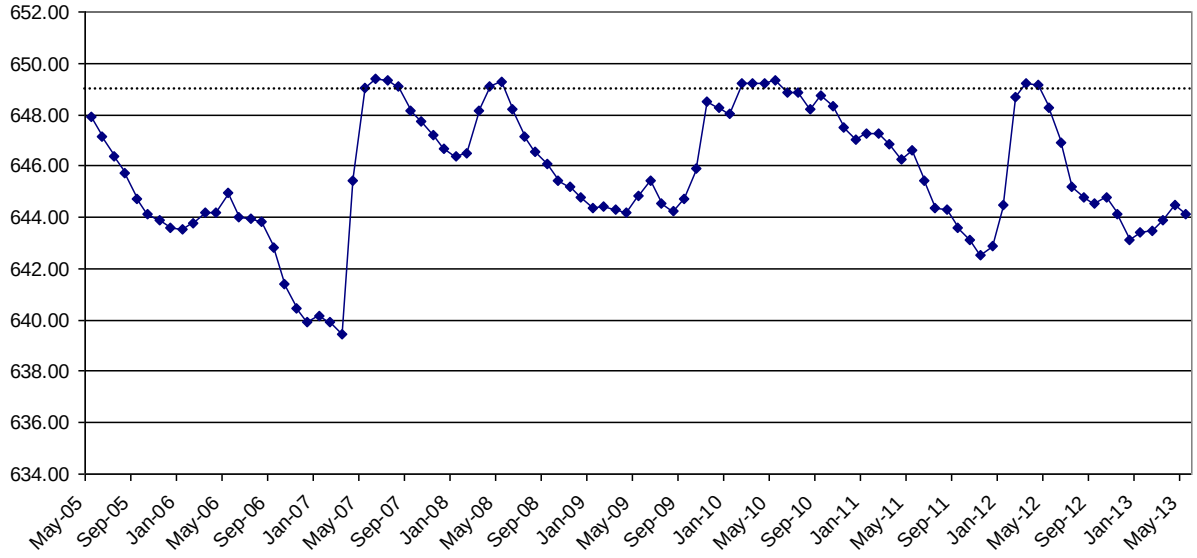


Figure 1. Mean monthly water level elevations in feet above mean sea level (MSL) recorded for Eagle Mountain Reservoir, Texas from May 2005-May 2013. Conservation pool is 649 feet above MSL.

Table 1. Characteristics of Eagle Mountain Reservoir, Texas.

Characteristic	Description
Year Constructed	1932
Controlling authority	Tarrant Regional Water District
Counties	Tarrant and Wise
Reservoir type	Mainstream Trinity River
Conductivity	281 umhos/cm

Table 2. Boat ramp characteristics for Eagle Mountain Reservoir, Texas, fall 2012. Reservoir elevation at time of survey was 644.8 feet above mean sea level. Elevation at end of boat ramp were not available at this time.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
West Bay Marina	32.93417	Y	50		Good.
	-97.51397				
Lakeview Marina	32.94834	Y	20		Good.
	-97.50889				
Creek Harbor Camp	32.96379	Y	17		Poor. Very shallow area.
	-97.49003				

Table 2, Continued. .

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Shady Grove Park	32.90811 -97.52989	Y	35		Poor. Very shallow area
Pelican Bay Ramp	32.91081 -97.51864	Y	25		Poor. Very shallow area.
Eagle Mountain Marina	32.86758 -97.50506	Y	125		Good.
Augie's	32.87235 -97.49708	Y	50		Good.
Twin Points	32.87562 -97.49323	Y	60		Good.
Lake Country Marina	32.89438 -97.45573	Y	50		Good.
Harbor One Marina	32.89495 -97.44658	Y	20		Good.

Table 3. Harvest regulations for Eagle Mountain Reservoir

Species	Bag Limit	Length Limit (inches)
Catfish: channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12 - minimum
Catfish: flathead	5	18 - minimum
Bass: white	25	10 - minimum
Bass: spotted	5	none
Bass: largemouth and smallmouth	In any combination	14 - minimum
Crappie: white and Black Crappie, their hybrids and subspecies	25 (in any combination)	10 - minimum

Table 4. Stocking history of Eagle Mountain, 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.

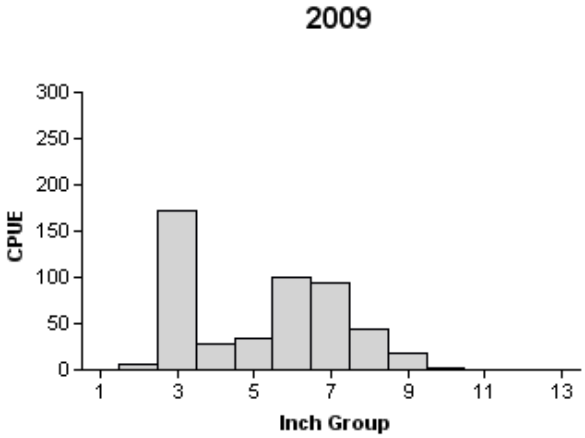
Species	Year	Number	Life Stage	Mean TL (in)
Blue Catfish	1991	92,147	FGL	2.1
	Total	92,147		
Channel Catfish	1969	48,000	AFGL	7.9
	1970	60,000	AFGL	7.9
	1971	10,964	AFGL	7.9
	1972	9,000	AFGL	7.9
	1973	200	UNK	UNK
	1979	10,095	AFGL	7.9
	Total	138,259		
Florida Largemouth Bass	1988	333,148	FRY	1.0
	1993	373,642	FGL	1.0
	1994	148,628	FGL	1.1
	2000	232,424	FGL	1.1
	2006	425,660	FGL	1.6
	2007	426,963	FGL	1.5
	Total	1,940,465		
Green sunfish x Redear Sunfish	1970	8,000		UNK
	Total	8,000		
Largemouth Bass	1969	300,000	UNK	UNK
	1971	100,000	UNK	UNK
	1978	275	UNK	UNK
	Total	400,275		
Mixed Largemouth Bass	1988	127,095		1.0
	Total	127,095		
Smallmouth bass	1978	84,800	UNK	UNK
	1979	34,460	UNK	UNK
	1980	1,200	UNK	UNK
	1999	197,905	FGL	1.5
	Total	318,365		
Threadfin Shad	1984	2,985	AFGL	3.0
	Total	2,985		
Walleye	1973	1,400,000	FRY	0.2

Species	Year	Number	Life Stage	Mean TL (in)
	1974	3,100,090	FRY	0.2
	1975	2,150,090	FRY	0.2
	Total	6,650,180		
White Crappie	1969	20,000	UNK	UNK
	Total	20,000		

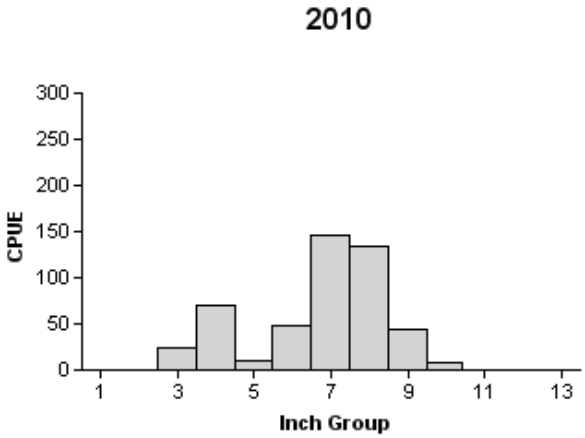
Table 5. Survey of structural habitat types, Eagle Mountain Reservoir, Texas, 2008. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Boat dock + native emergent + natural	0.1 miles	0.1
Boat dock + natural	12.2 miles	15.0
Boat dock + rock bluff	0.2 miles	0.2
Boat dock + rocky shoreline	17.3 miles	22.0
Bulkhead	0.3 miles	0.4
Bulkhead + boat dock	12.5 miles	15.4
Natural + native emergent	3.8 miles	4.7
Natural + native emergent + flooded terrestrial	0.7 miles	0.9
Natural + standing timber	4.7 miles	6.8
Rock bluff	0.1 miles	0.1
Standing timber	14.3 acres	0.2
Nondescript	27.3 miles	33.9

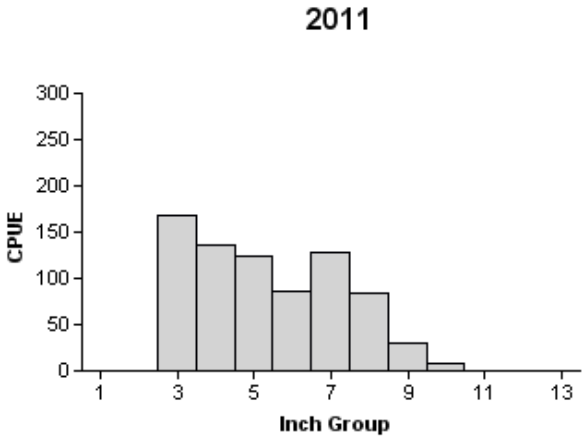
Gizzard Shad



Effort =	1.5
Total CPUE =	497.3 (20; 746)
Stock CPUE =	158.0 (21; 237)
IOV =	87 (3.3)



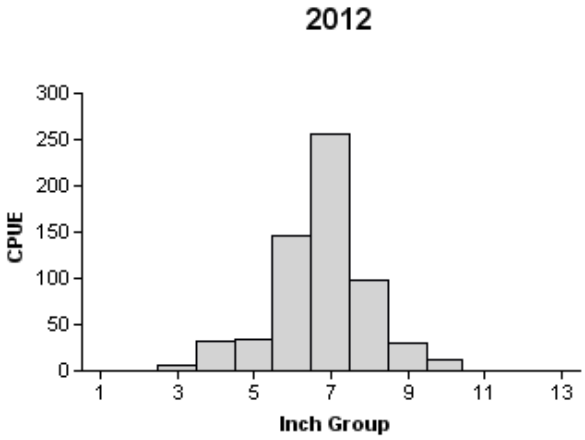
Effort =	1.5
Total CPUE =	484.7 (16; 727)
Stock CPUE =	332.7 (13; 499)
IOV =	62 (5.1)



Effort =	1.5
Total CPUE =	765.3 (21; 1148)
Stock CPUE =	250.0 (30; 375)
IOV =	84 (4.4)

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, Eagle Mountain Reservoir, Texas, 2009, 2010, and 2011.

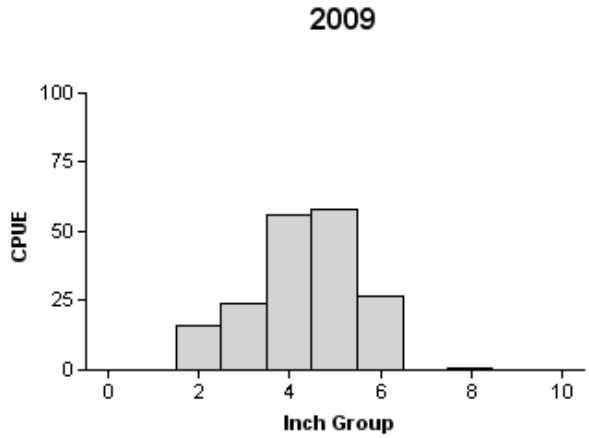
Gizzard Shad



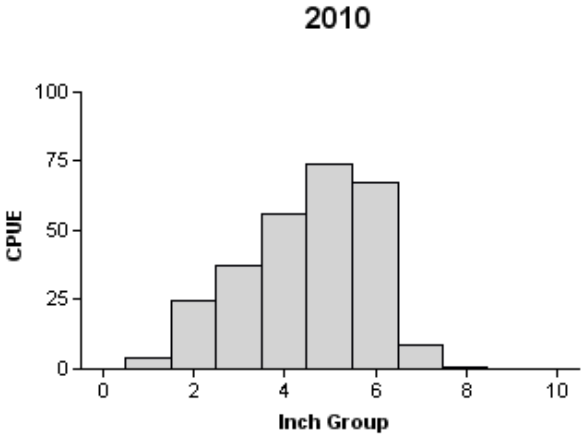
Effort =	1.5
Total CPUE =	612.7 (26;919)
Stock CPUE =	394.7 (26; 592)
IOV =	77 (5.2)

Figure 2, continued. 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, Eagle Mountain Reservoir, Texas, 2012.

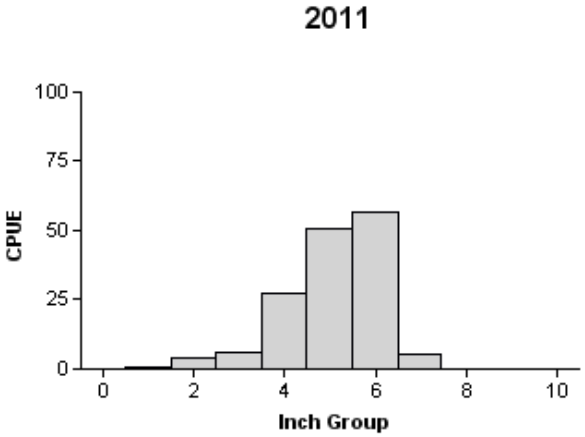
Bluegill



Effort = 1.5
Total CPUE = 181.3 (24; 272)
Stock CPUE = 165.3 (26; 248)
CPUE-6 = 27.3 (43; 41)
PSD = 17 (3.7)



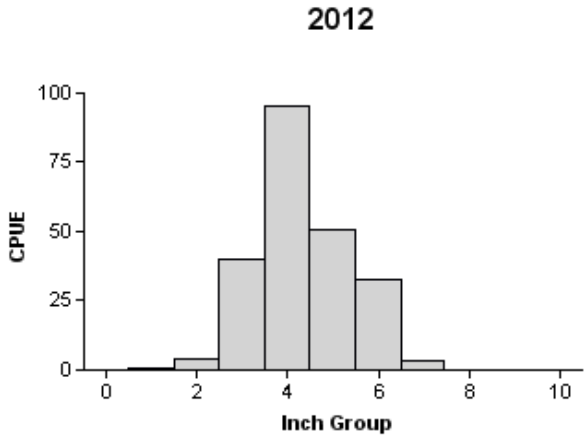
Effort = 1.5
Total CPUE = 272.7 (18; 409)
Stock CPUE = 244.0 (18; 366)
CPUE-6 = 76.7 (22; 115)
PSD = 31 (5.7)



Effort = 1.5
Total CPUE = 150.7 (22; 226)
Stock CPUE = 146.0 (23; 219)
CPUE-6 = 62.0 (30; 93)
PSD = 42 (5.2)

Figure 3. 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, Eagle Mountain Reservoir, Texas, 2009, 2010, and 2011.

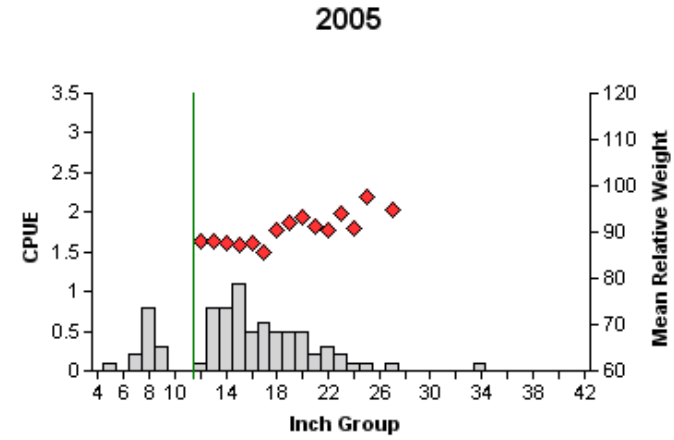
Bluegill



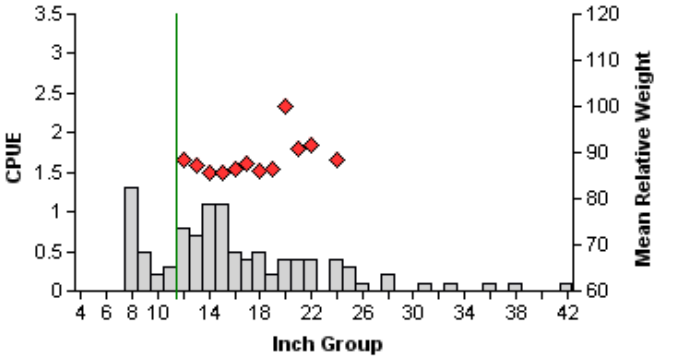
Effort =	1.5
Total CPUE =	226.7 (17; 340)
Stock CPUE =	222.0 (17; 333)
CPUE-6 =	36.0 (23; 54)
PSD =	16 (2.7)

Figure 3, continued. 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, Eagle Mountain Reservoir, Texas, 2012.

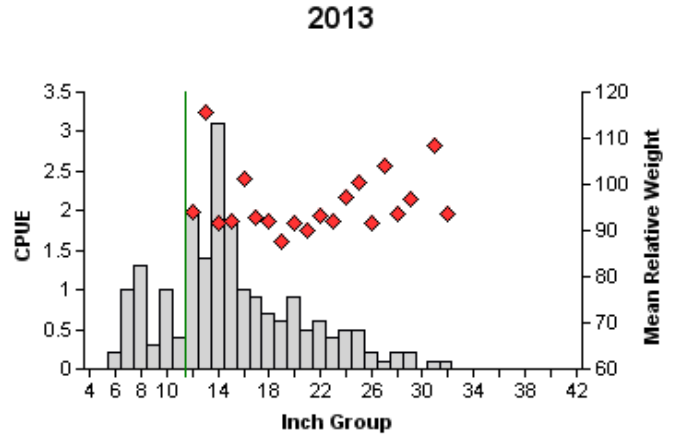
Blue Catfish



Effort = 10.0
Total CPUE = 7.9 (14; 79)
Stock CPUE = 6.5 (17; 65)
CPUE-30 = 0.1 (100; 1)
PSD = 25 (3.7)



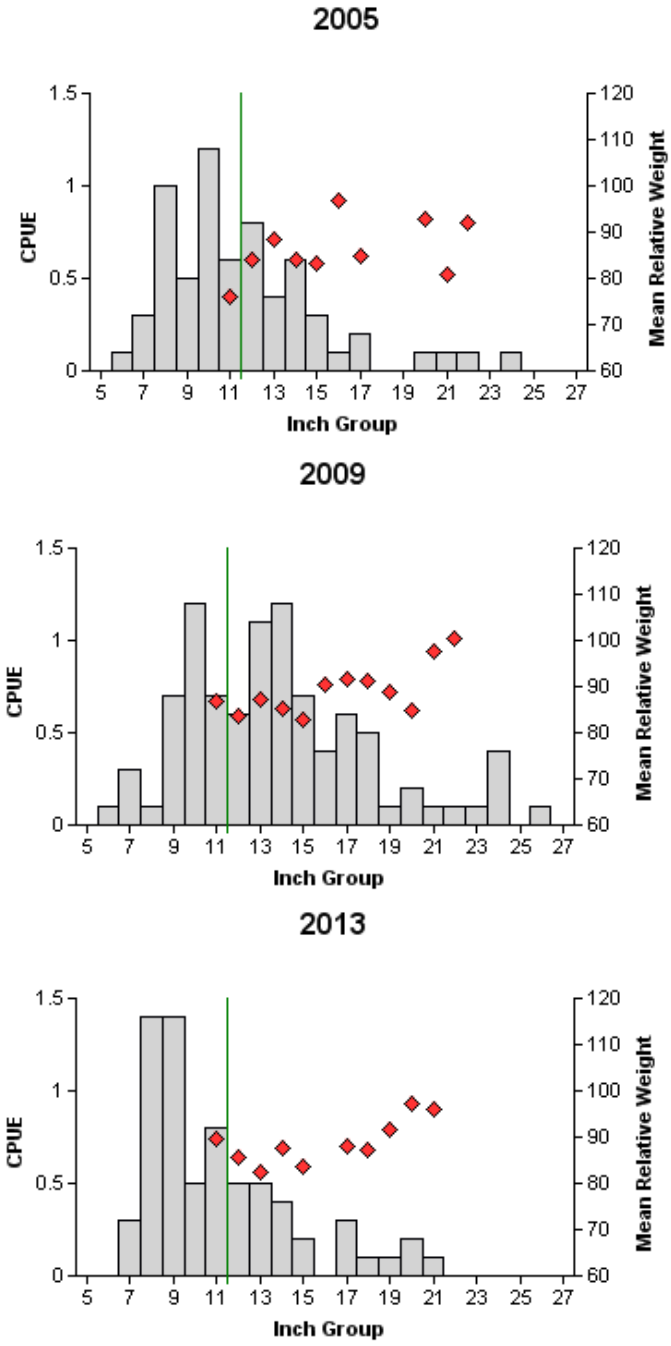
Effort = 10.0
Total CPUE = 10.3 (16; 103)
Stock CPUE = 8.0 (15; 80)
CPUE-30 = 0.5 (61; 5)
PSD = 34 (6.9)



Effort = 10.0
Total CPUE = 20.1 (26; 201)
Stock CPUE = 15.9 (26; 159)
CPUE-30 = 0.2 (67; 2)
PSD = 27 (5.5)

Figure 4. 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, Eagle Mountain Reservoir, Texas, 2005, 2009, and 2013. Vertical line represents length limit at time of sampling.

Channel Catfish



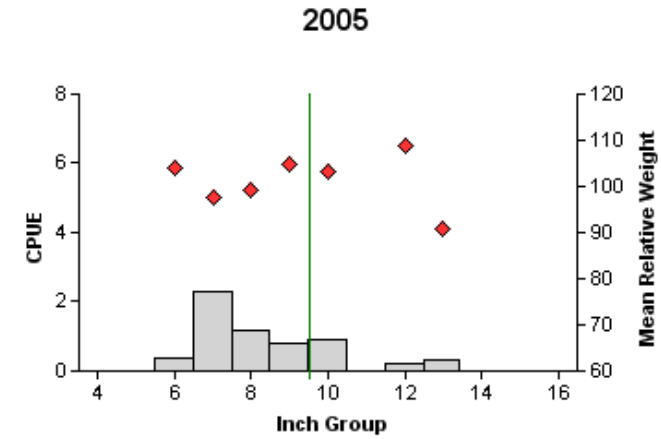
2005
Effort = 10.0
Total CPUE = 6.5 (19; 65)
Stock CPUE = 3.4 (25; 34)
CPUE-12 = 2.8 (25; 28)
PSD = 21 (6.4)

2009
Effort = 10.0
Total CPUE = 9.3 (16; 93)
Stock CPUE = 6.9 (18; 69)
CPUE-12 = 6.2 (17; 62)
PSD = 38 (8.2)

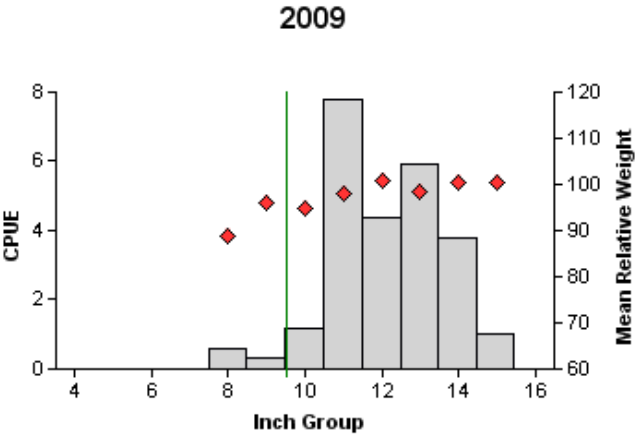
2013
Effort = 10.0
Total CPUE = 6.8 (20; 68)
Stock CPUE = 3.2 (23; 32)
CPUE-12 = 2.4 (22; 24)
PSD = 25 (8.7)

Figure 5. Number of Channel Catfish caught per net night (CPUE; bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Eagle Mountain Reservoir, Texas, 2005, 2009, and 2013. Vertical line represents length limit at time of sampling.

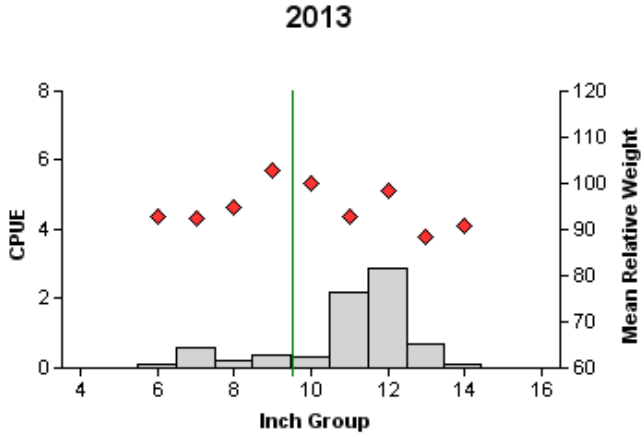
White Bass



Effort = 10.0
Total CPUE = 6.1 (54; 61)
Stock CPUE = 6.1 (54; 61)
CPUE-10 = 1.4 (30; 14)
PSD = 36 (7.1)



Effort = 10.0
Total CPUE = 25.0 (22; 250)
Stock CPUE = 25.0 (22; 250)
CPUE-10 = 24.1 (23; 241)
PSD = 98 (1)



Effort = 10.0
Total CPUE = 7.5 (45; 75)
Stock CPUE = 7.5 (45; 75)
CPUE-10 = 6.2 (50; 62)
PSD = 88 (5.5)

Figure 6. 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, Eagle Mountain Reservoir, Texas, 2005, 2009, and 2013. Vertical line represents length limit at time of sampling.

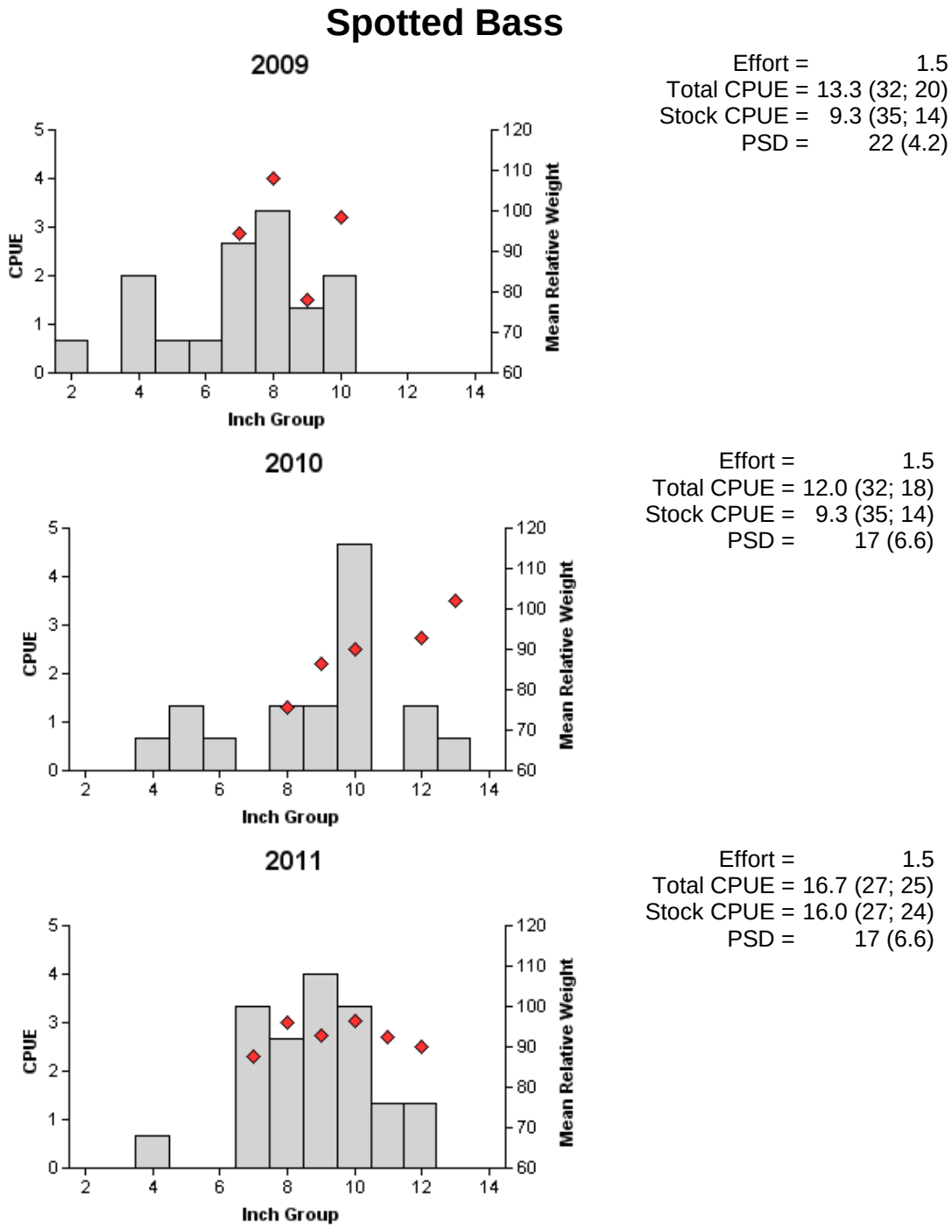
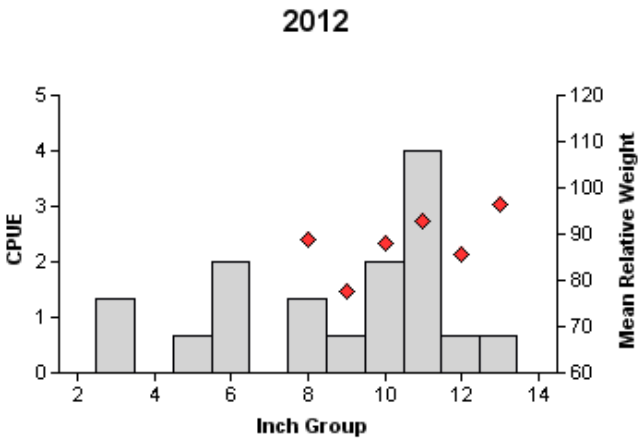


Figure 7. Number of Spotted Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Eagle Mountain Reservoir, Texas, 2009, 2010, and 2011.

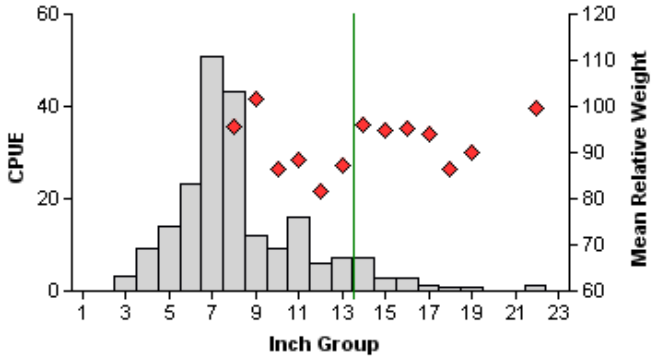


Effort = 1.5
Total CPUE = 13.3 (32; 20)
Stock CPUE = 9.3 (35; 14)
PSD = 22 (4.2)

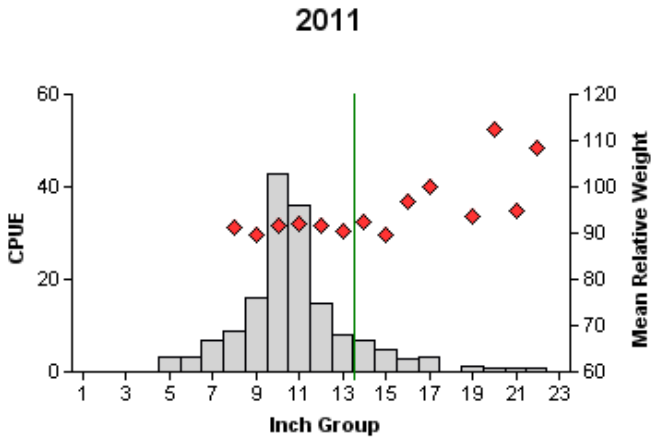
Figure 7, continued. Number of Spotted Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Eagle Mountain Reservoir, Texas, 2012.

Largemouth Bass

Effort = 1.5
Total CPUE = 96.0 (20; 144)
Stock CPUE = 79.3 (19; 119)
CPUE-14 = 5.3 (42; 8)
PSD = 43 (4.9)



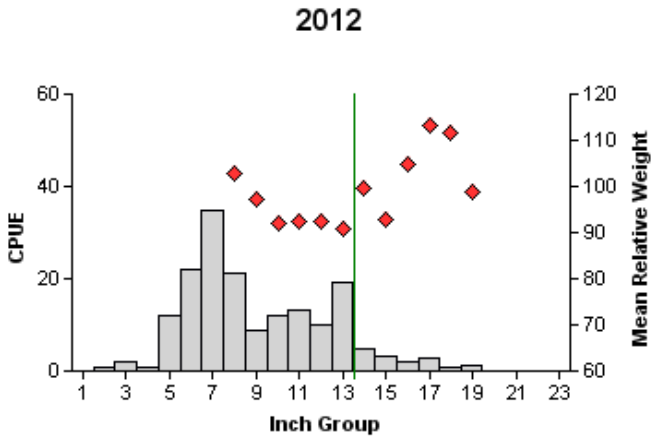
Effort = 1.5
Total CPUE = 211.3 (15; 317)
Stock CPUE = 110.7 (15; 166)
CPUE-14 = 16.7 (23; 25)
PSD = 27 (3.9)



Effort = 1.5
Total CPUE = 160.0 (16; 240)
Stock CPUE = 146.7 (17; 220)
CPUE-14 = 20.7 (24; 31)
PSD = 30 (5)

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, Eagle Mountain Reservoir, Texas, 2009, 2010, and 2011. Vertical lines represent length limit at time of sampling.

Largemouth Bass



Effort =	1.5
Total CPUE =	171.3 (19; 257)
Stock CPUE =	99.3 (21; 149)
CPUE-14 =	14.7 (22; 22)
PSD =	44 (3.5)

Figure 8, continued. 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, Eagle Mountain Reservoir, Texas, 2012. Vertical lines represent length limit at time of sampling.

Largemouth Bass

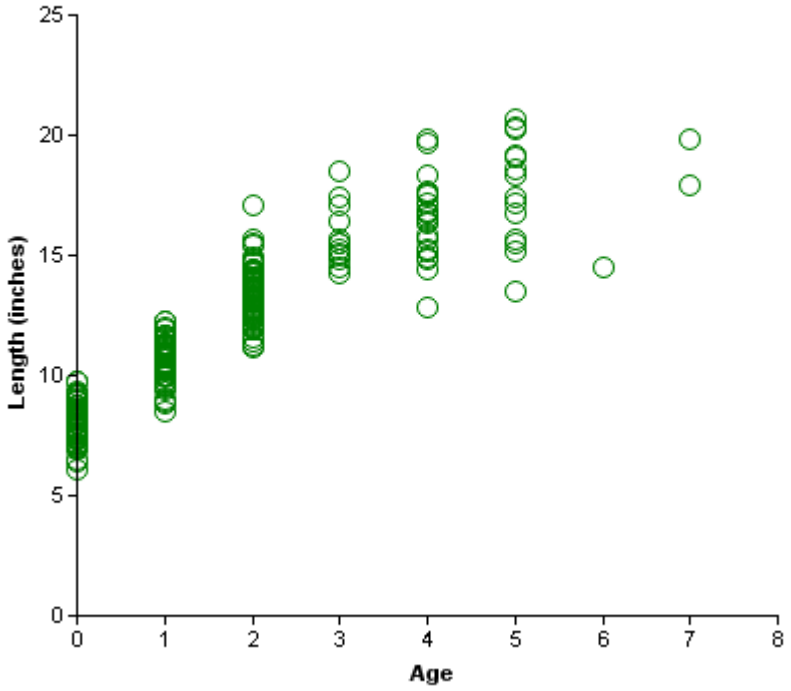


Figure 9. Length at age for Largemouth Bass (sexes combined) collected from electrofishing at Eagle Mountain Reservoir, Texas, for fall 2012 (N=234).

Table 6. Average length at capture for Largemouth Bass (sexes combined) ages 0 – 7 collected by electrofishing, Eagle Mountain Reservoir, fall 2012. Lengths are followed by the sample size. Note that the age-0 data may not be representative of the actual size distribution because of gear bias against smaller fish.

	Growth	
Age	Total Length	Number of fish
0	8.0	61
1	10.6	54
2	13.3	68
3	15.8	13
4	16.5	21
5	17.7	14
6	14.5	1
7	18.9	2

Table 7. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Eagle Mountain Reservoir, Texas, 2004, and 2012. 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.

		Number of fish				
Year	Sample size	FLMB	Intergrade	NLMB	% FLMB alleles	% FLMB
2004	30	1	21	8	29.2	3.3
2012	30	0	30	0	44.0	0.0

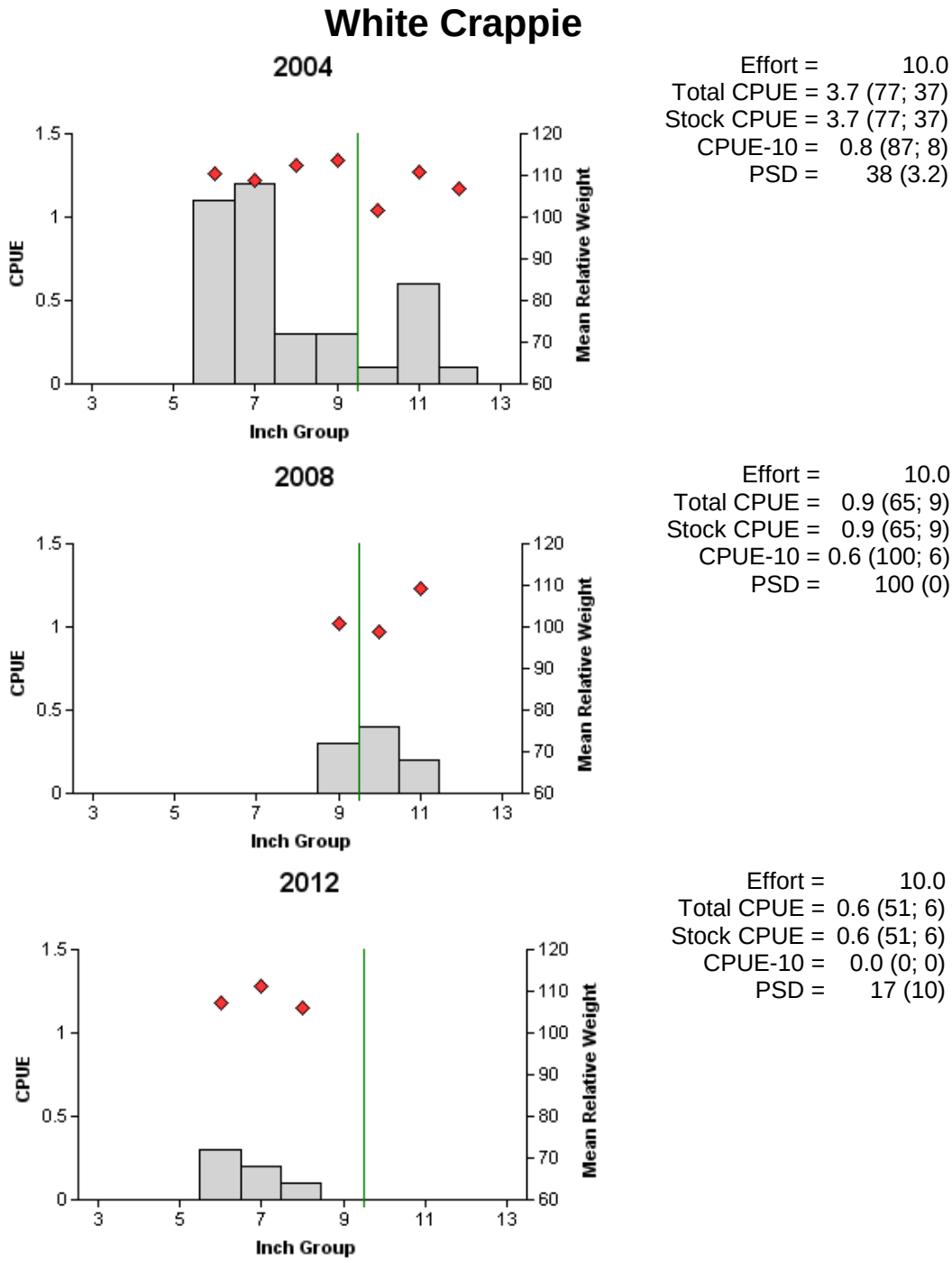


Figure 10. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Eagle Mountain Reservoir, Texas, 2004, 2008, and 2012. Vertical line represents length limit at time of sampling.

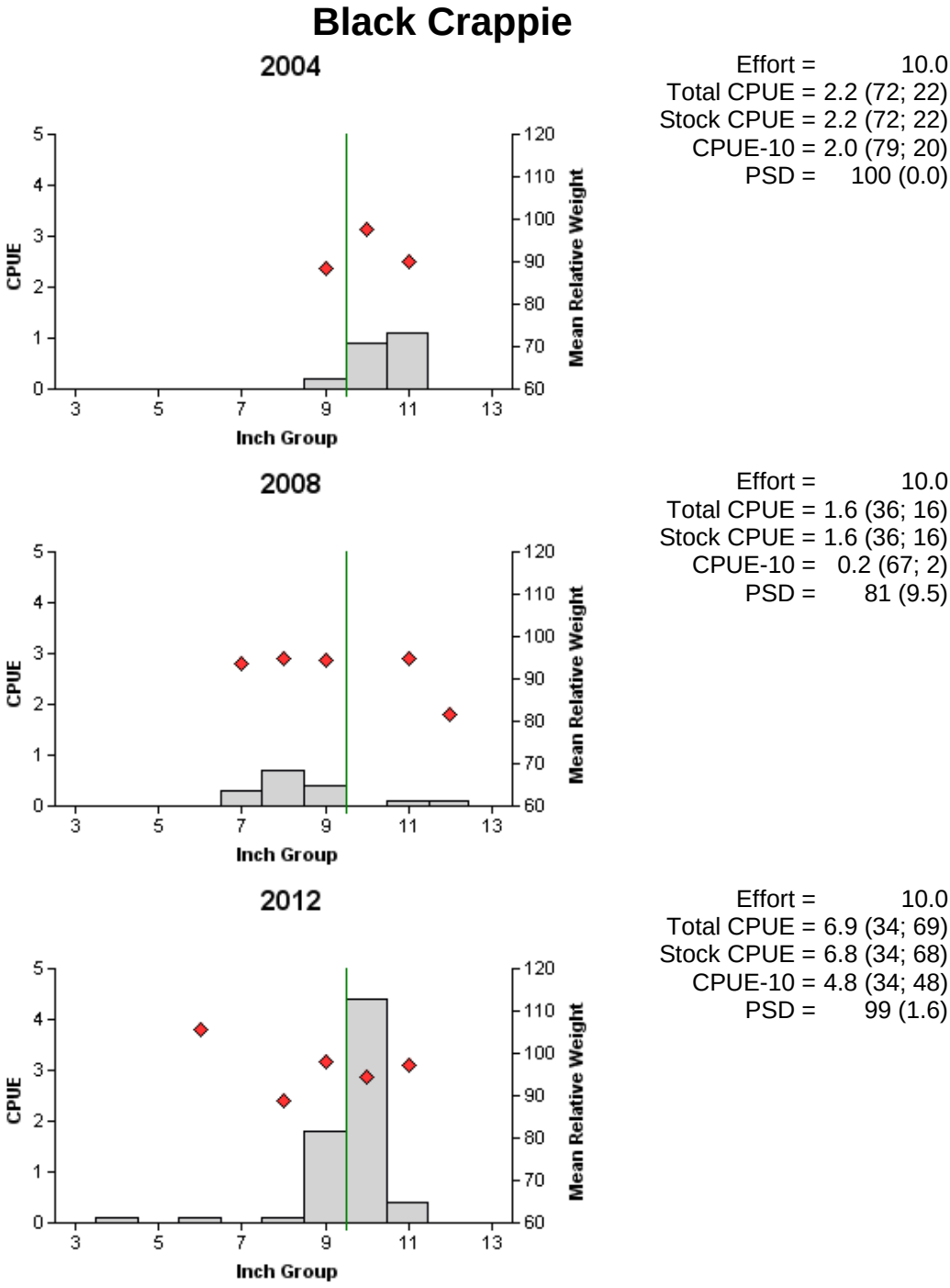


Figure 11. Number of Black Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Eagle Mountain Reservoir, Texas, 2000, 2004, and 2008. Vertical line represents length limit at time of sampling.

Table 8. Proposed sampling schedule for Eagle Mountain Reservoir, Texas. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard surveys are denoted by S and additional surveys denoted by A.

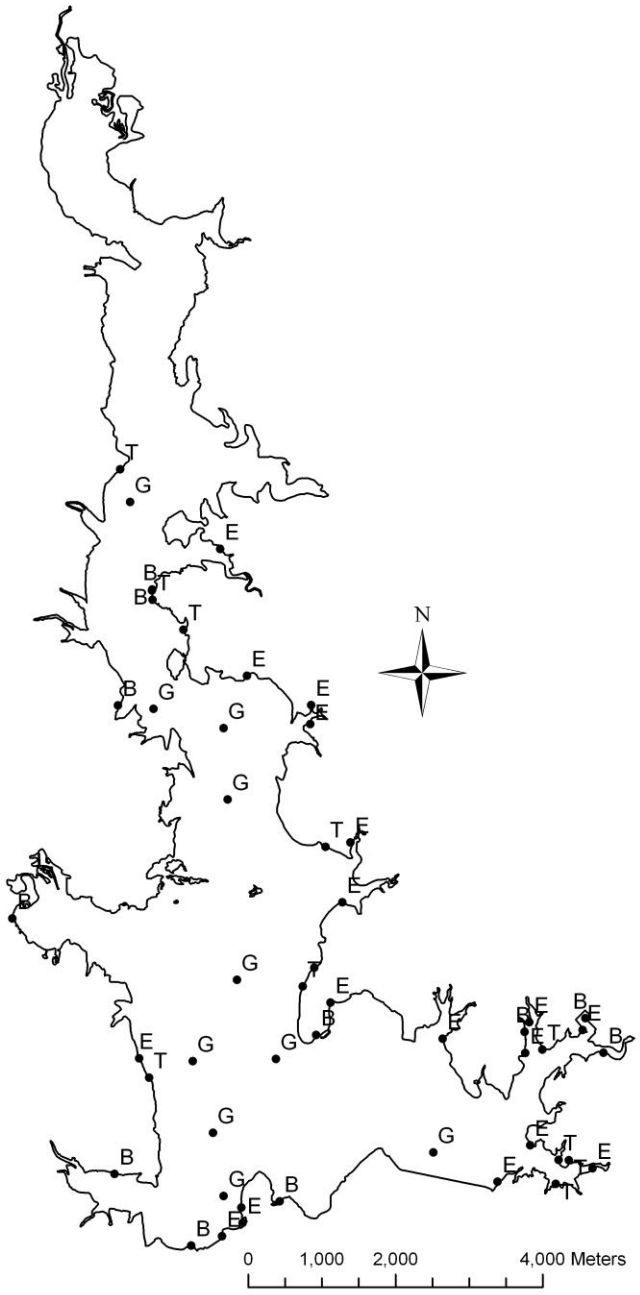
Survey year	Electrofish Fall(Spring)	Trap net	Gill net	Habitat		Access	Creel survey	Report
				Structural	Vegetation			
2013-2014								
2014-2015								
2015-2016								
2016-2017	S	S	S	S	S	S	A	S

APPENDIX A

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

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Spotted Gar	1	0.1				
Longnose Gar	7	0.7				
Gizzard Shad	278	27.8			919	612.7
Threadfin Shad					1,513	1,008.7
Common Carp	2	0.2				
River Carpsucker	2	0.2				
Smallmouth Buffalo	54	5.4				
Blue Catfish	201	20.1				
Channel Catfish	68	6.8				
White Bass	75	7.5				
Yellow Bass	1	0.1				
Bluegill	1	0.1			340	226.7
Longear Sunfish					182	121.3
Redear Sunfish					13	8.7
Spotted Bass					20	13.3
Largemouth Bass					257	171.3
White Crappie			6	0.6		
Black Crappie	3	0.3	69	6.9		
Freshwater Drum	6	0.6				

APPENDIX B



Location of sampling sites, Eagle Mountain Reservoir, Texas, 2012-2013. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Boat ramps are indicated with a B. Water level was near full pool at time of sampling.

APPENDIX C

Historical catch rates of targeted species by gear type for Eagle Mountain Reservoir, Texas, for specified years.

		Year											
Gear	Species	1988	1990	1992	1995	1998	2000	2001	2002	2004	2005	2008	2009
Gill Netting	Blue Catfish			0.0	0.9	0.6		0.9			7.9		10.3
(fish/net night)	Channel Catfish	8.0	5.0	7.0	11.8	3.8		2.3			6.5		9.3
	White Bass	7.0	9.0	3.0	10.3	11.1		3.7			6.1		25.0
Electrofishing	Gizzard Shad	214.0	291.0	328.7	274.0	589.3	711.3		500.5	437.4		506.0	497.3
(fish/hour)	Threadfin Shad	387.0	37.0	155.3	115.3	579.3	670.0		107.3	528.7		633.3	342.0
	Bluegill	273.0	212.0	276.0	132.0	47.3	140.0		259.1	264.0		267.3	181.3
	Longear Sunfish	109.0	145.0	0.0	98.0	52.7	148.0		92.5	143.3		219.3	149.3
	Redear Sunfish	32.0	5.0	36.7	18.7	2.0	4.7		15.5	1.3		28.0	37.3
	Spotted Bass	25.0	21.0	54.7	48.0	42.0	18.7		30.4	21.3		31.3	13.3
	Largemouth Bass	173.0	110.0	222.7	150.0	93.3	105.3		64.9	116.0		142.0	96.0
Trap Netting	White Crappie	4.0	9.0	4.8	1.4	3.4	3.2			3.7		0.9	
(fish/net night)	Black Crappie	0.0	0.0	0.0	0.5	6.4	0.7			2.2		1.6	

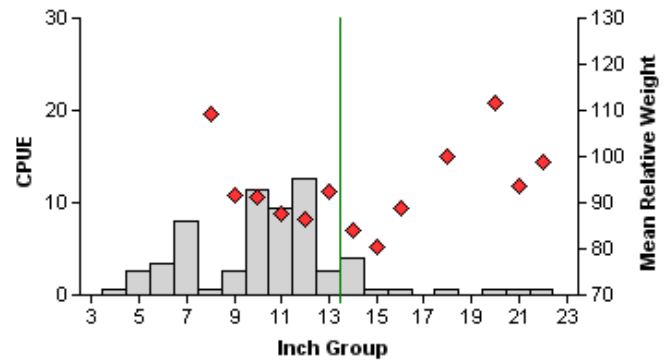
Appendix C, continued.

Gear	Species	Year 2010	2011	2012	2013	**Average**
Gill Netting	Blue Catfish				20.1	**5.8**
(fish/net night)	Channel Catfish				6.8	**6.7**
	White Bass				7.5	**9.2**
Electrofishing	Gizzard Shad	484.7	765.3	612.7		**477.9**
(fish/hour)	Threadfin Shad	366.7	1156.0	1008.7		**468.2**
	Bluegill	272.7	150.7	226.7		**207.9**
	Longear Sunfish	140.0	92.0	121.3		**116.2**
	Redear Sunfish	10.0	22.0	8.7		**17.1**
	Spotted Bass	12.0	16.7	13.3		**26.7**
	Largemouth Bass	211.3	160.0	171.3		**139.7**
Trap Netting	White Crappie			0.6		**3.4**
(fish/net night)	Black Crappie			6.9		**2.0**

APPENDIX D

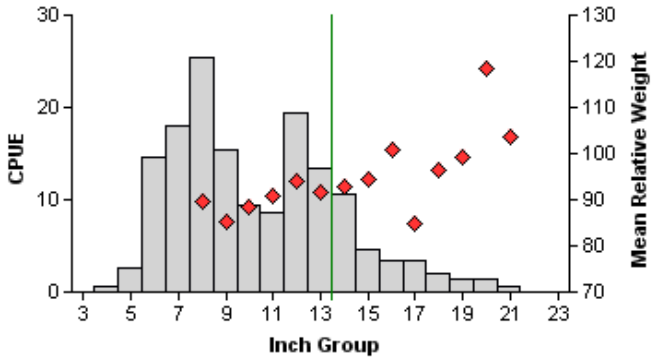
Largemouth Bass

2010



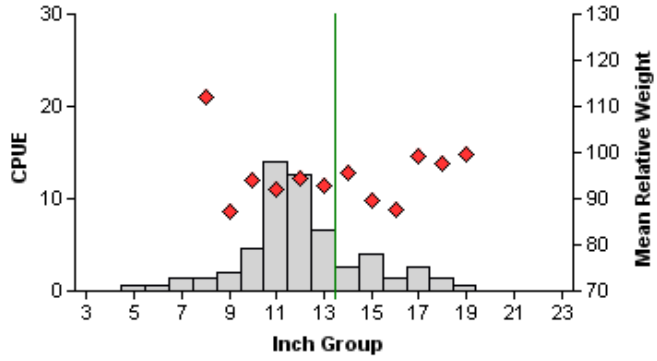
Effort =	1.5
Total CPUE =	62.0 (21; 93)
Stock CPUE =	47.3 (22; 71)
CPUE-14 =	8.0 (44; 12)
PSD =	49 (5.4)

2011



Effort =	1.5
Total CPUE =	154.7 (13; 232)
Stock CPUE =	118.7 (15; 178)
CPUE-14 =	27.3 (24; 41)
PSD =	51 (4.8)

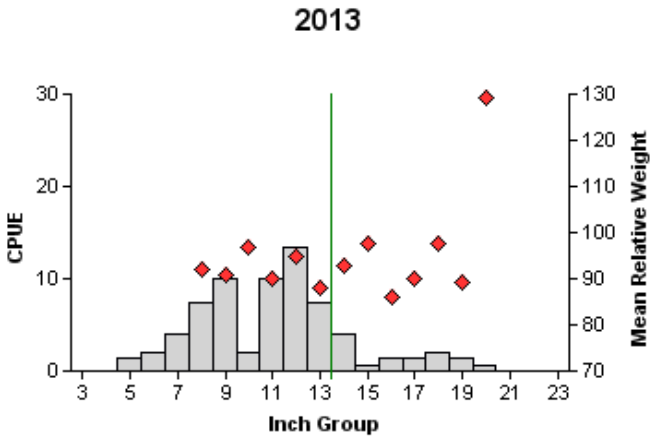
2012



Effort =	1.5
Total CPUE =	56.7 (16; 85)
Stock CPUE =	54.0 (16; 81)
CPUE-14 =	12.7 (31; 19)
PSD =	59 (5.3)

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 spring bass-only electrofishing surveys, Eagle Mountain Reservoir, Texas, 2010, 2011, and 2012. Vertical lines represent length limit at time of sampling.

Largemouth Bass



Effort =	1.5
Total CPUE =	68.7 (20; 103)
Stock CPUE =	61.3 (20; 92)
CPUE-14 =	11.3 (33; 17)
PSD =	52 (5.3)

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 spring bass-only electrofishing surveys, Eagle Mountain Reservoir, Texas, 2013. Vertical lines represent length limit at time of sampling.

APPENDIX E

Results from FAST modeling

Introduction

When managing a Largemouth Bass population in a reservoir, growth, exploitation, total mortality, and maximum size are all important population statistics. These statistics were calculated from data collected during electrofishing surveys conducted in fall 2012 using Fishery Analysis and Simulation Tools (FAST; Slipke and Maceina, 2000).

Methods

Largemouth Bass otoliths were collected using a stratified random approach in which ten fish per centimeter group were selected for otolith extraction. The remaining fish were assigned ages using an age-length key. Collection and processing of otoliths was conducted according to the Texas Parks and Wildlife Department Inland Fisheries Assessment Procedures (unpublished, revised manual 2011).

Total annual mortality, theoretical maximum age, L-infinity (theoretical maximum length), were calculated using FAST. Unweighted catch-curve regression was used to examine annual mortality, and theoretical maximum age. The Von Bertalanffy growth function was used to determine L-infinity. Only data from age-0 through age-3 were used for Largemouth Bass to calculate total annual mortality and theoretical maximum age because of possible gear bias for older fish described in the Texas Parks and Wildlife Department Inland Fisheries Assessment Procedures (unpublished, revised manual 2011). Theoretical maximum length was calculated using length data from all ages. Fish were not segregated by sex during the analysis. Yield was calculated using the Beverton-Holt equilibrium yield equation as described by Ricker.

Results and Discussion

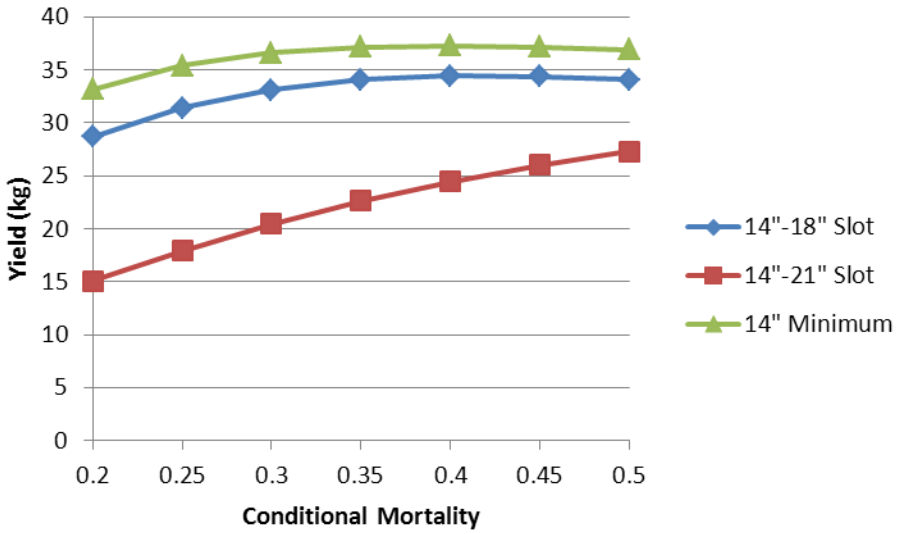
The results are shown in the accompanying table and figure. Results of the growth analysis using all ages were suspect with the L-infinity being just 18.2 inches and the maximum age being only 8.1 years. Therefore, the analysis was also conducted to solve for t_o and k while setting the L-infinity at the current water body record length of 692.2 mm. Modeling of different length limits could not be conducted with the maximum age estimate using all ages predicted that it would take 22.8 years for a fish to reach the 21-inch upper slot limit. Reasons for this abnormality of the model could be caused by the lack of older fish being included in the age sample.

To model different length limits, I assigned a maximum age of 10 to run the model successfully. Different rates of conditional natural mortality (ranging from 0.04-0.39) and conditional fishing mortalities (ranging from 0.2-0.5) were processed for three different types of regulations. These regulations were a 14- to 21-inch slot, a 14- to 18-inch slot, and a 14-inch minimum length limit. The FAST model produced yield estimates for each different length limit. Yield estimates across each different conditional natural mortality were averaged and presented with the corresponding conditional fishing mortality.

It appears from yield estimates that the 14- to 21- inch slot limit has very low yield estimates when compared to the other regulations modeled. This is mainly because not very many fish are growing to that size based on the available growth data. The 14- inch minimum regulation was predicted to have the largest yield. This is not unexpected because more fish would be available for anglers. Although lower, the 14-to 18- inch slot had somewhat similar yield estimates as the 14- inch minimum.

Population parameters of Largemouth Bass in Eagle Mountain Reservoir, 2012. Estimates were obtained using the FAST Modeling Program. Estimates of total mortality and maximum age were calculated with only ages 0-3 because of gear bias associated with effective sampling of older fish.

N aged	Total Mortality	Maximum size (L-infinity in inches)	Maximum age (years)
234	35.6%	18.2”	9.9



Average total yield estimates for 14-to 21-inch slot (squares), 14-to 18-inch slot (diamonds), and 14-inch minimum (triangles) length limits modeled under varying conditional natural mortalities and conditional fishing mortalities. Conditional natural mortalities ranged from 0.04-0.39. Estimates were obtained using the FAST modeling program with data collected from 2012 fall electrofishing.