

The U.S. shrimp fishery in the Gulf of Mexico off the coast of Mexico began in 1945. The fishery reached a peak in the early 1950's, when about 25 million pounds were caught. Since that time, the U.S. fishery has declined (to 9 million pounds in 1970) because of economic and industry problems and an unexplained decline in the Campeche shrimp population in the middle 1960's. Fishing by Mexican and more recently by Cuban vessels has increased. The U.S. shrimp fishery off Mexico can be

divided into: the brown shrimp fishery off the east coast of Mexico west of longitude 94°W, the pink shrimp fishery in the Campeche area, and the spotted pink shrimp and rock shrimp fishery in the Yucatan (Contoy) area. Work at the Center includes summarizing the extensive statistical data collected for the U.S. fishery since 1956 and using these data and other information about the stocks to determine the available yield and the best means to harvest the resource.

Since these distant-water shrimp fisheries are participated in by foreign as well as by U.S. fleets, international cooperation is essential to collect and analyze the total data for each fishery. The Center participates in the fisheries program of CICAR (Cooperative Investigations in the Caribbean and Adjacent Regions) which currently has under review the shrimp fisheries in this geographical area.

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Distribution of Commercial Shrimp off the Northeastern Coast of South America

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The shrimp fishing grounds off the coasts of Guyana, Surinam, and French Guiana were surveyed by the RV *Oregon II* of the Southeast Fisheries Center in June and July 1972 to determine the species distribution of shrimp available to the commercial fishery. The survey was conducted along 14 transect lines approximately 30 miles apart, from Georgetown, Guyana to Cabo Orange, Brazil. A total of 67 fishing stations was occupied along the transects, generally at 5-fathom intervals between 15 and 35 fathoms (Figure 1). At each station double-rigged, standard 40-foot, 4-seam flat trawls fabricated with 2-inch stretched mesh nylon netting and 1 3/4-inch mesh cod ends were used. Water temperatures and surface and bottom

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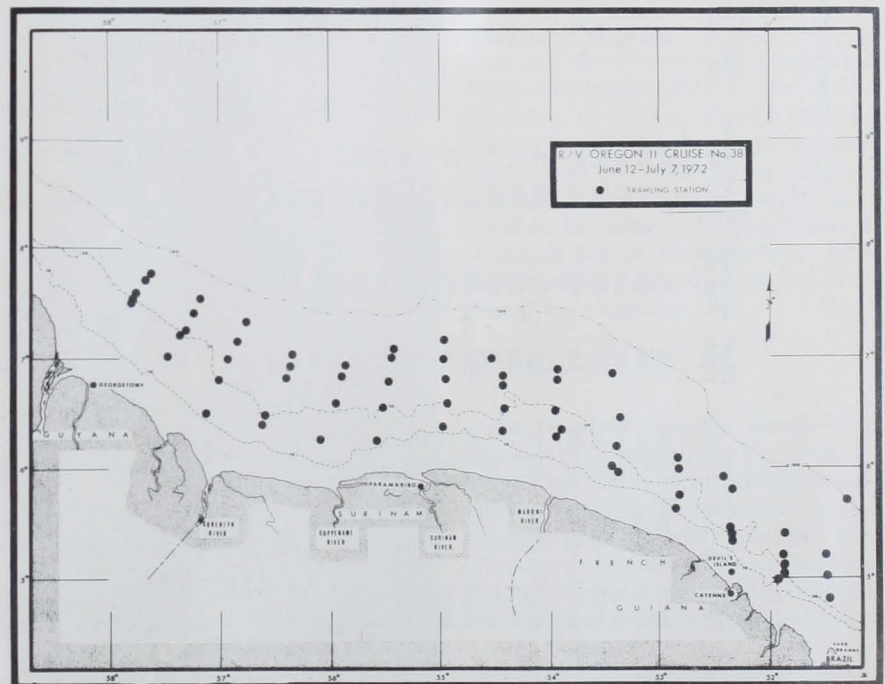


Figure 1.—Trawling stations occupied on RV *Oregon II* cruise 38. Positions, depths, and water temperatures at the stations and a summary of the catches are given in the fishing log (Table 1).

Table 1.—Fishing log, Oregon II, cruise 38.

Station Number	Date 1972	Position N. Lat. W. Long.		Depth (fms)	Minutes Fished	Temperature Surf. Bot.	SHRIMP CATCH		FISH CATCH	
							Approx. wt (lbs)	Predominant Species (common names)	Approx. wt (lbs)	Predominant and/or Commercial Species (common names)
11996	6/21	7°34'	57°48'	15	30	81 78	1	Pink	34	Goatfish 11#, Sand Perch 6#, Seatrout 5#
11997	6/21	7°36'	57°47'	20	30	30 81	1	Pink	22	Flounder 4#, Seatrout 4#
11998	6/21	7°37'	57°47'	25	30	82 78	12	Pink	32	Seatrout 11#, Searobin 7#, Flounder 3#
11999	6/22	7°46'	57°43'	30	32	82 77	3	Pink spotted	45	Grunt 10#, Snapper 6#, Filefish 4#
12000	6/22	7°38'	57°38'	35	60	82 79	<1	Pink spotted	165	Vermillion Snapper 65#, Carib. Red Snapper 42#, Mutton Snapper 6#, Grunt 14#, Soldierfish 6#
12001	6/22	7°35'	57°12'	36	30	80 76	1	Pink spotted	23	Sand Perch, Flounder, Puffer
12002	6/22	7°26'	57°14'	30	30	80 77	2	Pink spotted	37	Filefish 10#, Bigeye 4#
12003	6/22	7°19'	57°19'	25	60	80 78	2	Pink spotted	81	Goatfish 30#, Flounder 12#, Filefish 7#
12004	6/23	7°16'	57°22'	20	26	81 78	3	Pink spotted	44	Seatrout 6#, Sand Perch 5#, Goatfish 4#
12005	6/23	7°03'	57°29'	15	30	82 82	2	Pink spotted	71	Pigfish 18#, Snapper 12#, Seatrout 6#
12006	6/23	6°32'	57°08'	15	30	80 80	19	Pink	220	Grunt 68#, Croaker 62#, Seatrout 35#, Mojarras 16#
12007	6/23	6°50'	57°01'	20	30	80 80	1	Pink spotted	48	Goatfish 17#, Sand Perch 15#
12008	6/24	7°02'	56°56'	25	30	80 77	<1	Pink spotted	50	Grunt 21#, Snakefish 6#
12009	6/24	7°11'	56°51'	30	30	80 77	<1	Pink spotted	85	Grunt 36#, Porgey 4#
12010	6/24	7°22'	56°46'	35	30	81 75	9	Pink spotted	53	Snapper 15#, Searobin 8#
12011	6/24	7°04'	56°22'	35	30	81 76	1	Pink spotted	62	Grunt 24#, Snapper 18#, Bumper 8#
12012	6/24	6°57'	56°22'	30	30	81 77	3	Pink spotted	64	Snapper 15#, Grunt 13#, Bigeye 9#
12013	6/24	6°50'	56°25'	24	30	80 77	0	—	4	Grunt, Goatfish
12014	6/25	6°30'	56°35'	20	30	79 78	7	Pink spotted	91	Filefish 29#, Goatfish 15#, Grunt 8#
12015	6/25	6°26'	56°38'	17	60	79 79	18	Pink spotted	137	Seatrout 31#, Sand Perch 24#, Goatfish 14#, Filefish 13#
12016	6/25	6°16'	56°09'	15	60	79 78	1	Brown	131	Sea Catfish 62#, Drum 28#, Seatrout 6#
12017	6/25	6°37'	55°58'	20	60	80 77	<1	Pink spotted	148	Pigfish 37#, Grunt 27#, Goatfish 20#, Filefish 10#
12018	6/26	6°52'	55°54'	25	30	80 77	3	Pink spotted	58	Goatfish 26#, Filefish 11#, Snapper 10#
12019	6/26	6°58'	55°53'	30	37	80 76	5	Pink spotted	62	Snapper 11#, Bumper 9#, Flying Gurnard 6#
12020	6/26	7°05'	55°26'	35	34	81 76	11	Pink spotted	116	Snapper 76#, Bumper 5#
12021	6/26	7°01'	55°26'	30	30	81 75	8	Pink spotted	52	Snapper 31#, Goatfish 8#
12022	6/26	6°49'	55°29'	25	30	80 76	13	Pink spotted	103	Pigfish 28#, Goatfish 20#, Triggerfish 17#
12023	6/27	6°35'	55°33'	20	60	80 77	5	Pink spotted	245	Pigfish 98#, Goatfish 45#, Seatrout 28#, Snapper 13#
12024	6/27	6°16'	55°36'	15	60	79 77	6	White	339	Sea Catfish 119#, Drum 65#, Seatrout 48#
12025	6/27	6°23'	54°59'	15	30	79 76	1	Brown	364	Sea Catfish 246#, Drum 95#, Seatrout 15#
12026	6/27	6°36'	54°57'	20	30	79 76	9	Pink spotted	144	Croaker 48#, Pigfish 40#, Snapper 15#, Grunt 10#
12027	6/27	6°49'	54°88'	25	60	80 75	7	Pink spotted	116	Goatfish 48#, Lizardfish 10#, Seatrout 10#
12028	6/28	7°02'	55°00'	30	60	80 77	8	Pink spotted	74	Snapper 24#, Goatfish 20#, Seatrout 7#, Blackear Bass 6#
12029	6/28	7°11'	55°00'	35	60	81 74	4	Pink spotted	70	Snapper 28#, Searobin 9#, Lizardfish 9#
12030	6/28	6°59'	54°36'	35	30	81 73	9	Pink spotted	81	Snapper 32#, Cusk-eel 10#, Searobin 10#
12031	6/28	6°51'	54°26'	30	30	81 73	2	Pink spotted	41	Cusk-eel 13#, Flounder 6#
12032	6/28	6°46'	54°27'	25	30	80 73	3	Brown	50	Cusk-eel 13#, Seatrout 10#, Searobin 10#
12033	6/28	6°34'	54°28'	20	60	80 74	2	Brown	25	Seatrout 12#, Croaker 6#
12034	6/29	6°21'	54°28'	15	60	80 74	1	Brown	18	Seatrout 17#
12035	6/29	6°18'	53°58'	15	30	79 78	4	Brown	83	Seatrout 18#, Croaker 5#, Grunt 37#, Goatfish 8#
12036	6/29	6°21'	53°57'	15	60	80	17	Pink spotted	37	Flatfish 9#, Grunt 21#, Lizardfish 5#
12037	6/29	6°32'	53°58'	25	60	80 75	34	Pink spotted	200	Triggerfish 18#, Bumpers 16#, Goatfish 134#, Flatfish 8#
12038	6/30	6°49'	53°58'	30	60	80 74	21	Brown	94	Seatrout 5#, Goatfish 39#, Lizardfish 4#, Moonfish 14#, Flatfish 3#
12039	6/30	6°54'	53°58'	35	60	80 73	12	Brown	128	Wenchman 10#, Seatrout 2#, Cusk-eels 11#, Searobin 19#, Seabass 38#, Flatfish 17#, Lizardfish 6#
12040	6/30	6°52'	53°26'	35	30	82 73	5	Pink spotted	65	Wenchman 11#, Triggerfish 8#, Midshipman 9#, Goatfish 3#
12041	6/30	6°28'	53°21'	30	30	81 74	4	Pink spotted	69	Wenchman 2#, Triggerfish 51#, Midshipman 5#, Flatfish 4#
12042	7/1	6°12'	53°30'	25	30	80 76	12	Brown	56	Wenchman 4#, Flatfish 10#, Goatfish 16#
12043	7/1	6°05'	53°30'	22	60	80 77	25	Brown	44	Flatfish 10#, Cusk-eels 4#, Butterfish 12#, Midshipman 10#
12044	7/1	5°58'	53°23'	20	30	78 77	3	Pink spotted	238	Seatrout 4#, Drum 150#, Pigfish 50#, Flatfish 6#
12045	7/1	5°38'	52°52'	22	53	83 77	107	Brown	225	Drum 74#, Seatrout 7#, Snapper 5#, Pigfish 54#, Searobin 12#, Flatfish 22#, Lizardfish 10#

12046	7/1	5°46'	52°51'	24	60	83	76	32	Brown	105	Flatfish 83#, Lizardfish 4#
12047	7/1	6°00'	52°51'	30	60	82	75	1	Pink spotted	232	Cowfish 13#, Triggerfish 49#, Grunt 7#, Flatfish 30#, Goatfish 3#
12048	7/2	6°06'	52°52'	35	90	82	76	9	Pink spotted	183	Wenchman 3#, Triggerfish 65#, Searobin 9#, Goatfish 85#
12049	7/2	5°56'	52°26'	35	30	84	75	21	Pink spotted	103	Wenchman 6#, Triggerfish 44#, Grunt 7#, Pigfish 9#, Flatfish 10#, Goatfish 8#
12050	7/2	5°50'	52°22'	30	30	83	75	12	Pink spotted	56	Snapper 21#, Triggerfish 6#, Goatfish 8#
12051	7/2	5°27'	52°28'	25	55	82	75	27	Pink spotted	319	Snapper 30#, Cowfish 14#, Triggerfish 5#, Porgies 4#, Grunt 23#, Pigfish 195#, Flatfish 17#, Searobin 5#
12052	7/3	5°20'	52°22'	20	60	82	75	18	Brown	70	Seatrout 4#, Drum 17#, Sea Catfish 6#
12053	7/3	5°18'	52°22'	15	30	82	75	10	Brown	54	Snapper 2#, Seatrout 16#, Drum 23#, Pigfish 6#, Searobin 9#, Flatfish 4#
12054	7/3	4°59'	51°58'	18	33	82	76	2	Brown	438	Seatrout 33#, Drum 337#, Catfish 46#, Grunt 10#
12055	7/3	5°04'	51°54'	22	60	83	75	28	Brown	105	Seatrout 36#, Drum 36#, Goatfish 4#, Grunt 15#
12056	7/3	5°06'	51°53'	30	30	83	75	11	Brown	20	Midshipman 12#, Goatfish 1#
12057	7/3	5°14'	51°54'	30	30	83	76	2	Brown	218	Snapper 16#, Seatrout 7#, Cowfish 41#, Bonefish 13#, Spadefish 43#, Pigfish 69#
12058	7/4	5°24'	51°54'	35	30	83	75	2	Brown	28	Flatfish 9#, Lizardfish 4#, Cowfish 4#
12059	7/4	5°43'	51°15'	100	120	84		<1	—	89	Small Catch, Searobin 1#
12060	7/4	5°13'	51°30'	35	30	83	74	25	Brown	23	Boarfish 1#, Flatfish 19#
12061	7/4	5°01'	51°30'	32	30	84	75	2	Pink spotted	183	Snapper 14#, Triggerfish 34#, Pigfish 51#
12062	7/4	4°50'	51°29'	29	60	84	76	8	Brown	247	Snapper 11#, Seatrout 102#, Pigfish 68#, Threadfins 10#, Flatfish 7#



salinities were taken at the beginning and end of each fishing station.

All drags were made at night (between dusk and dawn) and were generally of 30- or 60-minute duration. The catches consisted of mixed shrimp and fish (Figure 2). The catches were sorted by species and the number and weight of each species were determined (Figures 3 and 4). In addition the length and sex of all commercial shrimp were recorded. Details of the catches are shown in the fishing log (Table 1).

SHRIMP

A total of 637 pounds (heads-on) of shrimp were caught at the 67 fishing stations. This catch included 340 pounds of brown shrimp (*Penaeus aztecus subtilis*), 268 pounds of pink spotted shrimp (*Penaeus brasiliensis*), 25 pounds of pink shrimp (*Penaeus duorarum notialis*), and 4 pounds of white shrimp (*Penaeus*



Figure 2.—Catch of shrimp (*Penaeus brasiliensis*) and fish on deck of RV Oregon II. This photograph is typical of the catches made during cruise 38.

Figure 3.—The conveyor/processing facility on deck of RV Oregon II. The facility transports the catch by conveyor belt to the adjacent interior laboratory.



Figure 4.—Sorting of the trawl catch into species categories. The numbers and weights of each species were recorded.

Figure 5.—Distribution of shrimp off Guyana, Surinam, and French Guiana in June-July 1972 (*Oregon II* cruise 38). The species of shrimp which predominated in the catches is shown for the area of the survey.

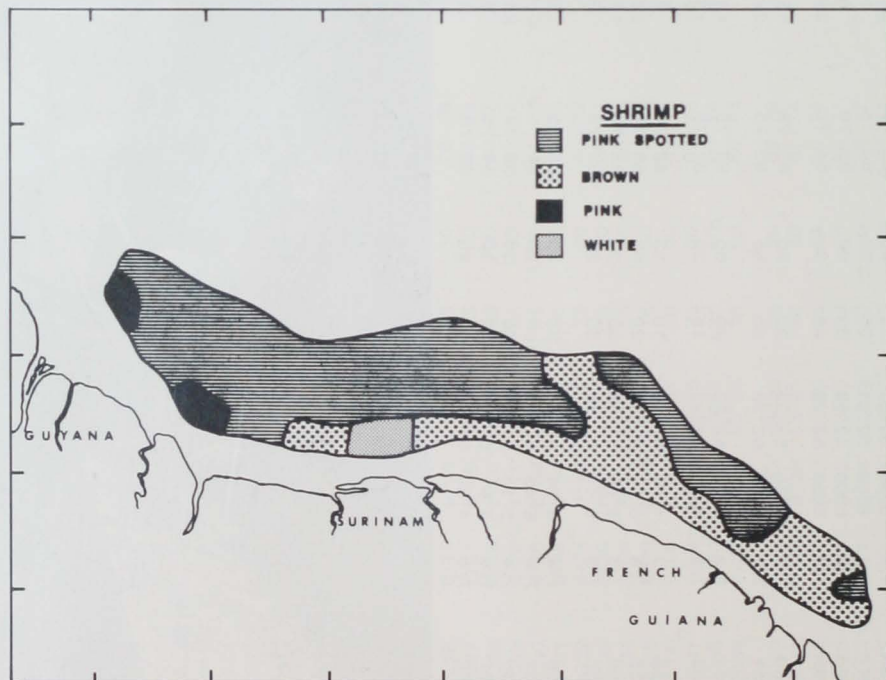




Figure 6.—Feeding frenzy behavior of large sharks near Devil's Island, French Guiana. The sharks were chummed to the boat with trash fish.

Maximum catch rates by species of shrimp were as follows: pink spotted shrimp, 30 pounds (heads-on) per hour; brown shrimp, 120 pounds; pink shrimp, 36 pounds; and white shrimp, 4 pounds. The average sizes of shrimp in the above maximum catches were: pink spotted shrimp, 9.8 per pound (heads-on); brown shrimp, 17.6; pink shrimp, 8.6; and white shrimp, 8.3.

FISH

Maximum catch rates of fish occurred in 15 to 18 fathoms between Paramaribo, Surinam, and Cayenne, French Guiana. The predominant fishes in these catches were sea trout (*Cynoscion*), croakers (*Micropogon*), and catfishes (*Ariidae*). In 20 to 35 fathoms throughout the survey area a variety of tropical species occurred. The deeper stations produced incidental catches of Caribbean red snapper (*Lutjanus purpureus*) and lane snapper (*L. synagris*). Grunts (*Haemulon*) were often the dominant finfish present at depths greater than 20 fathoms. Large numbers of carcharhinid sharks (mostly blacktip sharks with some bull sharks and sharpnose sharks and occasional very large unidentified sharks) were present throughout the survey. Off Devil's Island, French Guiana, sharks were easily chummed into a feeding frenzy (Figure 6).

schmitti). The catch rates were generally low, owing partially to bright moonlight nights. The maximum catch rate of shrimp was 120 pounds per hour but the average catch was only 14 pounds per hour.

The four species of commercial shrimps had distinct distribution patterns (Figure 5). The pink spotted shrimp dominated the catches off Guyana and Surinam, and the brown shrimp

dominated the catches off French Guiana. However, both species were caught on all the transects between Georgetown and Cabo Orange. Brown shrimp were generally most abundant in the catches from 25 fathoms or less while pink spotted shrimp were mostly restricted to the area off Guyana and western Surinam. White shrimp were taken only at the shallow water stations in the region of Paramaribo.

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