A Study of Sand Seatrout (Cynoscion arenarius Ginsburg) of the Galveston Bay Area

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ABSTRACT

Sand seatrout (Cynoscion arenarius Ginsburg) were studied in the Galveston Bay area to provide information on seasonality, population composition, food items, growth and spawning. Tagging efforts resulted in 518 tagged fish and a return of 16 tags during the 1968-70 period. Tag recovery data suggest a migration from the upper bay to the lower bay and Gulf waters in December and a return in March.

Electrophoretic analysis of multiple hemaglobin protein types were studied from 96 sand seatrout blood samples. Five protein types were observed without discernable differences that could be attributed to population hetrogeneity.

Analysis of stomach content revealed crustacea and fish as primary food items. Gonad development stages indicate a spawning period from March through August.

INTRODUCTION

The importance of the sand seatrout (Cynoscion arenarius Ginsburg) as a sport fish was cited by More (1965). Proper management of any type of fishery requires knowledge of the life history of the species involved. Previous work by Reid (1957) and Darnell (1958) involved abundance and food habitat studies. Little work has been directed to studies on seasonality and population composition of the sand seatrout.

The study area included Galveston Bay, the Galveston Jetties and the Texas Parks & Wildlife Department artificial reef in the Gulf of Mexico approximately 12 nautical miles south of the Galveston Jetties (Figure 1). These areas were chosen for geographic and habitat variations.

MATERIALS AND METHODS

Work began in September 1968 and ended in June 1970. Seventeen trips were made to the study areas. Sand seatrout for study and tagging were caught by hook and line. Fish were tagged with internal anchor tags and released. To apply the tags an inscision was made on the ventral surface of the abdomen, approximately 30-50 mm posterior to the base of the pelvic fins.

Fish were measured in standard length (tip of lower jaw to end of hyplural plate) to the nearest millimeter and weights were recorded in grams.

Blood samples were obtained from brachial arteries with a 21 gauge syringe, placed in vacuum sealed test tubes and kept on ice until processed. Mr. James Zotter* analyzed these samples by the polyacrylamide gel disc electrophoresis method of blood protein type examination.

Specimens used for food item analysis were kept on ice or frozen until examinations were made.

"Annuli" on scales removed from the area near the tip of the pectoral fin ventral to the lateral line, were examined with the aid of a Kena-vision X-1000 microprojector.

RESULTS

Seasonality: Tagging efforts were successful at one study area - the A-1 Flare in Galveston Bay. Large numbers of sand seatrout were found near the flares at night from September through November feeding on the bay anchovy (Anchoa mitchilli).

Of the 507 tagged fish released at A-1 Flare (Table 1) September 1968 through November 1969, 14 were recaptured (Table 2). Of these, 10 were recovered 47 days after release and within 6 miles of the tagging site. The other 4 were recaptured in May 1969. All were recaptured in the lower bay and shallow Gulf of Mexico (Figure 1). The tagging data indicated movement from the upper bay in December. Bay temperatures declined after November (Table 3). Gunter (1938) reported a decline of sand trout in the fall and winter in Louisiana bays. However, Simmons (1957) collected more sand seatrout in the Intracoastal Waterway during December and January in the upper Laguna Madre than any other time. A sports creel survey by More (1965) indicated summer and fall as prime fishing periods as catches of sand seatrout were high during these times. Sand seatrout ranked second in total numbers caught during More's sport fishing survey.

Tagging efforts at the Galveston Jetties and the offshore artificial reef were unproductive. Sampling trips resulted in limited numbers of fish taken, and all specimens were used for food analysis and blood studies.

Blood Samples: The study of electrophoretic patterns of serum protein types can aid in separating morphometrically similar forms in fish populations (Edsall, 1960). Efforts to determine population composition of sand seatrout were undertaken by analysis of blood protein groups. Analysis of samples did not reveal any serum protein type differences within sampled fish populations. Samples from the three areas indicated 5 different protein groups, but each of the groups were present in all samples. Results from these studies indicate population homogeneity (Zotter, 1971).

Food Items: Forty-five sand seatrout stomachs were examined, 73 percent of which were empty. Food items and frequency of occurrence are presented in Table 4. Fish and crustacea were the most common food items, each

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* University of Houston - Master's Thesis, May, 1971

appearing 5 times. Reid (1957) stated that the diet of sand seatrout over 60 mm was primarily fish.

Growth: Scale samples were taken from 45 fish for age and growth determinations. A Kena-vision X-1000 microprojector was utilized in viewing the scales. Clearly defined annuli were difficult to distinguish, and no age or growth calculations resulted from the scale readings.

Length-Weight Relationship: Figure 2 presents a length-weight curve for the sand seatrout. Forty-five fish taken from the three sampling areas during the summer and fall (August-November 1969, June-August 1970) were used in the calculations. Standard lengths and ungutted weight in grams were used.

The length-weight curve was calculated by the following formula:

$W = aL^n$ or $\log W = \log a + n \log L$
Where W = ungutted weight in grams
L = standard length in mm
a = a constant
n = an exponent
$\log W = 5.12 (\log L)$

Maturity Stages: Tabb (1961) described the gonad maturity stages of the spotted seatrout. His descriptions were the same used for sand seatrout. The stages are (1) Immature; (2) Newly maturing or totally spent; (3) Fat storage or first ripening stage; (4) Fat storage or second ripening stage; (5) Ripe fish; (6) Spent. Unpublished data collected by More (1963-67)* indicated a spawning season of March through August with the majority of stage 4 and 5 fish taken at the Galveston Jetties or shallow Gulf. Stage 4 and 5 fish taken during this study were caught in the same areas. Most stage 1 and 2 fish were taken in upper Galveston Bay. No ripe fish were collected in the upper bay. The smallest male and female stage 5 fish recorded were 265 mm and 225 mm respectively. However, in More's unpublished data, the sizes of the male and female stage 5 fish were 200 mm and 190 mm.

Females comprised 56.5 percent of the fish taken in the study.

Postlarval sand seatrout (less than 20 mm) collected in Chocolate Bay (Moffett and Simmons, 1972) appeared in greater numbers during August, September and October of 1969 and 1970. Pullen (1962) reported postlarval sand seatrout in upper Galveston Bay from May through September. These data combined with the gonad maturation data would indicate a spawning season of March through August in lower bays and the shallow Gulf of Mexico.

* William R. More collected data on the sand seatrout 1963-67. These data are on file at the Texas Parks & Wildlife Dept. Marine Laboratory at Seabrook, Texas

DISCUSSION

The objectives of the study were partially achieved. Movements of sand seatrout in the bay appeared to be seasonal (with water temperature as the prime factor controlling movements). Adult fish apparently migrate to the lower bay and Gulf after November and return in March. The extent of the Gulfward movement is not known although sports catches are made throughout the year at oil platforms and reefs in the Gulf of Mexico.

Analysis of blood samples indicate that the sand seatrout in the Galveston Bay area belong to one population. The five different serum protein groups isolated were present in all blood samples.

Growth study objectives were not met due to the inability to read annuli of scales. Growth analysis could not be made from the small number of tag returns.

The failure to obtain adequate numbers of fish for examination prevented any detailed analysis of gonad maturity or food items. The limited data can only be compared to More's unpublished work. A more detailed study of this species is planned for Galveston Bay beginning in 1973.

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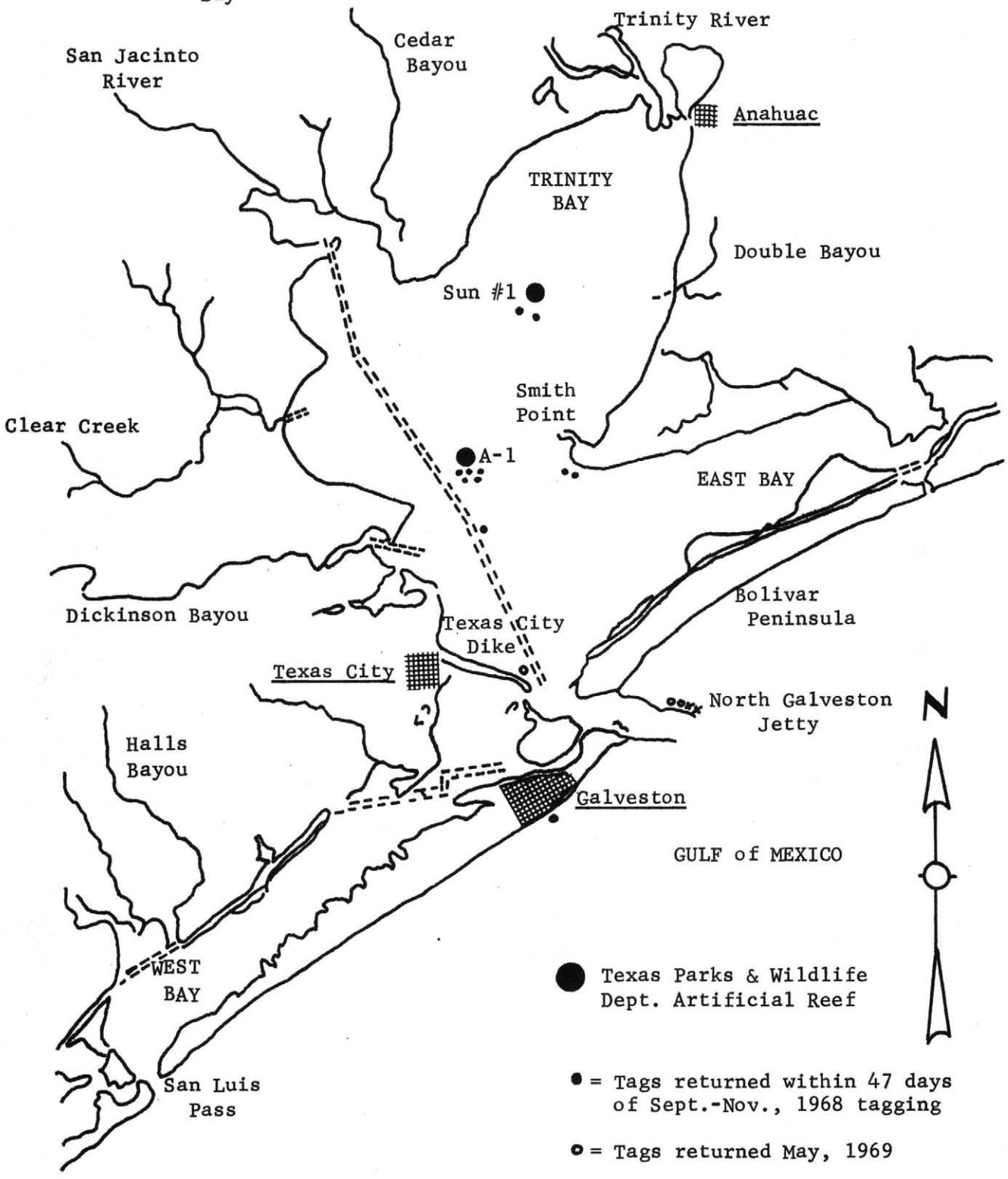
Figure 1: Tagging and Recapture Sites of Sand Seatrout in the Galveston Bay



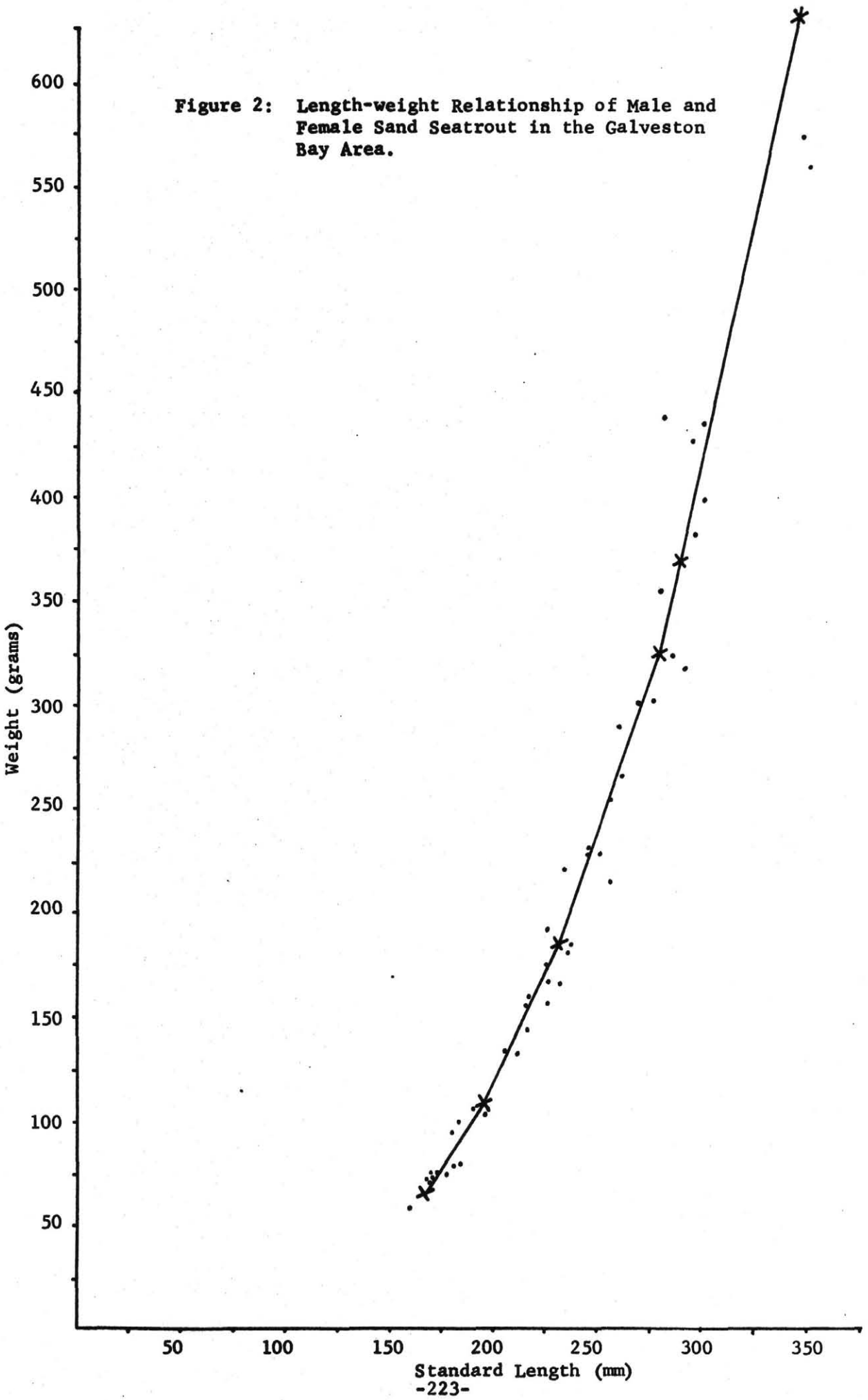


Figure 2: Length-weight Relationship of Male and Female Sand Seatrout in the Galveston Bay Area.

Table 1: Dates, Locations and Numbers of Sand Seatrout Tagged in Galveston Bay

Date Tagged	Location	Number of Fish Tagged
9-19-68	A-1 Flare-Galveston Bay	56
9-24-68		99
9-30-68		163
10-29-68		184
5-16-69	North Galveston Jetty	11
11-3-69	A-1 Flare-Galveston Bay	3
TOTALS		517

Table 2: Distance Moved and Days at Large of Tagged Sand Seatrout in Galveston Bay.

Release Area and Tagging Date	Movement in Nautical Miles 0-6	14-20	21-23	Days at Large	Area of Recapture
A-1 Flare					
9-19-68	1			22	A-1 Flare-Galveston Bay
9-24-68		1		232	North Galveston Jetty
9-24-68	1			17	A-1 Flare-Galveston Bay
9-24-68	1			5	Redfish Reef-Galveston Bay
9-24-68	1			3	Smith Point-East Galveston Bay
9-30-68	1			19	Sun No. 1 Flare-Trinity Bay
9-30-68	1			19	Sun No. 1 Flare-Trinity Bay
9-30-68	1			28	A-1 Flare-Galveston Bay
9-30-68	1			30	Smith Point-East Galveston Bay
9-30-68	1			7	A-1 Flare-Galveston Bay
10-29-68			1	161	29th St. Fishing Pier-Galveston
10-29-68		1		197	North Galveston Jetty
10-29-68	1			208	Texas City Dike
10-29-68	1			17	Market No. 52-Galveston Bay
N. Galveston Jetty					
5-15-69	1			1	North Galveston Jetty
5-16-69	1			3	North Galveston Jetty
TOTALS	13	2	1		

Table 3: Average Water Temperatures and Salinities in Upper and Lower Galveston Bay, 1968-70.

Water Year	Temperatures °C Winter Dec.-Feb.	Spring Mar.-April	Summer June-Aug.	Fall Sept.-Nov.
1968	15.9	21.7	28.5	23.3
1969	15.3	21.6	30.9	22.4
1970	13.7	19.4	27.8	21.3
Salinity ppt				
1968	19.1	14.3	10.3	19.2
1969	15.7	8.9	18.1	22.1
1970	23.3	15.9	23.9	18.8

Table IV: Food Items Found in 45 Sand Seatrout and the Number Stomachs in Which Each Item was Present.

Common Name	Scientific Name	Stomachs
Shrimp	Penaeus sp.	5
Menhaden	Brevoortia sp.	2
Bay Anchovy	Anchoa mitchilli	1
Fish remains		2
Unidentified material		2
Empty		33
TOTAL		45