PERFORMANCE REPORT

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FEDERAL AID PROJECT F-30-R-30

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2004 Survey Report

Navarro Mills Reservoir

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EXECUTIVE SUMMARY

Navarro Mills Reservoir was surveyed during the period June 2004 to May 2005 using electrofishing, trap nets, gill nets, littoral zone habitat and vegetation surveys, and an angler access and facilities survey. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Navarro Mills Reservoir is a 4,336-acre reservoir on Richland Creek, a tributary of the Trinity River. It was constructed by the U.S. Army Corps of Engineers (USACOE) in 1963 to provide flood control and water for municipal and industrial purposes. The quality of vegetative aquatic habitat remains poor. Less than 2% of the reservoir area contains aquatic vegetation. Distribution of hydrilla has increased in recent years, but total coverage is still less than 0.5 surface acres. Hydrilla occurs mainly in the Liberty Hill Park area and could potentially cause problems at the boat ramp and swimming areas. The controlling authority has been notified of the potential problems associated with hydrilla infestation.

- **Prey species:** The predominant prey species in Navarro Mills Reservoir were gizzard and threadfin shad. Most gizzard shad in 2004 were less than six inches in length and provide appropriate sized prey for most predators. Electrofishing catch rate of gizzard shad was much lower in 2004 (133 fish/hour) compared to the 2000 and 1997 surveys (579 and 335 fish/hour, respectively). Centrarchid species (e.g., bluegill) were not abundant in surveys. This was due to high silt loads, high turbidity, and poor vegetative habitat in this reservoir. All of the sunfish collected were <5 inches and they likely contribute little to the reservoir's recreational fishery.

- **Catfishes:** The catch rate (CPUE) of channel catfish during spring gill netting was higher in 2005 than in previous surveys. Total CPUE was 10.0 fish/net night and CPUE of stock-size fish was 3.6 fish/net night. Channel catfish recruitment has been consistent in recent surveys and the condition of fish was good. Mean relative weight (Wr) for most inch groups was >90. No age and growth analysis was conducted for channel catfish, but previous surveys indicated that fish reached legal length (12 inches) between age 3 and age 5. Blue catfish were documented in the reservoir for the first time during the 2005 survey. There are no public reservoirs upstream of Navarro Mills Reservoir that have been stocked with blue catfish, but this species is present in the watershed. Only 4 fish were collected during the 2005 survey (0.8 fish/net night). With adequate prey availability, this species has the potential to do well in this system and provide recreational angling opportunities.

- **White bass:** The white bass population appears to be increasing in Navarro Mills Reservoir. The 2005 gill net survey produced 5.2 fish/net night; over three times higher than surveys conducted in 2001. Fish of legal size (>10 inches) were abundant and comparable to other quality white bass populations (i.e., Cedar Creek Reservoir and Richland Chambers Reservoir). Despite low body condition (mean Wr <90 for many inch groups), growth rates

of white bass were good. Individual ages in a sub sample of 13 fish that were between 10.4 and 11.8 were all age 1. The increased white bass population in Navarro Mills Reservoir should improve angling opportunities. No palmetto bass were captured in 2005 surveys. This species, stocked throughout the 1970s, 1980s, and 1990s, failed to create a substantial sport fishery in the reservoir. Management efforts with palmetto bass were discontinued in 1998.

- **Black basses:** Improvements in the largemouth bass population documented in the 2000 electrofishing survey (Ott and Bister 2001) were not seen during the 2004 survey. Electrofishing CPUE was only 17 fish/hour, which is the lowest CPUE on record. Catch rate of stock-size fish (∃8 inches) was 14 fish/hour, which was also very low but similar to 1997 (14 fish/hour) and 1991 (17 fish/hour). The lack of aquatic vegetation, high silt load, and high turbidity are factors that limit largemouth bass recruitment in this reservoir. Florida largemouth bass were stocked in 2002 and 2003 to increase Florida largemouth bass alleles in the population. These fish were stocked to take advantage of improved habitat conditions observed during 2000 surveys (Ott and Bister 2001). No age and growth analysis was conducted during; however, previous surveys have indicated largemouth bass reach legal size (14 inches) between age 2 and age 3.

- **Crappie:** Fall trap netting in 2004 indicated a high quality white crappie population in Navarro Mills Reservoir. In 1997, 2000, and 2004 surveys, trap net catch rates of stock-size fish (∃5 inches) were 15.5, 14.4, and 32.0 fish/net night, respectively. Fish condition was good. Mean Wr values were >95 for most inch groups. Individual ages of a sub-sample of fish from 10.0 to 11.1 inches in length ranged from 1 to 3 with a mean age of 1.2 years. Approximately 43% of the fish sampled were longer than the minimum legal length (10 inches). Few fish were collected below 5 inches, and this may be an indication of a weak 2003 year class. However, a similar situation was seen in 1994 (Ott and Storey 1995) that did not have any lasting impact to this population. Variable year-class strength is common in crappie populations and should not be a concern at this reservoir.

- **Management strategies:** Based on current information, no changes in the Navarro Mills Reservoir fishing regulations are recommended. The reservoir's lack of aquatic vegetation continues to limit centrarchid populations. Any plan to improve the aquatic vegetation through introduction of desirable aquatic plants, would be difficult to accomplish due to high turbidity levels. Therefore, any improvements would have to occur naturally and likely at a slow rate. During 2008, electrophoresis should be conducted on age-0 largemouth bass to determine if the 2002 and 2003 Florida largemouth bass stockings had any positive effect on population genetics. If the percentage of Florida largemouth bass genetic influence is still below target levels, and aquatic vegetation abundance has improved, additional stocking should be recommended. The quality of the catfish, crappie, and white bass populations should provide excellent angling opportunities and should be publicized to increase utilization of these fisheries.

INTRODUCTION

This document is a summary of fisheries data collected from Navarro Mills Reservoir in 2004 and 2005. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other fishes was collected, this report deals primarily with major sport fishes and important prey species. Management strategies are included to address existing problems or opportunities.

Fish harvest regulations at Navarro Mills Reservoir in 2004-2005.

Species	Bag limit	Minimum length (inches)
Bass, largemouth	5	14
Bass, striped, its hybrids (palmetto bass) and subspecies	5	18
Bass, white	25	10
Catfish, blue and channel	25 (in combination)	12
Catfish, flathead	5	18
Crappie, black and white	25 (in combination)	10

METHODS

- Fishes were collected by electrofishing in fall (1 hour at 12, 5-minute stations), trap netting in fall (one net-night each at 5 stations), and gill netting in spring (one net-night each at 5 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour of actual electrofishing, and for gill and trap nets, as the number of fish caught in one net set overnight. Largemouth bass electrophoresis samples were collected in accordance with Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2004).

- Sampling statistics (CPUE for various length categories) and structural indices (proportional stock density [PSD], relative stock density [RSD], and relative weight [Wr]) were calculated for target fishes, when appropriate, according to Anderson and Neumann (1996).

- Ages were determined for white bass and white crappie using otoliths. Category 2 age and

growth analysis was conducted to calculate the average age at legal size for each species in accordance with the Texas Parks and Wildlife Department Inland Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2004).

- Aquatic vegetation and angler access and facility surveys were conducted in accordance with the Texas Parks and Wildlife Department Inland Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2004).

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.

Ott, R. A., Jr., and T. J. Bister. 2001. Statewide freshwater fisheries monitoring and management program survey report for: Navarro Mills Reservoir, 2000. Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Grant F-30-R, Performance Report. 22 pp.

Ott, R. A., Jr., and K. W. Storey. 1995. Statewide freshwater fisheries monitoring and management program survey report for: Navarro Mills Reservoir, 1994. Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Grant F-30-R, Performance Report. 38 pp.

Physical and historical data for Navarro Mills Reservoir, Texas, 2004.

Inland Fisheries water body code:		0525
IF District:		3-C, Tyler
Controlling authority:		U.S. Army Corps of Engineers
Area:		4,336 acres
Counties:		Navarro
Latitude:		31° 43'
Longitude:		96° 53'
Nearest major metropolitan area and distance:		Waco – 39 miles
Reservoir description:		Flood control
River system:		Trinity
Shoreline length (mi):		38
Mean depth:		11.0
Maximum depth (ft):		49.0
Shoreline development ratio:		3.8
Watershed drainage area (mi^2):		350
Secchi disc range (ft):		<1
Conductivity (µmhos/cm):		365
Constructed:		1963
Access:	Boat public:	Good – 6 ramps
	Bank:	Adequate – 4 areas
	Handicap	Good – all areas have ADA access

Survey History:

Method	Year
Gillnet	1978, 1987, 1989, 1991, 1994, 1997, 2001, 2005
Electrofishing	1978, 1987, 1989, 1991, 1994, 1997, 2000, 2004
Trap net	1987, 1989, 1991, 1994, 1997, 2000, 2004
Habitat survey	1994, 1997
Vegetation survey	1997, 2000, 2004

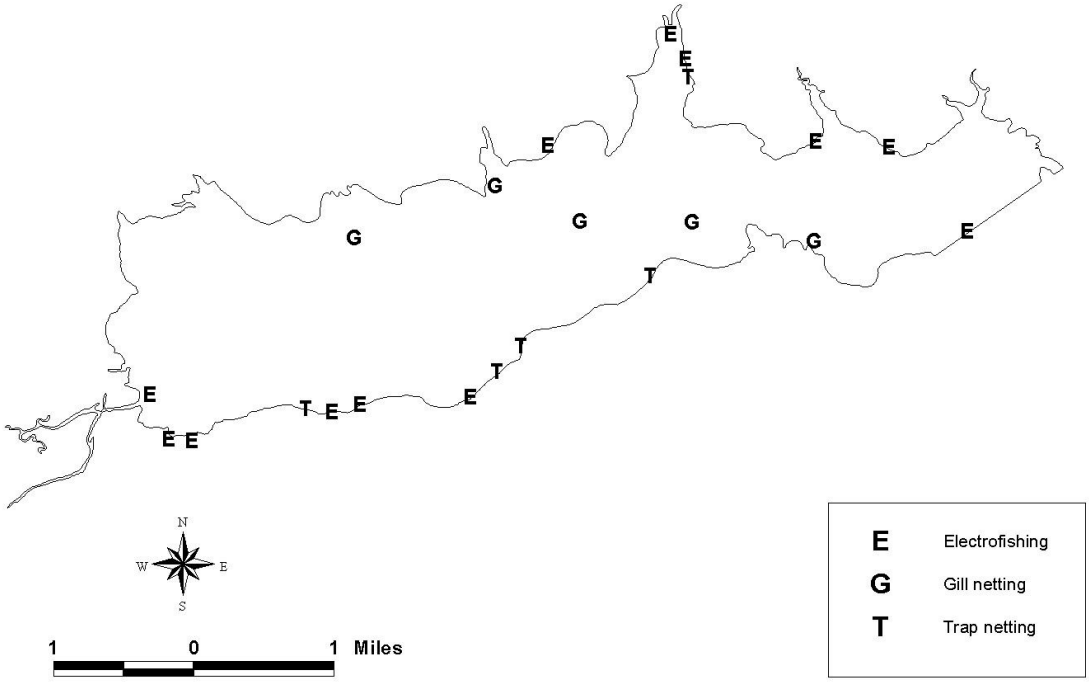
Summary of aquatic vegetation survey, Navarro Mills Reservoir, Texas, 9/20/2004. Lake elevation was 0.5 feet below conservation pool elevation. Total surface area = 4,336 acres.

Vegetation type	Species	Acreage	Percent of total
Native emergent	Water willow	12.9	<1
	American lotus	34.4	<1
Native submersed	Pondweed	8.2	<1
	Coontail	0.5	<1
Non-native/invasive[1]	Hydrilla	0.4	<1

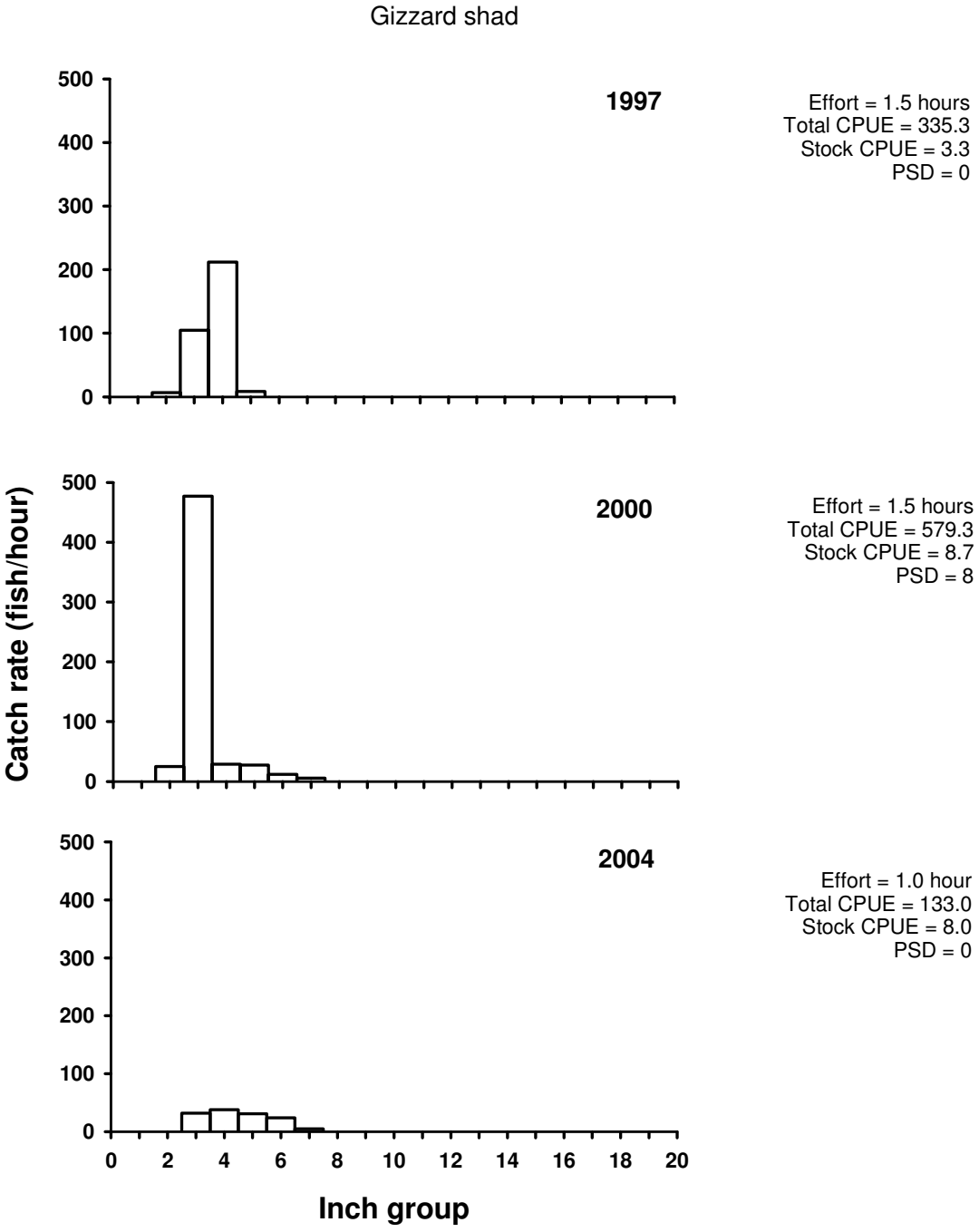
[1] Marine naiad was not documented during this survey. However, trace amounts were seen during the 2000 survey.

Stocking history of Navarro Mills Reservoir, Texas.

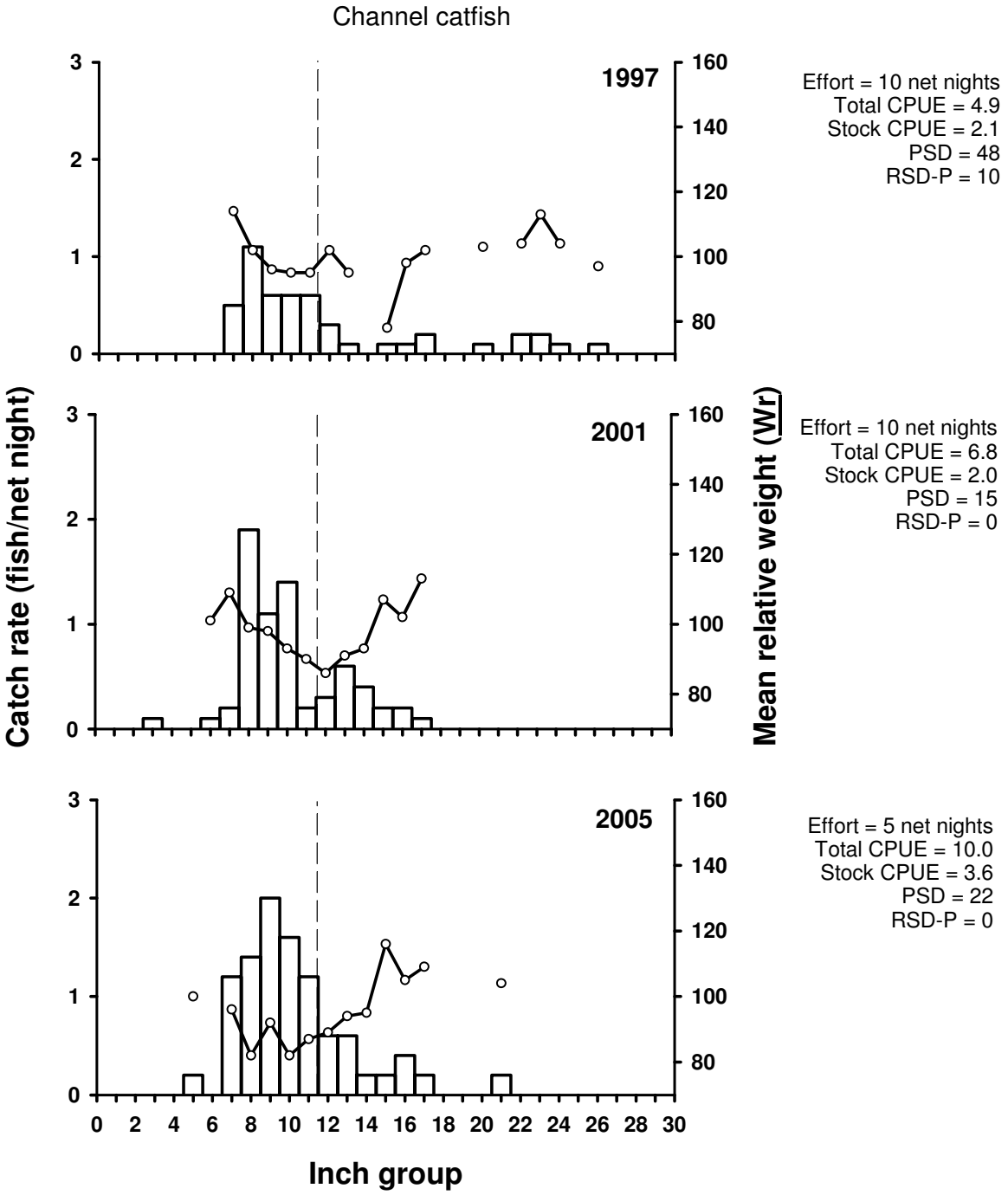
Species	Year		Number	Size
Channel catfish	1984		50,600	Fingerling
	1985		9,680	Fingerling
	1986		50,814	Fingerling
		Total	111,094	
Flathead catfish	1968		500	
		Total	500	
Striped bass	1967		400,000	Fry
	1968		176,500	Fry
	1969		31,900	Fingerling
	1970		32,880	Fingerling
	1971		21,000	Fingerling
		Total	662,280	
Palmetto bass	1975		51,748	
	1979		52,750	
	1982		50,945	
	1984		127,252	Fingerling
	1986		75,050	Fingerling
	1991		76,468	Fingerling
	1992		41,240	Fingerling
	1994		77,400	Fingerling
	1995		107,415	Fingerling
	1996		77,845	Fingerling
	1997		76,569	Fingerling
	1998		82,546	Fingerling
		Total	897,228	
Florida largemouth bass	1976		266,000	Fingerling
	1990		232,037	Fry
			17,482	Fingerling
	1995		253,996	Fingerling
	1998		49,973	Fingerling
	2002		218,491	Fingerling
	2003		218,684	Fingerling
		Total	1,256,663	



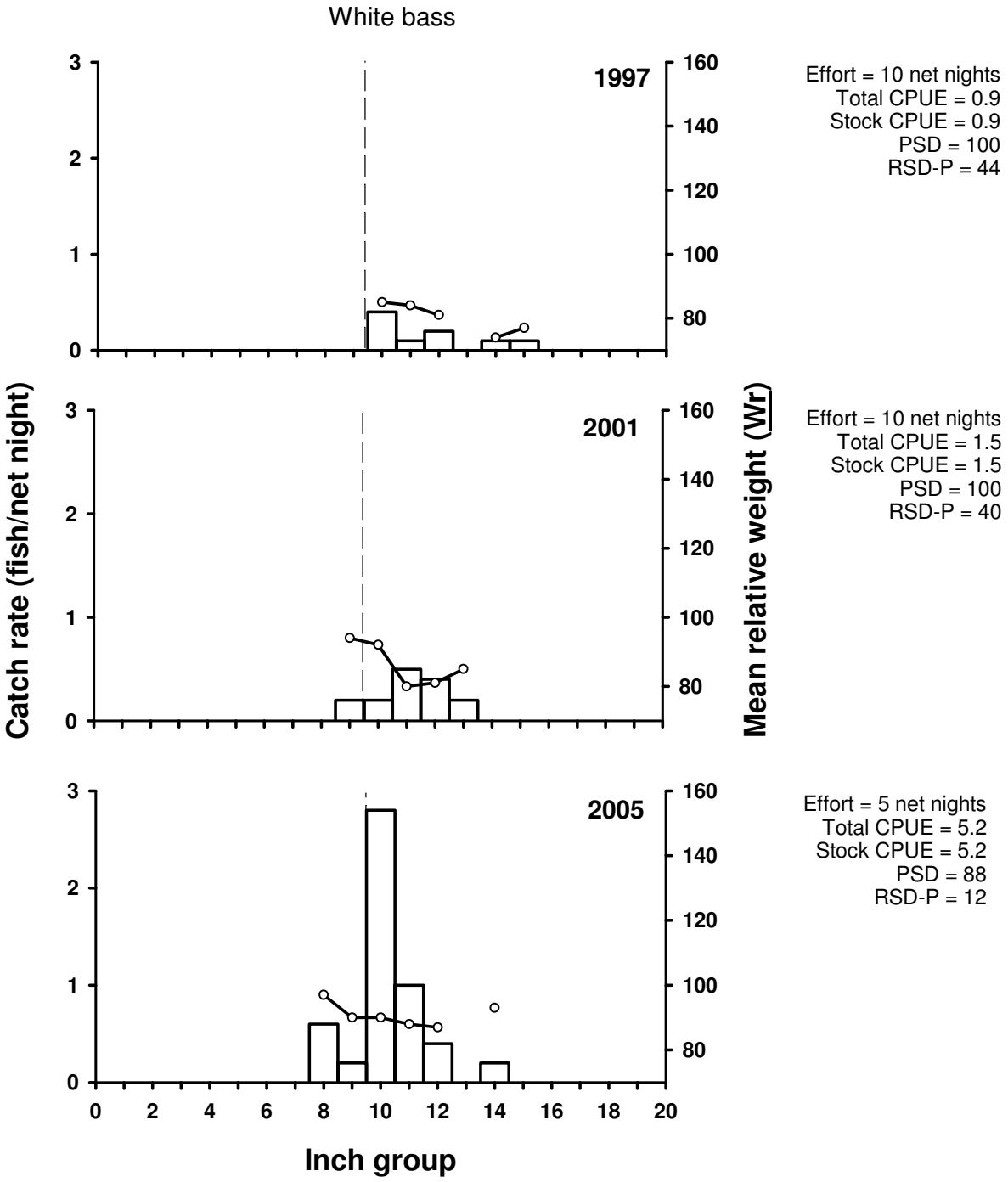
Location of fish community sampling locations, Navarro Mills Reservoir, Texas, 2004-2005. Legend indicates sampling gears.



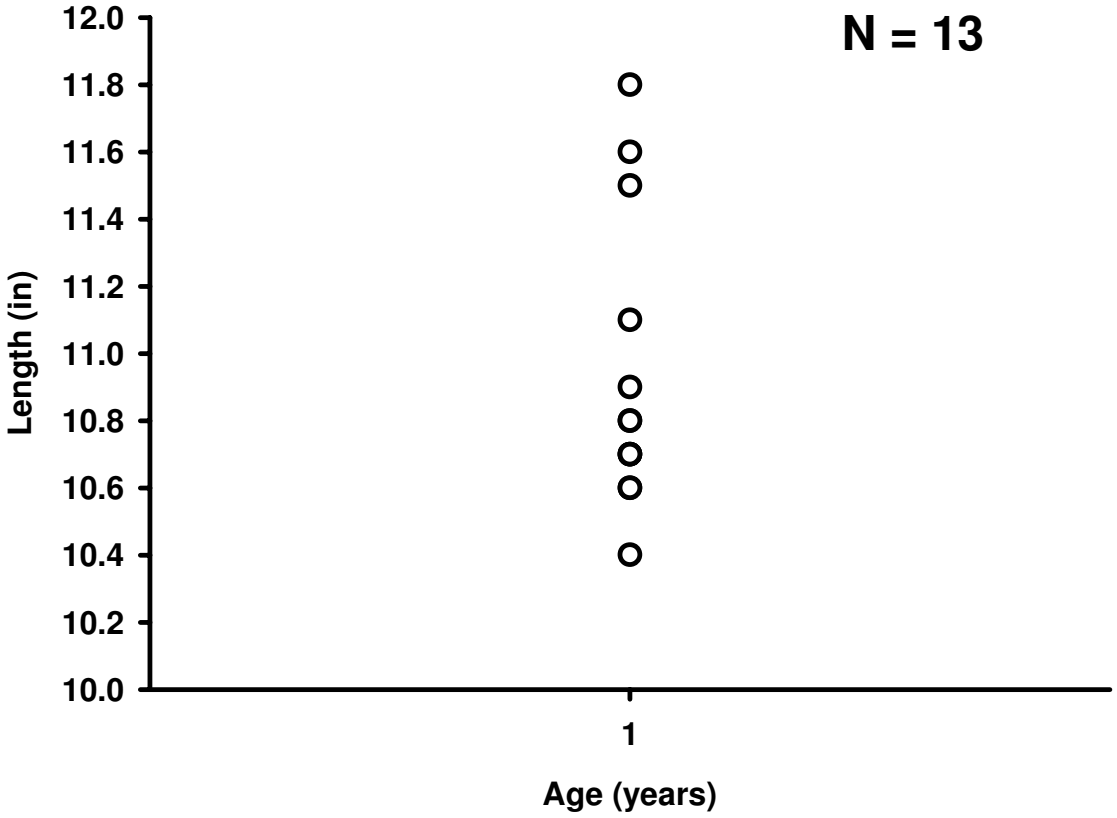
The number of gizzard shad caught per hour (CPUE, bars) and population indices for fall electrofishing surveys, Navarro Mills Reservoir, Texas.



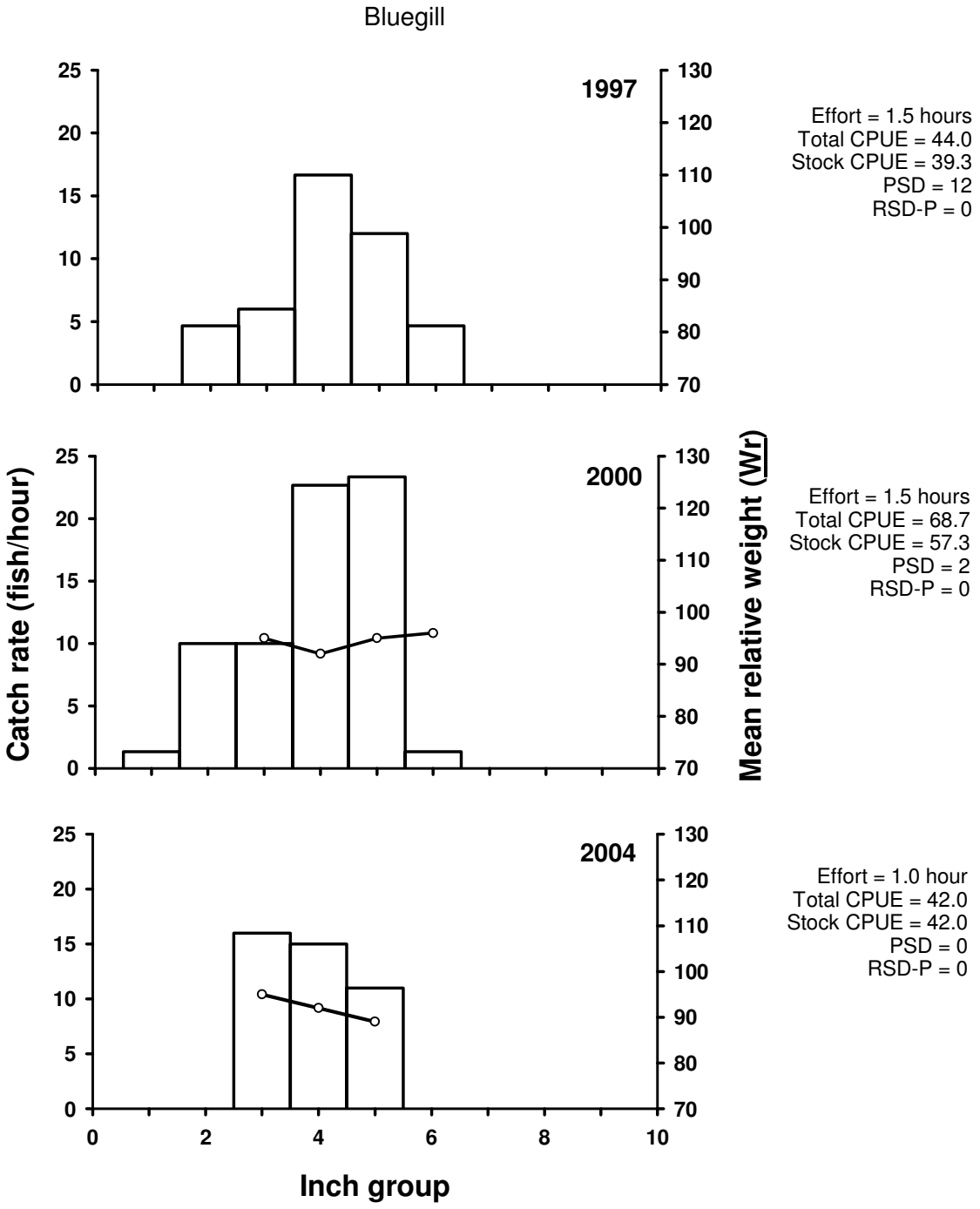
The number of channel catfish caught per net night (CPUE, bars), mean relative weight (lines), and population indices for spring gill net surveys, Navarro Mills Reservoir, Texas. Vertical dashed lines indicate minimum legal length.



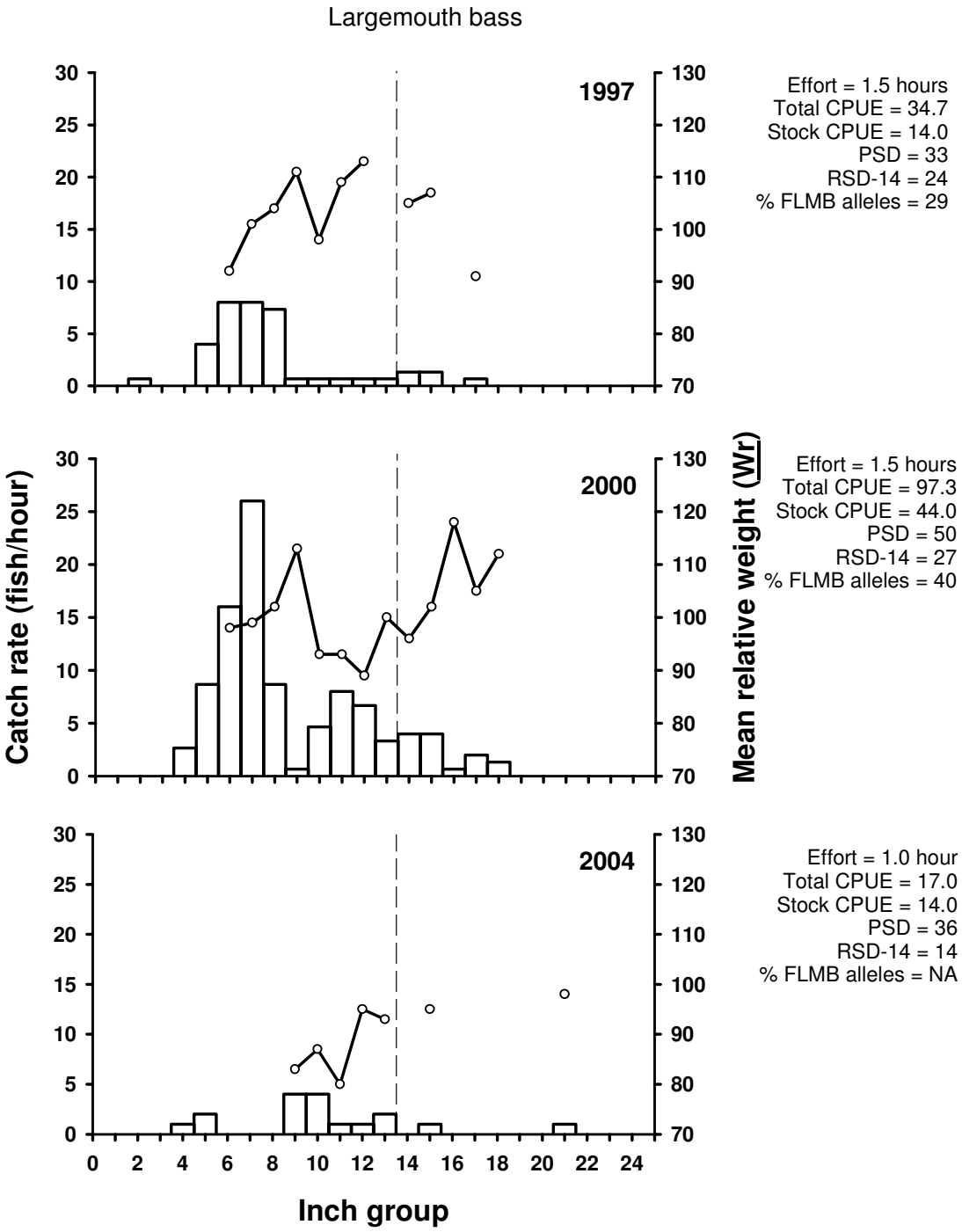
The number of white bass caught per net night (CPUE, bars), mean relative weight (lines), and population indices for spring gill net surveys, Navarro Mills Reservoir, Texas. Vertical dashed lines indicate minimum legal length.



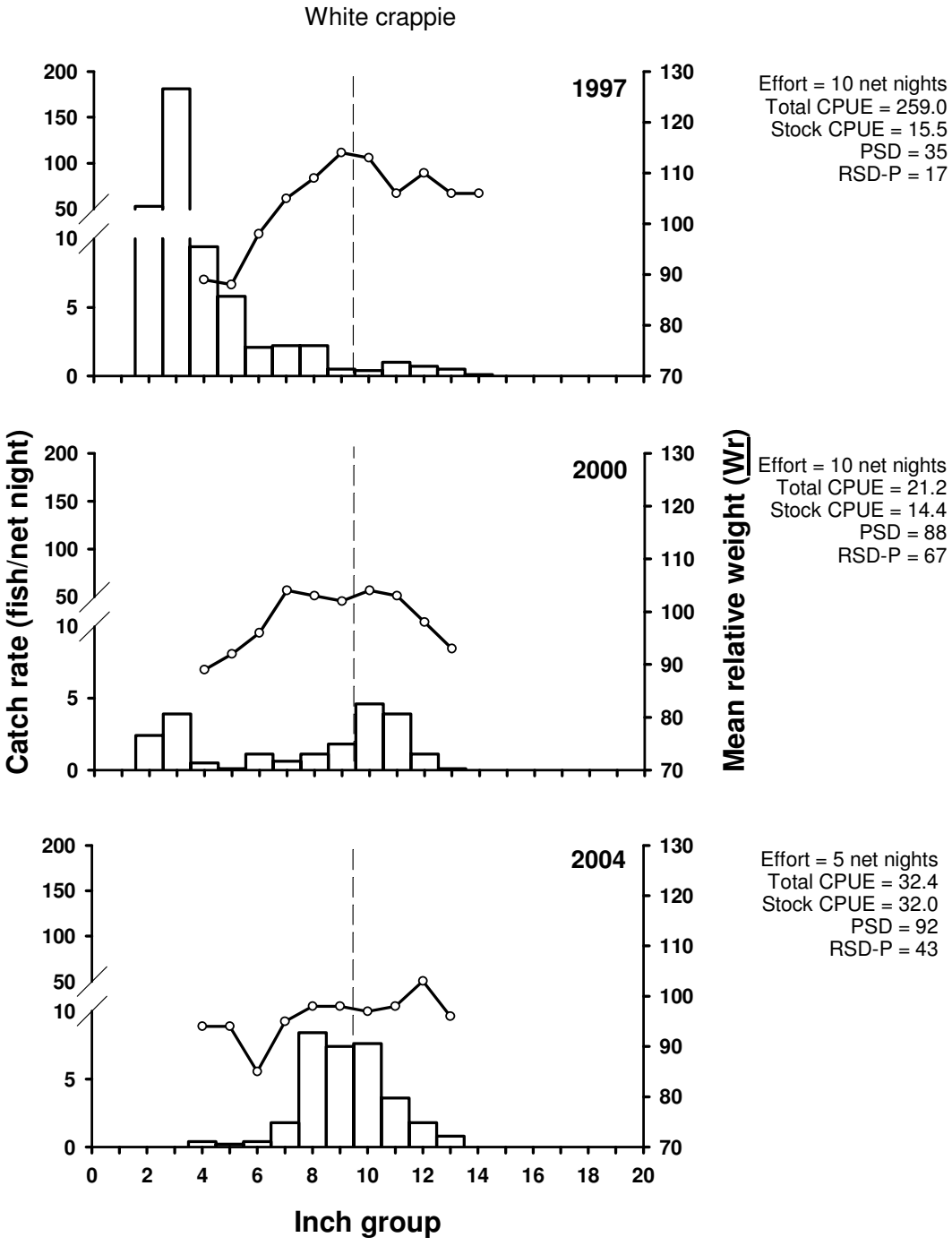
Length-at-age (inches) at time of capture for white bass within 1 inch above and below 10 inches (sexes combined); sub sample category 2, collected by spring gill netting, Navarro Mills Reservoir, Texas, March 2005.



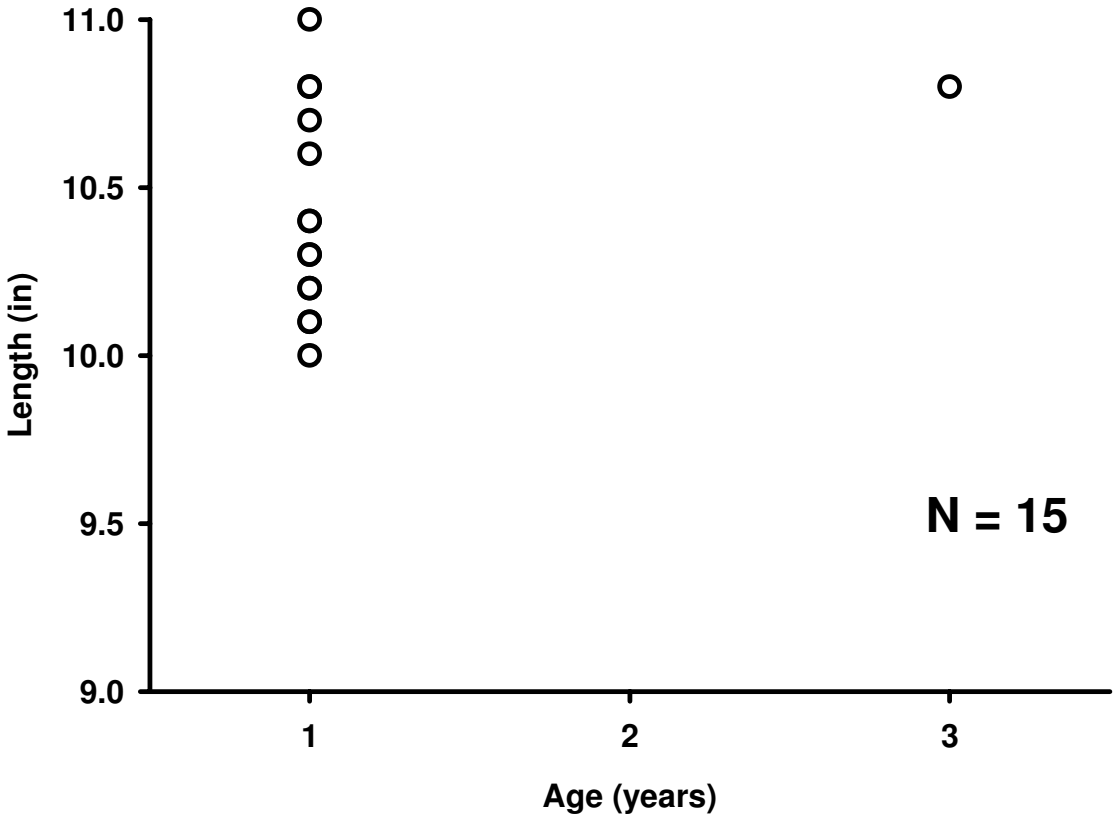
The number of bluegill caught per hour (CPUE, bars), mean relative weight (lines), and population indices for fall electrofishing surveys, Navarro Mills Reservoir, Texas.



The number of largemouth bass caught per hour (CPUE, bars), mean relative weight (lines), and population indices for fall electrofishing surveys, Navarro Mills Reservoir, Texas. Vertical dashed line indicates minimum length limit.



The number of white crappie caught per net night (CPUE, bars), mean relative weight (lines), and population indices for fall trap netting surveys, Navarro Mills Reservoir, Texas. Vertical dashed line indicates minimum length limit.



Length-at-age (inches) at time of capture for white crappie within 1 inch above and below 10 inches (sexes combined); sub sample category 2, collected by fall trap netting, Navarro Mills Reservoir, Texas, November 2004.

Fisheries Management Plan
Navarro Mills Reservoir

Prepared July 2005

ISSUE 1 During the 2004 aquatic vegetation survey, hydrilla was encountered in the Liberty Hill Park area of the reservoir. Hydrilla has the potential to become problematic, especially at access areas (e.g., boat ramps, fishing piers, swimming areas). The Army Corps of Engineers was notified of the presence of hydrilla and treatment was recommended. At this time, there has not been an Integrated Pest Management Plan developed by the controlling authority.

MANAGEMENT STRATEGIES

1. Make efforts to quantify hydrilla abundance in 2008, or sooner if the situation dictates.
2. Provide technical assistance regarding the control of hydrilla to the controlling authority, as necessary.

ISSUE 2 Florida largemouth bass fingerlings were stocked in 2002 and 2003 to take advantage of the improvements in habitat observed during 2000 surveys. Unfortunately, these improvements have not persisted. Electrofishing catch rates in 2004 were too low to conduct electrophoretic analysis to determine the effectiveness of the 2002 and 2003 stockings.

MANAGEMENT STRATEGIES

1. Collect adequate sample size of age-0 largemouth bass during 2008 electrofishing to conduct electrophoresis.
2. Recommend additional stocking if allele frequency is below target levels and if centrarchid habitat has improved.

ISSUE 3 Navarro Mills Reservoir provides excellent angling opportunities for a variety of sport fish species (i.e., catfish, crappie, and white bass). Additional efforts to promote these fisheries are needed. Also, anglers have reported difficulty in remembering fishing regulations in effect on this reservoir.

MANAGEMENT STRATEGIES

1. Promote these fisheries through local media sources. Write press releases and give public presentations aimed at increasing angler awareness of fishing opportunities on this reservoir.
2. Provide lake-specific regulation posters to vendors of angling-oriented businesses serving the Navarro Mills Reservoir vicinity.
3. Maintain regulation signs previously mounted at public and private boat ramps on Navarro Mills Reservoir.

ISSUE 4 Blue catfish were collected for the first time during 2005 gill net surveys. This species has not been stocked in this reservoir or in any public water bodies upstream. Blue catfish are present elsewhere in the watershed, and likely have been naturally introduced to Navarro Mills Reservoir. With adequate prey availability, this species has the potential to provide a quality recreational fishery.

MANAGEMENT STRATEGIES

1. Monitor the abundance of blue catfish during 2009 gill netting.
2. Promote this fishery if it becomes substantial.

Appendix 1

Number and catch rate (CPUE) of species collected by all gear types from Navarro Mills Reservoir, Texas, 2004 and 2005.

	Gill netting (5 net nights)		Trap netting (5 net nights)		Electrofishing (1 hours)	
Species	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					133	133.0
Threadfin shad					20	20.0
Blue catfish	4	0.8				
Channel catfish	50	10.0				
White bass	26	5.2				
Warmouth					2	2.0
Bluegill					42	42.0
Longear sunfish					15	15.0
Largemouth bass					17	17.0
White crappie			162	32.4		

Appendix 2

Results of electrophoretic analysis of largemouth bass collected by electrofishing from Navarro Mills Reservoir, Texas, 1987, 1994, 1997, and 2000.

Year	Sample size	Genotype				% Florida largemouth bass alleles	% pure Florida largemouth bass
		Florida	F1	FX	Northern		
1987	28	0	3	2	23	9.8	0.0
1994	30	0	0	8	22	15.0	0.0
1997	14	1	2	4	7	28.6	7.1
2000	30	4	6	10	10	40.0	13.3

Appendix 3

Angler access and facilities, Navarro Mills Reservoir, Texas, August 2004.

Name	GPS coordinates	Fee charged	# of lanes	Accommodations for challenged	Bank fishing	Comments
Liberty Hill Park Boat ramp #1	N 31 56' 46.162" W 96 42' 36.956"	Y	4	Y	Y	
Liberty Hill Park Boat ramp #2	N 31 57' 05.446" W 96 43' 12.947"	Y	2	Y	Y	
Liberty Hill Park Fishing Pier	N 31 56' 57.211" W 96 42' 50.357"	Y	NA	Y	Y	
Brushy Prairie Park Boat ramp	N 31 58' 06.341" W 96 43' 55.768"	N	2	Y	Y	
Wolf Creek Park Boat ramp	N 31 58' 07.172" W 96 43' 41.265"	Y	4	Y	Y	
Wolf Creek Park Fishing pier	N 31 57' 59.107" W 96 42' 56.652"	Y	NA	Y	Y	
Oak Park Boat ramp	N 31 57' 57.608" W 96 41' 48.078"	Y	4	Y	N	
Oak Park Fishing pier	N 31 58' 01.434" W 96 41' 54.165"	Y	NA	Y	Y	