

**SPECIAL CONTRACT FISHING BY
PACE FISH COMPANY
9 MAY 1976-10 MAY 1977**

by

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SPECIAL CONTRACT FISHING BY PACE
FISH COMPANY,
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EXECUTIVE SUMMARY

The Texas Parks and Wildlife Department entered into a 1-yr contract with Pace Fish Company of Brownsville, Texas to evaluate the use of pound nets, trawls and striking rigs for the harvest of underutilized fish species.

The pound net used consisted of a leader, two hearts and a trap (pound). The leaders used were made of 1-6-inch stretched mesh multifilament webbing (5-7 ft high) erected on willow poles to form a straight fence-like barrier which detoured fish schools into the hearts. The hearts (so named because of their shape) consisted of 3-inch stretched mesh multifilament webbing (7 ft high) erected on willow poles. The hearts corralled the fish and funneled them into the trap where they were harvested with a dip net. Catches with this gear were low, partly because the fish schools were not detoured into the trap and partly because of poor net maintenance. The catch consisted primarily of Gulf menhaden (Brevoortia patronus) and southern stingray (Dasyatis americana). Game fish accounted for 1.7% of the catch.

The 40-ft trawl, made of 3 5/8-inch stretched mesh multifilament webbing, was towed at 2 1/2-3 1/2 mph behind a fish scooter powered by a 75 hp outboard motor. This gear was used only four times and catches were low. Game fish accounted for 1.5% of the catch.

The 1200 x 3-ft striking rig consisted of wings made of 2-inch stretched mesh multifilament nylon webbing and a 12 x 12-ft bag or pocket of 1 1/2-inch stretched mesh webbing. The net was carried on a platform attached to the stern of a 16-ft tunnel skiff powered by a 70 hp outboard motor. The coastal flats (water depth: 1/2-2 ft) were searched in a zig-zag pattern for black drum (Pogonias cromis) schools. When a school was located the net was anchored and laid out around it at boat speeds of 10-25 mph. Having encircled the school, the boat was used to pull the net and diminish the circle diameter, concentrating the fish in the bag which was removed and transported to a fish house. This was the most used, efficient and selective gear type. The catch included 37,438 finfish of which 98% were black drum (Table A). Game fish accounted for 1.3% of the catch. The maximum catch/strike for black drum occurred in July; the maximum catch/strike for sheepshead occurred in September.

Very little could be said concerning the relationship between catch rates and weather conditions. The data were few and only general trends could be discerned.

Table A. Total catch from the 1200-ft striking rig.

Species	No.	% Total catch	Weight (lb)	% Total weight	Average weight/ fish (lb)	Average length/ fish (inches)
<u>Pogonias cromis</u> (black drum)	36841	98.41	132236	98.23	3.59	18.90
<u>Sciaenops ocellata</u> (red drum)	327	0.87	1439	1.07	4.40	22.24
<u>Cynoscion nebulosus</u> (spotted seatrout)	109	0.29	315	0.23	2.89	20.67
<u>Archosargus probatocephalus</u> (sheepshead)	107	0.29	411	0.31	3.84	17.23
<u>Paralichthys lethostigma</u> (southern flounder)	38	0.10	156	0.12	4.11	18.11
<u>Centropomus undecimalis</u> (snook)	16	0.04	52	0.04	3.25	21.50
Total	37438		134609			

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ABSTRACT

The effectiveness of pound nets, a 12.2-m trawl and a striking rig for the commercial harvest of under-utilized fish species was tested in the lower Laguna Madre system. Catches with the pound nets and trawl were low although few (< 2%) game fish were caught. The striking rig proved to be efficient and selective; 98% of the catch consisted of black drum (Pogonias cromis) with game fish constituting < 2% of the total catch.

INTRODUCTION

The Texas Parks and Wildlife Department and the Pace Fish Company of Brownsville, Texas entered into a 1-yr (9 May 1976-10 May 1977) agreement (similar to an agreement covering the period 1 November 1974-31 October 1975) which allowed the Company to harvest under-utilized marine and fresh-water fish species in the lower Laguna Madre, the Arroyo Colorado, the Brownsville ship channel and the mouth of the Rio Grande River for research and development of commercial fishing gear. The gear used included pound (trap) nets, paired 12.2-m trawls and striking rigs. During the previous contract the use of gill nets was permitted but was discontinued the second year due to a high incidence of game fish in the catch. The Department provided a representative who was present at all on-the-water phases of the operation to insure adherence to the agreement and to collect and analyze data on the effectiveness of the various gear types used. The Company was permitted to retain and sell unlimited numbers of under-utilized species but was prohibited from retaining red drum (Sciaenops ocellata), spotted seatrout (Cynoscion nebulosus), southern flounder (Paralichthys lethostigma) and robalo (snook - Centropomus undecimalis). When catches of the prohibited fish species exceeded 30% (by number) of the total catch, a modification of fishing gear, method and/or area was required; however, this limit was never reached.

MATERIALS AND METHODS

Pound (Trap) Nets

Pound nets were employed at no set schedule from June 1976 through April 1977 at four locations known to contain moving schools of fish:

- 1) approximately 0.8 km east of Intracoastal Marker #265; water depth 1.2-1.8 m
- 2) 0.4 km off the channel south of Marker #23; water depth 1.2 m
- 3) east of Marker #321A; water depth 0.9 m
- 4) 0.4 km from the Intracoastal Canal east of Marker #29.

The pound nets used consisted of a leader, two hearts and a trap (pound). The leaders used were made of 2.54-15.24-cm stretched mesh multifilament webbing (1.5-2.1 m high) erected on willow poles to form a straight fence-like barrier which detoured fish schools into the hearts. The hearts (so named because of their shape) consisted of 7.62-cm stretched mesh multifilament webbing (2.1 m high) erected on willow poles. The hearts corralled the fish and funneled them into the trap where they were harvested with a dip net.

12.2-m Trawl

The 12.2-m trawl, made of 9.21-cm stretched mesh multifilament webbing, was towed at 4.0-5.6 km/h behind a fish skooter powered by a 75 hp outboard motor. Correct door sizes and chain adjustments were determined and a set of permanent doors was constructed of 1.9-cm marine plywood. The doors could be adjusted to allow the trawl to be towed on the bottom, at the surface or in mid-water. This trawl was used four days in November 1976 to collect 12 samples.

Striking Rig

The 365.8 x 0.9-m striking rig consisted of wings made of 5.08-cm stretched mesh multifilament nylon webbing and a 3.7 x 3.7-m bag or pocket made of 3.81-cm stretched mesh webbing. The net was carried on a platform attached to the stern of a 4.9-m tunnel skiff powered by a 70 hp outboard motor. The coastal flats (water depth: 0.2-0.6 m) were searched in a zig-zag pattern for black drum (Pogonias cromis) schools. When a school was located the net was anchored and laid out around it at boat speeds of 16-40 km/h. Having encircled the school, the boat was used to pull the net and diminish the circle diameter, concentrating the fish in the bag. The bag was detached (and replaced if more fish remained in the encircling net); the fish were transferred onto a barge and transported to a fish house. Approximately 1.5-4 h were required to complete a strike and load the fish. The striking rig was used for 70 days during which 108 strikes were made. Weather information was recorded on each of the sampling days.

RESULTS

Pound (Trap) Nets

The low total catch from pound nets included 2,320 finfish (Table 1). The catch was predominantly Gulf menhaden (Brevoortia patronus) (54.2%) and Southern stingray (Dasyatis americana) (17.9%). Game fish accounted for 1.7% of the catch; underutilized species accounted for 98.3%.

12.2-m Trawl

The very low catch from the trawl included 114 finfish and 19 blue crabs (Callinectes sapidus) (Table 1). Game fish accounted for 1.5% of the catch; underutilized species accounted for 98.5%.

Striking Rig

The striking rig was the most effective gear used; the total catch included 37,438 finfish, 98% of which were black drum, averaging 1.63 kg/drum (Table 2). Game fish accounted for 1.3% of the catch; under-utilized species (P. cromis and Archosargus probatocephalus) accounted for 98.7%.

Table 3 presents weather data and catch data for black drum and sheepshead. No samples were collected during November 1976-March 1977 due to poor weather conditions. The maximum catch/strike for black drum occurred in July; the maximum catch/strike for sheepshead occurred in September (Figure 1). Rainfall, cloud cover, wind speed and wind direction appeared to have no effect on catch rates. The rise and fall of barometric pressure had no effect on the catch rates; however, the catches of both species were higher, at barometric pressures >760 mm (Figure 2). Temperature appeared to have no effect on sheepshead catches; however, black drum catches were greatest at temperatures >23 C (Figure 3).

DISCUSSION

Pound (Trap) Nets

The low catches from pound nets were partly a result of fish behavior, i.e., the schools of fish were not detoured into the trap by the barrier net. The reason for this behavior is unknown.

Although the net was maintained in good condition during the earlier months of the contract, it was neglected more and more as time passed with no significant catches of fish. Ultimately the net became clogged with grasses and damaged by crabs, large fish and high winds.

12.2-m Trawl

The trawl was not adequately tested, primarily because there was no available boat large enough to pull the trawl fast enough to capture rapidly moving species such as striped mullet (Mugil cephalus) and Atlantic croaker (Micropogon undulatus).

Striking Rig

The striking rig proved to be an efficient and selective gear as revealed by the high catches of black drum and the low catches of game fish.

Very little can be said concerning the relationship between catch rates and weather conditions. The data are few and only general trends may be discerned.

Table 1. Total catch from pound nets and the 12.2-m trawl.

Species	Common name	Net		Trawl	
		No.	%	No.	%
<u>Brevoortia patronus</u>	Gulf menhaden	1258	54.22		
<u>Dasyatis americana</u>	Southern stingray	416	17.93	6	5.26
<u>Bairdiella chrysura</u>	Silver perch	112	4.83	3	2.63
<u>Dorosoma cepedianum</u>	Gizzard shad	104	4.48		
<u>Chilomycterus schoepfi</u>	Striped burrfish	74	3.19	23	20.17
<u>Micropogon undulatus</u>	Atlantic croaker	60	2.58	11	9.65
<u>Elops saurus</u>	Ladyfish	56	2.41		
<u>Caranx hippos</u>	Crevaille	45	1.94		
<u>Arius felis</u>	Sea catfish	44	1.90	18	15.79
<u>Lagodon rhomboides</u>	Pinfish	32	1.38	13	11.40
<u>Trichiurus lepturus</u>	Ribbonfish	30	1.29		
<u>Cynoscion nebulosus</u>	Spotted seatrout	29	1.25	1	0.88
<u>Mugil caphalus</u>	Striped Mullet	26	1.12	6	5.26
<u>Oligoplites saurus</u>	Leatherjacket	15	0.65		
<u>Archosargus probatocephalus</u>	Sheepshead	6	0.26	9	7.89
<u>Paralichthys lethostigma</u>	Southern flounder	6	0.26		
<u>Sciaenops ocellata</u>	Red drum	4	0.18	1	0.88
<u>Lepisosteus spatula</u>	Alligator gar	3	0.13		
<u>Orthopristis chrysoptera</u>	Pigfish			12	10.53
<u>Selene vomer</u>	Lookdown			6	5.26
<u>Pogonias cromis</u>	Black drum			4	3.51
<u>Vomer setapinnis</u>	Atlantic moonfish			1	0.88
Total		2320		114	
<u>Callinectes sapidus</u>	Blue crab			19	

Table 2. Total catch from the 365.8-m striking rigs.

Species	No.	% Total catch	Weight (kg)	% Total weight	Average weight/ fish (kg)	Average length/ fish (mm)
<u>Pogonias cromis</u> (black drum)	36841	98.41	59982	98.23	1.63	480
<u>Sciaenops ocellata</u> (red drum)	327	0.87	653	1.07	2.00	565
<u>Cynoscion nebulosus</u> (spotted seatrout)	109	0.29	143	0.23	1.31	525
<u>Archosargus probatocephalus</u> (sheepshead)	107	0.29	186	0.31	1.74	438
<u>Paralichthys lethostigma</u> (southern flounder)	38	0.10	71	0.12	1.86	460
<u>Centropomus undecimalis</u> (snook)	16	0.04	24	0.04	1.47	546
Total	37438		61059			

Table 3. Weather data and total number and weight of black drum (*Pogonias cromis*) and sheepshead (*Archosargus probatocephalus*) caught with 365.8-m striking rig, 19 May 1976-9 May 1977.

Date	No. of strikes	Black drum		Sheepshead		Cloud cover	Barometric pressure (mm)		Rainfall (cm)	Air Temp. (C)	Wind velocity (km/h)	
		No.	Kg	No.	Kg		pressure	mm			velocity	direction
19 May 76	3	473	772				762			23	ESE	16-23
20	4	755	1061	4	7		761		0.68	21	SSW	6
24	1	21	34	2	4		756			24	SSE	13
26	3	1081	1765				755			26	E	10
27	4	1138	1858				759			24	WSW	6
Total	15	3468	5489	6	23							
1 June 76	1	998	1630			Cloudy	757		0.15	26	E	19
2	3	2482	4053			PC	759			27	SE	7
4	2	331	541			Cloudy	760			22	NW	6
9	0					PC	761			26	ESE	10
10	1	102	166	1	4	PC	760			26	SE	16
11	1	6	10			PC	759			27	S	16
12	0					PC	768			27	SSE	23
14	3	729	1191			Cloudy	759			26	S	3
21	1	43	71	6	10	PC	760		0.30	24	NW	6
28	1	15	24	1	1	Clear	764			26	S	13
29	0					Clear	762			26	S	10
30	0					Clear	761			25	SW	10
Total	13	4706	7685	8	13							
6 July 76	0					Cloudy	759		0.13	26	SSW	6-10
8	0					Cloudy	761		3.05	25	ESE	16-19
16	2	800	1307			PC	764		0.23	27	SE	16
19	1	699	1141	15	26	PC	764			26	SSE	23
21	4	1137	1856			PC	763			26	SE	10
22	1	712	2562			PC	764			27	SSE	13
27	3	602	982			PC	762			26	S	10
28	1	2982	4869			PC	761			27	S	10
29	1	4283	6993			Clear	761			27	S	13
Total	13	11215	18311	15	26							

Table 3. (Cont'd.).

Date	No. of Strikes	Black drum		Sheepshead		Cloud cover	Barometric pressure (mm)		Rainfall (cm)	Air Temp. (C)	Wind velocity (km/h)	
		No.	Kg	No.	Kg							
4 Aug 76	3	3419	5583			PC	761			27	SSE	19
5	5	1364	2227			PC	760			27	SSE	16
6	0					Overcast	739			26	SSW	10
9	4	490	801			Cloudy	762			24	SSE	19
11	3	1151	1879			Overcast	759			26	SSE	19
12	0					Cloudy	761			26	SE	13
16	0					Cloudy	764			27	SE	16
18	0					PC	763			26	SSW	13
20	0					PC	764			26	SE	10
23	2	73	118	15	26	PC	765			27	SE	13
24	4	376	614	7	11	PC	766		2.67	27	E	6
26	5	456	745	7	13	PC	763		0.03	24	SW	3
30	4	311	508	7	13	PC	761			27	S	13
31	1	69	112			Cloudy	761		Trace	27	S	13
Total	31	7709	12586	42	74							
1 Sept 76	0					PC	761			24	SW	3
2	0					PC	759			27	S	10
11	6	746	1219	3	5	Hazy	763			24	N	6
13	2	592	967			PC	760		Trace	26	S	6
14	1	2321	3791			PC	763			24	N	6
15	3	176	287			PC	763			26	SE	6
17	1	364	595			PC	763			23	WSW	3
22	2	491	802	28	50	Clear	760			19	N	10
23	3	718	1172	5	8	Clear	761			21	NNW	6
24	1	1052	1719			Clear	762			23	SSW	3
30	4	517	845			Cloudy	762			22	N	16
Total	23	6977	11396	36	63							
5 Oct 76	0					Cloudy	758		1.27	20	S	10
7	3	221	360			PC	760			16	NW	6
11	3	1178	1924			Clear	765			12	W	10

Table 3. (Cont'd.).

Date	No. of Strikes	Black drum		Sheepshead		Barometric		Rainfall (cm)	Air Temp. (C)	Wind velocity (km/h)
		No.	Kg	No.	Kg	Cloud cover	pressure (mm)			
12 Oct 76	2	233	380			Clear	764		21	NE 3
13	0					Cloudy	765		22	ENE 3
14	0					PC	762		18	SSW 6
18	0					Clear	762		13	NW 6
27	0					Cloudy	759		23	ESE 19
Total	8	1632	2664							
8 Apr 77	1	61	100			PC	771		20	SE 13
11	0					Clear	767		22	SE 23
13	0					Overcast	764		22	SE 10
18	2	253	412			Cloudy	759	0.50	21	SW 6
19	0					PC	761		23	SE 13
20	1	95	155			Cloudy	754		23	S 13
21	0					Cloudy	759		23	NE 19
Total	4	409	667							
4 May 77	0					PC	759		23	S 19
5	0					Cloudy	759		22	S 10
6	0					PC	759		23	SE 19
9	1	725	1183			Cloudy	757	2.03	21	ESE 6
Total	1	725	1183							
Grand Total	108	36841	59982	107	186					

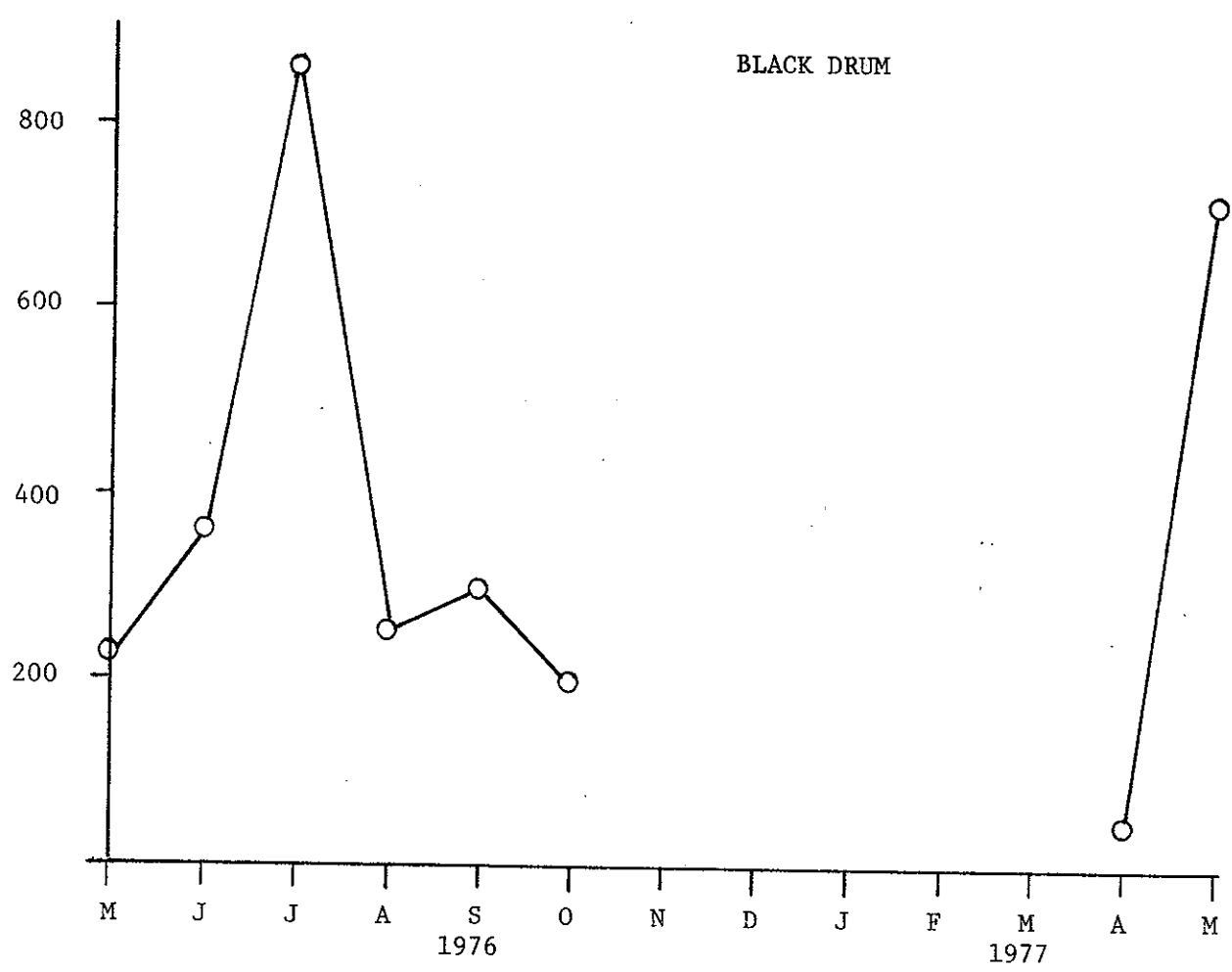
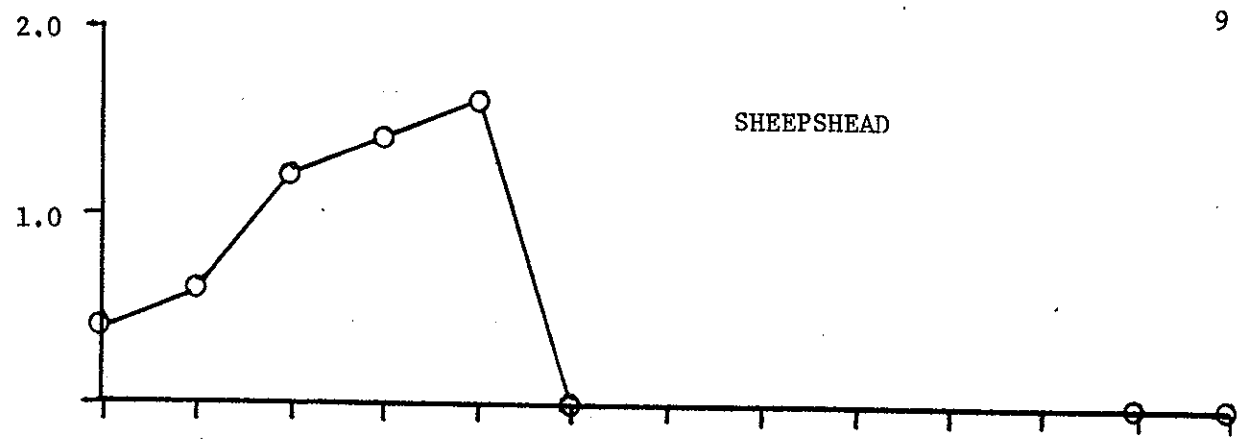


Figure 1. Average number of sheephead and black drum collected per strike with 365.8-m striking rig, May 1976 - May 1977.

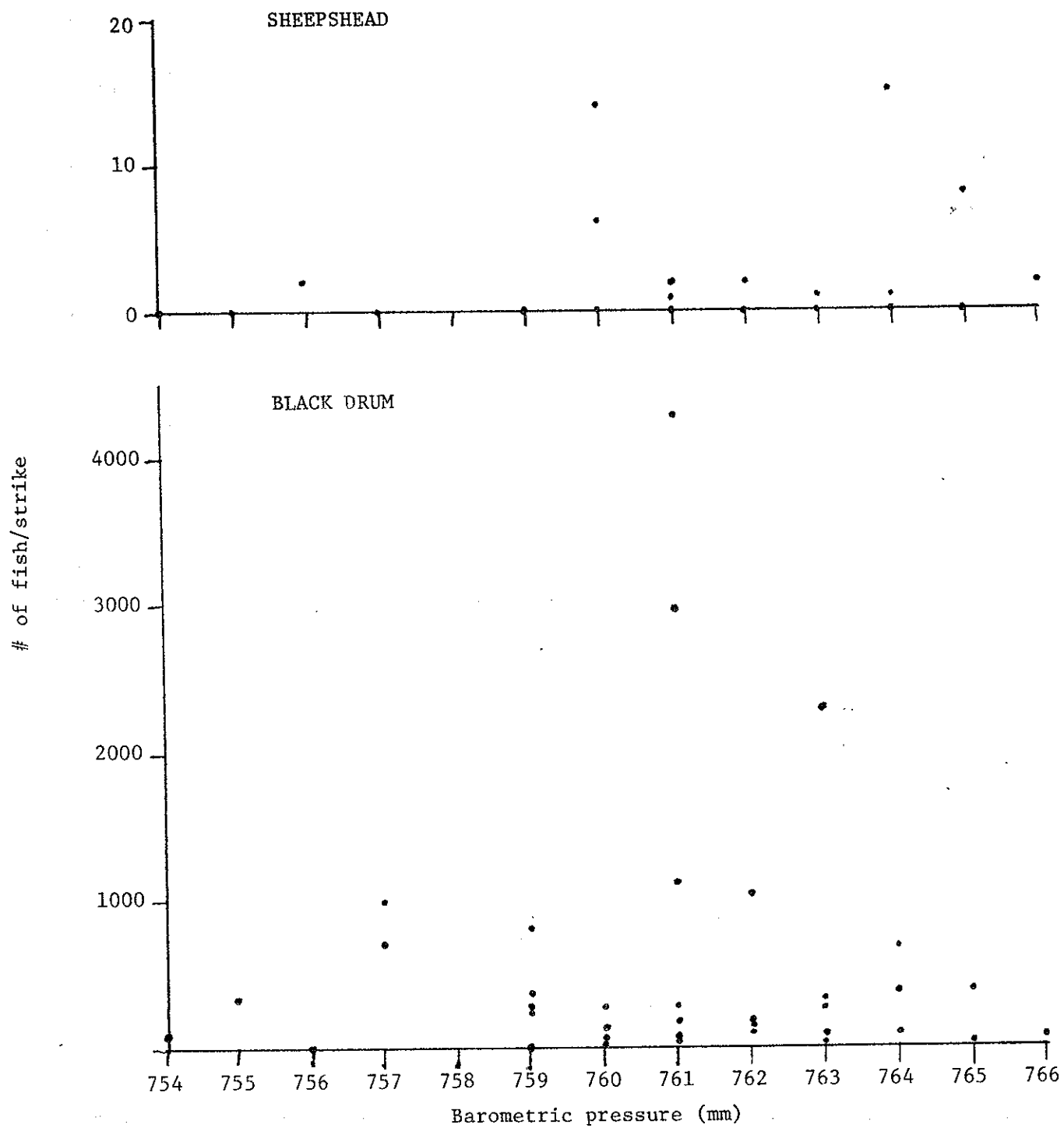


Figure 2. Relationship between barometric pressure and catch per strike for black drum and sheephead.

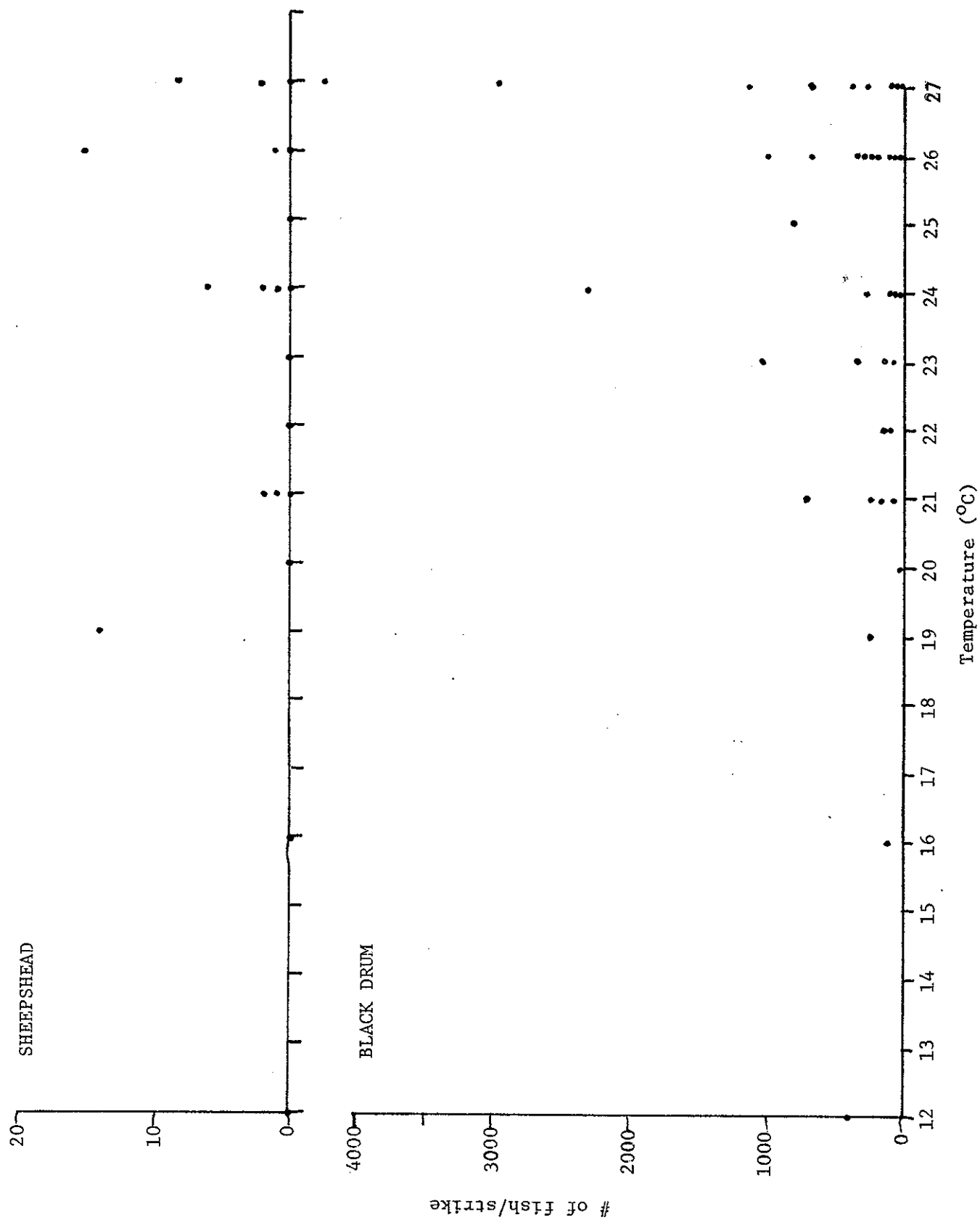


Figure 3. Relationship between temperature and catch per strike for black drum and sheepshead.