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JOB REPORT

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Project Name: Analysis of Population of Sports and Commercial Fin-Fish and of Factors which Affect these Populations in the Coastal Bays of Texas

Period Covered: January 1, 1964 to December 31, 1964 Job No. 2

Population Studies of the Sports and Commercial Fin-Fish
of the Galveston Bay System

Abstract: Survival of Year-Class 0 redfish (Sciaenops ocellatus) and southern flounder (Paralichthys lethostigma) was high and good standing crops of both species were present during late fall.

Trends in the relative availability of adult game fish were not clear as drag seine data were weak and incomparable.

Commercial landings decreased slightly from 1963 figures, due mainly to a reduction in the speckled trout (Cynoscion nebulosus) catch.

Objective: To determine the population fluctuations of the food and game fish of the Galveston Bay system.

Procedures: Juvenile game fish were sampled monthly at: (1) 10 regular shoreline stations with a 60-foot nylon seine, 6 feet deep of 3/4-inch stretched mesh. Seine hauls were made in shallow water shoreline areas and the total area of bay bottom covered was calculated and expressed in acres; (2) 5 regular bar-seine stations with a 6-foot bar-seine of 1/2-inch stretched mesh. The bar-seine was pulled 500 feet at each station and all samples were designed to cover approximately 3000 square feet of bay bottom; (3) 1 regular trawl station with a 10-foot trawl of 1 1/4-inch mesh with a 1/4-inch mesh liner. The trawl was pulled behind a boat at a regulated speed for 15 minutes. All small game fish caught were measured in standard length in millimeters.

Four adult game fish stations were sampled bimonthly with a drag seine (4 feet deep) of 2 1/2-inch stretched mesh. The bag section was of 2-inch stretched mesh and was 6 feet deep. Different lengths of net (1200 - 3600) were used in sampling; thus, the total area sampled was calculated accordingly, and expressed in acres. Lengths of all game fish taken were recorded in total or fork lengths* in millimeters. Weights were calculated from length-weight tables supplied by the fish project leader.

Tags were applied to game fish that appeared to be in good condition after capture. The tags were described by More (1963).

* Fork length for sheepshead only.

Hydrographic and meteorological data were obtained at each station. Temperatures were recorded as degrees centigrade and salinities were determined by the Mohr titration method.

Figure 1 shows location of all sampling stations.

Findings: Juvenile Game Fish

The apparent year class strength of redfish (Sciaenops ocellata), black drum (Pogonias cromis), speckled trout (Cynoscion nebulosus), and southern flounder (Paralichthys lethostigma) is estimated in Table 1. Survival of 1964 year-class speckled trout and black drum appears to be down when compared to 1963 year-class levels. There was a sharp increase in the number of redfish and southern flounder in the samples over 1963. This indicated a successful fall and winter spawning for both species.

Catch per area calculations for 10 regular seine stations sampled are shown in Table 2, while an evaluation of each habitat is presented in Table 3. Surf Oaks was a productive nursery area for black drum and redfish, while Moses Lake was productive for southern flounder, redfish, black drum, and speckled trout. Dickinson Bayou and Double Bayou, both with good supplies of fresh water discharge from the local watershed, were good nursery areas for southern flounder and speckled trout. All West Bay stations had good vegetative stands and a fairly stable environment and each served as a nursery area for all game fish species.

Table 4 is a summary of juvenile game fish caught in 6-foot bar-seine samples. This small mesh size of the bar-seine was valuable in detecting game fish at an earlier date and smaller size than the more selective larger mesh of the 60-foot seine. It appears to be more effective than the 60-foot seine for catching Year-Class 0 southern flounder.

The 10-foot trawl was not an effective sampling device for catching juvenile game fish. Only 14 Year-Class 0 southern flounder were taken during this study by this gear.

Figure 2 gives the monthly progression of average size and size ranges for redfish and southern flounder. The acceleration of growth in April for both species is well illustrated. The monthly average size for all species was higher in West Bay than in Galveston Bay.

Speckled Trout: Ninety-seven 1964 year-class speckled trout were collected between May and December. The size range was 14 to 138 mm. Peak months of abundance were August, October, and November (Table 2). Spawning activity probably commenced in March and extended through September (Figure 3). Trout were recorded in salinities between 3.2 and 35.7 ppt.

Redfish: The first 1963-64 year-class redfish appeared in November (1963) and were recorded every month through November 1964. Survival of the fall and winter spawn was high and a good standing crop of juveniles was present during late summer and fall. This good standing crop should be reflected in increased sports catch and commercial landings during 1965. The rapid rate of growth of young redfish during spring and summer months is shown in Figure 2. A total of 72 Year-Class 0 redfish was collected during this survey in salinities varying between 2.9 and 32.0 ppt. Based on 1962-63 year-class data, this estimated 1963-64 year-class strength is 7.5 times as great as the preceding year-class (Table 1).

Black Drum: Data indicated that the survival of 1964 year-class drum was down when compared to 1963 year-class levels. However, data are based mainly on catches at one station (Surf Oaks). For this reason, little confidence can be placed on the estimated year-class strength from drum in Table 1. By fitting a regression line to monthly average sizes of drum taken at Surf Oaks (Figure 4), a growth rate of 0.7 mm/day was estimated.* This rate is slightly higher than 0.6 mm/day estimated by More (1963). Year-class drum were taken in salinities between 12.7 and 35.7 ppt. Peaks of abundance were found in July and August.

Southern

Flounder: Southern flounder were taken in Mud and Taylor Lakes in fair numbers during February and April with a 6-foot bar-seine. March and April were peak months at regular 60-foot seine stations. A total of 131 Year-Class 0 southern flounder was taken during this survey. The average size increased from 22 mm in February to 40 mm in April (Figure 2), and then jumped to 62 mm in May. This increase in growth can probably be attributed to increased water temperatures and follows a trend demonstrated by Year-Class 0 redfish. The estimated 1964 year-class strength (Table 1) is 10 times as great as the 1963 year-class. This species was recorded in salinities from 2.0 to 31.3 ppt., but was most frequently taken in salinities below 17 ppt.

Sheepshead: Fourteen 1964 year-class sheepshead (Archosargus probatocephalus) were taken during this study period. Six of these were taken in one sample in Christmas Bay during May. All but one of the sheepshead collected were associated with heavy vegetation and only one was found in a salinity of less than 28.1 ppt. Upper and lower Galveston Bay stations produced only 1 Year-Class 0 sheepshead. The rest were taken at West Bay stations. Data on sheepshead were weak, and no conclusions on the success of the year-class were reached.

Adult Game Fish

Drag seine data are presented in Table 5 in pounds per acre. Trends in the availability of the different species are not clear, but sheepshead and atlantic croaker (Micropogon undulatus) were relatively abundant during most of the year.

A bimonthly comparison of catch data for 1962 and 1964 is shown in Table 6. The catch data suggest a poor standing crop of redfish, speckled trout, and black drum. Catch rates were erratic and the catch data does not appear to be indicative of the size of the populations of these species. This is exemplified by a good standing crop of Year-Class 0 redfish during the fall and winter which were caught readily with other fishing gear, but did not appear in regular drag-seine hauls.

Commercial Landings

Table 7 shows the commercial landings for Galveston Bay** for 1963 and 1964. Speckled trout and southern flounder landings (1964) decreased 67 and 62 per cent, respectively. Redfish landings were up 300 per cent and the sheepshead catch increased 136 per cent. Total 1964 landings were down 2.6 per cent from 1963 figures. The reduction in total landings for this year (1964) is due mainly to the decrease in the speckled trout catch (-65,000 lbs).

* No recruitment was apparent.

** This does not include Gulf landings.

Fish Tagging

Tagging data and returns for 1964 are presented in Tables 8 and 10. A total of 681 game fish was tagged during 1964. There were 11 returns from the 1964 tagging and 8 returns from previous years tagging.

Revisions of the 1963 tagging data and returns are shown in Table 9. Redfish showed the highest rate of return (9.2%), followed by speckled trout (2.9%) and sheephead (2.7%).

Movement of tagged fish was random.

Comments

The value of the drag-seine in sampling the relative availability of adult game fish is questionable. More emphasis should be placed on the size and survival of successive year-classes of game fish species.

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Reference

More, William R. Population Studies of the Sports and Commercial Fin-Fish and Forage Species of the Galveston Bay System. Parks and Wildlife Department Project Report. 1963.

Table 1
 Estimated Year Class Strength in Numbers Per Acre for Major Game Fish Species
 Based on 60-Foot Seine Juvenile Game Fish Collections (1963-64)

<u>Trout</u>			<u>Black Drum</u>		
<u>Month</u>	<u>1963</u>	<u>1964</u>	<u>Month</u>	<u>1963</u>	<u>1964</u>
May	-	1.74*	April	2.0	-
June	-	.87	May	1371.3	10.3
July	26.0	-	June	494.3	3.9
August	13.1	14.1	July	159.4	132.0
September	8.9	10.2	August	73.9	41.0
October	55.4	12.7	September	16.6	9.4
November	268.5	26.7	October	21.7	7.2
December	<u>27.2</u>	<u>5.2</u>	November	<u>28.3</u>	<u>1.7</u>
TOTAL	399.1	95.0	TOTAL	2167.5	205.5
Year-class** Index	1.00	0.24	Year-class Index	1.00	0.09

<u>Flounder</u>			<u>Redfish</u>		
<u>Month</u>	<u>1963</u>	<u>1964</u>	<u>Month</u>	<u>1962-63</u>	<u>1963-64</u>
February	-	1.2	November	-	56.7
March	-	19.6	December	-	27.2
April	2.0	11.5	February	1.5	3.7
May	-	5.2	March	2.7	31.3
June	2.9	2.6	April	16.2	25.7
July	-	2.0	May	-	4.4
August	-	2.2	June	<u>-</u>	<u>3.0</u>
September	-	1.7	TOTAL	20.4	152.0
October	-	1.4	Year-class Index	1.0	7.5
November	<u>-</u>	<u>2.2</u>			
TOTAL	4.9	49.6			
Year-class Index	1.0	10.1			

* Average number of individuals per acre for all nursery areas sampled

** Index base 1963 year class

Table 2
Year Class 0 Game Fish Collections - 60-Foot Seine (1964)
Number Per Acre

Month	Species	Double Bayou	Moses Lake	Dickinson Bayou	Surf Oaks	Houston Pt.	Maggies Pt.	Turtle Grass Flats	Nymph Pt.	Mud Cut	Christmas Bay
Feb.	Redfish	-	17.4	-	-	N.S.	8.7	N.S.	-	-	N.S.
	Flounder	-	-	-	-	N.S.	8.7	N.S.	-	-	N.S.
March	Redfish	17.4	43.5	8.7	161.2	N.S.	-	-	4.3	8.7	37.2
	Flounder	-	96.7	-	-	N.S.	-	-	21.5	52.2	6.2
April	Redfish	17.4	26.1	32.7	111.6	-	26.1	26.1	-	8.7	8.7
	Flounder	8.7	26.1	54.5	-	-	17.4	8.7	-	-	-
May	Redfish	8.7	-	-	34.8	-	-	-	-	-	-
	Drum	-	-	-	26.1	-	-	26.1	-	-	60.9
	Sp. Trout	-	-	-	-	-	-	-	-	-	17.4
	Sheepshead	-	-	-	-	-	-	8.7	-	-	52.2
	Flounder	8.7	-	34.8	-	-	-	-	8.7	-	-
June	Redfish	-	-	-	-	8.7	21.8	-	-	-	-
	Drum	-	-	-	12.4	-	-	-	8.7	8.7	8.7
	Sp. Trout	-	-	-	-	-	-	-	-	8.7	-
	Sheepshead	-	-	-	-	-	-	24.8	-	-	-
	Flounder	-	8.7	17.4	-	-	-	-	-	-	-
	Whiting	-	-	-	-	-	-	-	8.7	-	-
July	Redfish	-	8.7	-	-	-	-	-	-	-	-
	Drum	-	121.8	-	1128.4	-	34.8	-	-	26.1	8.7
	Sheepshead	-	-	10.9	-	-	8.7	-	-	-	-
	Flounder	-	-	10.9	-	-	-	-	8.7	-	-
	Whiting	-	-	-	-	-	-	-	34.8	-	-

Table 2 (Cont.)
 Year Class 0 Game Fish Collections - 60-Foot Seine (1964)
 Number Per Acre

Month	Species	Double Bayou	Moses Lake	Dickinson Bayou	Surf Oaks	Houston Pt.	Maggies Pt.	Turtle Grass Flats	Nymph Pt.	Mud Cut	Christmas Bay
August	Redfish	8.7	-	-	-	-	-	-	-	-	-
	Drum	-	60.9	-	297.6	43.2	-	-	-	-	8.7
	Sp. Trout	-	26.1	10.9	-	-	-	-	-	69.6	34.8
	Sheepshead	-	-	-	-	-	-	-	-	-	8.7
	Flounder	-	-	21.8	-	-	-	-	-	-	-
Sept.	Redfish	-	-	-	6.5	8.7	-	-	-	8.7	-
	Drum	-	8.7	-	32.5	17.6	-	-	-	34.8	-
	Sp. Trout	26.1	-	32.7	-	-	8.7	-	-	-	34.8
	Flounder	-	8.7	-	-	-	-	-	-	8.7	-
	Whiting	-	-	-	-	8.7	-	-	26.1	-	-
Oct.	Redfish	-	-	-	-	N.S.	-	-	4.8	-	-
	Drum	-	26.1	10.9	-	N.S.	-	17.4	-	17.4	-
	Sp. Trout	-	26.1	10.9	-	N.S.	16.2	8.7	48.0	17.4	-
	Flounder	-	-	-	-	N.S.	-	-	4.8	8.7	-
	Whiting	-	-	-	-	-	-	-	43.5	17.4	-
Nov.	Redfish	10.9*	-	-	-	8.7	-	287.1*	-	-	N.S.
	Drum	-	8.7	-	-	8.7	-	-	-	-	N.S.
	Sp. Trout	54.5	26.1	-	49.6	26.1	-	52.2	17.4	8.7	N.S.
	Sheepshead	-	-	-	-	-	8.7	-	8.7	-	N.S.
	Flounder	-	-	21.8	-	-	-	-	-	-	N.S.
Whiting	-	-	-	-	-	-	-	2.9	-	-	
Dec.	Redfish	8.7*	8.7*	-	-	-	-	-	-	-	-
	Sp. Trout	-	8.7*	43.5	-	-	-	-	-	-	-

* 1964-65 Year Class
 N.S. - No Sample Taken

Table 3
Habitat Description of Juvenile Game Fish Stations (1964)

<u>Station</u>	<u>Description</u>	<u>Salinity Range (ppt)</u>	<u>Vegetation</u>	<u>Evaluation</u>
Double Bayou	Bottom type: mixed clay and soft mud, many <u>Rangia sp.</u> shells. Subject to frequent flooding and heavy runoff from rice field drainage	0.6 - 15.7	Sprouts of <u>Ruppia sp.</u>	Good nursery area for redfish, speckled trout, and flounder.
Dickinson Bayou	Bottom type: soft mud, heavy deposits of silt on sloping bottom	8.5 - 16.9	None	Good nursery area for flounder; fair for redfish and speckled trout.
Moses Lake	Bottom type: sandy clay - mixed shell; good nutrient source from near-by marshy area	16.4 - 21.5	Frequent algae blooms, especially <u>Enteromorpha sp.</u>	Very productive nursery area for redfish, speckled trout, black drum, and flounder.
Surf Oaks	Bottom type: sandy mud; marshy habitat, receives good supply of runoff from adjacent slough; salinities fluctuate	2.0 - 24.4	Frequent algae blooms, especially <u>Enteromorpha sp.</u>	Excellent nursery area for black drum and redfish; good for speckled trout.
Houston Pt.	Bottom type: hard sand; low marshy area - receives good supply of fresh water from Cedar Bayou; - near discharge of cooling water used by oil company in producing operations.	11.1 - 28.8	None	Was not an important nursery area during this study.
Maggies Pt.	Bottom type: sand and mud, fairly stable hydrography, good vegetative cover	14.0 - 35.9	Good stand of <u>Gracilaria sp.</u> ; <u>Diplanthera wrightii</u> ; traces of <u>Halophilia engelmanni</u>	Nursery area for all game fish species.

Table 3 (Continued)
Habitat Description of Juvenile Game Fish Stations (1964)

<u>Station</u>	<u>Description</u>	<u>Salinity Range (ppt)</u>	<u>Vegetation</u>	<u>Evaluation</u>
Turtle Grass Flats	Bottom type: hard sand - adjacent of Gulf Pass - very shallow (1/2 - 1 1/2')	17.5 - 36.6	Good stand of <u>Diplanthera wrightii</u> ; some <u>Thalssia testudinum</u>	Serves as a nursery area for all species, especially sheepshead and redfish.
Mud Cut	Bottom type: sandy mud - near a Gulf Pass	14.6 - 34.5	Good stand of <u>Ruppia</u> <u>sp.</u> and <u>Dictyota sp.</u> ; some <u>Diplanthera</u> <u>wrightii</u> , <u>Halophilia</u> <u>engelmanni</u>	Good nursery area for all species.
Nymph Pt.	Bottom type: mixed clay, mud and sand - adjacent to New Bayou water- shed - conditions fluctuate with runoff	5.4 - 26.6	Frequent brown and green algae blooms	Served as a nursery area for speckled trout, black drum, redfish, flounder, whiting and gafftopsail catfish.
Christmas Bay	Bottom type: hard sand - very heavy vegetative cover. Many <u>Bugula sp.</u> colonies; well protected area.	19.5 - 35.7	Good stands of <u>Gracilaria sp.</u> ; other types present include <u>Halophilia engelmanni</u> and <u>Diplanthera wrightii</u>	Indicator station - used to detect first zero year class members. Very good nursery area for all game fish species.
Mud Lake	Bottom type: soft mud - drains into Clear Lake - fed by Middle Bayou Depth: 3 - 4'		None	Good flounder nursery.
Taylor Lake	Bottom type: soft mud - drains into Clear Lake - fed by Taylor Bayou - well protected area. Depth: 3 - 5'		None	Good flounder nursery.

Table 4
 Summary of Year Class 0 Game Fish Caught in 6-Foot Bar-Seine
 Number of Individuals Per Acre

Month	Species	Mud Lake	Taylor Lake	Moses Lake	Double Bayou	Surf Oaks	Size Range (mm)
February	Flounder	116.0	261.0	NS	NS	NS	13-30
March	Flounder	0	14.5	14.5	29.0	NS	32-42
April	Flounder	58.0	72.5	275.5	0	0	13-46 60,80
May	Flounder	29.0	0	0	14.5	0	46-56
	Drum	0	0	0	0	435.6	20-33
June	Flounder	0	14.5	14.5	14.5	0	50-81
	Whiting	0	0	0	0	24.2	17
July	Drum	0	0	0	0	24.2	65
	Speckled Trout	14.5	0	14.5	0	0	25, 35
August	Speckled Trout	0	0	14.5	145.0	0	15-24 50
September	Speckled Trout	0	0	0	58.0	0	18-20
October		0	0	0	0	0	-
November	Redfish	0	0	0	29.0*	0	35, 60
	Whiting	0	0	0	0	48.4	22, 27
December	Flounder	14.5					115
	Redfish	0	0	58.0*	0	0	24-40

* 1964-65 Year Class

Table 5
 Summary of Fish Caught at Drag Seine Stations (1964)
 (Expressed as Pounds/Acre)

		Redfish	Speckled Trout	Black Drum	Sheepshead	Southern Flounder	Croaker	TOTALS
Jan.	Lone Oak	0	.73	.05	0	0	0	.78
	Surf Oaks	0	.71	.02	0	0	.02	.75
Feb.	Mud Cut	.31	.09	.15	.09	.17	0	.81
	Chocolate Bay	0	0	0	.27	0	0	.27
March	Lone Oak	.56	0	.39	.44	0	0	1.39
	Surf Oaks	0	0	4.79	0	0	0	4.79
	Mud Cut	.39	1.01	3.70			.01	5.10
	Chocolate Bay	1.25	.67	2.40	1.67	.02		6.01
April	Surf Oaks	.02	0	0	.14	0	.44	.60
	Mud Cut	1.39	6.69	.84	7.92	0	.16	17.0
May	Lone Oak	0	.27	1.79	5.13	.03	5.40	12.62
	Chocolate Bay	0	.94	.56	.86	.01	1.30	3.67
June	Surf Oaks	.03	.66	0	0	0	1.24	1.92
	Mud Cut	.03	1.41	0	.63	.20	.99	3.26
July	Lone Oak	0	.58	.01	.73	0	1.00	2.31
	Chocolate Bay	0	.07	.01	0	0	.15	.23
Aug.	Surf Oaks	0	0	.98	4.37	.04	1.80	7.19
	Mud Cut	.16	.48	.01	0	.06	.79	1.49
Sept.	Lone Oak	0	1.09	.34	.44	0	.72	2.59
	Chocolate Bay	0	.08	.04	3.25	.16	.35	3.88

Table 5 (Continued)
 Summary of Fish Caught at Drag Seine Stations (1964)
 (Expressed as Pounds/Acre)

		Redfish	Speckled Trout	Black Drum	Sheepshead	Southern Flounder	Croaker	TOTALS
Oct.	Surf Oaks	0	.75	.01	.54	0	.50	1.80
	Mud Cut	.42	.49	.84	4.68	0	-	6.43
Nov.	Lone Oak	0	0	1.23	.45	0	0	1.68
	Chocolate Bay	0	.25	0	1.51	0	0	1.76
Dec.	Surf Oaks	0	0	.08	0	.19	0	.27
	Mud Cut			Not Completed				
	TOTALS	4.56	16.97	18.24	33.12	.88	14.87	87.90
	Avg. Sample	.18	.68	.73	1.33	.035	.58	3.52

Table 6
Bimonthly Comparisons of the Relative Availability of Adult Game Fish at Drag Seine Stations (1962 & 1964)

	Speckled Trout		Redfish		Drum		Sheepshead		Flounder		Croaker	
	1962	1964	1962	1964	1962	1964	1962	1964	1962	1964	1962	1964
March-April	8.2*	1.4	4.6	.6	7.6	2.0	2.1	1.7	.1	0	1.0	.1
May-June	2.8	.8	1.5	.01	.1	.6	1.4	1.7	.02	.01	1.3	2.3
July-August	1.6	.3	1.2	.04	.2	.25	1.6	1.3	.09	.02	1.1	.9
Sept.-Oct.	1.5	.6	1.2	.1	.7	.3	2.8	2.2	0	.04	.9	.4
Nov.-Dec.	<u>1.1</u>	<u>.06</u>	<u>2.8</u>	<u>0</u>	<u>3.0</u>	<u>.4</u>	<u>4.3</u>	<u>.7</u>	<u>.01</u>	<u>.06</u>	<u>0</u>	<u>0</u>
TOTALS	15.2	3.16	11.3	.72	11.6	3.55	12.2	7.6	.13	.13	4.3	3.7

* Average weight in pounds/acre of all drag seine samples for that period.

Table 7
 Commercial Landings - Galveston Bay (1963-64)
 Source: Marcal Johnson, Statistical Clerk, Parks and Wildlife Department,
 Seabrook Marine Laboratory, Seabrook, Texas

	Redfish		Speckled Trout		Black Drum		Southern Flounder		Sheepshead	
	1963	1964	1963	1964	1963	1964	1963	1964	1963	1964
January	1737	25	16296	-	5049	1140	96	320	1653	13728
February	664	4447	11808	161	1884	4067	60	84	4190	1179
March	720	40	39636	21575	6130	2800	41	443	0	6751
April	387	0	8119	15493	524	-	1108	1374	3983	-
May	200	2672	14448	3444	1132	2648	175	784	1545	1716
June	0	2738	0	14628	0	2177	1072	66	0	2720
July	0	2600	0	90	0	5981	1124	869	30	4673
August	20	2994	16	9341	386	3613	2163	1355	585	3014
September	101	2747	2	5494	2516	10991	6325	695	2710	1476
October	250	578	18638	401	634	1346	6676	5324	3190	16792
November	496	2157	37879	19553	1348	3460	8360	5335	2736	6106
December	753	727	14894	6524	2277	1526	647	594	5053	2611
TOTAL	5328	21725	161732	96704	21877	39749	27837	17153	25675	60766
% Change		+300		-67		+82		-62		+136
Total Landings (1964)	236,097									
Total Landings (1963)	242,449									

Table 8
Tagging Data (1964) Galveston Bay

<u>Species</u>	<u>No. Tagged</u>	<u>No. Returned</u>	<u>% Returned</u>
Speckled Trout	158	2	1.2
Sheepshead	273	3	1.1
Black Drum	182	4	2.2
Redfish	32	2	6.25
Flounder	19	0	0
Sand Trout	14	0	0
Croaker	2	0	0
Cabio	<u>1</u>	<u>0</u>	0
TOTAL	681	11	

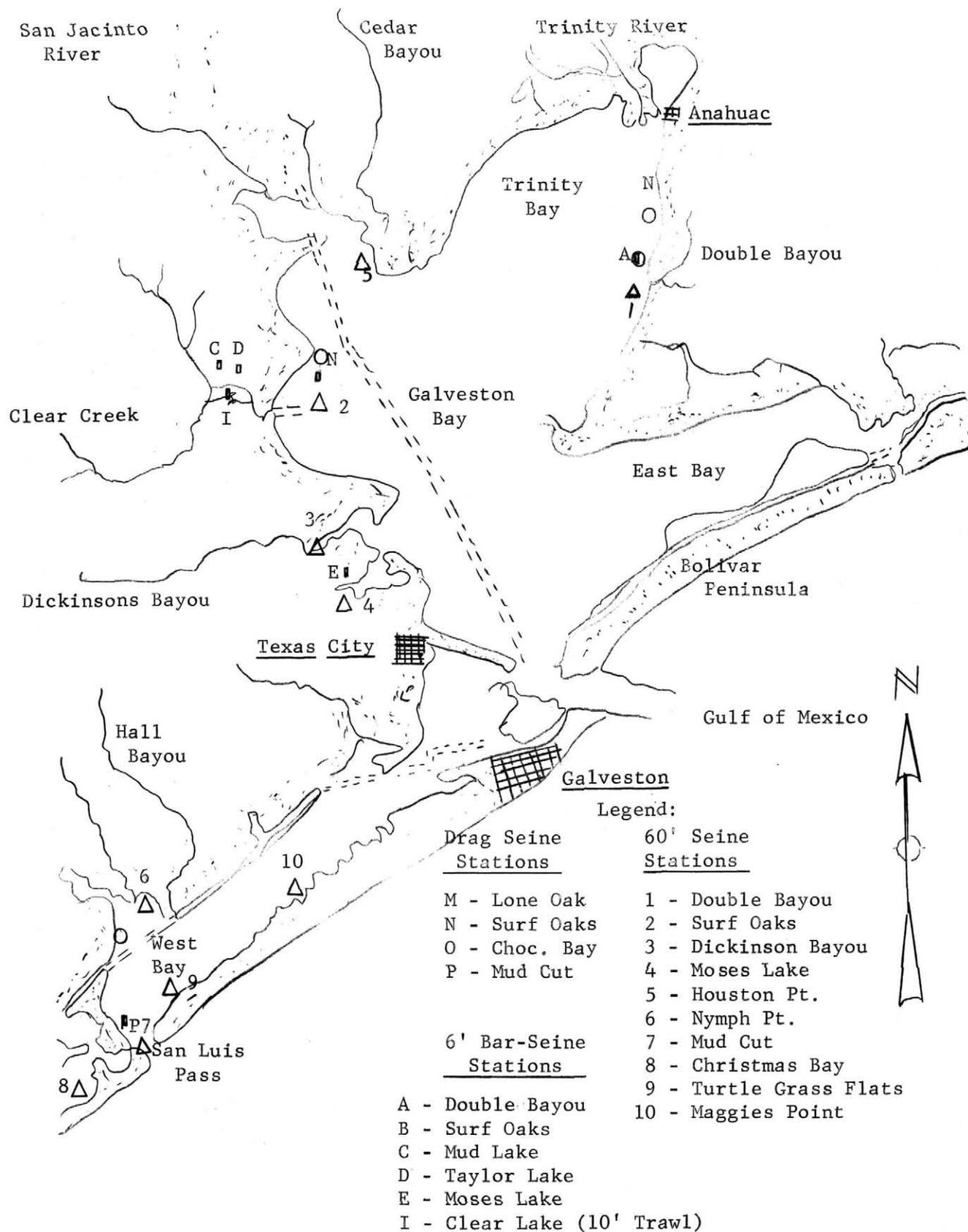
Table 9
Revision of 1963 Tagging Data - Galveston Bay

<u>Species</u>	<u>No. Tagged</u>	<u>No. Returned</u>	<u>% Returned</u>	<u>Maximum No. Days Free</u>
Speckled Trout	103	3	2.9	199
Sheepshead	298	8	2.7	272
Black Drum	241	5	2.1	218
Redfish	<u>47</u>	<u>4</u>	9.2	161
TOTALS	689	20		

Table 10
Tag Returns (1964) - Galveston Bay

Species	Place Tagged/Date	No. Days Free	Distance From Release Point (Nautical Miles)	Place Recaptured	Direction
Redfish	Mud Cut 3/31/64	27	0	Mud Cut	-
Drum	Chocolate Bay 3/30/64	50	1	Alligator Head (West Bay)	E
Sheepshead	Lone Oak 5/18/64	38	7	Triangle Pass	NW
Sheepshead	Lone Oak 5/18/64	38	7	Triangle Pass	NW
Drum	Surf Oaks 8/26/64	5	0	Red Bluff	-
Drum	Red Bluff 10/ 6/64	19	0	Red Bluff	-
Drum	Red Bluff 10/ 6/64	19	2	Morgan's Point	N
Redfish	Maggies Point 7/22/64	90	5	Greens Lake (West Bay)	NE
Sheepshead	Mud Cut 4/27/64	184	0	Mud Cut	-
Speckled Trout	Chocolate Bay 6/23/64	180	14	Freeport Jetties	S
Sheepshead	Chocolate Bay 9/27/63	102	14	Velasco Jetty, Freeport	S
Speckled Trout	Lone Oak 7/17/63	199	20	Offatts Bayou	SW
Redfish	Mud Cut 12/10/63	88	13	N. Deer Island	NE
Sheepshead	Mud Cut 10/22/63	188	0	Mud Cut	-
Drum	Lone Oak 9/25/63	218	2	Double Bayou	N
Redfish	Mud Cut 12/10/63	161	0	Mud Cut	-
Sheepshead	Mud Cut 10/22/63	272	0	Mud Cut	0
Redfish	Mud Cut 12/ 6/62	567	15	Jones Lake (West Bay)	NE

Figure 1
Sampling Stations - Galveston Bay (1964)



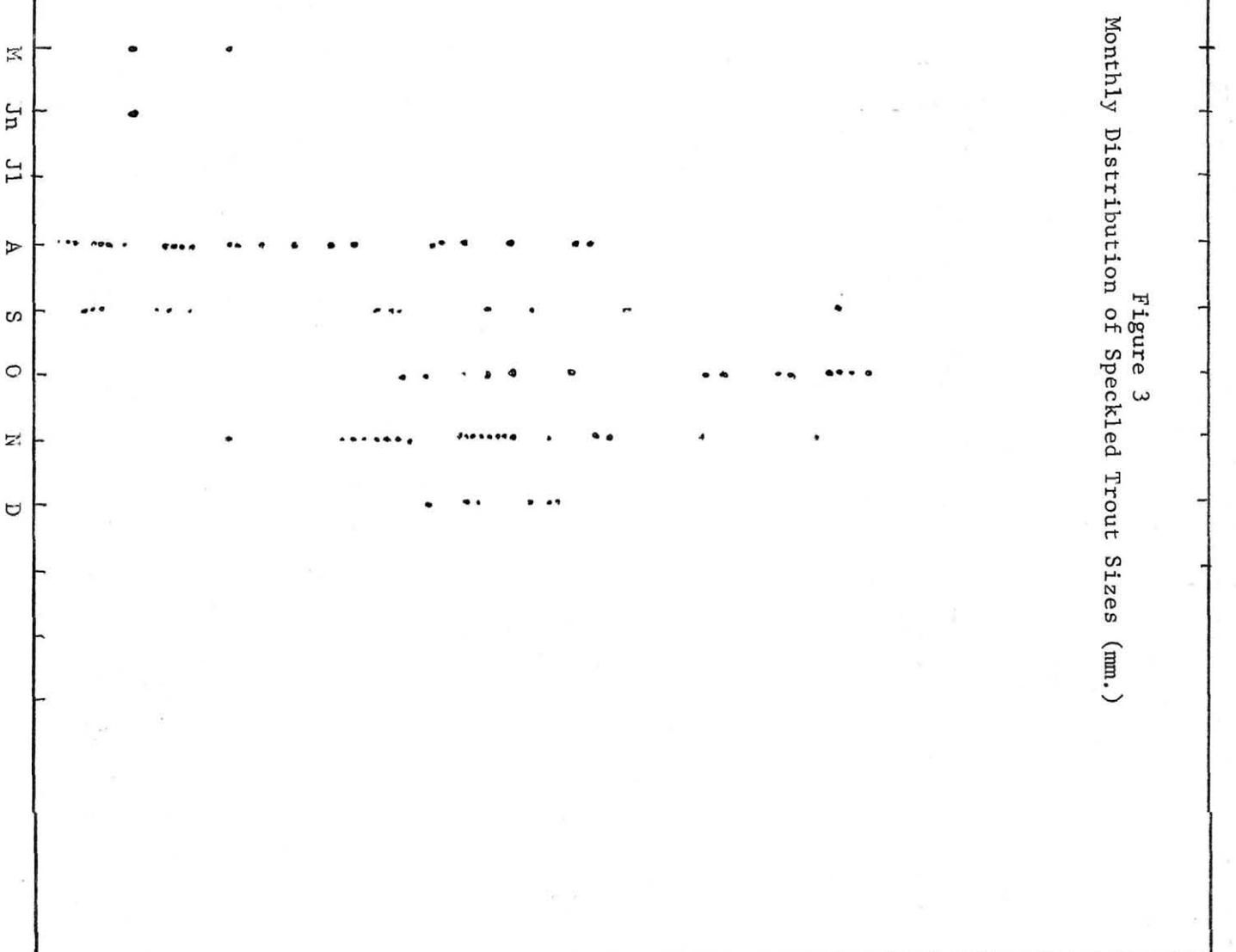
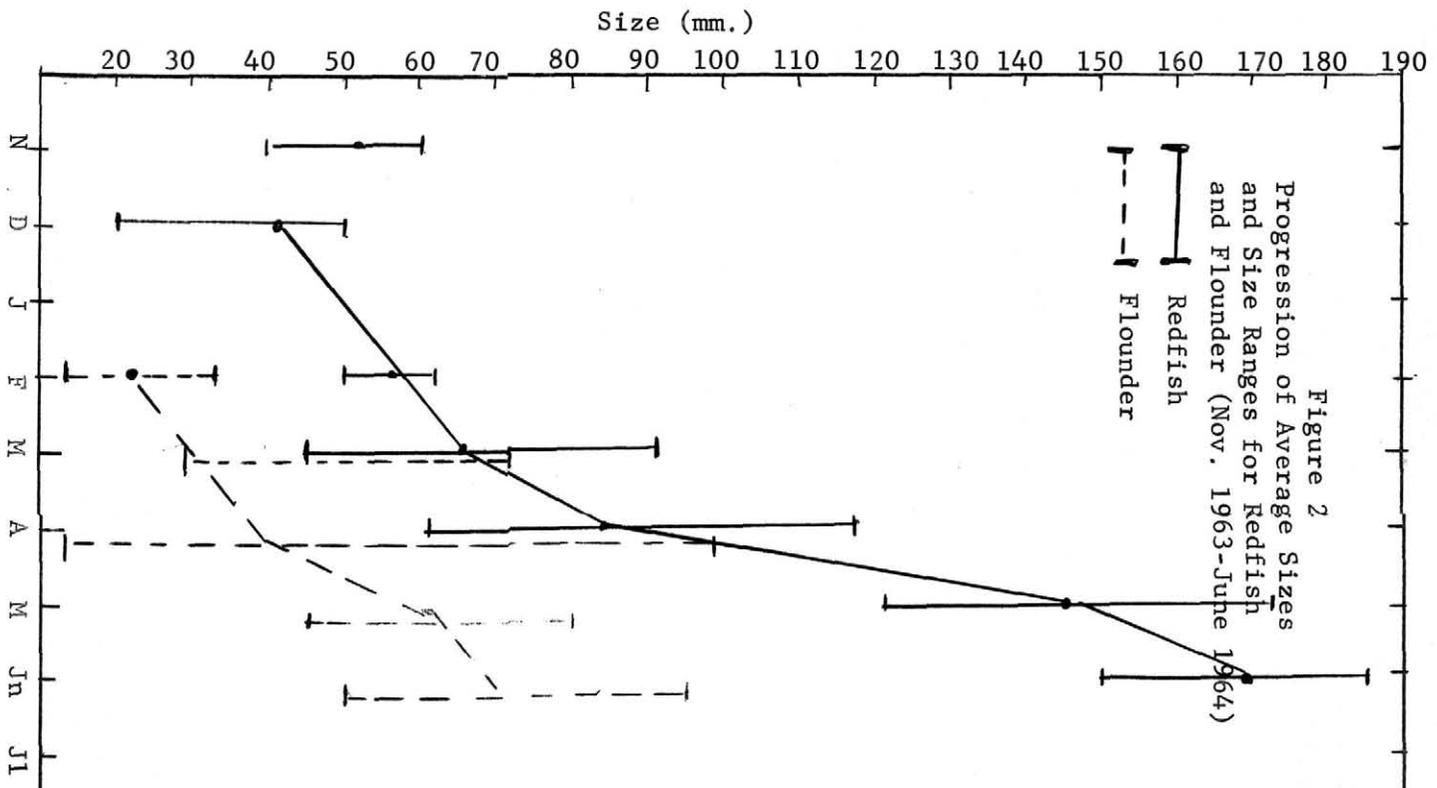


Figure 4
Growth Rate of Black Drum at Surf Oaks,
as Calculated by the Regression Equation

