

Job Report

William C. Hawley
Marine Biologist

Project No. MF-R-6 Date July 12, 1965
Project Name: Analysis of Populations 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. 9

Population Studies of the Sports and Commercial Fin-Fish of the Upper Laguna Madre

Abstract: Monthly seine samples were made at 10 stations in the Upper Laguna Madre during 1964 in order to investigate juvenile fish populations. Redfish and drum had excellent spawns in 1963-64, the best in the past three years. Spring and fall trout hatches were both good but probably not as large as those of 1963. Few young flounder and no juvenile sheepshead were found. Catch per unit effort of two monthly 2,400-foot drag seine hauls was compared with commercial fish landings. These landings indicated increases in drum and sheepshead populations, steady trout populations over the past two years, and a definite decrease, as much as 50 per cent, was for redfish. A tagging program was conducted and of 1576 fish tagged, 7 tags were recovered. This low rate of tag returns was related directly to a decrease in rewards offered for returned tags.

Objectives: To determine the population fluctuations of the food and game fish of the Upper Laguna Madre.

Procedures: Ten juvenile game fish sampling stations were selected to represent various types of habitat in widely scattered areas of the Upper Laguna Madre (Figure 1). These stations were sampled once each month with a 60-foot seine of 3/4-inch stretch mesh webbing. Each seine haul covered approximately one-tenth of an acre of bay bottom so that individual seine catches could be compared. The catch was expressed in numbers of fish per acre based on the ten stations.

A 2,400-foot drag seine was pulled at two locations each month. These two areas (Figure 1) were rather close together because of limited space available free from obstructions. Each drag covered approximately 16 acres of bay bottom. All game fish caught in these sets were counted, measured, and those fish that were suitable were tagged and released. Weights were calculated from weight-length charts for each species.

Adult game fish were tagged with either a monel jaw tag or a plastic internal anchor tag. Tag numbers, species, fork length, point of release, and date of release were recorded for each tagged fish.

Findings and

Discussion:

The Upper Laguna Madre is noted first for its high salinity and second as a favorable fishing bay. While salinities normally run 50 to 60 p.p.t. in the summer and early fall as compared with 35 p.p.t. in the Gulf, many game fish found in bays tolerate this amount of salt. In fact, large trout, redfish and drum are sometimes relatively abundant in areas in which salinity measures as high as 60 p.p.t. Two reasons were given by Simmons (1957): (1) The high salinity may kill parasites on these fish and thus make the fish more comfortable, and (2) many species such as skates and rays, gaftops, and jackfish cannot live in water this salty and thus interspecies competition in such waters is reduced. Monthly salinity averages were 2 to 8 p.p.t. higher in 1964 than they were in 1963, but no extremely adverse effects on game fish were noted.

JUVENILE FISH

Redfish (Sciaenops ocellata)--Juvenile redfish were more abundant in the Upper Laguna Madre in 1964 than in 1963. Young redfish were scattered throughout the area, but the largest catches were made in boat basins and sloughs.

Speckled Trout (Cynoscion nebulosus)--Speckled trout fry were present in the lagoon all year and a few were caught nearly every month. No large concentrations were found in 1964. However, available data (Table 1) shows that there was an increase in the number of trout caught after June. The 1964 trout hatch was a good one although not as large as the 1963 hatch.

Black Drum (Pogonias cromis)--Juvenile black drum were common in the Upper Laguna Madre this year for the first time in the past three years. No small drum were found in 1963 and few were seen in 1962. Young drum first appeared in March at the Landcut and near Yarborough Pass. A school of drum, 17 mm. to 41 mm. long was discovered at Marker 75 in May. Fifty-one drum, 92 mm. to 140 mm. in length, were caught in one seine drag at Tyler's Point from water of 58 p.p.t. salinity in August. These were some of the more spectacular catches, but drum were caught in the lagoon throughout most of 1964.

Southern Flounder (Paralichthys lethostigma)--Only three small southern flounder were caught in the lagoon during 1964. They were caught north of Padre Island Causeway in March and April. Water north of the causeway was usually much fresher than that farther south; therefore young flounder may have avoided entering the hypersaline water of the Laguna Madre. No flounder fry were found in 1962.

Sheepshead (Archosargus probatocephalus)--No young sheepshead were caught either in 1963 or 1964, although adult sheepshead were abundant.

ADULT FISH

Speckled trout--Commercial trout landings in 1964 (Figure 2) and drag seine catches during the same period followed similar trends. In both there was a buildup to a peak in July followed by a sharp decline in August. Both then rose in September and commercial landings continued to rise in October while seine catches declined slightly. In November there was major disagreement since biological catches increased while commercial landings dropped.

Discrepancies of this type may be due to sampling error, or they may be caused by changes in fishing effort. In the Laguna Madre fishing effort is normally curtailed in November as fish prices decline with the approach of Thanksgiving. This usually results in a drop in commercial landings.

A more serious discrepancy involves drag seine catches in successive years. These data (Figure 2) indicate that trout were much more abundant in August, September and October 1963 than in the same months in 1964. Commercial landings, however, were slightly higher in October 1964 than in October 1963. This disagreement indicates that two samples per month were insufficient to provide accurate estimates.

Redfish--Both commercial landings and drag seine catches indicated a drop in redfish abundance from the previous year. Figure 3 graphically indicates 1964 monthly commercial landings to be between 700 to 7,600 pounds below those of corresponding months of 1963. Annual commercial harvest of redfish was down nearly 50 per cent in 1964. Drag seine samples indicated an even greater decrease (Figure 2). Sampling during the last four months of 1964 gave an average of 0.05 redfish per acre as compared with 0.90 for similar sampling in 1963. This decline was expected because of poor juvenile crops in the Laguna Madre in both 1962 and 1963.

Black Drum--Drag seine catches of black drum were erratic during 1964, but consistently high in 1963 (Tables 2 and 3 and Figure 4). However, 1964 commercial landings were higher for 9 consecutive months and the yearly total was about 30 per cent higher than in 1963. These increased landings indicate that drum were more abundant in 1964 than the previous year.

Sheepshead--Sheepshead are often weighed in with drum at commercial fish houses, thus no reliable data on commercial landings were available. Catch per unit effort, as graphed in Figure 5, shows a fairly large sheepshead population present in both years, with possibly a slightly larger population in 1964.

Southern Flounder--Few flounder were caught in the drag seine but commercial catches were fairly high in November. Biological sampling has not produced enough flounder during the past two years for a valid comparison; however, commercial landings were significantly higher in 1964.

Fish Tagging

Of the 1576 fish tagged during 1964 only 7 tags were recovered (Table 4). Fourteen additional recoveries came from tags used in previous years. An insufficient number of tags were recovered to allow population estimates, but some interesting data on fish movement are presented in Table 5. In general, drum tended to move south while redfish showed a northward movement. The only tagged trout recovered outside the area was caught in the Gulf near Port Mansfield Pass. Greatest movement was observed in tagged drum, 6 of which left the Upper Laguna Madre. Recoveries of these drum were as follows: 1 was recovered in the ship channel at Port Aransas, 1 in Corpus Christi Bay at the bulkheads, 2 moved to the headwaters of Baffin Bay, 1 drum was caught just south of the Landcut, and 1 traveled approximately 135 miles south to La Pesca, Mexico.

Table 6 compares percentages of annual tag returns in 1964 with those of 1962 and 1963. Total tags recovered annually and percentage of recoveries remained about the same for the three years. Beginning in 1963 plastic internal anchor tags were substituted for monel jaw tags in tagging trout because the jaw tags were probably being shed. It is quite likely that trout retained the internal anchor tags longer than they did monel tags and thereby increased the chances for trout tag recoveries. Redfish, drum, and sheepshead recoveries declined in 1964. After two years 14.4 per cent of the 1962 redfish tags had been recovered as compared with 4.6 per cent of the 1963 redfish tags in an

equal period to time. Drum recoveries dropped off sharply from 0.9 per cent in 1963 to 0.2 per cent in 1964. A rapid decline in sheepshead returns was also evident, but since more sheepshead were caught and tagged in 1964 this reduction in recoveries was probably due to tagged fish leaving the sampling area and recruitment of untagged sheepshead. Few flounder tags were ever recovered.

Comments: A reduction in 1964 tag recoveries coincides with the nearly complete elimination of rewards for tag returns. In 1961 four bait manufacturers each awarded a lure to persons turning in a fish tag. Also, the department sent free pamphlets dealing with marine resources to these individuals. These rewards gradually decreased until by 1964 the only reward was one free lure. During each year a personal letter was written to each individual that returned a tag, thanking him for his cooperation and giving him all the information that was available concerning the tagged fish he caught. These letters were not enough to stimulate initial returns of tags. A system of rewards must be offered and the rewards made known to the public before a successful tagging program can be carried out.

Prepared by: William C. Hawley
Marine Biologist

Joseph P. Breuer
Project Leader

Ernest G. Simmons
Regional Supervisor

Approved by: Terence R. Leary
Coordinator

Literature Cited

Simmons, Ernest G. 1957. An Ecological Survey of the Upper Laguna Madre of Texas. Publ. Inst. Mar. Sci. Univ. of Tex., 4(2):156-203.

Table 1
Number of Juvenile Game Fish Per Acre Caught at Each Seine Station
in the Upper Laguna Madre During 1964

<u>STATION</u>	<u>SPECIES</u>	<u>FEB.</u>	<u>MAR.</u>	<u>APR.</u>	<u>MAY</u>	<u>JUNE</u>	<u>JULY</u>	<u>AUG.</u>	<u>SEP.</u>	<u>OCT.</u>	<u>NOV.</u>	<u>DEC.</u>
1 Boat Hole	Redfish		10	10	10							
	Trout											
	Drum											
	Flounder		10	10								
2 Humble Channel	Redfish	10		30			10				10	
	Trout											
	Drum											
	Flounder			10								
3 Packery Channel	Redfish	10										
	Trout											
	Drum											
	Flounder											
4 Tyler's Point	Redfish		10		10							
	Trout										40	
	Drum							510		10		
	Flounder											
5 Marker 65	Redfish	10	30	10	10							
	Trout							20	20			
	Drum							30		10		
	Flounder											
6 Marker 75	Redfish		10		10							
	Trout											
	Drum				140							
	Flounder											
7 Green Hill	Redfish											
	Trout		10									
	Drum											
	Flounder											
8 Point of Rocks	Redfish					10						10
	Trout		20									
	Drum				10			50	10	10		
	Flounder											
9 Yarborough Pass	Redfish		10	10								
	Trout											
	Drum		40	20		240				10		
	Flounder											
10 Land- cut	Redfish		10	30								
	Trout											
	Drum		40		10						10	
	Flounder											
Average	Redfish	7.5	8.9	9.0	4.0							
	Trout		3.3			1.0	2.5	2.2	3.0	1.0	5.0	1.0
	Drum		4.4	2.0	16.0	24.0		65.6		3.0	1.0	
	Flounder		1.1	2.0								

Table 2
Pounds of Fish per Acre Caught in 2400-foot Drag Seine Sampling
in the Upper Laguna Madre During 1963 and 1964

STATION		SPECIES	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.
Big Cove	1964	Trout	0.54	*	0.76	2.84	13.09	0.03	0.53	1.62	3.43
		Redfish	0.34		0.11	0.24	1.57			0.07	0.34
		Drum	0.79		0.27	0.10	1.69	0.08	355.00	0.63	25.06
		Flounder			0.24	0.25	0.08	0.06		0.01	
		Sheepshead	0.42		0.21		1.05	0.15		0.82	1.29
Mkr. 65	1964	Trout			0.76	3.12	1.62	0.24	1.36	0	0.09
		Redfish			0.33	0.48	0.18	0.02	0	0	0
		Drum			0.62	0.14	0.24	0.09	0.47	0	0.41
		Flounder			0.11	0.08	0.22	0.01	0	0	0
		Sheepshead			1.67	4.05	1.93	0.95	18.06	1.44	7.40
1964 Averages		Trout	0.54		0.76	3.00	7.35	0.14	0.94	0.81	1.76
		Redfish	0.34		0.22	0.36	0.88	0.01	0	0.03	0.17
		Drum	0.79		0.45	0.12	0.90	0.08	177.74	0.31	12.73
		Flounder	0		0.18	0.16	0.15	0.04	0	0.01	0
		Sheepshead	0.42		0.94	2.03	1.49	0.55	9.03	1.13	4.35
1963 Averages		Trout						2.96	4.64	3.48	.94
		Redfish		Drag seine sampline was not started until Aug. '63.				1.78	1.12	.51	.20
		Drum						40.11	19.48	29.59	3.60
		Flounder						0.15	0.01	0	.01
		Sheepshead						2.88	3.09	.08	4.98

* Big Cove was sampled with the drag seine in April but strong water currents washed the net together and no fish were caught. Marker 65 was not sampled because of these strong currents.

Table 3
1964 Commercial Landings of the Upper Laguna Madre
as Reported by Texas Parks and Wildlife Department

	<u>Trout</u>	<u>Redfish</u>	<u>Drum</u>	<u>Flounder</u>
January	7,100	2,000	24,600	40
February	4,600	1,100	25,700	
March	6,600	3,700	24,700	200
April	12,700	5,600	20,800	30
May	10,200	4,800	19,300	310
June	13,200	6,800	40,700	550
July	15,500	6,600	21,300	960
August	9,200	2,000	42,000	500
September	15,100	6,100	38,100	500
October	17,800	7,200	30,600	120
November	8,900	3,800	25,300	2,400
December	<u>10,000</u>	<u>3,100</u>	<u>38,500</u>	<u>150</u>
1964 Total	130,900	52,800	341,600	5,760
1963 Total	130,800	100,800	263,200	3,350

All figures represent pounds of fish.

Table 4
Fish Tagged in the Upper Laguna Madre in 1964 and
Annual Percentage of Tags Recovered Since 1961

	<u>Redfish</u>	<u>Trout</u>	<u>Drum</u>	<u>Sheepshead</u>	<u>Flounder</u>	<u>Total</u>
January	--	--	--	--	--	--
February	14	23	86	1	4	128
March	7	22	17	16	1	63
April	--	--	--	--	--	--
May	3	26	12	16	1	58
June	17	98	4	39	14	172
July	20	206	24	31	6	287
August	2	8	25	34	1	70
September	--	6	480	127	--	613
October	1	42	--	31	--	74
November	8	34	1	59	--	102
December	<u>2</u>	<u>4</u>	<u>--</u>	<u>3</u>	<u>--</u>	<u>9</u>
TOTAL	74	469	649	357	27	1576

Annual Recovery Rates

1961	33.6%	5.4%	3.1%	0.0%	0.9%
1962	12.2%	0.6%	2.4%	4.8%	0.0%
1963	4.6%	1.1%	1.2%	4.3%	1.6%
1964*	4.1%	0.4%	0.1%	0.3%	0.0%

* 1964 Incomplete

Table 5
Upper Laguna Madre Fish Tags Recovered in 1964

Species	Date	Where Tagged	Size	Date	Recovered	Size	Time Free	Growth	Movement	Caught By
Drum	12/ 9/63	Big Cove	23 1/2"	1/ 2/64	Marker 183 Baffin Bay	--	3/4 mo.	--	19 mi. S.	SF
Drum	3/ 7/63	Big Bird Isl.	20 3/4"	3/ 8/64	Sandy Hook Baffin Bay	--	12 mo.	--	35 mi. SW	SF
Drum	12/ 9/63	Big Cove	17 3/4"	3/11/64	Sandy Hook	--	3 mo.	--	35 mi. SW	C
Drum	7/23/63	Big Cove	14 1/4"	3/21/64	W. Marker 63 Pt. Aransas	14 1/4"	8 mo.	None	3 mi. N	C
Drum	7/24/63	Marker 65	--	4/25/64	Channel Marker 5	--	9 mo.	--	33 mi. NE	SF
Drum	9/23/63	E. Mkr. 75	13"	11/ 4/64	C. Ch. Bay La Pesca,	--	13 1/2 mo.	--	20 mi. N	SF
Drum	9/25/63	Marker 65	--	11/12/64	Mexico 13 mi. N	--	13 1/2 mo.	--	Est. 135 mi. S	C
Drum	9/22/64	Big Cove	26 1/2"	11/26/64	Pt. Isabel	--	2 mo.	--	87 mi. S	SF
Redfish	3/11/64	Green Hill	23 1/2"	3/25/64	Pure Oil Co.	--	1/2 mo.	--	15 mi. NW	C
Redfish	8/14/62	Marker 201	14 3/4"	3/28/64	Pure Oil Co.	27"	19 1/2 mo.	12 1/4"	30 mi. N.	C
Redfish	2/12/64	W. Mkr. 45	18"	3/ 7/64	Fish Mkt.	--	1 mo.	--	--	C
Redfish	12/19/62	Pt. of Rocks	15"	4/15/64	Marker 33 13 mi. S	22 1/2"	16 mo.	7 1/2"	20 mi. N.	C
Redfish	8/20/62	Pt. of Rocks	14"	8/17/64	Pita Isl.	25 1/4"	24 mo.	11 1/4"	7 mi. N	C
Redfish	7/26/63	Landcut Green Hill	11 1/2"	8/27/64	Yarbgh. Pass	27"	25 mo.	15 1/2"	7 mi. N	SF
Redfish	5/25/64	Reef	17"	11/ 2/64	Marker 37	--	5 1/4 mo.	--	8 mi. N	SF
Trout	6/19/63	Pt. of Rocks	17 1/4"	4/ 6/64	ICW Bridge	17"	9 1/2 mo.	None	24 mi. N	SF

Table 5 (Continued)

Species	Date	Where Tagged	Size	Date	Recovered	Size	Time Free	Growth	Movement	Caught By
		Oil Channel			1/2 mi. S					
Trout	2/19/64	Reef	16"	5/ 1/64	Pita Isl.	16"	1 1/2 mo.	None	4 1/2 mi. N	C
Trout	6/19/63	Pt. of Rocks	24 3/4"	5/ 6/64	Pt. of Rocks	25 1/2"	10 1/2 mo.	3/4"	Vicinity	C
					Gulf at					
Trout	5/ 1/64	Marker 201	13	6/ 9/64	Pt. Mansfld.	--	1 1/4 mo.	--	48 mi. S	SF
Sheepshead	11/20/63	Marker 65	13 1/2"	8/27/64	Marker 65	13 1/2"	9 1/4 mo.	None	Vicinity	N
Sheepshead	8/27/64	Marker 65	13 1/2"	9/23/64	Marker 65	13 1/2"	1 mo.	None	Vicinity	N

Size and growth recorded in inches.

Time free recorded in months and fractions thereof.

SF indicates sport fishermen.

C indicates commercial catch

N indicates tags recovered by drag seine.

Table 6
Recoveries of Tagged Fish From Upper Laguna Madre - 1962-1964

		TROUT		REDFISH		DRUM		SHEEPSHEAD		FLOUNDER	
		No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
1962	T	163		139		274		21		12	
	R	1	0.6	7	5.0	2	0.7	1	4.8	0	
	R+1	1+0=1	0.6	7+13=20	14.4	2+4=6	2.2	1+0=1	4.8	0	
	R+2	1+0=1	0.6	20+ 3=23	16.5	6+0=6	2.2	1+0=1	4.8	0	
1963	T	441		152		2315		322		62	
	R	3	0.7	6	4.0	20	0.9	14	4.3	1	1.6
	R+1	3+2=5	1.1	6+1=7	4.6	20+7=27	1.2	14+1=15	4.7	1+0=1	1.6
1964	T	469		74		649		357		27	
	R	2	0.4	3	4.1	1	0.2	1	0.3	0	

T = Number of fish tagged annually.

R = Number and percentage of tags returned during a calendar year.

R+1 = Number and percentage of total tags returned during the second calendar year after tagging.

R+2 = Number and percentage of total tags returned during the third calendar year after tagging.

Figure 1
Seine Station, Upper Laguna Madre - 1964

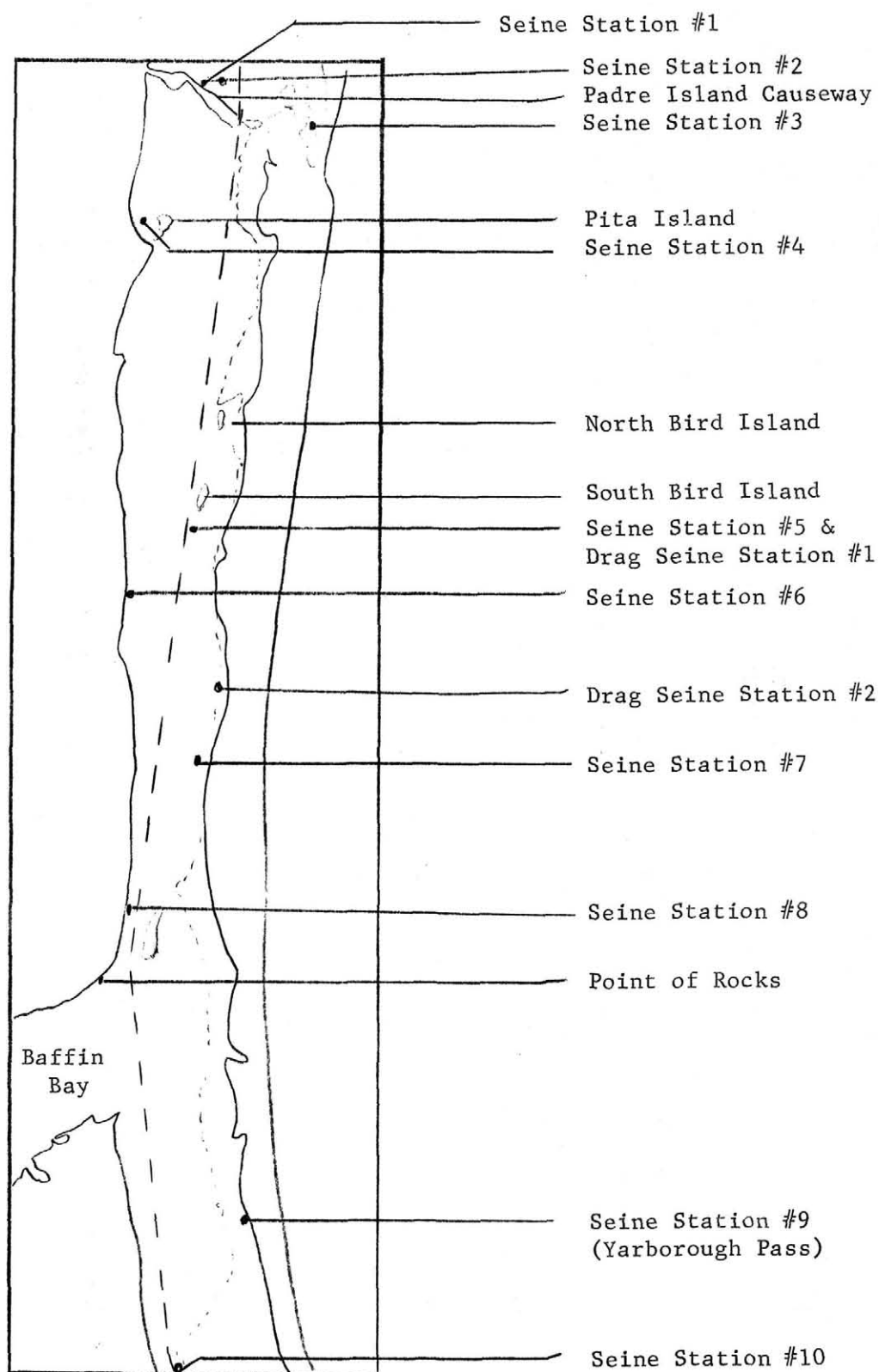


Figure 2
Comparison of Sample Catches (Drag Seine)
of Trout and Commercial Landings, Upper Laguna Madre

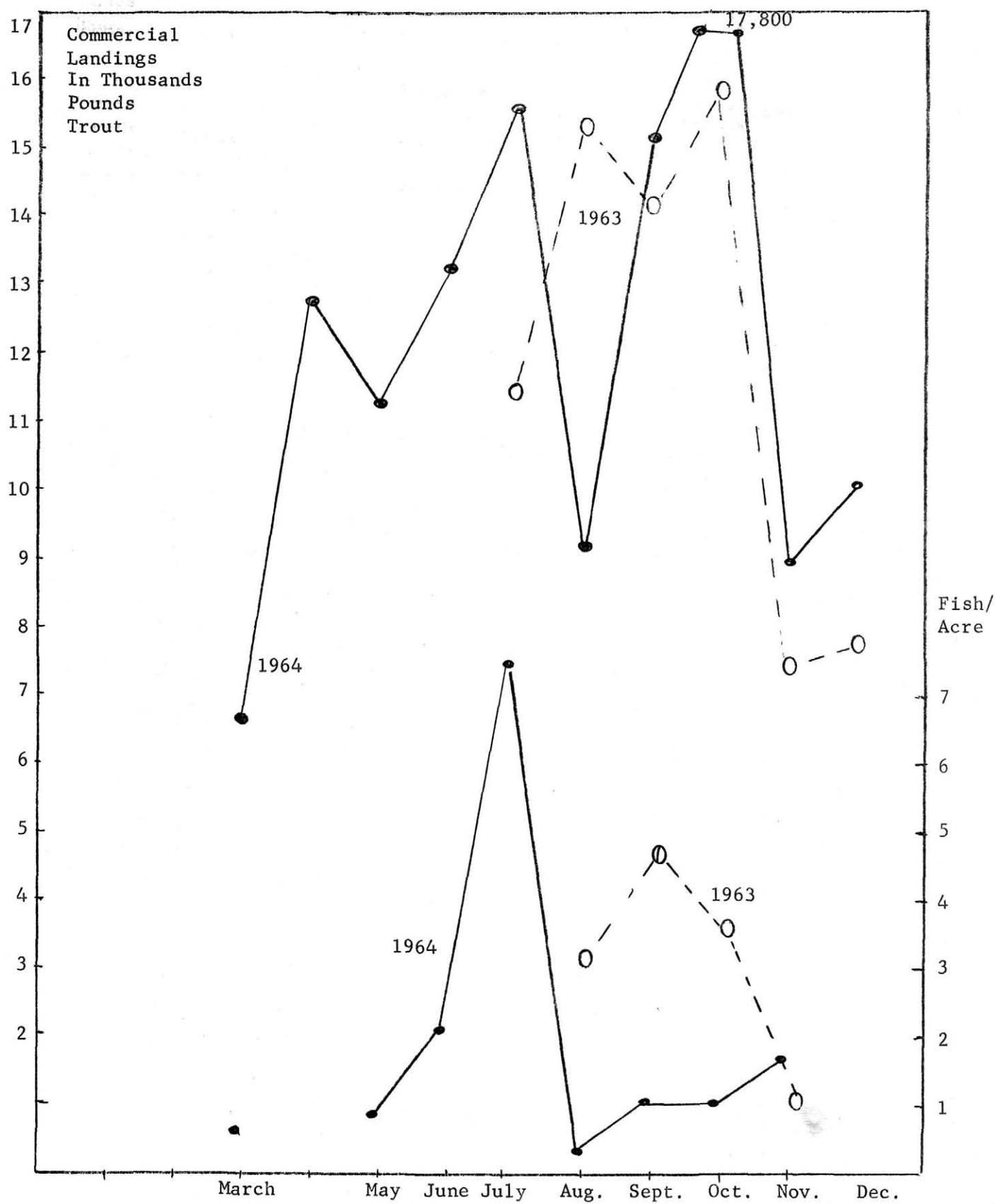


Figure 3
Comparison of Sample Catches (Drag Seine) of Redfish
with Commercial Landings, Upper Laguna Madre - 1964

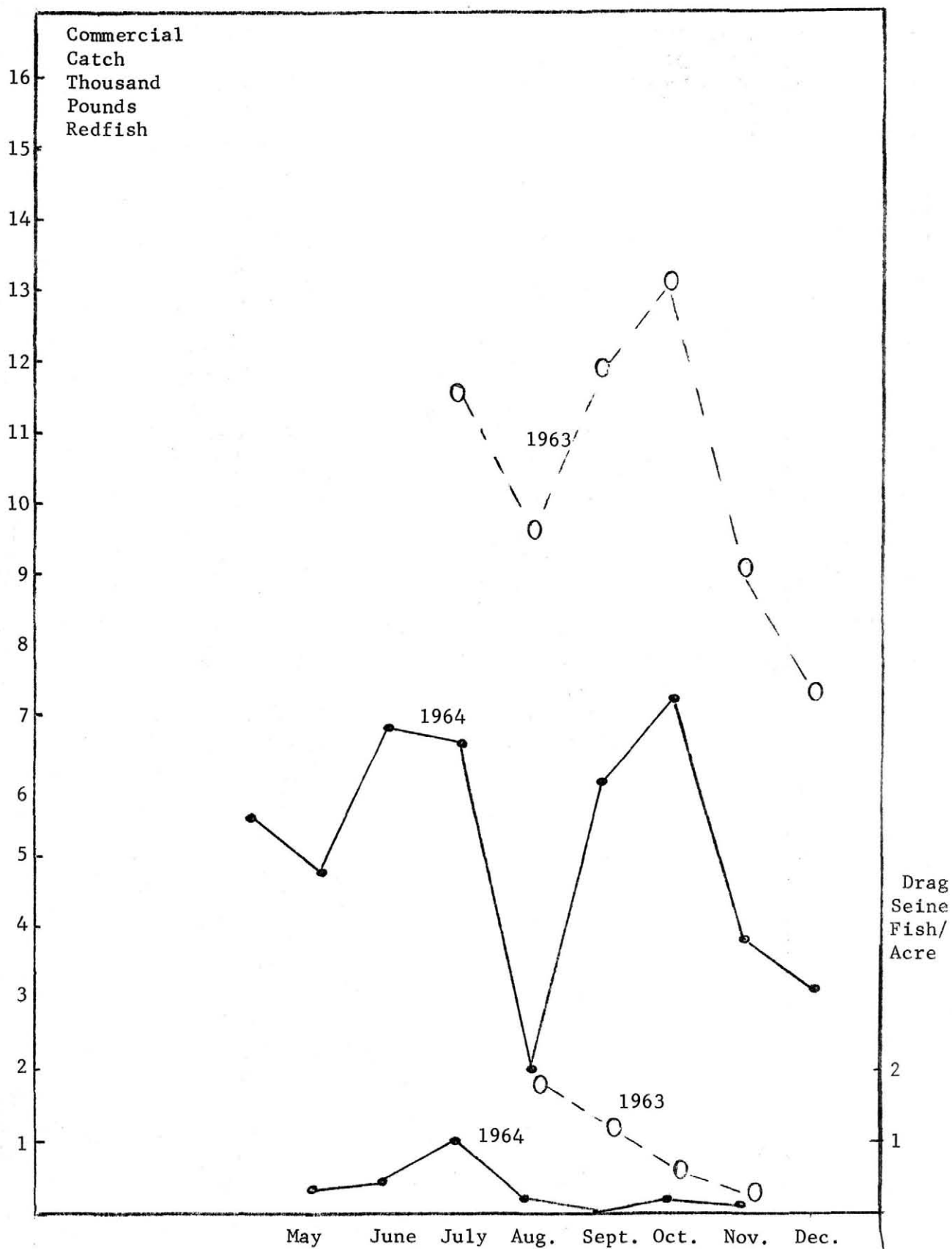


Figure 4
Sample Catches (Drag Seine) of Black Drum
Compared with Commercial Catch, Upper Laguna Madre - 1963-1964

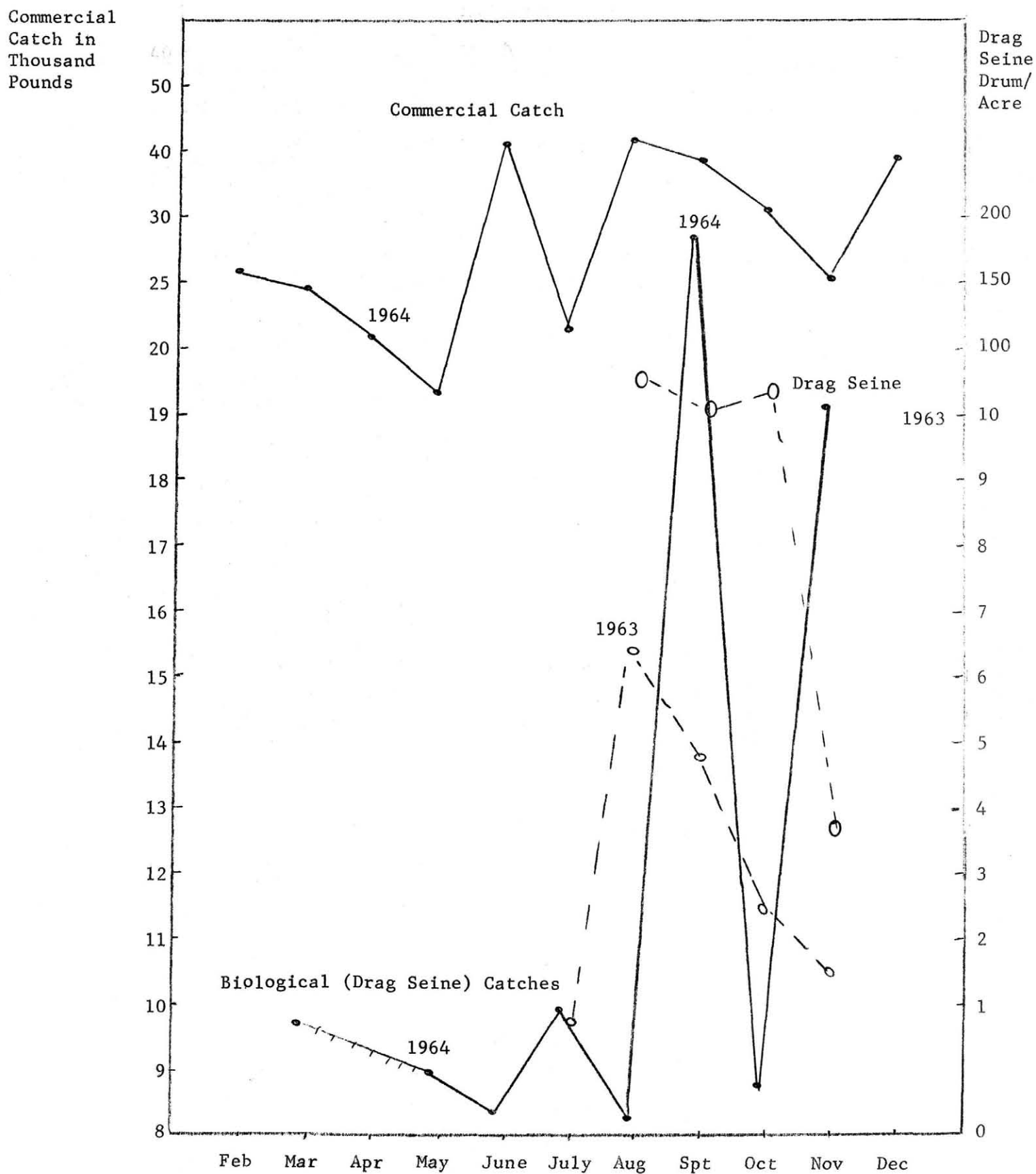


Figure 5
Biological Catches of Sheepshead Per Acre
in the Upper Laguna Madre During 1963 and 1964

