PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-1

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2010 Survey Report

Nasworthy Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Nasworthy Reservoir were surveyed in 2006, 2008, and 2010 using electrofishing and trap nets, and in 2007, 2009 and 2011 using gill nets. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Nasworthy Reservoir is a 1,598-acre impoundment located on the southwestern edge of San Angelo, Texas in Tom Green County. It is a shallow, turbid reservoir with stable water levels and extensive emergent vegetation. Access is good with numerous public boat ramps and parks.

- **Management History:** Important sport fish include largemouth bass, white crappie, and channel catfish. Palmetto (hybrid striped) bass were stocked from the 1970s through 2007. Red drum were once an important game species, but the discontinued operation of the power plant on Nasworthy Reservoir beginning in 2003 eliminated this fishery that was dependent on the plant's heated water effluent.

- **Fish Community**
  - **Prey species:** Gizzard shad were present in good numbers, but few were small enough to be consumed by predators. Few threadfin shad were captured in samples. Bluegill abundance appears to have declined since the 2007 report.
  - **Catfishes:** No blue catfish were sampled. Flathead catfish were present in low numbers. Channel catfish abundance was down slightly from 2007, but still good. Size structure of channel catfish improved since 2007; individuals up to 27 inches were sampled.
  - **Temperate basses:** White bass were present in low abundance. Palmetto bass (hybrid striped bass) abundance declined and size structure increased since stockings were discontinued in 2007.
  - **Largemouth bass:** Largemouth bass abundance was good. Size structure and body condition improved slightly since 2006 but was still poor. Growth rate to 14 inches remained poor since 2006.
  - **White crappie:** White crappie catch rate was about half of the 2006 catch rate; however, more individuals were over 10 inches in the latest survey. Growth to 10 inches was poor, with average 10-inch crappie being 3.5-years old.

- **Management Strategies:** To improve size structure of largemouth bass population, propose changing the largemouth bass length limit to no-minimum, and only two under 18 inches may be kept. Communicate with anglers through public meetings, traditional, and social media to promote the potential benefits of the new regulation. Conduct additional electrofishing, trap netting, and gill netting in 2012-2013, additional electrofishing in fall 2011 and 2013, and standard monitoring in 2014-2015.

INTRODUCTION

This document is a summary of fisheries data collected from Nasworthy Reservoir in 2010-2011. 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 2010-2011 data for comparison.

Reservoir Description

Nasworthy Reservoir is a 1,598-acre impoundment constructed in 1930 on the South Concho River. It is located in Tom Green County on the southwestern edge of San Angelo and is operated and controlled by the City of San Angelo. Primary water uses included municipal water supply, irrigation and recreation. Water level remains fairly constant due to supplemental flows from upstream Twin Buttes Reservoir (Figure 1). The reservoir was used for power plant cooling until 2003, when the plant ceased operation. Nasworthy Reservoir was eutrophic with a mean TSI chl-*a* of 54.04, which was higher than the 2005 sample (Texas Commission on Environmental Quality 2008). Habitat at time of sampling consisted of bulkhead, riprap, boat docks, and native emergent vegetation (bulrushes and water willow). Boat access consisted of fifteen public boat ramps and several private boat ramps. Bank fishing access was good at the numerous lakeside city parks, including one disabled-access fishing pier. Other descriptive characteristics for Nasworthy Reservoir are in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Scott and Bonds 2007) included:

1. Investigate possible reasons for lack of large palmetto bass; resume stocking of palmetto bass at 4/acre every other year if new information indicates stockings should resume.
   Action: An electrofishing survey was performed in the Concho River below Nasworthy dam to determine presence or absence of palmetto bass. None were collected, so no evidence was found that palmettos were escaping through the dam. Also, a nighttime boat trailer count was conducted on 10 nights in summer 2007. Results showed that zero to two boats were on the lake after dark on any particular night, so no evidence was found for a significant nighttime palmetto bass fishery. Stockings were discontinued after 2007.
2. Present at least one alternative largemouth bass length limit to stakeholder groups and discuss potential enforcement issues with local game wardens. If input is favorable, go forward with proposing a length limit change.
   Action: A presentation was made to local bass clubs. Overall, public opinion was in favor of changing the regulation to enhance bass trophy potential.
3. Conduct management stocking of threadfin shad in April 2008.
   Action: Threadfin shad were collected in surveys after the 2006 report, so no stocking was needed.

Harvest regulation history: Sport fishes in Nasworthy Reservoir are currently managed with statewide regulations (Table 2). In 2005, the minimum length limit and bag limit on red drum were removed to allow harvest of any remaining red drum after the closure of the reservoir's power plant; the discontinuation of hot-water discharge from the power plant made the reservoir unsuitable for this species.

Stocking history: Species stocked have included channel catfish, largemouth bass, palmetto bass and red drum. Palmetto bass stockings were discontinued after 2007 because of poor growth and lack of a fishery. Red drum stockings were discontinued after 2002 because the power plant on the reservoir stopped operation, eliminating the heated water effluent that enabled overwinter survival of red drum.

The complete stocking history is in Table 3.

Vegetation/habitat management history: The City of San Angelo dredged the reservoir in 1999 to remove excess sediment. The city also periodically controls spread of bulrushes with chemical methods.

Water Transfer: Nasworthy Reservoir is primarily used for municipal water supply, irrigation, and recreation. When the Twin Buttes dam gates are opened by the City of San Angelo, the water feeds directly into downstream Nasworthy Reservoir. Water from Nasworthy Reservoir is fed downstream directly into the South Concho River which flows through south San Angelo to a pumping station near Ave L, supplying municipal water for San Angelo. An irrigation canal is sometimes used to provide water to Concho River watershed farmers.

METHODS

Fishes were collected by electrofishing (1 hour at 12, 5-min stations), gill netting (5 net nights at 5 stations), and trap netting (5 net nights at 5 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for gill and trap nets, as the number of fish per net night (fish/nn). All survey sites were randomly selected, and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), as defined by Guy et al. (2007)], and condition index [relative weight (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for gizzard shad (DiCenzo et al. 1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics, and SE was calculated for structural indices and IOV. Ages were determined using otoliths. We collected 80 largemouth bass >6 inches for aging in the 2008 sample. In 2010 we collected 13 largemouth bass between 13 and 15 inches to calculate mean age at 14-inch length. In 2011 we collected 10 white crappie between 9 and 11 inches to calculate mean age at 10-inch length. Water level data was provided by the City of San Angelo Water Utilities Department.

RESULTS AND DISCUSSION

Habitat: The most recent (2002) habitat survey results can be found in Van Zee 2003. Field observations confirmed the presence of bulrushes and water willow; no prohibited species were encountered.

Prey species: Electrofishing catch rates of gizzard shad and bluegill were 438.0/h and 104.0/h, respectively (Figures 2, 3). Catch rate of gizzard shad increased by more than double since 2006; however, index of vulnerability (IOV) for gizzard shad decreased from 37 to 16, indicating that only a small proportion of shad were available as prey to existing predators. Threadfin shad were encountered in small numbers in electrofishing and trap netting surveys. Bluegill catch rate was lower than in 2006, and most individuals captured were between three and five inches long.

Blue catfish: No blue catfish were captured in 2009 or 2011 gill net surveys. Only three were captured in 2007.

Channel catfish: Fewer channel catfish were captured in 2011 compared to 2007 and 2009 (Figure 4). Gill netting catch rate, stock-size catch rate, and catch rate of legal-sized fish decreased from 2007 to 2011. However, size structure improved as indicated by the higher PSD (55 versus 37) and PSD-P (9 versus 4). The largest channel catfish captured was 27 inches long. Relative weights remained excellent (>100) for fish over 15 inches.

Flathead catfish: Flathead catfish were collected in low (0.8/nn) numbers, similar to 2009 (1.8/nn) and 2007 (0.8/nn) (Figure 5). Most flathead catfish in the survey were over the 18-inch minimum length limit.

White bass: White bass abundance was low in 2011 (1.4/nn), similar to 2009 (0.2/nn) and 2007 (0.3/nn, Figure 6). The largest individuals sampled were 12 inches in length.

Palmetto bass: This population began dwindling since the stockings were discontinued in 2007. The 2011 gill net catch rate was 1.6/nn, compared to 13.3/nn in 2007 (Figure 7). In 2011 the length range of sampled fish was 15 to 25 inches, and PSD-18 was 62, meaning that 62 percent of stock-size fish were over the legal length limit of 18 inches. Relative weights were somewhat improved in 2011 but still poor, with most inch-group averages between 80 and 90. Growth rates of this species have been poor in recent years. In 2007, it took palmetto bass about five years to reach the 18-inch length limit. We only collected seven fish for the age-and-growth sample in 2011; they ranged in age from 4 to 8 years, and in size from 16 to 20 inches.

Largemouth bass: Electrofishing catch rate of largemouth bass was 119.0/h, similar to catch rates from previous years (Figure 8). Size structure improved slightly from 2006 to 2010, evidenced by the increase in PSD from 12 to 29. Also, more legal-sized (over 14 inches) fish were captured in the sample, but the number was still low (10/h). Fish condition was slightly better in 2010, as some higher length categories had average W_r values over 90. Still, the abundance of sub-legal fish and low relative weights for those smaller fish showed that intraspecific competition may be hindering the health of the population. Mean age at 14 inches was high in 2010 and in 2006 (4.3 and 3.3 years, respectively), and the 2008 sample showed that it took largemouth bass about four years to reach 14 inches (Figure 9), giving more evidence that overabundance of small fish may be stunting their growth.

White crappie: Trap net catch rate for white crappie was about half in 2010 (15.6/nn) compared to 2006 (29.2/nn, Figure 10). Catch rate of stock-size fish was also considerably lower (8.8/nn versus 27.8/nn). However, the proportion of adult crappie that were over the 10-inch minimum length limit was higher in the latest survey (14 percent versus 3 percent). Also, the largest individual captured in the 2011 sample was 12 inches, versus 10 inches in the 2006 and 2008 samples. Growth of crappie was poor, with 10-inch fish averaging about three years old in the 2006 (2.8 years), 2008 (3.5 years) and 2010 (3.5 years) samples.

Fisheries management plan for Nasworthy Reservoir, Texas

Prepared – July 2011.

ISSUE 1: Largemouth bass size structure is poor and growth is slow due to overabundance of small (< 14 in) fish relative to prey availability. The 2003/2004 creel survey showed that Nasworthy anglers are willing to harvest as many as half of legal-sized bass that are caught.

MANAGEMENT STRATEGIES

1. Propose to change length limit on largemouth bass from the statewide 14-inch minimum to no-minimum, and only two under 18 inches may be kept. Keep bag limit at five fish per person per day.
2. Communicate with area bass anglers and angling groups about the proposed regulation and its potential benefits to Lake Nasworthy using public meetings, social media, and traditional media.

ISSUE 2: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant Salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc… so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes electrofishing, trap netting, and gill netting in 2012/2013, additional electrofishing in fall 2011 and 2013, and mandatory monitoring in 2014/2015 (Table 4). This schedule is adequate for monitoring the status of the most important game fish species: largemouth bass, white crappie, and channel catfish. The additional electrofishing in 2011 will provide additional baseline data for the pre-regulation-change largemouth bass population, and electrofishing in 2013 will help give a clearer picture of the effects of the new regulation on this species.

LITERATURE CITED

Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 *in* B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

DiCenzo, V. J., M. J. Maceina, and M. R. Stimert. 1996. Relations between reservoir trophic state and gizzard shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.

Guy, C. S., R. M. Neumann, D. W. Willis, and R. O. Anderson. 1999. Proportional size distribution (PSD): a further refinement of population size structure index terminology. Fisheries 32 (7):348.

Scott, M. K. and C. C. Bonds. 2007. Statewide freshwater fisheries monitoring and management program survey report for Nasworthy Reservoir, 2006. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-32. Austin

Texas Commission on Environmental Quality. 2008. Trophic classification of Texas reservoirs: 2008 water quality inventory and 303(d) list. 15 pp.

Van Zee, B. 2003. Statewide freshwater fisheries monitoring and management program survey report for Nasworthy Reservoir, 2002. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.

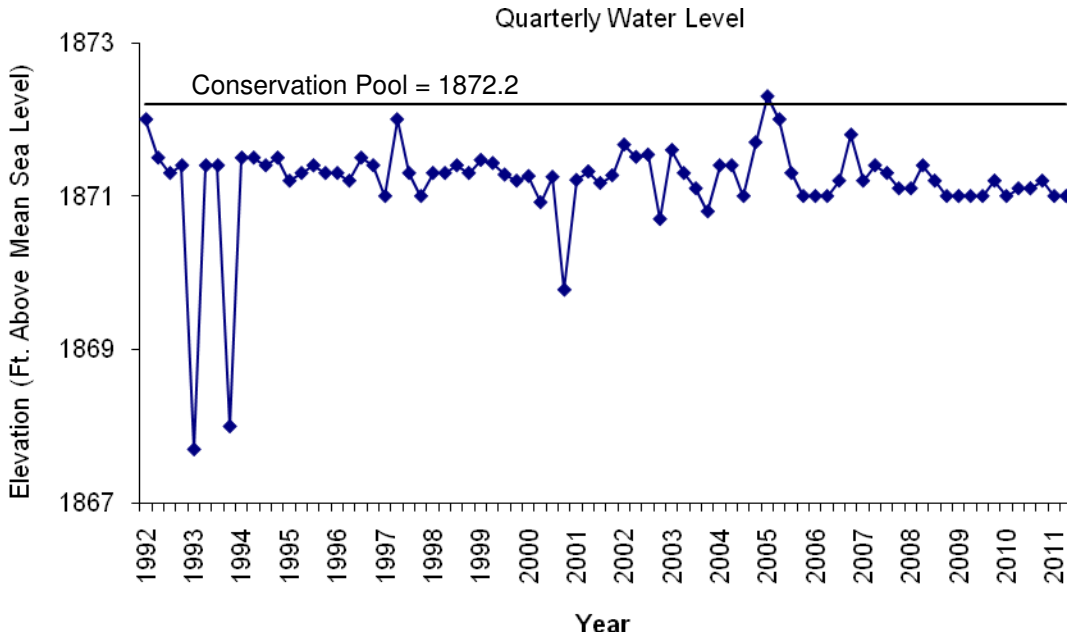


Figure 1. Quarterly water level elevations in feet above mean sea level recorded for Nasworthy Reservoir, Texas.

Table 1. Characteristics of Nasworthy Reservoir, Texas.

Characteristic	Description
Year constructed	1930
Controlling authority	City of San Angelo
County	Tom Green
Reservoir type	Mainstream
Shoreline Development Index	7.01
Conductivity	872 µmhos/cm

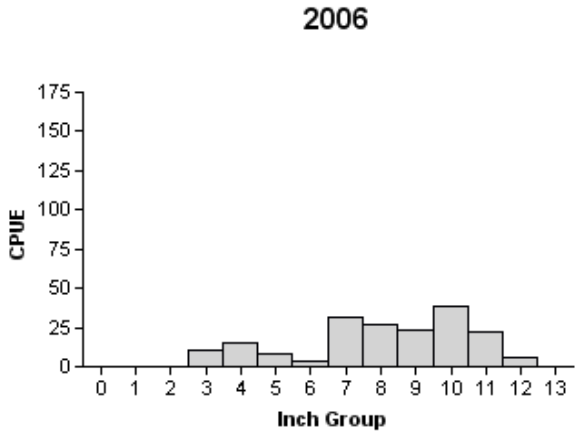
Table 2. Harvest regulations for Nasworthy Reservoir, Texas.

Species	Bag Limit	Minimum-Maximum Length (inches)
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 - No Limit
Catfish, flathead	5	18 - No Limit
Bass, white	25	10 - No Limit
Bass, palmetto (hybrid striped)	5	18 - No Limit
Bass, largemouth	5	14 - No Limit
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 - No Limit

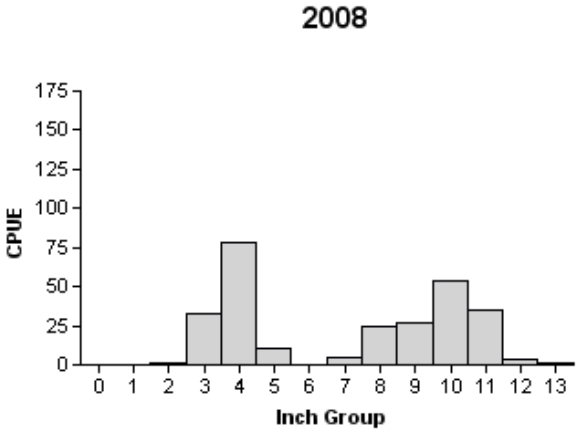
Table 3. Stocking history of Nasworthy Reservoir, Texas. Size categories are: FRY =<1 inch; FGL = 1-3 inches; ADL = adult, and UNK = unknown.

Year	Number	Size	Year	Number	Size
	Threadfin shad			Bluegill	
1984	8,800	UNK	2010	360	ADL
	Channel catfish			White crappie	
1966	32,000	UNK	1972	16,000	UNK
1968	26,000	UNK			
1969	15,000	UNK		Florida largemouth bass	
1970	20,000	UNK	1980	8,100	FGL
1971	10,000	UNK	1986	201,600	FGL
1972	20,425	UNK	1987	2,159	ADL
1973	15,000	UNK	1990	159,799	FRY
1974	10,000	UNK	1991	159,854	FGL
1990	16,637	FGL	1995	159,840	FGL
1991	16,191	FGL	1995	172	ADL
1993	400	FGL	Species Total	691,524	
2011	157	ADL			
Species Total	181,810			Green X Redear sunfish	
			1966	14,700	UNK
	Palmetto bass				
1974	17,767	UNK		Red drum	
1975	16,000	UNK	1984	101,276	FGL
1977	16,000	UNK	1985	195,387	FGL
1979	8,430	UNK	1986	159,604	FGL
1981	16,000	UNK	1991	164,950	FGL
1982	16,176	UNK	1994	165,732	FGL
1994	28,600	FGL	1995	171,200	FGL
1995	32,080	FGL	1996	161,805	FGL
1996	23,897	FGL	1997	161,401	FGL
1997	25,164	FGL	1999	194,089	FGL
1998	24,021	FGL	2000	197,515	FGL
1999	24,140	FGL	2001	224,122	FGL
2002	24,108	FGL	2002	239,895	FGL
2003	19,410	FGL	Species Total	2,136,976	
2004	19,386	FGL			
2005	6,933	FGL		Largemouth bass	
2006	6,775	FGL	1968	440	UNK
2007	8,611	FGL	1969	24,000	UNK
Species Total	333,498		1970	271,000	UNK
			1972	68,700	UNK
	Redear sunfish		1993	145	ADL
1970	4,900	UNK	1997	52,600	FGL
			Species Total	416,885	

Gizzard Shad



Effort = 1.0
Total CPUE = 185.0 (21; 185)
IOV = 37 (6)



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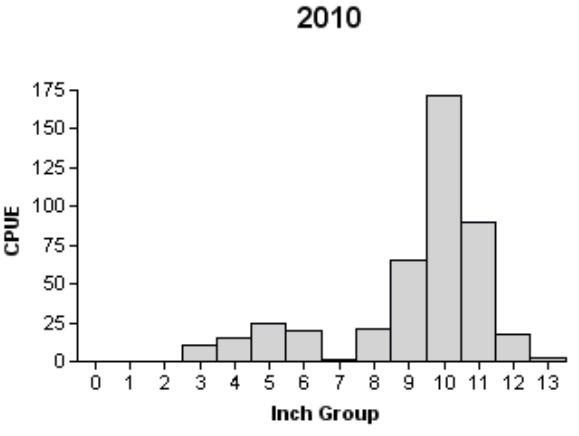
IOV = 47 (13)

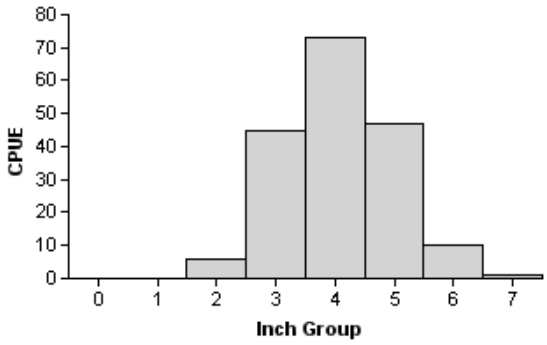


Effort = 1.0
Total CPUE = 438.0 (15; 438)
IOV = 16 (4)

Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N are in parentheses) for fall electrofishing surveys, Nasworthy Reservoir, Texas, 2006, 2008, and 2010.

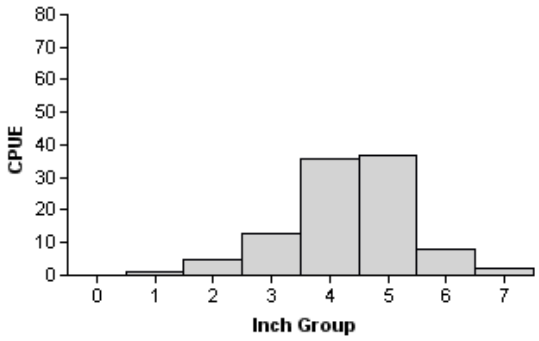
Bluegill

2006



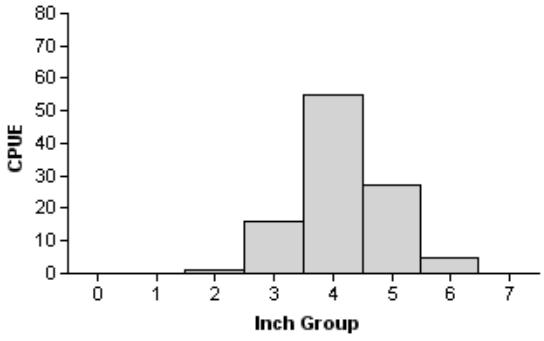
Effort = 1.0
Total CPUE = 182.0 (17; 182)
Stock CPUE = 176.0 (16; 176)
PSD = 6 (2)

2008



Effort = 1.0
Total CPUE = 102.0 (23; 102)
Stock CPUE = 96.0 (22; 96)
PSD = 10 (3)

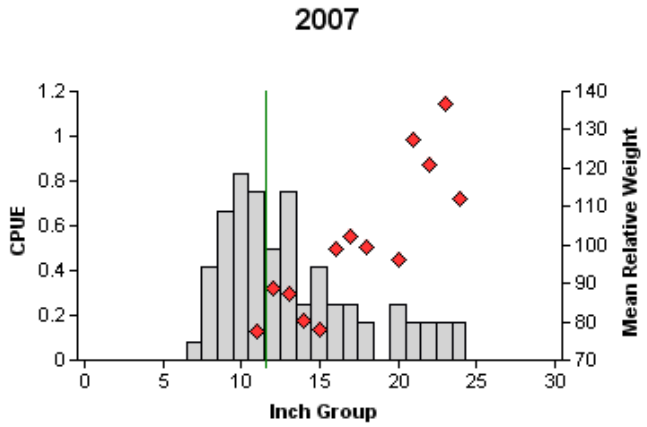
2010



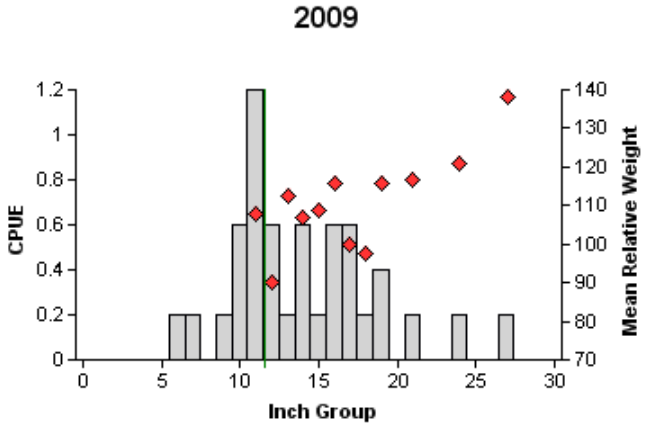
Effort = 1.0
Total CPUE = 104.0 (30; 104)
Stock CPUE = 103.0 (29; 103)
PSD = 5 (3)

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, Nasworthy Reservoir, Texas, 2006, 2008, and 2010.

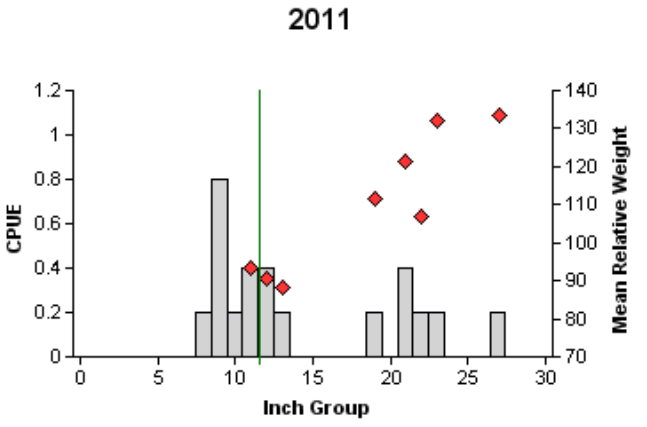
Channel Catfish



Effort =	12.0
Total CPUE =	6.3 (19; 75)
Stock CPUE =	4.3 (16; 51)
CPUE-12 =	3.5 (18; 42)
PSD =	37 (6)
PSD-P =	4 (3)



Effort =	5.0
Total CPUE =	6.4 (19; 32)
Stock CPUE =	5.2 (21; 26)
CPUE-12 =	4.0 (32; 20)
PSD =	46 (5)
PSD-P =	8 (6)



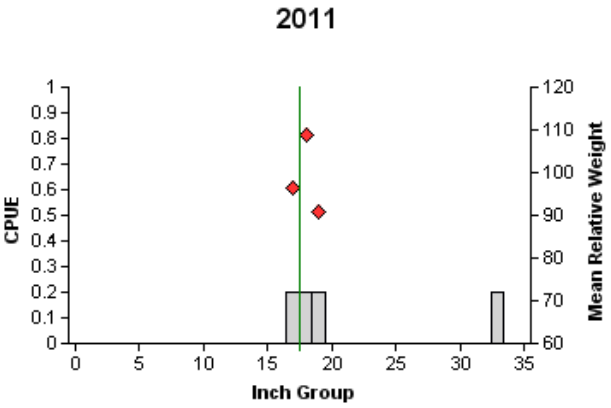
Effort =	5.0
Total CPUE =	3.4 (20; 17)
Stock CPUE =	2.2 (27; 11)
CPUE-12 =	1.8 (21; 9)
PSD =	55 (8)
PSD-P =	9 (7)

Figure 4. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Nasworthy Reservoir, Texas, 2007, 2009, and 2011. Vertical line represents the 12-inch minimum length limit.

Flathead Catfish

Effort =	12.0
Total CPUE =	0.8 (47; 9)
PSD =	43 (30)
PSD-18 =	71 (18)

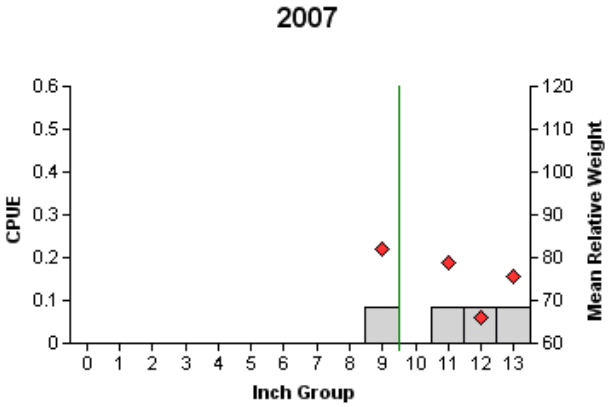
Effort =	5.0
Total CPUE =	1.8 (21; 9)
PSD =	89 (9)
PSD-18 =	100 (0)



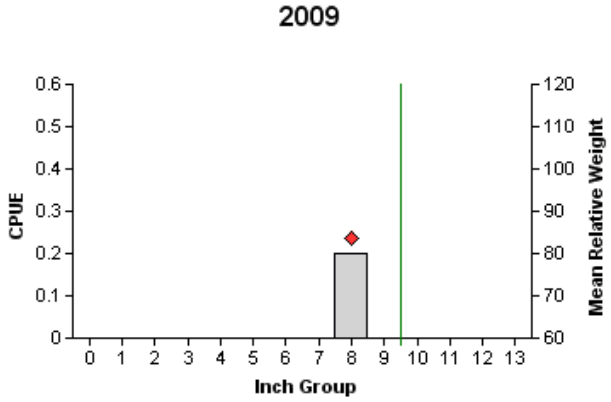
Effort =	5.0
Total CPUE =	0.8 (47; 4)
PSD =	25 (26)
PSD-18 =	75 (17)

Figure 5. Number of flathead catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Nasworthy Reservoir, Texas, 2007, 2009, and 2011. Vertical line represents the 18-inch minimum length limit.

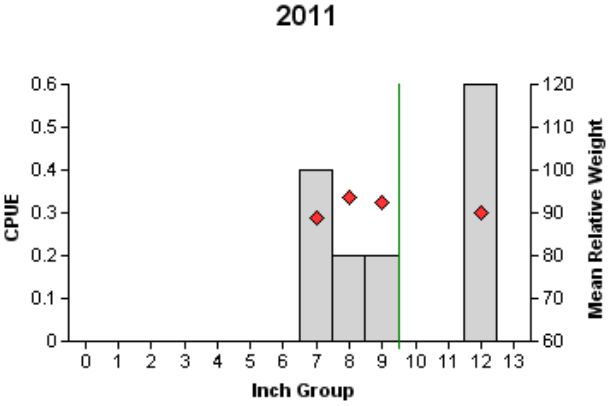
White Bass



Effort =	12.0
Total CPUE =	0.3 (56; 4)
Stock CPUE =	0.3 (56; 4)
CPUE-10 =	0.3 (52; 3)



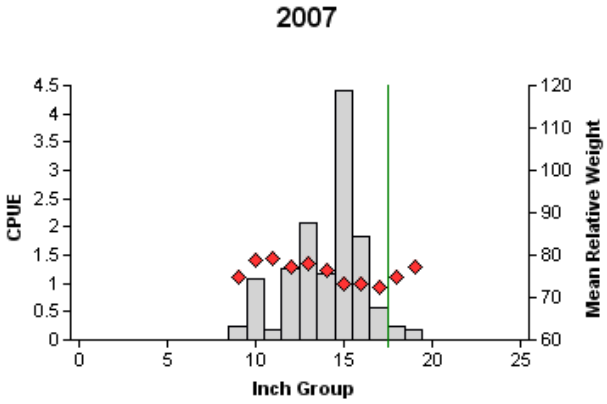
Effort =	5.0
Total CPUE =	0.2 (100; 1)
Stock CPUE =	0.2 (100; 1)
CPUE-10 =	0.0 (0; 0)



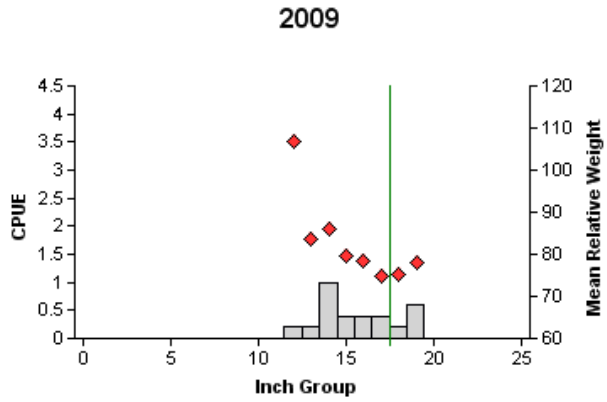
Effort =	5.0
Total CPUE =	1.4 (48; 7)
Stock CPUE =	1.4 (48; 7)
CPUE-10 =	0.6 (100; 3)

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, Nasworthy Reservoir, Texas, 2007, 2009, and 2011. Vertical line represents the 10-inch minimum length limit.

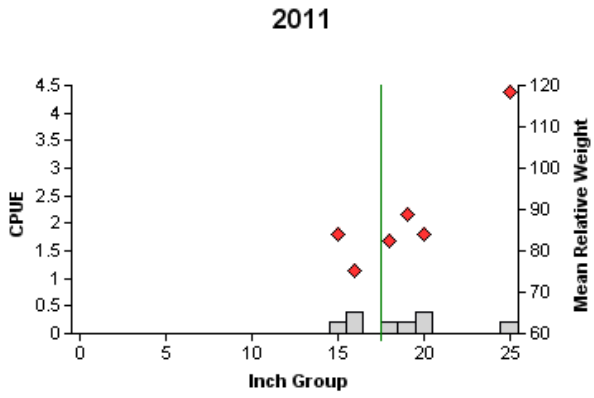
Palmetto Bass



Effort = 12.0
Total CPUE = 13.3 (27; 159)
Stock CPUE = 13.3 (27; 159)
PSD = 89 (4)
PSD-18 = 4 (1)



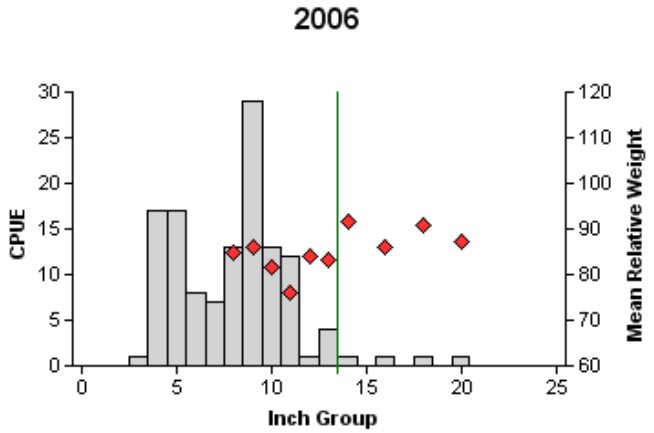
Effort = 5.0
Total CPUE = 3.4 (34; 17)
Stock CPUE = 3.4 (34; 17)
PSD = 100 (0)
PSD-18 = 24 (10)



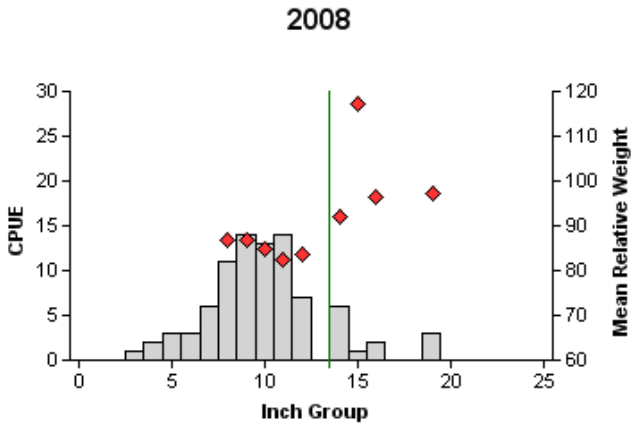
Effort = 5.0
Total CPUE = 1.6 (32; 8)
Stock CPUE = 1.6 (32; 8)
PSD = 100 (0)
PSD-18 = 62 (7)

Figure 7. 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, Nasworthy Reservoir, Texas, 2007, 2009, and 2011. Vertical line represents the 18-inch minimum length limit.

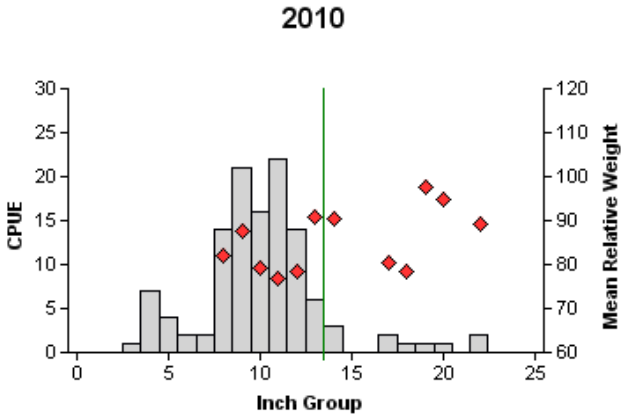
Largemouth Bass



Effort =	1.0
Total CPUE =	126.0 (18; 126)
Stock CPUE =	76.0 (19; 76)
CPUE-14 =	4.0 (43; 4)
PSD =	12 (5)
PSD-14 =	5 (3)



Effort =	1.0
Total CPUE =	86.0 (14; 86)
Stock CPUE =	71.0 (16; 71)
CPUE-14 =	12.0 (28; 12)
PSD =	27 (7)
PSD-14 =	17 (4)



Effort =	1.0
Total CPUE =	119.0 (20; 119)
Stock CPUE =	103.0 (18; 103)
CPUE-14 =	10.0 (32; 10)
PSD =	29 (6)
PSD-14 =	10 (3)

Figure 8. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for fall electrofishing surveys, Nasworthy Reservoir, Texas, 2006, 2008, and 2010. Vertical line represents the minimum length limit.

Largemouth Bass

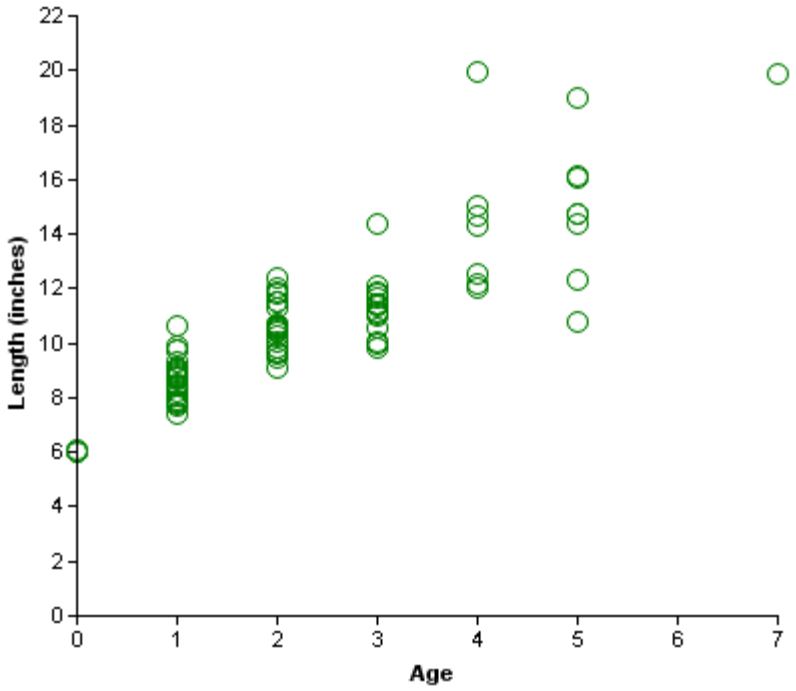
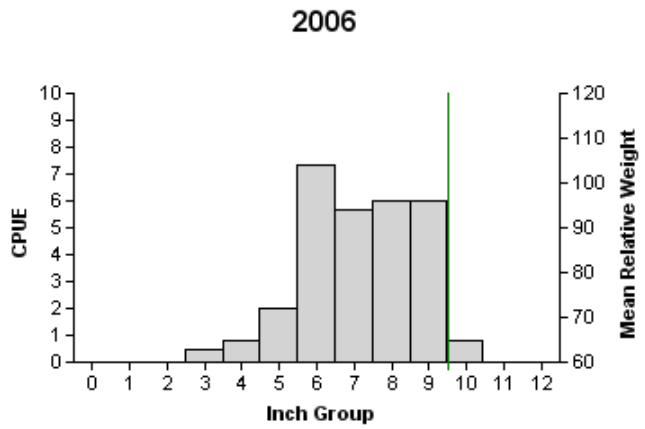
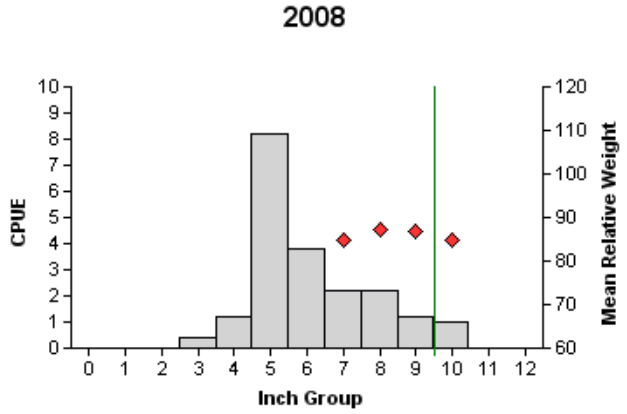


Figure 9. Length at age for largemouth bass collected by electrofishing at Nasworthy Reservoir, Texas, October 2008. N = 80.

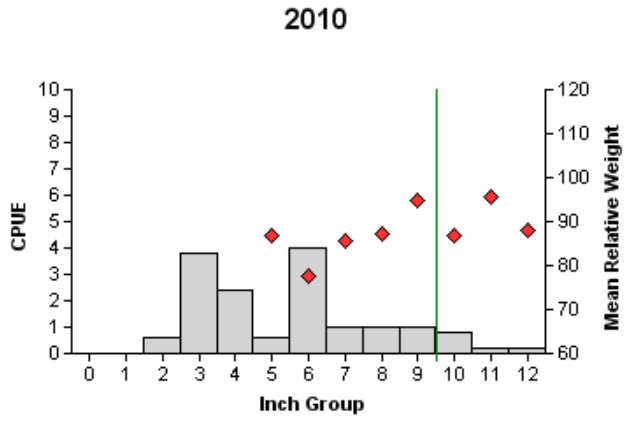
White Crappie



Effort =	6.0
Total CPUE =	29.2 (23; 175)
Stock CPUE =	27.8 (24; 167)
PSD =	46 (5)
PSD-10 =	3 (2)



Effort =	5.0
Total CPUE =	20.2 (72; 101)
Stock CPUE =	18.6 (76; 93)
PSD =	24 (9)
PSD-10 =	5 (6)



Effort =	5.0
Total CPUE =	15.6 (9; 78)
Stock CPUE =	8.8 (24; 44)
PSD =	36 (16)
PSD-10 =	14 (10)

Figure 10. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for fall trap netting surveys, Nasworthy Reservoir, Texas, 2006, 2008, and 2010. Vertical line represents the minimum length limit.

Table 4. Proposed sampling schedule for Nasworthy Reservoir, Texas. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S, and additional survey denoted by A.

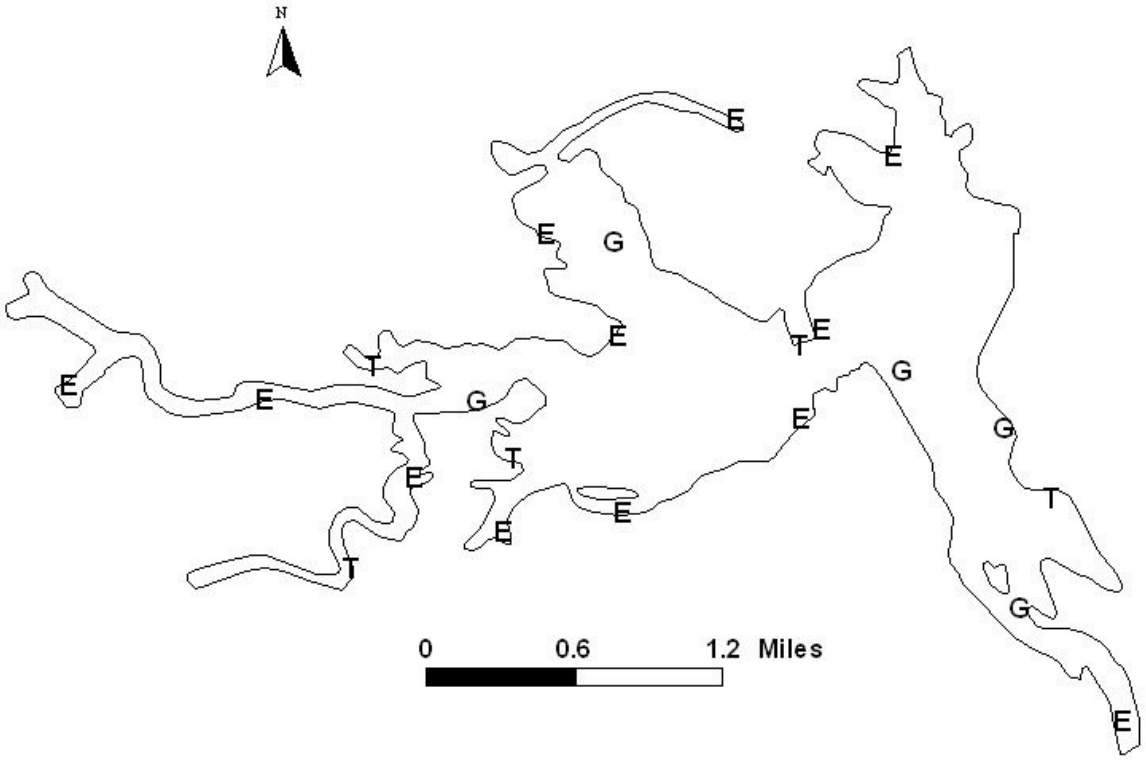
Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Vegetation Survey	Access Survey	Report
Fall 2011-Spring 2012	A						
Fall 2012-Spring 2013	A	A	A				
Fall 2013-Spring 2014	A						
Fall 2014-Spring 2015	S	A	S	A	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected from all gear types from Nasworthy Reservoir, Texas, 2010-2011.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Longnose gar	1	0.2				
Gizzard shad	184	36.8	1	0.2	438	438.0
Threadfin shad			8	1.6	12	12.0
Common carp	5	1.0				
River carpsucker	6	1.2				
Channel catfish	17	3.4				
Flathead catfish	4	0.8				
White bass	7	1.4				
Palmetto bass	8	1.6				
Redbreast sunfish					2	2.0
Warmouth					3	3.0
Bluegill	1	0.2	12	2.4	104	104.0
Longear sunfish					19	19.0
Redear sunfish					6	6.0
Largemouth bass	13	2.6			119	119.0
White crappie	11	2.2	78	15.6		
Freshwater drum	3	0.6				

APPENDIX B



Location of sampling sites, Nasworthy Reservoir, Texas, 2010-2011. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was approximately 1 foot below conservation pool at time of sampling.