An Evaluation of Phase II Palmetto and Sunshine Bass Co-stockings in the Escambia River, Florida[1]

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Abstract: Equal numbers of tagged sunshine bass (*Morone chrysops* female × *M. saxatilis* male) and palmetto bass (*Morone saxatilis* female × *M. chrysops* male) were stocked in the Escambia River for 4 years to determine which striped bass hybrid was better suited for stocking based on tag returns. Total tag return rates after 4 years was 11.2% for sunshine bass and 10.1% for palmetto bass. Over 90% of all tag returns occurred during the first 9 months after stocking. There was no consistent difference found in return rates between palmetto and sunshine bass. Although not statistically significant for all year classes, return rates seemed to be related more to the size of fish at stocking rather than the types of striped bass hybrid stocked.

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Both sunshine (*Morone chrysops* female × *M. saxatilis* male) and palmetto bass (*M. saxatilis* female × *M. chrysops* male) have been stocked in the Escambia River, Florida, since 1978 to supplement the existing fresh water sport fishery. However, no definitive study has ever been done which demonstrates which hybrid cross may be better suited to enhance this fishery.

Due to its proximity to metropolitan Pensacola, most of the fishing effort on the Escambia River occurs in the lower portion of the river (Yeager 1985). Previous studies indicated that sunshine bass may be more suitable than palmetto bass for stocking in the lower Escambia River. Mesing and Land (1987) reported that tagged sunshine bass stocked in Lake Seminole, Florida, exhibited a greater tendency to migrate out of the lake and to the lower Apalachicola River, Florida, than did palmetto bass, but Stout and Drda (1987) reported that sunshine bass grew faster and were less susceptible to handling stress in hatchery ponds. The purpose of this study was to determine which hybrid is more suitable for stocking in the lower Escambia River.

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Methods

The Escambia River in northwestern Florida is a temperate zone river, characterized by slightly acidic, soft water (Bass 1983). It drains approximately 10,878 km^2 of Alabama and Florida and is approximately 148 km long. It is Florida's fourth largest river based on average discharge. The Florida portion of the river is approximately 87 km long with an average annual flow rate of 181 m^3/sec (U.S. Dep. Int. 1980). During low water periods, saltwater intrusion from Escambia Bay can extend 13 km up river (Yeager 1982).

From 1988 through 1991 equal numbers of tagged phase II (178 to 254 mm total length) sunshine and palmetto bass were stocked in the Escambia River (Table 1). All fish were stocked in the fall of each year. Except for 500 1988 year-class sunshine and palmetto bass stocked approximately 3 km south of the Florida-Alabama state line, all fish were stocked in the lower 12 km of the river and delta. Lengths and weights were taken from a subsample of each group of fish to obtain an average size at stocking. All fish were reared at the Blackwater Fisheries Research and Development Center in Holt, Florida.

All fish were tagged with internal anchor tags (Floy Tag and Manufacturing, Inc., Seattle, Wash.). Tags were composed of a 0.50-mm piece of vinyl tubing secured to a laminated plastic oval disk measuring 4.7 mm by 14.3 mm. After being anesthetized, fish were tagged by making a small ventrolateral incision through the body wall on the left side posterior to the pectoral fin. The disk portion of the tag was then inserted through the incision, into the body cavity with the vinyl tubing portion remaining outside the fish. An identification number and a toll-free telephone number was printed on the vinyl tubing to enable anglers to inform project personnel of creeled fish. No monetary reward was offered for the return of tagged fish.

Fish were sampled monthly in the lower 10 km of the Escambia River and marsh from November 1988 through December 1992 with gill nets and by elec-

Table 1. Number of fish stocked, number returned, and percent returned by year class for tagged palmetto and sunshine bass stocked in the Escambia River, Florida. Asterisk denotes significant different ($P < 0.05$) in return rates of palmetto and sunshine bass.

	Palmetto bass			Sunshine bass		
Year class	*N* stocked	*N* returned	% returned	*N* stocked	*N* returned	% returned
1988*	2,496	235	9.4	2,497	400	16.0
1989	2,494	176	7.1	2,500	210	8.4
1990*	2,450	351	14.3	2,450	288	11.8
1991	2,500	238	9.5	2,500	218	8.7
Total	9,940	1,000	10.1	9,947	1,116	11.2

trofishing. Length and weight data were recorded for all fish collected. A creel survey conducted on the lower river was used to collect additional data. The creel survey was an access type survey using non-uniform probability methodology, designed by D. W. Hayne, North Carolina State University (Pfeiffer 1967, Ware et al. 1972, Malvestuto et al. 1978).

Simple *t*-tests were used to test for significant differences among lengths at stocking. A Chi square contingency table was used to test for significant differences in return rates between sunshine and palmetto bass for all 4 years.

Results

Overall return rates for all 4 year classes combined were 10.1% for palmetto bass and 11.2% for sunshine bass (Table 1). A greater percentage of sunshine bass were returned from the 1988 and 1989 year classes, while palmetto bass from the 1990 and 1991 year classes showed a higher rate of return. The return rates for 1988 sunshine bass (16.0%) was significantly greater than the return rates of 1988 palmetto bass (9.4%). Conversely, 1990 palmetto bass were returned at a significantly higher rate (14.3%) than 1990 sunshine bass (11.8%).

The average total length of phase II fish at stocking ranged from 215 to 252 mm for palmetto bass and 235 to 244 mm for sunshine bass (Table 2). Except for the 1988 year class there was no significant difference in stocking size of phase II fish at the 95% confidence level. However, at the 90% confidence level, 1988 and 1989 sunshine bass were significantly larger at stocking than palmetto bass and 1991 palmetto bass were significantly larger than sunshine bass.

Approximately 90% of all tag returns for both species occurred during the first nine months after phase II fish were stocked (Fig. 1, 2). Anglers returned more tagged fish during December, January, and March than for any other months during the study period. The longest time period a tagged fish was at large was 37 months. This was a 1988 sunshine bass which weighed 4.3 kg when captured. Nine sunshine bass and 8 palmetto bass were recaptured 24 to 34 months after release. Anglers reported age II fish weighed between 1.6 to 2.0 kg.

Table 2. Average total length at stocking, sample size (N), and p-value by year class for tagged palmetto and sunshine bass stocked in the Escambia River, Florida. Asterisk denotes significant differences ($P < 0.005$) in size at stocking for palmetto and sunshine bass.

	Palmetto bass		Sunshine bass		
Year class	Length (mm) at stocking	N	Length (mm) at stocking	N	p-value
1988*	222	75	239	50	0.04
1989	215	25	235	25	0.07
1990	249	25	235	25	0.64
1991	252	20	244	20	0.08

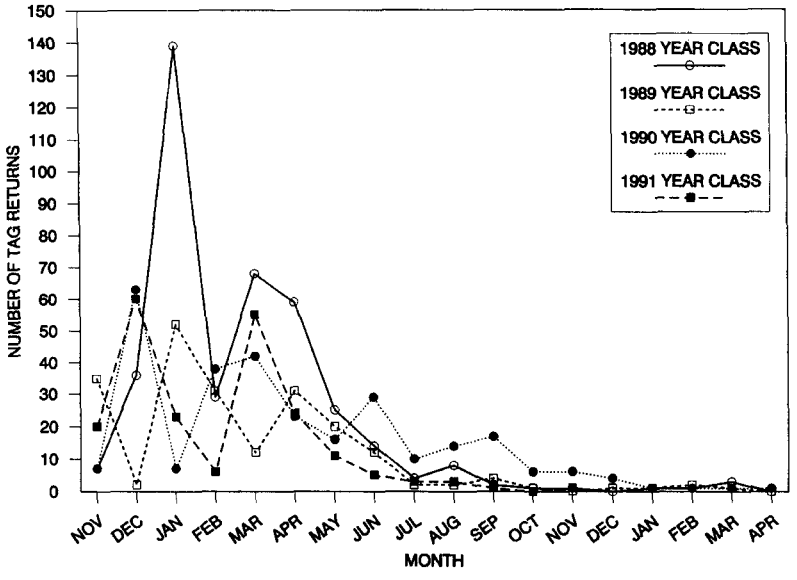

Figure 1. Monthly tag return rates for phase II sunshine bass.

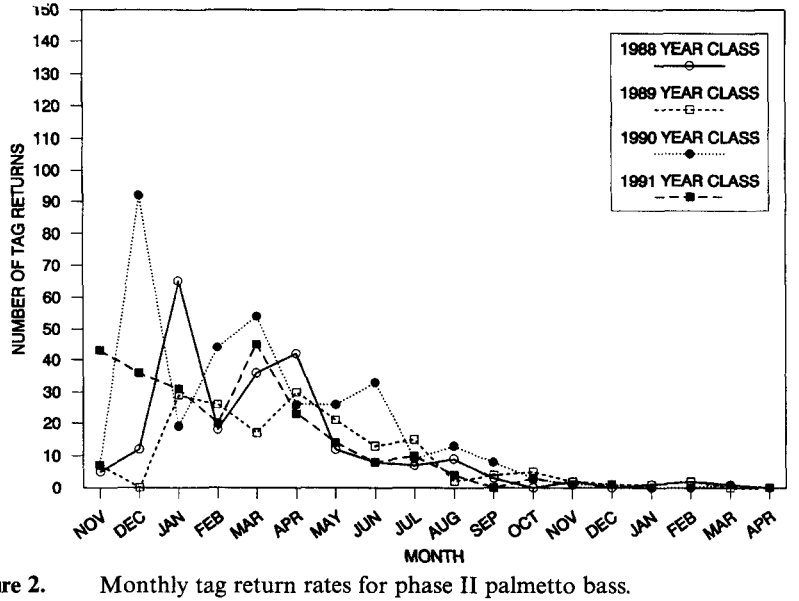

Figure 2. Monthly tag return rates for phase II palmetto bass.

Discussion

In this tag-recapture study it was assumed that survival after stocking and tag retention rates were the same for both the palmetto and sunshine bass. Stout and Drda (1987) reported sunshine bass were less susceptible to handling stress; however, this was not the case in this study. Phase I (35 to 45 mm fingerlings) to phase II survival rates averaged 73% and 76% for sunshine bass and palmetto bass, respectively, during 4 grow out seasons at this facility (D. M. Yeager, unpubl. rep., Fla. Game and Fresh Water Fish Comm.). Waldman et al. (1991) reported retention rates of 98% after 1 year using this type of anchor tag on striped bass. Also, no tag loss occurred after 2 months in a tag retention test at this facility in which 100 sunshine bass were tagged with anchor tags and held in 1,900-liter tanks (D. M. Yeager, unpubl. rep., Fla. Game and Fresh Water Fish Comm.). In addition, grow out, harvest, tagging, and stocking procedures were the same for both groups of fish. Equal numbers of both species were released at each stocking location to minimize non-random distribution of fish throughout the study area.

Results from this study show there was no consistent difference in return rates between phase II palmetto and sunshine bass. Greater numbers of sunshine bass were returned during the first 2 years of the study while more palmetto bass were returned during the last 2 years. Overall return rates for the entire study were similar.

Although not statistically different for all 4 year classes, return rates seemed to be related more to the size of the fish at stocking rather than the type of striped bass hybrid stocked. The average size at stocking and return rates of the 1988 and 1989 year classes of sunshine bass was greater than for palmetto bass. Conversely, return rates were higher for the 1990 and 1991 year classes of palmetto bass which on the average were larger when stocked.

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