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STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2008 Survey Report

Sheldon Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Sheldon Reservoir were surveyed in 2008 using electrofishing and in 2009 using gill netting. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Sheldon Reservoir is a 1,229-acre reservoir on Culpepper Bayou in Harris County, Texas, lying within the Sheldon Wildlife Management Area. The lake has a drainage area of 4.0 square miles and a shoreline length of 13.1 miles. The reservoir has a mean depth of 3 feet and a maximum depth of 20 feet
- **Management history:** Sheldon Reservoir is a very important asset to Texas Parks and Wildlife and to the people of Houston. To make the most of this resource Inland Fisheries Division has worked closely with Sheldon Reservoir State Park's Staff and Infrastructure Staff to improve the reservoir in conjunction with the development of the Sheldon Education Center. Heavy infestations of hydrilla, giant salvinia, and water hyacinth have greatly impeded recreational use at Sheldon Reservoir. Multiple herbicide treatments over several years have been unsuccessful in maintaining control of noxious vegetation.
- **Fish Community**
 - **Prey species:** Gizzard and threadfin shad are no longer present in electrofishing samples. Reduced sampling efficiency due to low water and extensive vegetation coverage may account for the lack of shad species collected. In addition, heavy infestations of aquatic plants reduce the quantities of free-floating microscopic algae necessary for shad to thrive.

The catch rate of bluegills in 2008 was 8.0/h, much lower than in 2004 (42.0/h). Redear sunfish are also available as prey. The catch rate in 2008 was 22.7/h, down from 2004 (84.0/h). Again, the lower catches of sunfish are probably due to low efficiency caused by excessive vegetation.
 - **Catfishes:** Historically, blue and channel catfish were present in Sheldon Reservoir; however, only channel catfish were captured in the 2009 gill net survey. Numbers are low, but individuals 29 inches in length were observed.
 - **Largemouth bass:** Electrofishing catch rate of largemouth bass dropped from 249.0/h in 2004 to 21.3/h in 2008. Excessive vegetation hampered sampling efficiency so the 2008 catch rate may not represent an actual population decline.
 - **Crappie:** Because of the vegetation problem in the reservoir, no trap net survey was conducted in 2008. The trap net catch rate of white crappie in 2004 was 0.4 /nn, down drastically from 20.4/nn in 2000. The catch in 2000 was very well distributed across all sizes classes from 2 to 14 inches indicating population expansion over the past several years. Black crappie were absent in the 2004 sample. White crappie attained legal harvestable size (10 inches) by about age 3.
- **Management Strategies:** The primary challenge at Sheldon Reservoir is aquatic vegetation management. We are continuing to implement integrated pest management strategies to address the problem. Strategies include chemical treatments, biological control insects, and triploid grass carp. Fish management strategies will be implemented once the vegetation growth is controlled. These strategies will include habitat enhancement and stocking Florida largemouth bass.

INTRODUCTION

This document is a summary of fisheries data collected from Sheldon Reservoir in June 2008 through May 2009. 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 2008-2009 data for comparison.

Reservoir Description

Sheldon Reservoir is a 1,229-acre reservoir on Culpepper Bayou in Harris County, Texas, lying within the Sheldon Wildlife Management Area. The lake has a drainage area of 4.0 square miles, a shoreline length of 13.1 miles, and a shoreline development ratio of 2.7. The reservoir has a mean depth of 3 feet and a maximum depth of 20 feet. Rainfall in the watershed averages 42.6 inches per year. Sheldon Reservoir lies within the Gulf Coast Plains Land Resource Area with Lake Charles/Benard Association (clay) soil types. Land uses around the reservoir are primarily agricultural and recreational. Other descriptive characteristics for Sheldon Reservoir are in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Henson and Webb 2005) included:

1. Produce a trophy largemouth bass fishery at Lake Sheldon.
Action: No survey was conducted in 2006 due to time constraints. The largemouth bass population was surveyed in 2008. No other actions were taken on the remaining strategies due to the ongoing exotic vegetation infestation.
2. Angler access at Lake Sheldon is very limited because of dense coverage of submerged and emergent aquatic vegetation. Increase angler access to Lake Sheldon.
Action: Herbicide and bio-control treatments for giant salvinia, water hyacinth, and hydrilla have continued with limited success. Triploid grass carp were stocked in May 2009 to control hydrilla. Horsepower restriction and closed seasons regulations have been removed to allow greater angler access to Sheldon Reservoir. All other short and long-term strategies from the previous plan are contingent upon funding and cooperation from other entities and the success of the vegetation control measures.
3. Increase harvest opportunities for Lake Sheldon anglers.
Action: Stocking of channel catfish at Sheldon Reservoir has been delayed due to heavy infestation of exotic vegetation. Construction of feeders and rearing ponds is contingent upon success of vegetation controls and funding.
4. Increase awareness of Lake Sheldon's fisheries.
Action: District staff continues to disseminate information on Sheldon Reservoir and Sheldon Lake State Park. Sheldon Reservoir is a featured part of the publicized San Jacinto River Watershed Management Plan. All other strategies are contingent upon the success of the vegetation control measures.

Harvest regulation history: Currently on Sheldon Reservoir, there are no exceptions to statewide fishing regulations. Table 2 summarizes the harvest regulations for the reservoir.

Stocking history: The most recent stockings at Sheldon Reservoir include channel catfish stocked in 2004 and 2005. The complete stocking history is in Table 3.

Vegetation/habitat history: Sheldon Reservoir has a mixed aquatic plant community of both native and non-native species (Table 4). Hydrilla, giant salvinia, and water hyacinth have all been problematic at times and continue to impede access. Management efforts have had moderate success. Structural shoreline habitat consists primarily of non-descript shoreline with overhanging brush and native emergent vegetation and has not changed in recent years.

METHODS

Fishes were collected by electrofishing (0.8 hours at nine 5-min stations) and gill netting (five net nights at five 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 nets, as the number of fish per net night (fish/nn). Survey sites were subjectively selected due to excessive vegetation coverage. The electrofishing survey was conducted during daylight hours because of limited access from vegetation. All other aspects of the surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2008).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)], and condition indices [relative weight (W_t)] were calculated for target fishes according to Anderson and Neumann (1996). Relative standard error ($RSE = 100 \times SE$ of the estimate/estimate) was calculated for all CPUE statistics and SE was calculated for structural indices.

RESULTS AND DISCUSSION

Habitat: Sheldon Reservoir has a history of over-abundant aquatic vegetation of both native and exotic varieties. The reservoir is very shallow and thus is prone to problematic stands of plants that in larger, deeper reservoirs might not pose a problem. Shoreline habitat is primarily nondescript with overhanging brush and native emergent vegetation. Table 4 summarizes the vegetation and habitat survey from 2008.

Prey species: Gizzard and threadfin shad were captured in Sheldon Reservoir as late as 2000 (Henson and Webb 2005), but were absent in the 2005 and 2008 electrofishing samples. Reduced sampling efficiency due to low water and extensive vegetation cover may account for the lack of shad species collected. The last year clupeids were collected in any significant numbers was 1997 (Henson and Webb 1997).

Both bluegill and redear sunfish were available as prey in Sheldon Reservoir. The catch rate of bluegills in 2008 was only 8.0/h (Figure 1), down from 42.0/h in 2004 (Figure 1). Redear sunfish made up a higher proportion of the catch in 2008 at 22.7/h (Figure 2). This too was lower than that observed in 2004 when 84.0/h were captured (Figure 2). Again, this is probably a reflection of reduced sampling efficiency rather than population decline.

Catfishes: in past samples, blue and channel catfish have been captured in Sheldon Reservoir, but only channel catfish were captured in 2009. Gill net CPUE was 1.6/nn, down from 2.4/nn in 2005 (Figure 3). Though the numbers are low, individuals measuring 20 to 29 were present in the population. (Figure 3). Low recruitment of catfish may be related to the overabundance of vegetation. Heavy vegetation can reduced the production of benthic invertebrates important to juvenile catfish.

Largemouth bass: Low sampling efficiency due to vegetation density accounted for a low catch rate of largemouth bass in the 2008 sample with only 21.3/h captured (Figure 4). In 2004, the catch rate was 249.0/h (Henson and Webb 2005). Despite low numbers, the size range of the population is desirable with fish to 19 inches observed in the sample. The low relative abundance of stock-length fish in the sample is likely due to the constraints on sampling efficiency caused by the heavy hydrilla infestation.

(Figure 4).

White crappie: No trap net survey was conducted in 2008 because of the vegetation coverage. White crappie were present in very good numbers in 2000 with a desirable size distribution (Henson and Webb 2001). However, few were caught in 2004 (Henson and Webb 2005).

Fisheries management plan for Sheldon Reservoir, Texas

Prepared – July 2009

ISSUE 1: Access to Sheldon Reservoir is very limited due to heavy infestations of exotic vegetation and infrastructure improvement needs.

MANAGEMENT STRATEGY

1. Treat entire reservoir with GALLEON SC herbicide in July 2009 for hydrilla, giant salvinia, and water hyacinth control.
2. Continue introducing water hyacinth weevils, giant salvinia weevils, and hydrilla flies whenever available as part of an integrated pest management plan for control of exotic vegetation.
3. Continue spot treatments of exotic vegetation with appropriate herbicides when necessary.
4. Continue to work with TPWD State Parks Staff and Infrastructure Staff to develop better access infrastructure including a new boat ramp, new and repaired fishing piers, and dredging to increase boating access.

ISSUE 2: Increase public awareness of the Sheldon Reservoir resources.

MANAGEMENT STRATEGY

1. Continue to publicize the Sheldon Reservoir fisheries and habitat management as part of the San Jacinto River Watershed Management Plan.

ISSUE 3: As vegetation abundance decreases, fish populations should respond and become more accessible to sampling.

MANAGEMENT STRATEGY

1. If accessible, conduct electrofishing survey at Sheldon Reservoir in the fall of 2010 to monitor changes in largemouth bass and their prey.
2. Conduct trap net survey in fall of 2012 to evaluate crappie, and a gill net survey in the spring of 2013 to evaluate catfish.

SAMPLING SCHEDULE JUSTIFICATION: Currently electrofishing, trap netting, and gill netting will continue to be conducted every four years, except that an electrofishing survey will be conducted in the fall of 2010, if accessibility improves. Vegetation surveys will be conducted annually. Fish population sampling frequency may increase depending on changes in fish habitat.

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Table 1. Characteristics of Sheldon Reservoir, Texas.

Characteristic	Description
Year Constructed	1958
Controlling authority	Texas Parks & Wildlife Commission
Counties	Harris
Reservoir type	State Park Reservoir
Shoreline Development Index (SDI)	2.7
Conductivity	80 μ mhos/cm

Table 2. Harvest regulations for Sheldon Reservoir.

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: 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 Sheldon Reservoir, Texas. Size Categories are FRY =<1 inch, FGL = 1-3 inches, and AFGL = 6-8 inches.

Species	Year	Number	Size
Blue catfish	1972	4,800	UNK
	1978	46,360	UNK
	1983	89	UNK
	Total	51,249	
Channel catfish	1972	12,500	AFGL
	1976	34,640	AFGL
	1978	90,654	AFGL
	1984	78,432	FGL
	1990	12,261	FGL
	2004	1,968	AFGL
	2005	17,908	AFGL
Total	248,363		
Flathead catfish	1972	1,015	UNK
	1983	25	UNK
Total	1,040		
Warmouth	1972	41,600	UNK
Redear sunfish	1983	107,800	UNK
Florida largemouth bass	1978	120,000	FRY
	1983	52,344	FRY
Total	172,344		
Largemouth bass	1972	73,000	UNK
	1983	15,569	UNK
Total	88,569		
Black crappie	1972	51,000	UNK
Green x Redear	1972	80,000	UNK
	1976	24,365	UNK
	1978	70,300	UNK
Total	174,665		
Red drum	1976	246	UNK

Table 4. Survey of littoral zone and physical habitat types, Sheldon Reservoir, Texas, 2008. A linear shoreline distance (miles) was recorded for each habitat type found. Surface area (acres) and percent of reservoir surface area was determined for each type of aquatic vegetation found.

Shoreline habitat type	Shoreline Distance		Surface Area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Structural habitat				
Overhanging brush	5.3	40		
Non-descript/mixed vegetation	7.8	60		
Native vegetation				
Native emergent			479	40
Native submergent			281	23
Native floating			223	19
Non-native vegetation				
Giant salvinia			587	49
Hydrilla			772	64
Asian marshweed			33	3
Water hyacinth			555	46
Alligator weed			4	<0.01

Bluegill

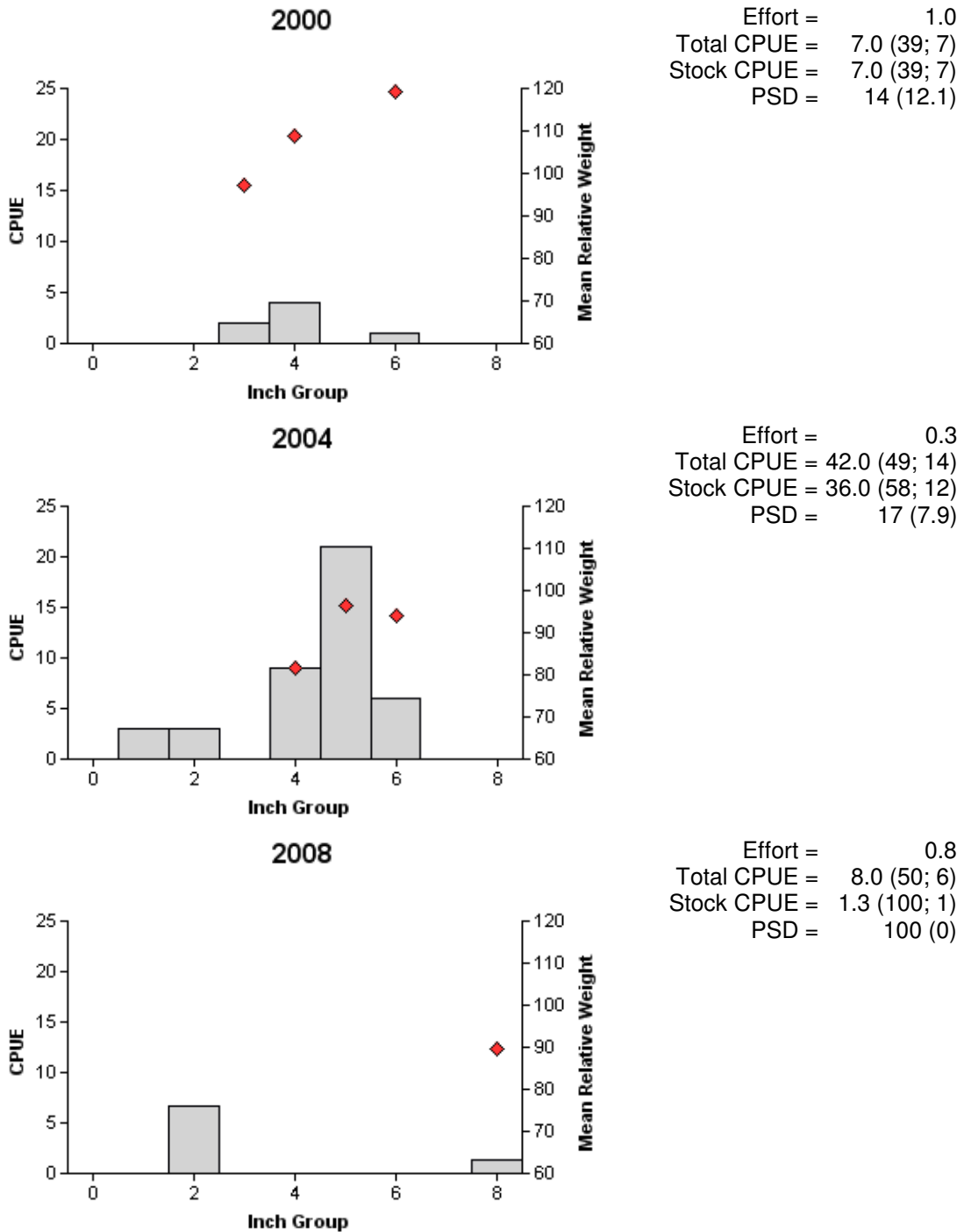
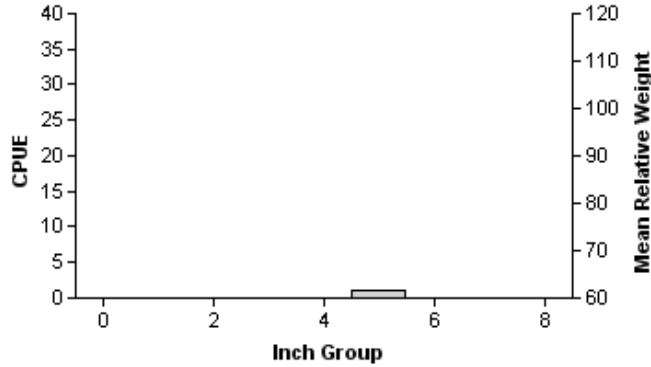


Figure 1. Number of bluegill caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sheldon Reservoir, Texas, 2000, 2004, and 2008. Effort in 2004 and 2008 was limited due to excessive vegetation. Four 5-minute stations were sampled in 2004 and nine 5-minute stations were sampled in 2008. The 2008 sample was conducted during daylight hours and stations were subjectively selected in both years.

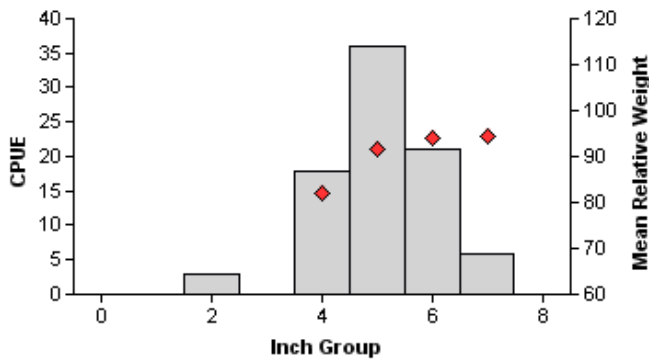
Redear Sunfish

2000



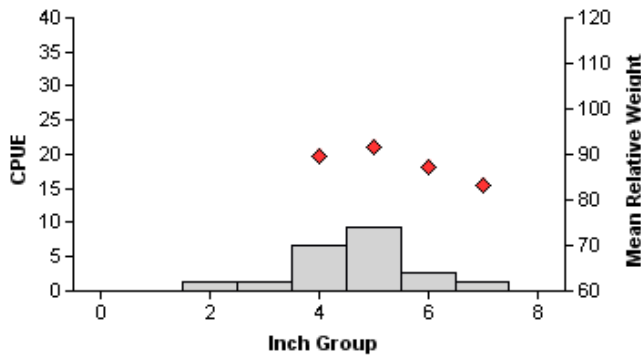
Effort = 1.0
 Total CPUE = 1.0 (100; 1)
 Stock CPUE = 1.0 (100; 1)
 PSD = 0 (104.5)

2004



Effort = 0.3
 Total CPUE = 84.0 (48; 28)
 Stock CPUE = 81.0 (51; 27)
 PSD = 7 (3.9)

2008

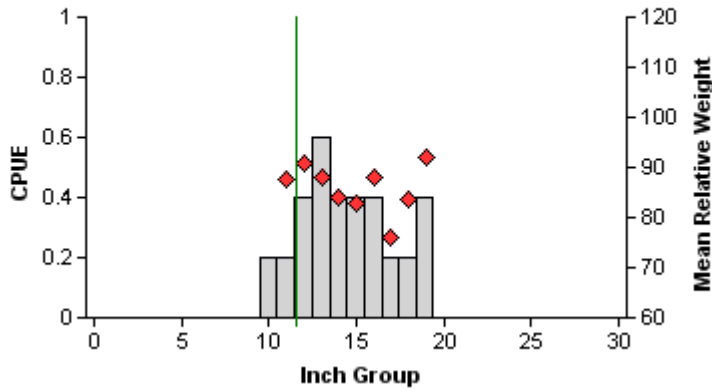


Effort = 0.8
 Total CPUE = 22.7 (50; 17)
 Stock CPUE = 20.0 (45; 15)
 PSD = 7 (7.2)

Figure 2. Number of redear sunfish caught per hour (CPUE, bars), mean relative (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sheldon Reservoir, Texas, 2000, 2004, and 2008. Effort in 2004 and 2008 was limited due to excessive vegetation. Four 5-minute stations were sampled in 2004 and nine 5-minute stations were sampled in 2008. The 2008 sample was conducted during daylight hours and stations were subjectively selected in both years.

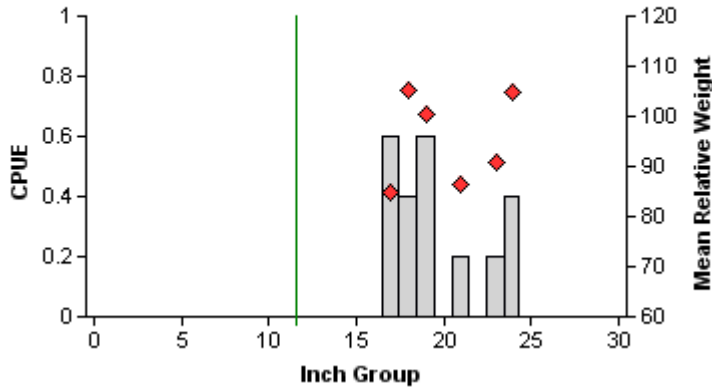
Channel Catfish

2001



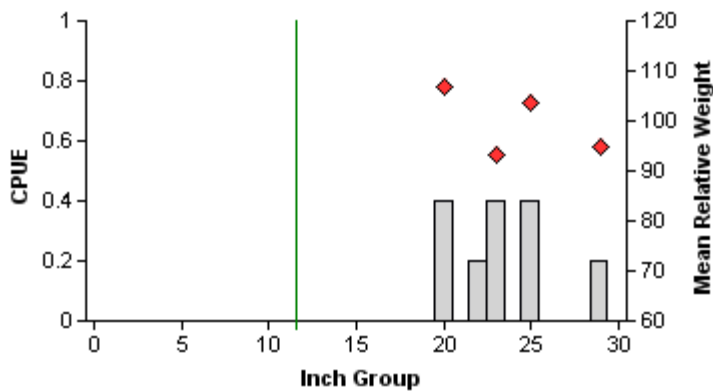
Effort = 5.0
 Total CPUE = 3.4 (38; 17)
 Stock CPUE = 3.2 (36; 16)
 PSD = 38 (14.3)
 RSD-12 = 94 (7.5)

2005



Effort = 5.0
 Total CPUE = 2.4 (43; 12)
 Stock CPUE = 2.4 (43; 12)
 PSD = 100 (0.0)
 RSD-12 = 100 (0)

2009



Effort = 5.0
 Total CPUE = 1.6 (70; 8)
 Stock CPUE = 1.6 (70; 8)
 PSD = 100 (0)
 RSD-12 = 100 (0)

Figure 3. 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, Sheldon Reservoir, Texas, 2001, 2005, and 2009. Vertical line indicates minimum length limit at time of survey.

Largemouth Bass

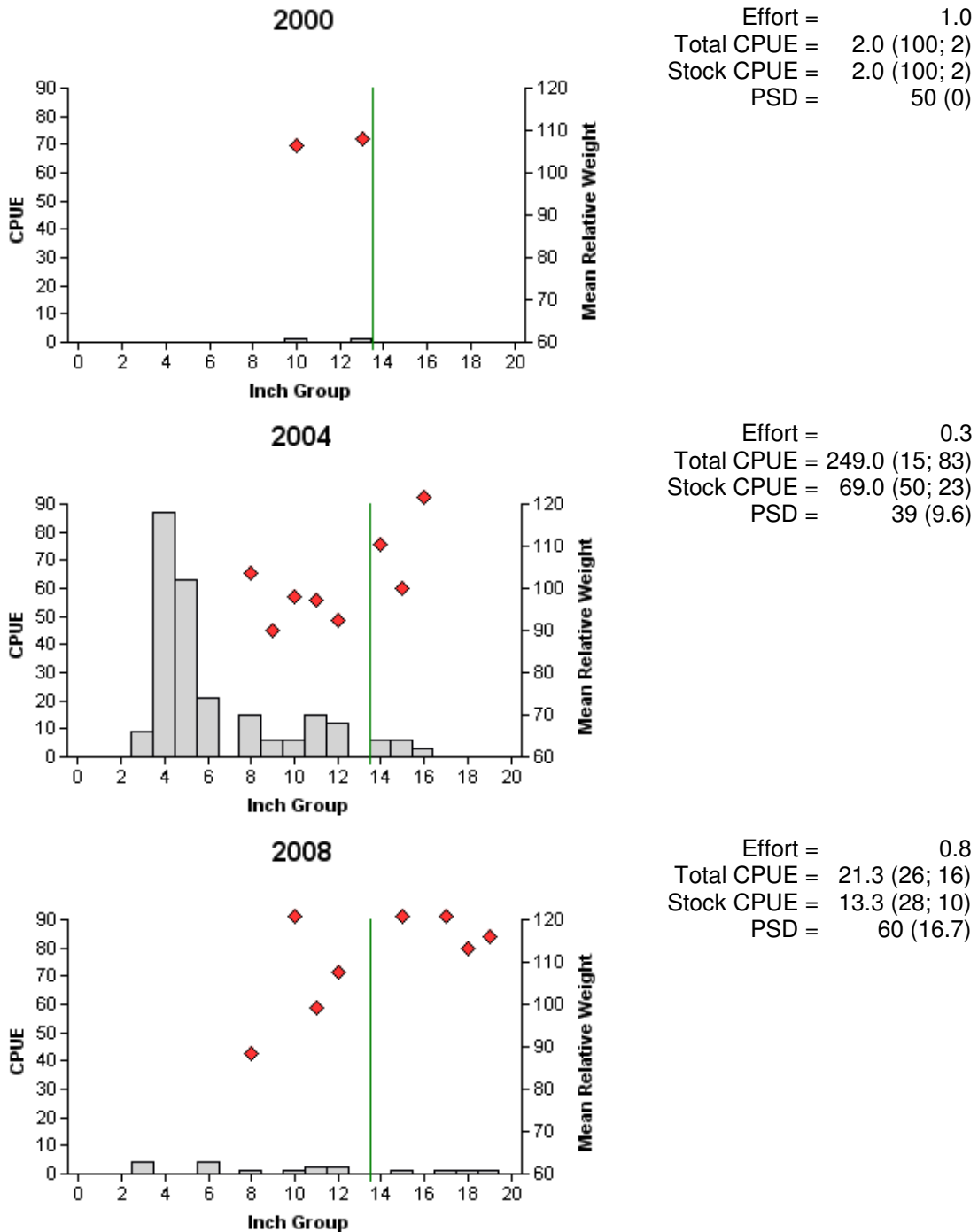


Figure 4. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sheldon Reservoir, Texas, 2000, 2004, and 2008. Effort in 2004 and 2008 was limited due to excessive vegetation. Four 5-minute stations were sampled in 2004 and nine 5-minute stations were sampled in 2008. The 2008 sample was conducted during daylight hours and stations were subjectively selected in both years. Vertical line indicates minimum length limit at time of survey.

Table 5. Results of genetic analysis of largemouth bass collected by fall electrofishing, Sheldon Reservoir, Texas, 1994, 1997, and 2004. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass, F1 = first generation hybrid between a FLMB and a NLMB, Fx = second or higher generation hybrid between a FLMB and a NLMB.

Year	Sample size	Genotype				% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	NLMB		
1994	9	2	2	4	1	55.6	22.2
1997	9	2	2	5	0	72.2	22.2
2004	50	8	11	31	0	65.0	16.0

Table 6. Proposed sampling schedule for Sheldon 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.

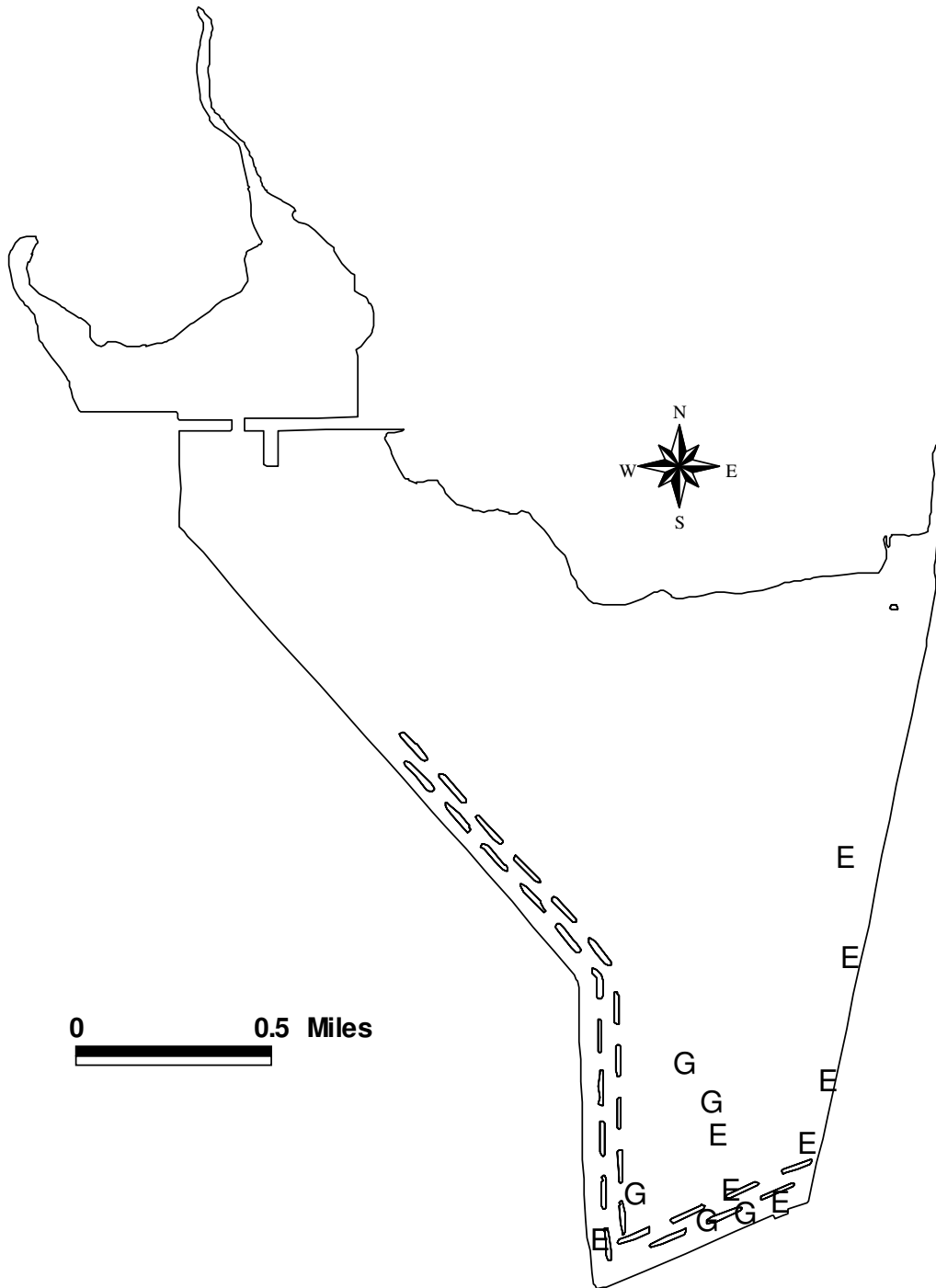
Survey Year	Electrofisher	Trap Net	Gill Net	Vegetation Survey	Report
Fall 2009-Spring 2010				A	
Fall 2010-Spring 2011				A	
Fall 2011-Spring 2012				A	
Fall 2012-Spring 2013	S	A	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Sheldon Reservoir, Texas, 2008-2009.

Species	Gill Netting		Electrofishing	
	N	CPUE	N	CPUE
Channel catfish	8	1.6		
Warmouth			2	2.7
Bluegill			6	8.0
Redear sunfish			17	22.7
Largemouth bass			16	21.3
Black crappie	2	0.4	1	1.3

APPENDIX B



Location of sampling sites, Sheldon Reservoir, Texas, 2008-2009. G and E indicate gill net and electrofishing stations, respectively. Water level was near full pool at time of sampling.