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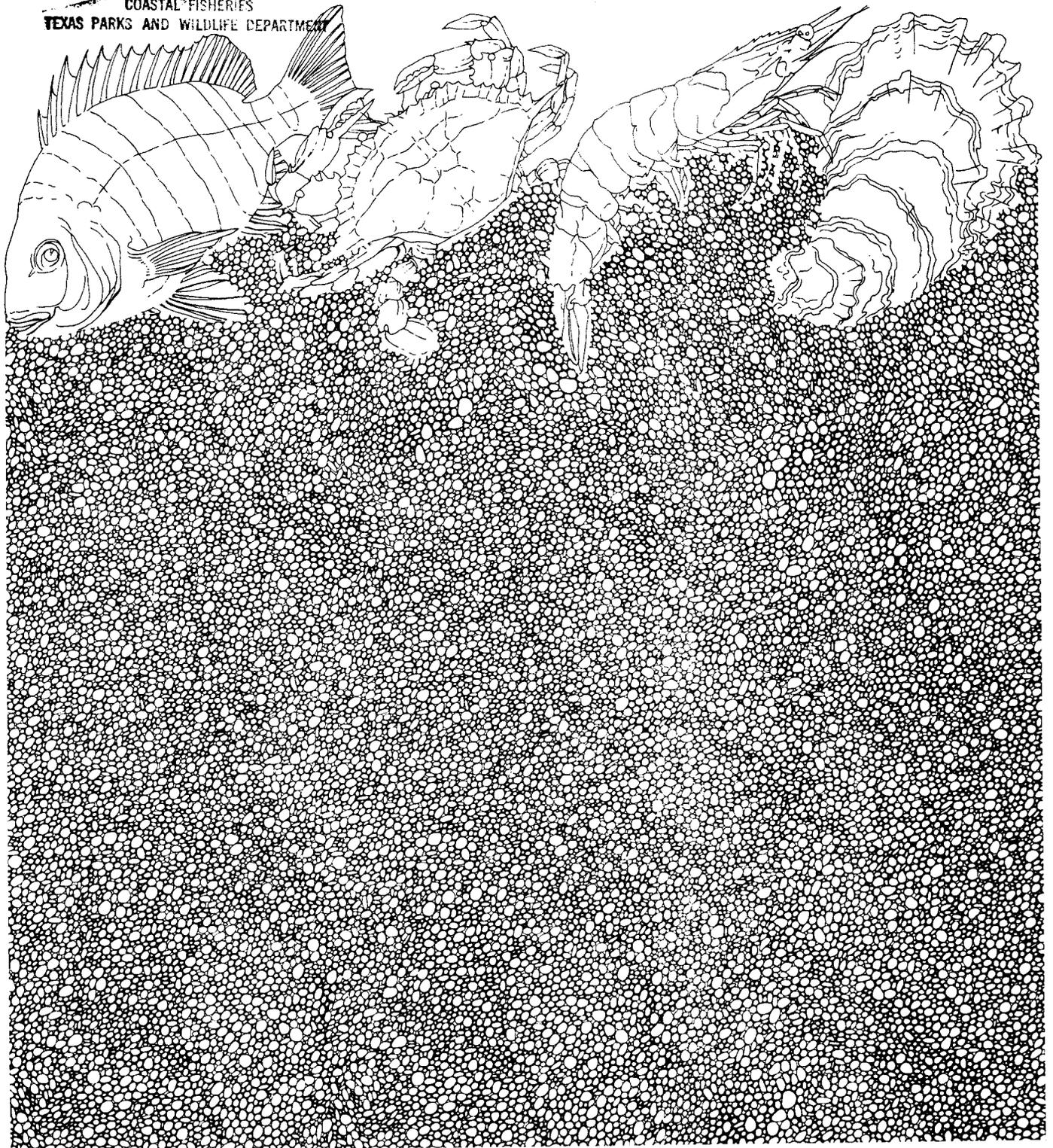
# EVALUATION OF AN INITIAL STRIPED BASS STOCKING PROGRAM IN TEXAS BAYS

By: Gary C. Matlock, Bruce T. Hysmith,  
and Robert L. Colura

Management Data Series Number 56  
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Texas Parks and Wildlife Department  
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COASTAL FISHERIES  
TEXAS PARKS AND WILDLIFE DEPARTMENT



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## ABSTRACT

The introduction of striped bass (Morone saxatilis) fingerlings into Texas bays during 1975-1977 did not result in the establishment of a fishery. However, striped bass catches in unstocked bays indicated the potential for developing a fishery along the Texas Gulf coast through up-river stockings because striped bass reported from unstocked bays probably migrated from freshwater lakes.

## INTRODUCTION

Striped bass (Morone saxatilis) support major recreational, and to a lesser extent, commercial fisheries throughout the United States. The ability to spawn and rear captive fish has provided a source for widespread freshwater introductions. In some cases these fisheries are maintained by annual fry or fingerling stockings (Goodson 1966, Stevens 1974). However, a more favorable situation is the establishment of naturally reproducing populations through planned introductions (Moczygemba and Morris 1977, Bayless 1972). Range extensions have resulted from stocking activities (Setzler et al. 1980). Saltwater introductions have also created or enhanced striped bass fisheries along the Atlantic, Pacific, and Gulf coasts (Stevens 1980, McIlwain 1980, Setzler et al. 1980), but have been less extensive than freshwater introductions.

Striped bass were historically present in Texas bays as late as 1932 as evidenced by annual commercial catches of 200-4000 kg between 1887 and 1932 (Collins 1892, Townsend 1900, Fiedler 1936). Two confirmed catches from Texas coastal waters have been recorded (Benefield et al. 1977), but a fishery is essentially non-existent. The Texas Parks and Wildlife Department (TPWD) initiated a 3-year stocking program in 1975 to establish a coastal striped bass fishery. This report evaluates success of stocking striped bass in Texas bays using documented catches of striped bass and striped bass hybrids in bays and the adjacent Gulf of Mexico during June 1975-April 1983.

## MATERIALS AND METHODS

Several bay systems were stocked (Appendix A). However, San Antonio Bay was selected as the primary bay for stocking because of freshwater inflow from the Guadalupe River. This river met minimum requirements for reproduction including 80 km of uncontrolled flow of at least 0.3 m/sec (Albrecht 1964). The stocking program and requests to report striped bass captures to TPWD were advertised on posters distributed in fish houses, fishing piers, and tackle stores adjacent to the stocked bay and through local newspaper articles. When possible, each reported striped bass capture was verified by a TPWD biologist using morphometric characteristics described in Hoese and Moore (1977) and Eddy (1969).

Fish were transported in 4-8 o/oo salinity seawater treated with 100 ppm nitrofurazone without foam. Agitators and gaseous oxygen were used to maintain adequate dissolved oxygen. Loads never exceeded 0.04 kg/liter in the hauling tank.

Striped bass sac-fry (2 days old) were obtained from the South Carolina Wildlife and Marine Resources Department, Moncks Corner Striped Bass Hatchery in April 1975, 1976, and 1977. Sac-fry from fish spawned at Lake E.V. Spence were also obtained from the TPWD fish hatchery at San Angelo in 1975. Fry were laboratory maintained in fiberglass tanks at the TPWD Marine Fisheries Research Station (Palacios) until 7 days old. Fry were fed brine shrimp nauplii during 5-7 days of age. Exogenous-feeding

fry were stocked at night into fertilized earthen ponds at the station and held for about 30 days without supplemental feeding (see Colura et al. 1976 and Hysmith et al. 1984 for additional details). Harvest was accomplished by draining fingerlings into a 2-m section of the concrete drainage canal immediately below the rearing-pond discharge and dip-netting fingerlings into a hauling tank. The 2-m section of the canal was isolated using wire mesh partitions and a valve on the downstream side. The first group of fingerlings recovered was weighed and counted to establish number per unit weight. Thereafter, only en-masse weights of fish were determined. The final weight times the mean number per weight were multiplied to estimate the total number (to the nearest thousand) of harvested fingerlings.

## RESULTS

Stocking fingerling striped bass into Texas bays did not result in the establishment of a coastal fishery. Of 494,000 fish stocked during 1975-1977 (Table 1) only one fish was recaptured in a stocked bay by fishermen. The single recapture occurred in San Antonio Bay on 2 April 1977 (Table 2). However, a total of 18 striped bass and 4 hybrid bass ( $\geq$  300 mm) were caught in unstocked bays and the Gulf of Mexico. Six juveniles were recaptured by TPWD in Sabine Lake within 1 month after stocking (Table 2).

## DISCUSSION

Reasons for the lack of success in establishing a striped bass fishery in bays from fingerling stockings are unclear. Fish apparently survived for at least 1 month, but catches in stocked bays were rare. Bay-stocked fish may have succumbed to estuarine environmental conditions before being caught. However, fish in Sabine Lake survived initial stocking and striped bass were caught in unstocked bays. The number of fish stocked relative to numbers of fishermen may have been insufficient to detect success. Most San Antonio Bay system fishermen do not fish in upper San Antonio Bay (TPWD unpublished data) where most fish were released. Therefore, emigration of striped bass to heavily fished areas, like Espiritu Santo Bay would be required to maximize recapture and reporting potential. The only documented striped bass caught in the San Antonio Bay system was from Espiritu Santo Bay about 1 year after the first introduction.

The low fingerling stocking rate in bays may also have been insufficient to develop a fishery. Bay stocking rates ranged from 0.3/ha in Corpus Christi Bay to 24.6/ha in Sabine Lake. San Antonio Bay stocking rates ranged from 1.2/ha to 4.8/ha over 3 years. A rate of 24.7/ha is used to establish striped bass fisheries in Texas inland waters (Roger McCabe, personal communication).<sup>1</sup> Despite the relatively high stocking rate for inland waters, the establishment of a significant fishery often requires years of annual introductions.

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<sup>1</sup>Mr. Roger McCabe, Regional Director, Texas Parks and Wildlife Department, Waco, Texas, pers. commun., September 1983.

Failure to establish a Texas reproducing fishery may be attributable to small size of stocked fish. Fisheries established on the west coast were accomplished with far fewer fish (435) but yearling fish were introduced (Scofield 1931, Raney 1958). Greater returns were reported in Alabama when 13-25 cm fingerlings rather than 2.5-5.0 cm fingerlings were stocked (Minton 1982). Vulnerability to predation may be reduced by using fish larger than fingerlings or by greatly increasing the stocking rates for smaller fish. In Watts Bar Reservoir, Tennessee, survival and average size of striped bass at ages 1 and 2 were inversely related to stocking density and directly related to size at stocking (VanDenAvyle and Higginbotham 1979). During 1971-1978, fingerlings were stocked in Watts Bar Reservoir at 0.5/ha to 13.8/ha and at sizes ranging from 13-225 mm.

The capture of striped bass in unstocked bays may reflect the success of inland introductions by TPWD. Because of their size, fish captured in Lavaca Bay in 1983 were considered to be those stocked in Lake Texana on the Lavaca River 1 year earlier (Steve Miranda, personal communication).<sup>2</sup> Catches in the Matagorda Bay system in 1980 may have resulted from either the San Antonio Bay stocking or from up-river stocking in impoundments on the Colorado River. Striped bass in Galveston Bay may have originated from Lake Livingston on the Trinity River, while fish caught in Corpus Christi Bay may have come from Lake Corpus Christi stockings (Bill Rutledge, personal communication).<sup>3</sup>

The appearance of striped bass in previously unstocked bays and the capture of fish in the Gulf suggests the potential for development of a sea-run striped bass fishery along the Texas coast. Because striped bass found in unstocked bays probably migrated from upstream inland populations, it suggests that a coastal fishery might be more effectively established through upstream freshwater introductions. Stocking of coastal streams and rivers has been used to successfully establish a coastal striped bass fishery in Mississippi (Nicholson 1982). The appearance of striped bass in previously unstocked Texas bays and the Gulf of Mexico suggests a similar up-river stocking program may be used to establish a sea-run striped bass fishery in Texas. Further consideration should also be given to stocking larger and more fingerlings per hectare (i.e., 25/ha). Assessing the success of any fish introduction depends on fishing pressure. Galveston Bay may be best suited for further introductions because it receives greater fishing pressure than all other Texas bay (McEachron and Green 1983) and the Trinity River meets minimum flow requirements for reproduction.

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<sup>2</sup>Mr. Steve Miranda, Fishery Biologist, Texas Parks and Wildlife Department, Kerrville, Texas, pers. commun., May 1983.

<sup>3</sup>Mr. Bill Rutledge, Chief, Fish Hatcheries Branch, Texas Parks and Wildlife Department, Austin, Texas, pers. commun., August 1983.

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Table 1. Summary of striped bass introductions into Texas bays during May and June, 1975-1977.

Year	Month	Bay system	Hectares	Number	Total length (mm)	Number/hectare
1975	June	San Antonio	45,998	56,000	41	1.2
1976	May	San Antonio	45,998	203,000	40	4.4
1977	May	San Antonio	45,998	222,000	29	4.8
1977	May	Corpus Christi	6,273	3,000	29	0.5
1977	May	Sabine Lake	404	10,000	29	24.6

Table 2. Summary of confirmed striped bass and hybrid white x striped bass catches in Texas coastal waters, June 1975-April 1983. Ten unconfirmed fish also reported (2 striped bass, 1 each from Corpus Christi and Matagorda Bays on 2-14-83 and 2-16-79, respectively, and 8 hybrids from Corpus Christi Bay during 9/82-2/83).

Bay system	Date	Location	Capture method		Number	Total length (mm)
			Fisherman	Gear		
Sabine Lake	6-2-77	South impoundment	TPWD	Bag seine	2	51; 53
Sabine Lake	6-9-77	South impoundment	TPWD	Bag seine	4	65; 60; 65; 50
Galveston	6-16-75	Redfish Island	Commercial	Trawl	1	830
Galveston	2-12-79	Unknown	Commercial	Gill net	1	496
Galveston	2-26-79	Trinity Bay, N of Fisher's Shoals	Sport	Rod and reel	1	542
Galveston	10-9-80	Trinity Bay	Sport	Rod and reel	2	285; 330
Galveston	7-30-82	Trinity Bay, Houston Lighting & Power Co., discharge outlet	Sport	Rod and reel	1	Unknown
Galveston	1-11-83	Trinity Bay, Houston Lighting & Power Co., discharge outlet	TPWD	Rod and reel	1	638
Galveston	1-11-83	Trinity Bay, Houston Lighting & Power Co., discharge outlet	TPWD	Rod and reel	1 (Hybrid)	458
Galveston	4-8-83	Trinity Bay, Houston Lighting & Power Co., discharge outlet	TPWD	Rod and reel	1	605
Matagorda	3-8-78	Carancahua Bay	TPWD	Gill net	1 (Hybrid)	Unknown
Matagorda	12-19-80	Powderhorn Lake	Commercial	Gill net	1	742
Matagorda	12-29-80	Powderhorn Lake	Sport	Rod and reel	1	Unknown
Matagorda	4-13-83	Redfish Lake, Lavaca Bay	TPWD	Gill net	1	327
Matagorda	4-28-83	Redfish Lake, Lavaca Bay	TPWD	Gill net	1	333

Table 2. (Cont'd).

Bay system	Date	Location	Capture method		Number	Total length (mm)
			Fisherman	Gear		
Matagorda	4-28-83	Redfish Lake, Lavaca Bay	TPWD	Gill Net	1	337
San Antonio	4-2-77	Espiritu Santo	Sport	Rod and reel	1	330
Corpus Christi	9-12-81	Ingleside Cove	Sport	Rod and reel	1 (Hybrid)	360
Corpus Christi	1-2-82	Ingleside Cove	Sport	Rod and reel	1 (Hybrid)	387
Gulf of Mexico	6-2-77	San Luis Pass	Sport	Rod and reel	1	685
Gulf of Mexico	5-78	San Luis Pass	Sport	Rod and reel	1	685
Gulf of Mexico	2-23-83	Matagorda Ship Channel	Sport	Rod and reel	1	514
Gulf of Mexico	2-23-78	Matagorda Island, near San Antonio Bay	Commercial	Unknown	1	352

APPENDIX A: Stocking Sites

Table 1. Number, size, and location of striped bass fingerlings stocked into Texas bays, June 1975-May 1977.

Date	Bay system	Site	Number stocked	Total length (mm)
June 1975	San Antonio		56,000	41.0
5-20-76	San Antonio	Goff Bayou	10,000	42.9
5-20-76	San Antonio	Guadalupe River	23,000	42.9
5-20-76	San Antonio	Guadalupe River	71,000	38.5
5-24-76	San Antonio	Swan Point	1,000	37.6
5-24-76	San Antonio	Intracoastal Waterway	7,000	37.6
5-24-76	San Antonio	Middle of bay	9,000	37.6
5-26-76	San Antonio	Mustang Lake	20,000	36.0
5-5-77	Corpus Christi	Sunset Lake	3,000	19-38
5-10-77	Sabine Lake	South impoundment	10,000	19-38
5-10-77	San Antonio	Middle of bay	30,000	19-38
5-4-77	San Antonio	Middle of bay	102,000	18-38
5-12-77	San Antonio	Middle of bay	50,000	19-38

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