299a

STATE OF FLORIDA

GAME AND FRESH WATER FISH COMMISSION

1991-1994

COMPLETION REPORT

SOUTH REGIONAL FISHERIES MANAGEMENT

Study Title: MEDARD PARK EVALUATION AND MANAGEMENT

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

STATE: Florida PROJECT NO.: 6210

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PROJECT TITLE: South Region Fisheries Management

PERIOD COVERED: 1 July 1991 through 30 June 1994

STUDY TITLE : Medard Park Evaluation and Management

STUDY OBJECTIVE: To develop and implement a management program directed to enhance fishing quality for all sportfish species.

ABSTRACT

Angler complaints prompted Hillsborough County officials to request the Florida Game and Fresh Water Fish Commission provide fish management assistance at Edward Medard Reservoir. Preliminary electrofishing surveys revealed largemouth bass (Micropterus salmoides) populations to be dominated by sub-quality-sized fish (less than 36 cm). Bluegill (Lepomis macrochirus) and redear sunfish (L. microlophus) Proportional Stock Density indices were low at 24 and 33, respectively. Angler surveys indicated total fishing effort was high. Angling catch rates for panfish species were good; however, success for bass was poor. Fish feeders and brushpile fish attractors installed to concentrate bream and increase angler success were marginally successful. A 356 to 457 mm slot-length-limit for largemouth bass with a reduced bag limit of four fish per day (only one could be longer than 457 mm) reduced bass harvest by 65%. A 1.5 m drawdown conducted during spring 1993 significantly affected fish community structure. By 1994, largemouth bass population size structure improved; however, relative importance of either the drawdown or size/harvest regulations could not be determined. Bluegill and redear sunfish populations did not improve. Fishing effort, total harvest, and success rates did not change from pre-management levels.

INTRODUCTION

Florida's rapidly growing population is putting increasing pressure on freshwater fishery resources. Edward Medard Reservoir is located near the densely-urbanized Tampa Bay area. Public freshwater fishing opportunities in this area are extremely limited and Medard Reservoir has received high public fishing pressure since its creation in 1970. Recently, angler's complaints to Hillsborough County officials prompted a request to the Florida Game and Fresh Water Fish Commission (GFC) for fish management assistance.

Redmond (1986) documented that high exploitation rates of largemouth bass (Micropterus salmoides) in large impoundments can result from high angling effort. This can lead to an unbalanced population of predominantly small-sized bass. Anderson (1975) determined that largemouth bass populations can influence the balance of fish communities and fishing quality of other sportfish such as bluegill (Lepomis macrochirus) and redear sunfish (L. microlophus).

The use of catch-and-release regulations to reduce harvest and maintain fish community balance has increased during the past decade (Barnhart and Roelofs 1987). This approach was utilized successfully at Saddle Creek Park Fish Management Area near Lakeland. This fishery was heavily-exploited, and a slot length limit for largemouth bass improved bass population structure as well as angler success (Champeau et al. 1992). Preservation of previously unexploited, high-quality fisheries was accomplished at Tenoroc Fish Management Area utilizing special regulations that required catch-and-release of bass (Chapman et al. 1991).

The purpose of this study was to evaluate the fishery of Medard Reservoir, and to develop and implement a fish management plan. Our primary objective was to enhance fishing quality for all sportfish species.

STUDY AREA

Edward Medard Reservoir (formerly Pleasant Grove Reservoir) is a 312-ha reclaimed phosphate pit located in southeastern Hillsborough County near the small community of Turkey Creek. Originally owned and mined by American Cyanamid, Medard Reservoir was donated to the Southwest Florida Water Management District (SWFWMD) in 1969. Reclamation of the reservoir was completed in 1970 with the installation of a dam and control structure. Water levels fluctuated from 38.0 to 62.1 fmsl (feet above mean sea level) between 1971 and 1992; however, the lake is currently managed under a narrow range of fluctuation. Replacement of the dam in 1977 resulted in the only major drawdown of the reservoir.

Medard Reservoir is one of the largest freshwater bodies in Hillsborough County (Kelly 1991). The Little Alafia River, a tributary of the Alafia River, enters and exits the reservoir. The design of the reservoir consists of an irregular shoreline with coves and points, steep slopes, a bottom contour with deep holes, numerous sandbars and numerous islands (Figure 1). A narrow littoral shelf supports a low abundance of emergent macrophytes. Boody and coworkers (1985) evaluation of water quality, secondary production, and fisheries determined that Medard Reservoir was an extremely productive system. Medard Reservoir provides an environment capable of sustaining a good sportfishery.

MATERIALS AND METHODS

Fish population and angler data were documented to determine the status of the fishery, develop management plans, and evaluate effects of management strategies. Largemouth bass and bream (bluegill and redear sunfish) population structures were evaluated using electrofishing from spring 1991

through spring 1994. Sampling conducted during 1991 was done to determine baseline conditions. A standardized electrofishing regime was developed to evaluate management techniques from 1992 through 1994. Fish were sampled along six shoreline transects (Figure 1). Samples were 15 minutes (pedal time) in duration and all transects were sampled five times over a three week period. Population structures of bass, bluegill, and redear sunfish were evaluated using length-frequency distributions and Proportional and Relative Stock Density indices (PSD and RSD, respectively). Efforts to estimate largemouth bass population densities provided unreliable results and were discontinued. Condition of largemouth bass body composition was evaluated using the Relative Weight index (W_r). Comparison of length-frequency distributions and W_r indices were made using the nonparametric, Kolmogorov-Smirnov two-sample test.

Anglers were interviewed utilizing a stratified random survey conducted during fall 1991, 1992 and during spring 1992, 1994. No surveys were conducted during 1993, due to low water, poor access and insufficient manpower. Duration of survey seasons varied between 10 to 12 weeks (five to six 2-week periods). Anglers were interviewed during three week days and two weekend days randomly-selected for each 2-week period. Days were divided into three 4-hour segments; morning (four hours following sunrise), mid-day (two hours prior and two hours after midday) and afternoon (four hours prior to sunset). An instantaneous count of all anglers was conducted halfway through each survey.

Data gathered from anglers consisted of: domicile, species fished for, species and number of fish harvested and released, and size of bass released.

Lengths of harvested bass and bluegill were measured. Opinions about specific aspects of the management program were also documented.

Results from 1991 fish population and angler surveys were utilized to develop a fish management program that was designed to improve bass population structure, fish community balance, and angling success for panfish. Special regulations were developed to reduce bass harvest and improve size structures and community balance. A 356-457 mm slot-length-limit with a reduced daily bag limit of four largemouth bass (only one of the four could be >457 mm) was implemented 1 July 1992. Fish attractors (n = 2) made of tree brush and automatic fish feeders (n = 2) were installed by the foot bridge and dock in June 1992 to concentrate catfish and bream for bank anglers (Figure 1). Sunshine bass were stocked at 20 to 30 fingerlings per hectare during spring 1991 through 1994 to supplement the existing fishery.

The SWFWMD conducted a 1.5 m drawdown from April through August 1993 to repair the dam. The unplanned drawdown reduced public access to the reservoir forcing cancellation of the spring 1993 creel survey. Low water conditions provided an opportunity to transplant giant bulrush (Scirpus californicus) to exposed sandbars. Over 2,000 plants were planted on 20 selected sites, encompassing a total area of 1 ha. Once expanded, these sites will serve as living fish attractors in deep water areas (1.0 to 1.5 m). Coordination with the Florida Department of Environmental Protection provided funds needed for transplanting and also modification of the footbridge to allow barrier-free access. Fines assessed to IMC Corporation for environmental impact violations were used to fund these projects.

Efforts were made to inform and educate anglers about the special regulations and other aspects of the management plan. Signs were posted throughout the park. Brochures containing information on fishing regulations,

management techniques, fishing tips, and a diagram of the reservoir was developed and distributed. Adhesive rulers with information on largemouth bass slot and bag limit were also provided. News releases were sent out to various media sources during the first two years of the study to inform anglers of the regulation changes.

FINDINGS

The fish community supported by Medard Reservoir reflects the high productivity of the system. High reproduction and recruitment of largemouth bass are evidenced by length-frequency distributions (Figure 2). During the first two years of the study, 62% of the largemouth bass fishery was less than 36 cm in total length (Table 1, Figure 2). Mean W_r for bass below 53 cm in total length were below the expected standard of 100, indicating that forage fish availability for overabundant, smaller bass may be limited (Figure 3). During spring 1992, mean bass length at ages II, III, IV, and V were 226, 308, 370, and 414, respectively.

Largemouth bass size structure improved following implementation of management regulations and the 1993 drawdown. Figure 2 indicates modal lengths shifted from 35 cm in 1992 to 40 cm in 1994; however, overall length-frequency distributions were not significantly different ($P = 0.05$). Bass PSD were stable (71-78) during the study; however, RSD_{356} for quality-size bass nearly doubled and RSD_{457} tripled by 1994 (Table 1). Figure 4 shows that percentages of bass below, within, and above the slot limit were stable between 1991 and 1993, indicating that the regulation had no effect eight months after implementation. However, during the next year, significant

recruitment into the protective slot occurred. From 1993 to 1994, percent composition of bass below the slot decreased by 28% while percentages of bass within and above the limit increased by 18 and 60%, respectively (Figure 4).

No bass of trophy-size (63 cm) were collected during electrofishing surveys nor recorded during creel surveys. No change in electrofishing catch-per-unit-effort (CPUE) from 1992 through 1994 may indicate that while largemouth bass size structures improved, standing stock remained stable (Table 1). Between 1993 and 1994, mean W_r for bass greater than 32 cm in total length increased considerably, indicating that body condition improved during the same period that size structures shifted (Figure 3).

Bluegill and redear sunfish size structures did not improve to desired levels during the study period. PSD for bluegill were 24 in 1992 and 22 in 1994 and redear sunfish PSD were 33 and 32 during the same years. Increases in bluegill and redear sunfish PSD during spring 1993 reflect sampling error since 1993 panfish sampling was conducted during the drawdown. Low water conditions altered electrofishing conditions as vegetated habitats were dewatered and did not concentrate small bream. It is possible, however, that small bream were preyed on heavily by bass during the drawdown resulting in higher PSD estimates.

Total angling effort at the reservoir was high throughout the study (432 to 637 hr/ha/yr) with most effort directed toward black crappie (Pomoxis nigromaculatus) and catfish (Ictalurus spp., Table 2). Total harvest was also high ranging from 292 to 542 fish/ha/year with bluegill and black crappie predominant. Success rates for panfish and catfish were good (Table 2). Sunshine bass were targeted by a fair number of anglers that experienced good success as harvest rates approached stocking rates (Table 2). Most sunshine bass harvested are Age-I that averaged 27 cm in total length. Reports have

been made of 3 kg sunshines being caught. Effort for sunshine bass may increase with time since only 44% of all anglers were aware of their existence (Table 3). The majority of anglers (55 to 66%) felt that fishing quality was fair to excellent throughout the study period (Table 3).

Effort for largemouth bass dropped in half after special regulations went into effect; however, this decrease was not indicated by opinion data. The majority of bass anglers both were aware of and supported the slot limit (Table 3). Few anglers stated that they would fish less because of the regulation changes (Table 3). Success rates for bass were relatively stable during the study ranging from 0.16 to 0.27 fish/hour. Bass harvest dropped from 26 fish/ha/year to 4 fish/ha/year after regulations were imposed. Voluntary release rates of bass below the slot limit were high (73 to 84%) before and after the regulation (Table 4). Noncompliance to the slot limit (= number slot bass harvested/slot bass catch) was 15% (Table 4). Catch of bass greater than 45.7 cm in length did not increase during the study and most of these bass were harvested.

Most anglers are not aware of the presence nor function of brush-type fish attractor or fish feeders (Table 3). Of those anglers aware of attractors/feeders, few felt that they enhanced their fishing success.

DISCUSSION AND CONCLUSIONS

Medard Reservoir is capable of supporting an excellent fishery; however, decades of high fishing pressure has affected fishing quality. The largemouth bass fishery was fair, with small bass predominant and quality-sized bass low in abundance. Angling success for bass barely reached levels considered minimal for quality fisheries. It may be for this reason that effort at Medard Reservoir is distributed over panfish and catfish with less effort

directed toward bass. The exploited bass population structure has resulted in insufficient predation on bluegill, leading to overpopulation and stunting of this species. Population unbalance along with high fertility of the reservoir provided strong justification for a slot length limit. A similar regulation implemented at Saddle Creek Park Fish Management Area improved bass population structure, angler success, and angler's rating of fishing quality (Champeau et al. 1992). Two years following implementation at Medard, the slot length limit has had a very positive effect on the largemouth bass population.

High recruitment of sub-quality-sized bass into protected lengths occurred during a period of low water. Drawdowns often cause an improvement in largemouth bass growth and condition by crowding both predator and prey into reduced area increasing the availability of forage for largemouth bass (Keith 1975). Increases in bass W_r and composition of bass within and above the slot limit provide strong evidence that prey crowding during the drawdown was the principal factor in bass population improvements. Having a protective regulation in place will help preserve population structure by reducing harvest of quality-sized bass. The drawdown provided habitat improvements (expanded desirable macrophytes and consolidated benthic substrates) that may result in future fishery improvements. Transplanted bulrush will expand over the next few years to provide excellent structure, thereby enhancing angling success. Repeating drawdowns of Medard Reservoir will aid bulrush expansion, increase bass growth and recruitment, and facilitate fish management objectives.

The effectiveness of the slot limit is dependent on angler harvest of sub-slot-sized largemouth bass. Currently, voluntary release of small bass is high, and this can compromise the effectiveness of the regulation (Eder 1984). Education of anglers is required, since management objectives at Medard

contradict statewide bass size limits where all bass less than 35.6 mm must be released. Furthermore, voluntary release of small bass by Florida anglers has been prevalent even prior to current statewide requirements (Champeau and Thomas 1991). Effectiveness of slot limit regulations is dependent on changing angler's mindset in special management programs such as Medard Reservoir.

Growth of bass into and beyond the slot limit improved bass size structure. Limited harvest of bass greater than 45.7 cm in length is designed to enable growth of large bass to be maintained into trophy-size. The slot limit imposed at Saddle Creek Park resulted in increased abundance of slot-sized bass; however, W_r decreased, and the abundance of trophy-sized bass (>63 cm) decreased (Champeau et al. 1992). Protective regulations that require catch-and-release will only produce trophy-size bass if adequate growth rates can be maintained. This objective is achievable at Medard where high fertility, capability to crowd forage, and limited harvest of the stock can be managed simultaneously.

Improved bream populations have been documented following improvement of largemouth bass populations on water bodies with slot-length-limits (Champeau et al. 1991, Eder 1984, Guy and Willis 1990). This was not indicated during this three-year study. Further evaluation is required to determine bluegill population dynamics in relation to predation by the improved bass population and drawdown effects.

The management program did not influence total angler effort, although bass effort decreased. Bass anglers supported regulation changes and compliance was good. Harvest of sunshine bass was high and popularity should increase as more anglers become aware of successful angling methods. Black crappie and catfish were most popular. Public concern about catfish

overharvest, and commercial fishing in particular, became a major issue. However, commercial harvest by castnet, trotline, or angling was limited at Medard. Recreational catfish harvest did not decline during this three-year study, and it is unlikely the catfish fishery is being overexploited. Additional data need to be collected to confirm this assumption, however. Little data was collected that evaluated black crappie, one of the most popular species at Medard. Another study need concerns the effects of angling harvest, drawdown, and sunshine bass stocking on the black crappie population at Medard Reservoir.

Public utilization of brush fish attractors and automatic feeders was low. Poor knowledge of attractor's existence can be improved with education, thereby increasing utilization. Additional work needs to be done to determine if fishing success is enhanced by these methods. Survival and expansion of bulrush transplants has been good. Bulrush stands require two to three more years to expand and become fully effective in concentrating fish.

RECOMMENDATIONS

1. Extend the study for three additional years to fully document effects of special regulations for largemouth bass, the 1993 drawdown, and fish attractors (feeders, brush piles, and bulrush).

2. Continue educational efforts to heighten awareness of management programs, particularly to maximize compliance with special regulations and encourage harvest of sub-slot bass.

3. Evaluate possible competition between sunshine bass and black crappie.

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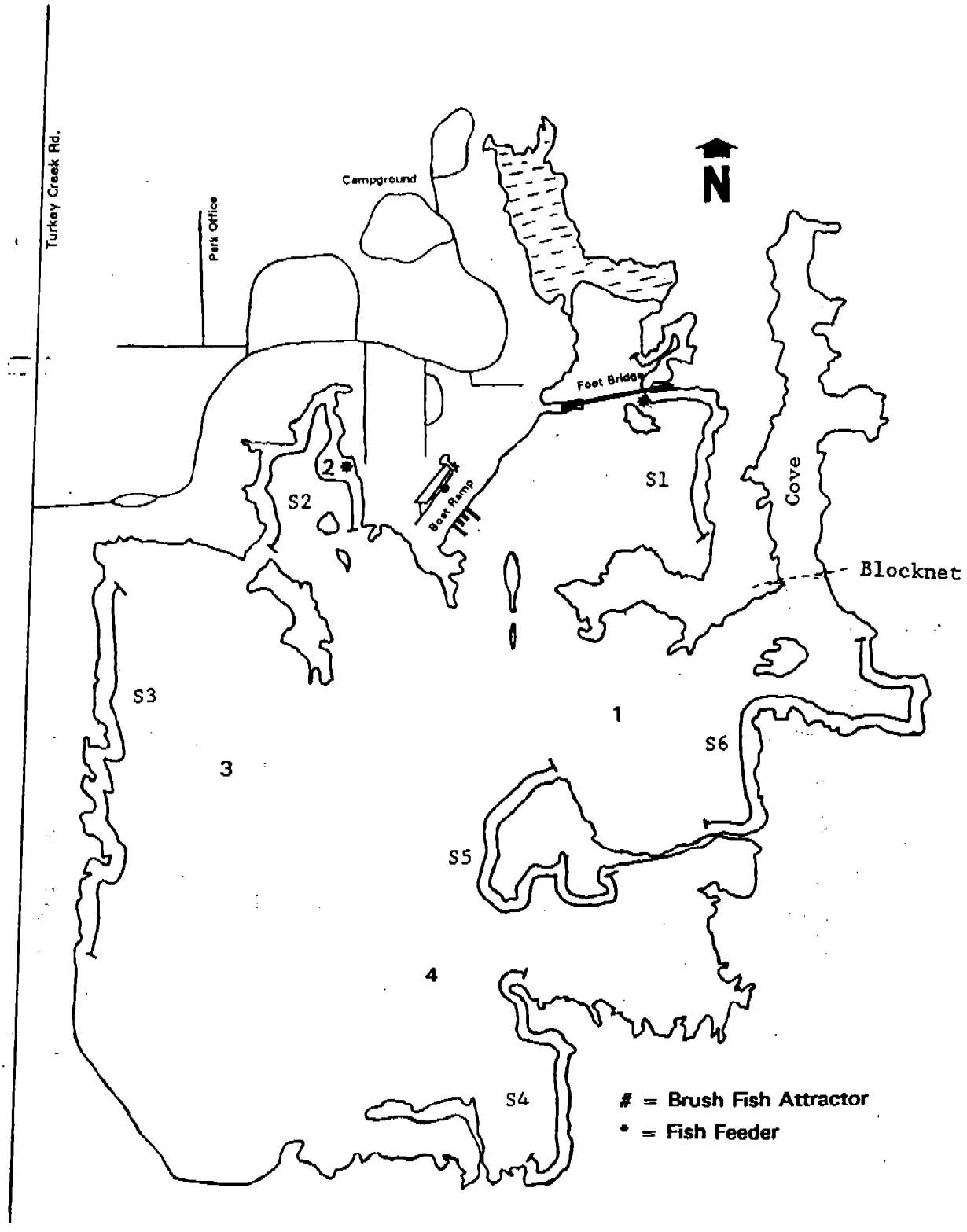

FIGURE 1. Edward Medard Reservoir (312 ha), Hillsborough County, Florida. Cove and lake (S1-6) sampling areas are noted.

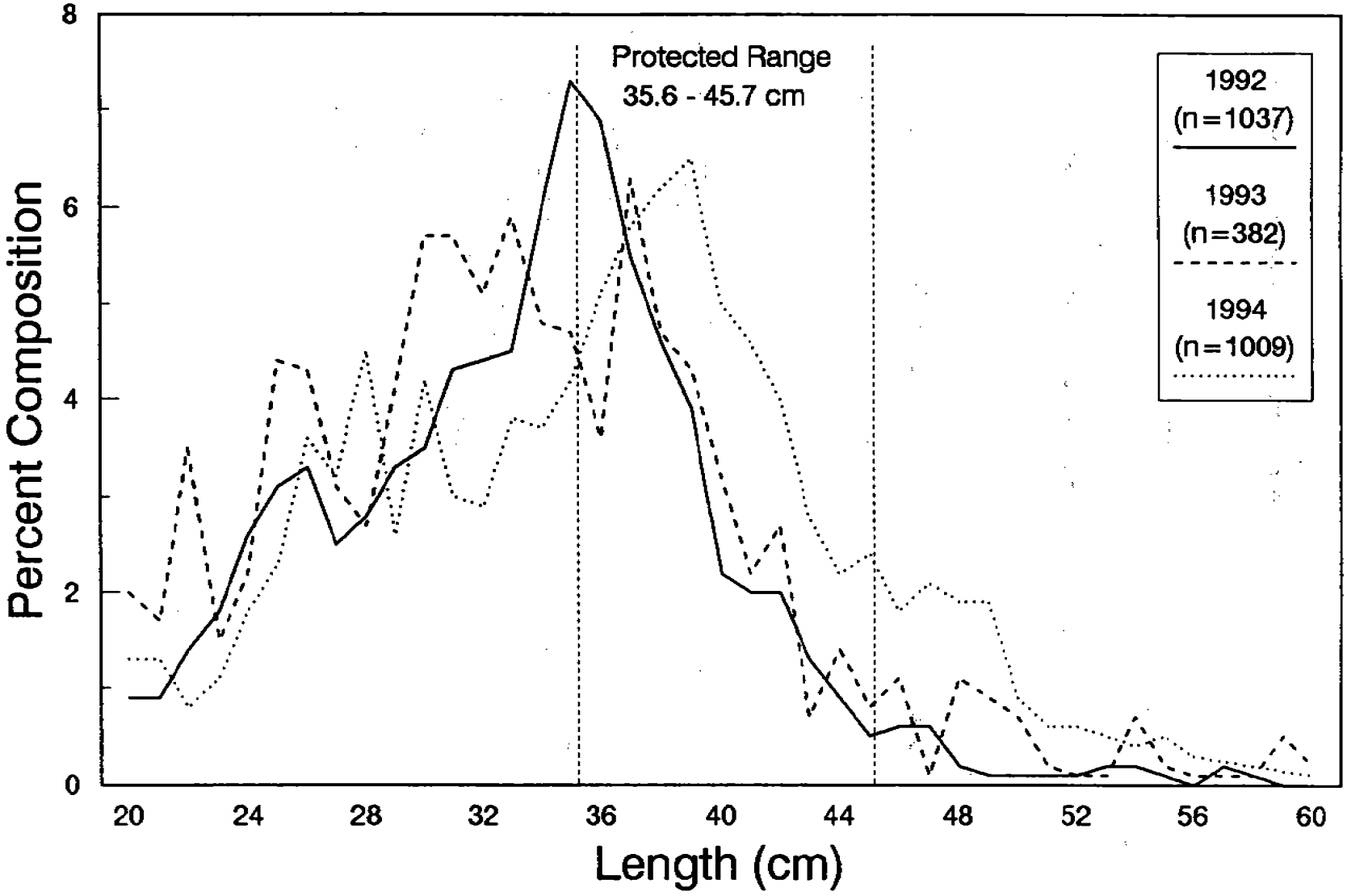

FIGURE 2. Length-frequency distributions for largemouth bass at Medard Reservoir, 1992-1994.

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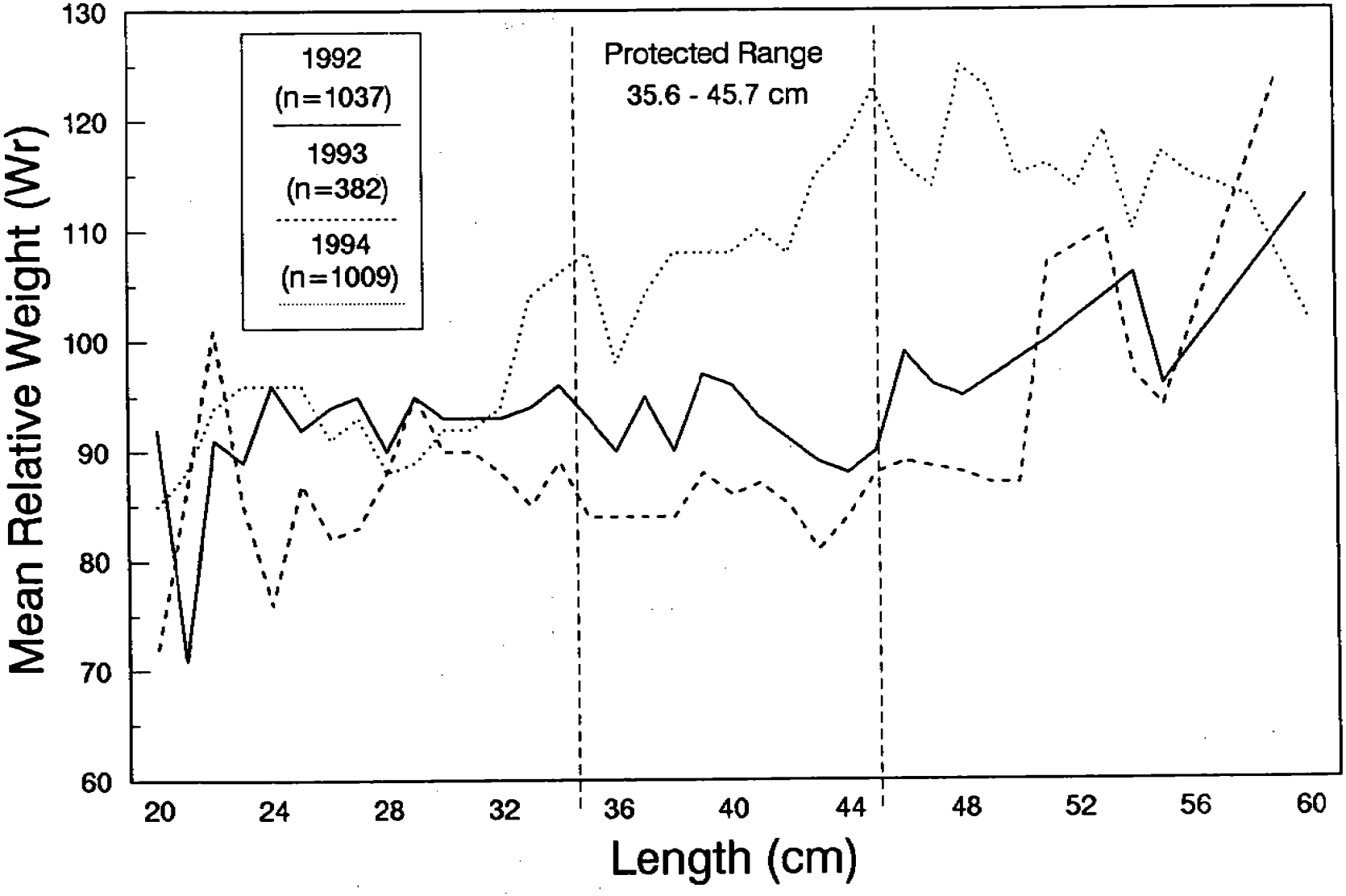

FIGURE 3. Mean relative weights of largemouth bass at Medard Reservoir, 1992-1994.

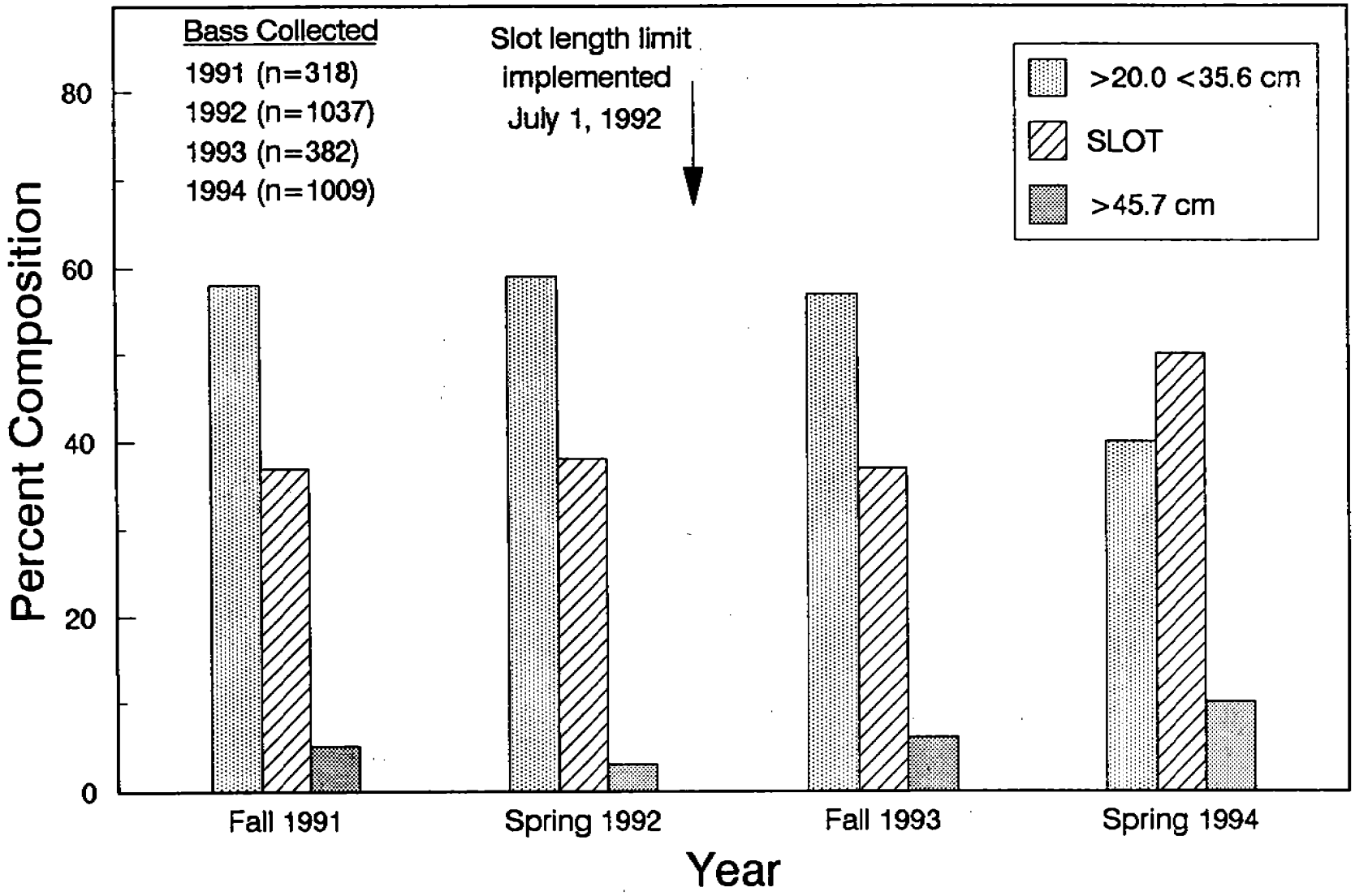

FIGURE 4. Percentages of largemouth bass from electrofishing samples below, within and above the 356 - 456 mm slot-length-limit imposed at Edward Medard Reservoir, 1991-1994.

TABLE 1. Electrofishing data for largemouth bass bluegill and redear sunfish at Medard Reservoir, 1992-1994.

	YEAR		
LARGEMOUTH BASS	**1992**	**1993**	**1994**
Total number of bass collected	1037	382	1009
Total sample time (min)	870	540	810
CPUE[a] (bass/min)	1.2	0.7	1.2
PSD[b]	71	74	78
RSD^{c}_{36}	37	39	60
RSD^{d}_{46}	3	6	10
RSD^{e}_{63}	0	0	0
Mean Length (mm)	299	318	362
Mean Relative Weight	92	87	106
BLUEGILL AND REDEAR SUNFISH			
CPUE[a] (Both species/min)	N/A	3	2
Mean Length of Bluegill (cm)	16	16	16
PSD[b] Bluegill	24	46	22
PSD[b] Redear sunfish	33	80	32

[a]CPUE = Catch-Per-Unit-Effort.
[b]PSD = Proportional Stock Density.
[c]RSD_{36} = Relative Stock Density of Bass longer than 36 cm.
[d]RSD_{46} = Relative Stock Density of Bass longer than 46 cm.
[e]RSD_{63} = Relative Stock Density of Bass longer than 63 cm.

TABLE 2. Total estimated effort, harvest and success for all species from Medard Reservoir angler surveys, 1991-1994.

	Year							
	Fall 1991				1992[a]			
	Spring 1992				1994			
Effort (Hours/Hectare/Year)		Percent of Total		Percent of Total		Percent of Total		Percent of Total
Largemouth bass	104.5	24	162.4	25	62.8	14	78.2	13
Bluegill	21.5	5	101.5	16	42.4	10	40.3	7
Redear sunfish	17.0	4	26.5	4	14.1	3	15.7	3
Black crappie	166.1	38	119.6	19	103.8	24	141.9	23
Sunshine bass	0.6	<1	4.3	1	7.5	2	13.6	2
Catfish[b]	59.9	14	121.7	19	139.6	32	194.6	32
Miscellaneous[c]	64.8	15	101.6	16	61.9	14	128.8	21
Total	434.4		637.1		432.1		613.1	
Harvest (#/Hectare/Year)								
Largemouth bass	10.1		26.4		8.9		4.4	
Bluegill	44.6		320.1		113.9		94.8	
Redear sunfish	13.2		33.6		37.6		25.8	

Table 2. Continued.

	Fall	1991		1992[a]	
	Spring		1992		1994
Harvest (#/Hectare/Year)					
Black crappie		172.5	68.8	102.6	124.9
Sunshine bass		5.9	6.5	17.5	6.2
Catfish[b]		43.1	83.1	73.6	173.8
Miscellaneous[c]		3.2	4.0	6.2	14.9
	Total	292.6	542.5	360.3	444.8
Fished for Success (#/Hour)					
Largemouth bass		0.16	0.22	0.27	0.20
Bluegill		1.89	2.97	1.37	1.15
Redear sunfish		0.45	1.05	0.46	0.70
Black crappie		1.04	0.50	0.93	0.74
Sunshine bass		0.00	0.64	0.59	0.15
Catfish[b]		0.42	0.49	0.44	0.96
Miscellaneous[c]		0.01	0.01	0.05	0.05
	Average	0.57	0.84	0.59	0.56

[a] Post regulation period
[b] Includes all Ictaluidae
[c] Includes all fish not mentioned above

TABLE 3. Opinion survey results for all anglers at Medard Reservoir, 1991-1994.

Questions and Answers[a]	Year				
	Fall 1991[b]		1992		
	Spring	1992[b]		1994	Mean
Are you aware that all bass 14 - 18" must be released immediately and only one of the four you harvest can be over 18"?					
Yes	N/A	N/A	78	89	
No	N/A	N/A	22	11	
What is your opinion about this regulation?					
In favor	N/A	N/A	75	61	
Opposed	N/A	N/A	3	16	
No opinion	N/A	N/A	22	23	
Did you know that sunshine bass or "stripers" are stocked in Medard Reservoir?					
Yes	35	46	49	47	44
No	65	54	51	53	56
Did you know that brushpile fish attractors have been installed in Medard Reservoir?					
Yes	37	48	59	52	49
No	63	52	41	48	56
How do you rate your fishing success in Medard Reservoir?					
Excellent	6	5	7	6	6
Good	28	25	27	24	26
Fair	30	36	34	25	31
Poor	25	25	19	29	25
No opinion	10	9	13	16	12
Has the slot-limit regulation changed the amount of time you fish in Medard Reservoir, if so how?[c]					
No	80	81	99	98	89
Increase	11	14	1	2	7
Decrease	9	5	0	0	4

TABLE 3. Continued.	Fall / Spring	Year 1991	1992	1992[b]	1994
Are you aware of the floating fish feeders near the bridge and burnt stump dock?[d]					
Yes		49	57	69	64
No		51	43	31	36
Can you explain the purpose of the fish feeders?[d]					
Yes		40	58	42	44
No		60	42	58	56
Compared to fishing in other areas on Medard Reservoir, how would you categorize the fishing near the feeders?[d]					
Better		45	36	3	4
Same		50	60	47	18
Worse		5	4	13	2
No opinion[e]				37	76

[a] Results expressed as percent.
[b] Survey conducted prior to implementation of slot limit regulation.
[c] Question directed to largemouth bass anglers only.
[d] Question directed to bream anglers only.
[e] Option was not given during fall 1991 and spring 1992.

Table 4. Estimated catch (harvest and release) for largemouth bass at Medard Reservoir, 1991-1994.

		Year			
	Fall	1991		1992[a]	
	Spring		1992		1994
Bass Catch (#/Hectare/Year)		37.7	43.5	56.8	24.0
Bass Harvested (#/Hectare/Year)					
<356 mm		7.8	7.5	7.8	2.8
356 - 457 mm		2.3	8.0	0.8	1.6
>457 mm		0.0	0.8	0.3	0.0
	Total	10.1	26.4	8.9	4.4
Bass Released (#/Hectare/Year)					
<356 mm		26.0	21.6	43.1	11.2
356 - 457 mm		0.9	2.0	4.7	8.5
>457 mm		0.0	0.0	0.1	0.0
	Total	26.9	23.6	47.9	19.7

[a] Post slot limit period.