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OCEAN SHRIMP REPORT
1976 SEASON

by

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TWENTIETH ANNUAL SHRIMP REPORT

MARINE RESOURCES

Administrative Report No. 77-12

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ABSTRACT

Statewide Pacific ocean shrimp, *Pandalus jordani*, landings totaled 3,400,191 lb, down from the 1975 record catch of 4,992,233 lb but well above the 10-year (1966-1975) mean of 2.6 million lb. Landings from Areas A (Eureka-Crescent City) and B-1 (Fort Bragg) were 2.7 and 0.7 million lb, respectively. Only negligible amounts were landed in Areas B-2 (Bodega Bay) and C (Avila-Morro Bay). In Areas A and B-1 catch per hour trawled by single-rig vessels ranged from 294 to 1,803 lb while catch per hour by double-rig vessels ranged from 431 to 3,428 lb. Two-year-old (1974 year class) shrimp dominated the catches during the first part of the season, but 1-year-old (1975 year class) shrimp dominated the catches from August to October. The outlook for the 1977 season in Areas A, B-1 and B-2 is good because of the strong showing of the 1975 year class.

1/ Marine Resources Administrative Report No. 77-12, May 1977.

2/ Marine Resources Region, 619 2nd St., Eureka, CA 95501.

3/ Marine Resources Region, c/o Dept. Parks and Recreation,
Star Route, Mendocino, CA 95460.

4/ Marine Resources Region, 411 Burgess Dr., Menlo Park, CA
94025.

California's 1976 ocean shrimp landings totaled 3,400,191 lb. In 1975, 4,992,233 lb were landed, a record statewide catch. Statewide landings for 1976 were well above the 10-year (1966-1975) mean of 2.6 million lb.

Based upon recommendations of the Department of Fish and Game, the Commission removed the quotas in all areas in 1976. The fishery was managed on the basis of year class composition, count per pound, and catch per unit of effort criteria that are used to indicate the status of the shrimp stocks. Had resource problems arisen the fishery could have been closed with 48 hours' notice.

AREA A

Area A (Eureka-Crescent City) landings for 1976 were 2,673,819 lb, considerably lower than the previous season's landings of 3,395,178 lb.

The season opened April 16 and fishing commenced April 18 after a price settlement of 16¢ per lb. Heavy concentrations of smelt (*Osmeridae*) hampered fishing effort and the price jumped to 18¢ per lb May 4. A strike from May 18 to May 23 brought the price to 20¢ per lb where it remained throughout the remainder of the season.

Poor grade and volume prevailed during June and many fishermen left the area to fish shrimp off Fort Bragg and the Oregon coast. By mid-July, fishing improved with good catches occurring over the entire bed from the Oregon border to Patrick's Point. The grade was variable but by early August a low grade of shrimp dominated the catches. One company stopped buying shrimp and daily limits of 2,500 to 3,000 lb per boat were imposed.

Effort remained low throughout September, but in early October very dense concentrations of shrimp were found in the Redding Rock area and heavy

fishing effort with extremely high volume catches took place up to and including the last day of the season, October 31 (Figure 1).

Catch per hour for the season of 11 single-rig and 7 double-rig vessels averaged 678 and 1,644 lb respectively (Table 1).

Two-year-old, 1974 year class shrimp dominated the catch by weight from April through July, but the very strong 1975 year class was most abundant during the remainder of the season and comprised 89.6% of the catch in October (Table 2). Primary females were first noted in August and by October represented 18.5% of the samples (Table 3).

In May, average carapace lengths of 1975 year class shrimp were considerably smaller than those of 1-year-olds in 1975; however, growth was rapid, showing a gain of 4.3 mm during the season. Two-year-old shrimp were larger and exhibited faster growth than the same age group in 1975 (Table 4).

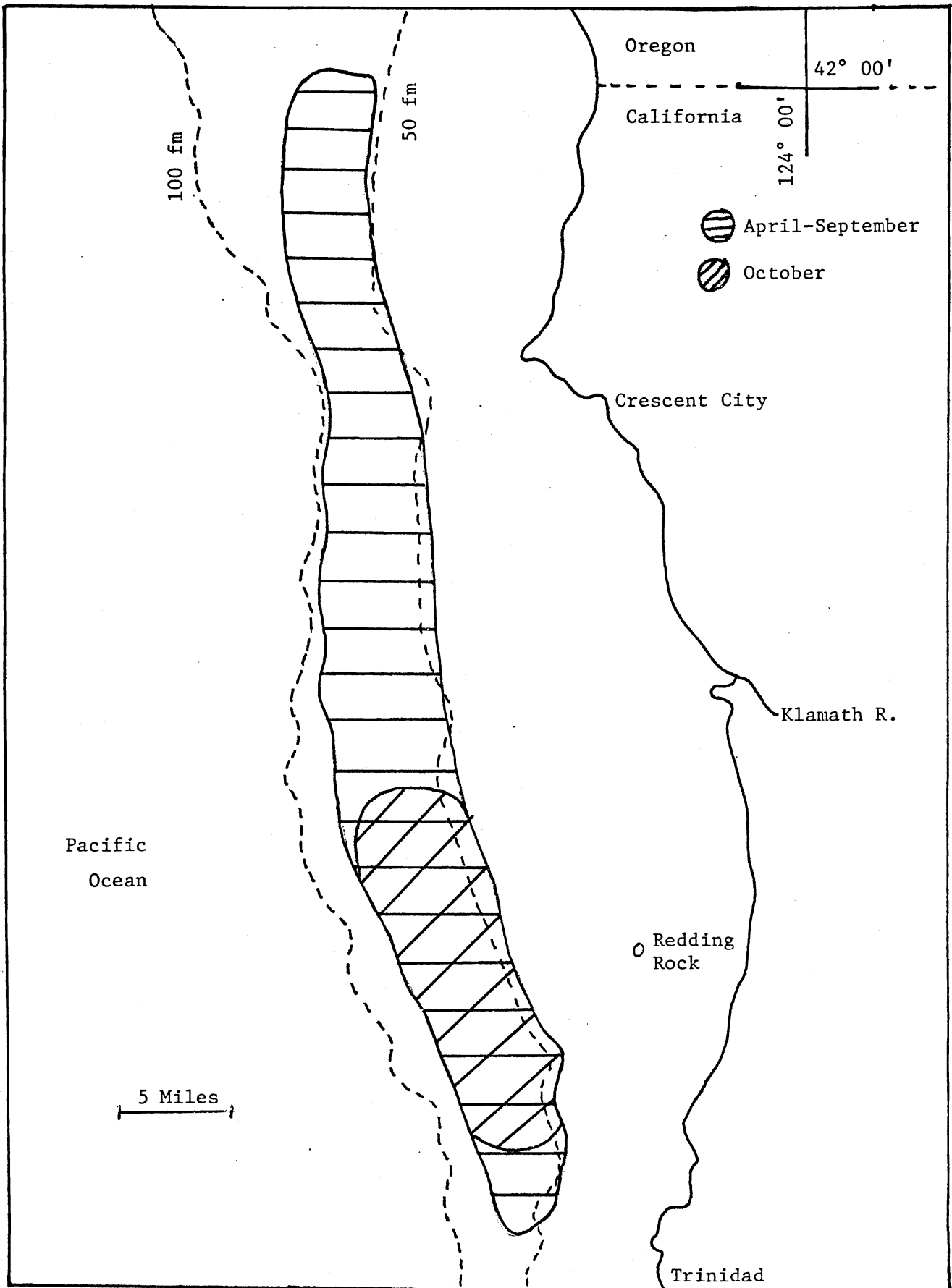


FIGURE 1. Area A ocean shrimp, *Pandalus jordani*, catch locations, 1976.

TABLE 1. Area A Monthly Catch and Effort Data, 1976 (California Ports Only)

Month	Pounds landed	Effort (hours)	Pounds per hr	Vessels	Trips
<u>Single-rig vessels</u>					
April	91,490	185.7	493	5	32
May	66,817	227.2	294	6	51
June	123,114	330.6	372	6	48
July	249,380	438.6	569	11	70
August	355,276	570.8	622	10	113
September	173,228	204.2	848	9	46
October	429,210	238.0	1,803	6	51
Totals	1,488,515	2,195.1	678*	11+	411
<u>Double-rig vessels</u>					
April	8,301	12.2	680	1	1
May	35,537	52.9	672	3	10
June	65,808	80.5	817	3	4
July	286,577	270.8	1,058	3	16
August	107,470	106.8	1,006	3	9
September	67,365	26.5	2,542	1	3
October	614,246	171.3 [†]	3,428	6	36
Totals	1,185,304	721	1,644*	7+	79
<u>All vessels</u>					
Season Totals	2,673,819	2,916.1	917*	18+	490

* Mean.

+ Total vessels which made landings.

† Total effort not reported.

TABLE 2. Area A Count Per Pound and Year Class Composition of Shrimp, 1976 Season

Month	Count per lb	Age class percent by number				Age class percent by weight			
		0	I	II	III	0	I	II	III
April	121	-	5.1	76.7	18.1	-	2.4	68.3	29.3
May	123	-	11.5	76.9	11.6	-	3.5	77.4	19.1
June	154	-	47.0	52.2	0.7	-	23.6	74.7	1.8
July	172	-	67.5	31.4	1.1	-	45.1	52.0	3.0
August	156	-	76.0	23.5	0.5	-	56.8	41.7	1.5
September	163	-	85.5	13.9	0.6	-	71.8	26.4	1.8
October	147	-	89.6	10.1	0.3	-	80.6	18.6	0.9

TABLE 3. Year Class and Sex Composition of Area A Shrimp by Month, 1976 Season (Percentages)

Month	Males			Transitionals		Females		
	0	I	II	I	II	I	II	III
April	-	2.6	9.4	-	51.0	-	13.6	18.2
May	-	11.5	1.4	-	51.0	-	24.5	11.6
June	-	45.3	0.8	1.7	27.2	-	24.3	0.7
July	-	60.3	0.3	7.3	17.9	-	13.1	1.1
August	-	60.2	-	14.9	10.0	0.9	13.5	0.5
September	-	63.6	-	17.8	8.4	4.2	5.5	0.6
October	-	67.4	-	3.7	0.1	18.5	10.0	0.3

TABLE 4. Average Carapace Length (mm) of Area A Shrimp, 1975 and 1976 Seasons

Season (Year Class)	I		II		III	
	1975 (1974)	1976 (1975)	1975 (1973)	1976 (1974)	1975 (1972)	1976 (1973)
April	-	12.0	-	18.0	-	21.9
May	14.2	12.6	18.5	18.7	21.7	22.2
June	14.7	12.8	18.8	19.0	22.4	23.3
July	15.6	14.4	19.7	19.8	23.3	23.7
August	16.2	15.0	20.1	20.3	23.6	23.8
September	16.3	15.4	20.4	20.8	24.2	23.9
October	16.3	16.3	20.4	21.2	24.4	24.1

AREA B-1

Area B-1 (Fort Bragg) shrimp landings for the 1976 season totaled 720,549 lb, more than double last year's catch of 347,832 lb and the second highest landings in history. The record is 799,722 lb landed in 1961.

Fishing began on April 28. No Fort Bragg based vessels entered the fishery. Fishing effort was increased due to the voluntary fishery closure in Area B-2 (Bodega Bay) because of small shrimp, and occasional poor catches and grade in Area A primarily during June and July. Eleven vessels engaged in the fishery compared to five during the previous season.

Price followed that of Eureka, beginning at 16¢ per lb and increasing to 18¢ per lb on May 4. Fishermen tied up on May 18 for a better price, settling at 20¢ per lb on May 23 for the remainder of the season.

During April, fishing effort was between Abalone Point and Cottaneva Creek in 68 to 80 fm (Figure 2). During this period, eulachon, *Thaleichthys pacificus*, concentrations hampered fishing operations. Six tows off Bruhel

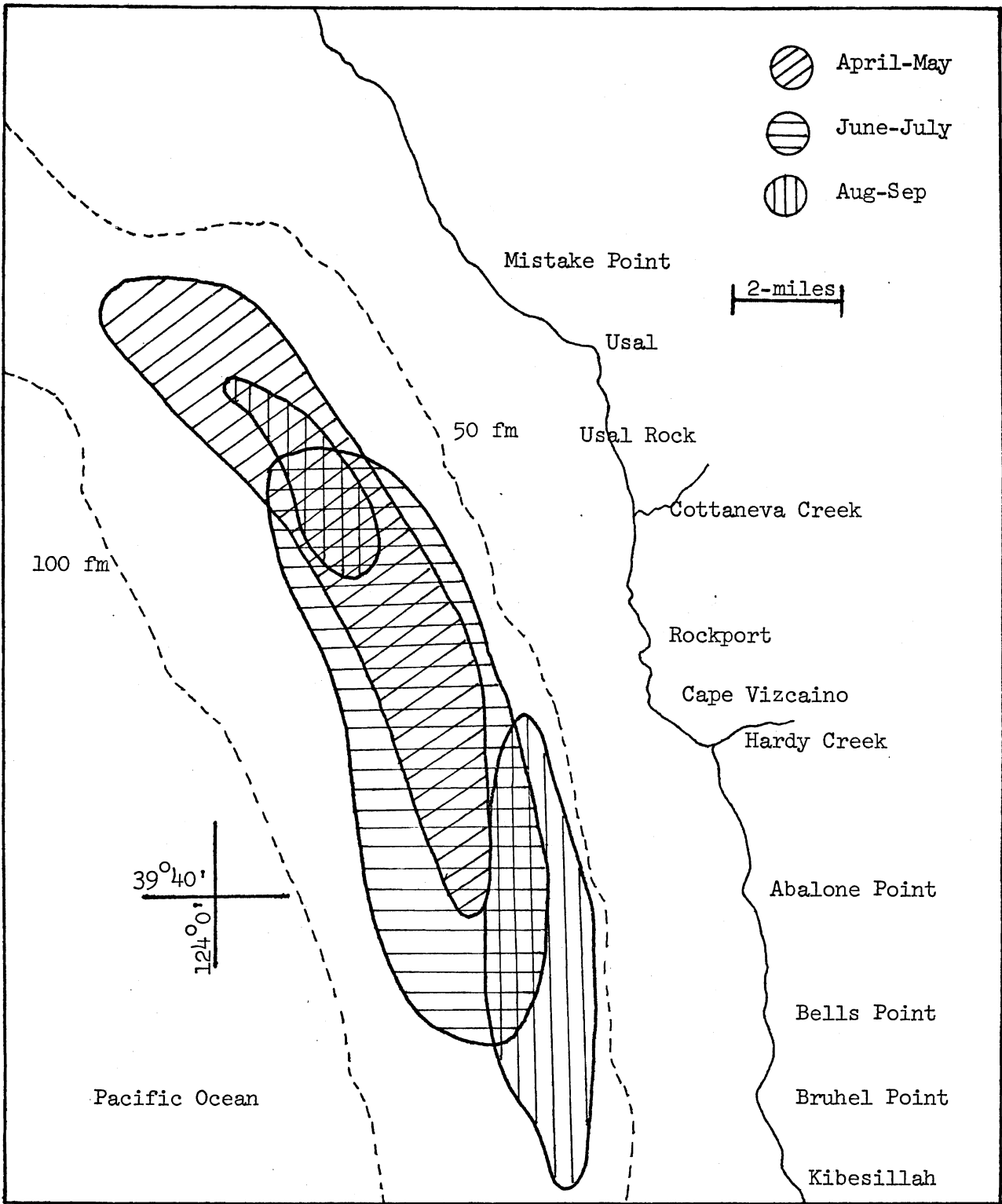


FIGURE 2. Area B-1 ocean shrimp, *Pandalus jordani*, catch locations, 1976.

Point produced only an estimated 50 lb total. In May, the fishery expanded and moved farther north to off Mistake Point in 70 to 80 fm. Eulachon concentrations were temporarily avoided but soon appeared in this area' too.

Seventy percent of the total effort was spent in June and July fishing from Bells Point to Usal Rock in 60 to 80 fm. Eulachon concentrations lessened by June 12 and by the end of that month ceased to be a problem. However, at the end of June, strong currents adversely affected the fishery through August. On July 7 to 10, fishermen agreed to tie up to allow the shrimp bed to rest due to the previous week's poor catch rates of only 431 lb per hr. On July 17, Eureka based vessels returned to Area A and the following week there was rough weather.

The August fishery was divided between off Usal in 70 to 80 fm and off Hardy Creek to Kibesillah in 55 to 70 fm (Figure 2). The latter area indicated a southern shift of the shrimp population into a previously unproductive area.

Two double-rig trawlers fished during September and October, concentrating their effort between Kibesillah and Cape Vizcaino in 54 to 65 fm. They landed their catches in Eureka.

Eight single-rig trawlers made 113 trips in Area B-1, averaging 575 lb per hr, while three double-rig trawlers made 15 trips (usually consisting of 3 fishing days) averaging 989 lb per hr (Table 5).

Two-year-old shrimp dominated the catch in numbers during April through June and equaled 1-year-olds in July. One-year-olds dominated the catch in August and September (Table 6). Except for August, 2-year-old shrimp dominated in weight. No samples were obtained from the October landings.

TABLE 5. Area B-1 Catch and Effort Data, 1976 (California Ports Only)

Month	Pounds landed	Effort (hours)	Pounds per hr	Vessels	Trips
<u>Single-rig vessels</u>					
April	11,840	23.3	508	2	4
May	54,130	61.6	944	2	8
June	327,919	507.1*	647	8	62
July	78,504	198.0	346	8	33
August	13,725	36.8	373	2	5
September	4,691	9.9	474	1	1
October	-	-	-	-	-
Totals	480,809	836.7	575+	8†	113
<u>Double-rig vessels</u>					
April	-	-	-	-	-
May	-	-	-	-	-
June	49,484	50.1	988	1	3
July	14,522	33.7	431	2	2
August	25,758	35.0	736	2	2
September	138,660	103.0	1,346	2	6
October	11,316	20.5	552	2	2
Totals	239,740	242.3	989+	3†	15
<u>All vessels</u>					
Season Totals	720,549	1,079.0	668+	11†	128

* Nine logs were missing - effort was prorated.

† Mean.

‡ Total vessels which made landings.

TABLE 6. Area B-1 Count Per Pound and Year Class Composition of Shrimp, 1976 Season

Month	Count per lb	Age class percent by number				Age class percent by weight			
		0	I	II	III	0	I	II	III
April	119	-	19.2	71.9	8.9	-	6.9	78.7	14.4
May	119	-	18.9	66.5	14.6	-	7.5	71.6	20.9
June	152	-	40.7	56.2	3.1	-	19.8	74.5	5.7
July	146	-	48.6	49.0	2.4	-	28.6	66.8	4.6
August	162	-	70.2	26.3	3.4	-	49.3	43.6	7.1
September*	163	-	84.2	15.3	0.5	-	-	-	-

* Hand tabulated.

Two-year-old females steadily decreased through the season to 11%, the opposite of what was found in the 1975 season. The fishery was dominated by the increasing number of 1-year-old males which increased to 58% in September (Table 7).

TABLE 7. Year Class and Sex Composition of Area B-1 Shrimp by Month, 1975 Season (Percentages)

Month	0	Males		Transitionals		Females		
		I	II	I	II	I	II	III
April	-	19.2	16.3	-	17.0	-	38.6	8.9
May	-	17.1	7.9	1.7	22.9	-	35.8	14.6
June	-	41.5	5.9	2.3	18.0	-	29.5	2.9
July	-	42.4	0.9	5.8	23.4	0.5	24.7	2.4
August	-	46.7	-	17.8	6.8	5.7	19.6	3.4
September*	-	58.1	-	14.9	4.7	11.2	10.7	0.5

* Hand tabulated.

Average carapace lengths by year class (Table 8) for 1976 were less than those of 1975 shrimp. One-year-old shrimp during July through August 1976 grew at a comparable rate but averaged 1.3 mm less carapace length per month than that of the same period in 1975. The 1975 fishery did not begin until July 16; therefore spawning data are not available for that season. This season, during the first week (April 25-May 1), 49% of the females sampled were ovigerous. Bad weather stopped fishing from May 2 to May 8, but from May 9 to May 15 sampling indicated 12.2% of the females remained ovigerous. May 16 to May 22 had bad weather and no ovigerous females were found during the following week's samples, although some were noticed in the landings. Differential annual spawning and/or larval settling periods may account for the size differences noted.

TABLE 8. Average Carapace Length (mm) of Area B-1 Shrimp, 1975 and 1976 Season

	I		II		III	
	1975	1976	1975	1976	1975	1976
April		13.6		18.9		21.5
May		13.6		19.2		21.5
June		13.8		19.2		21.8
July	15.8	14.6	19.1	19.4	21.6	21.8
August	16.6	15.3	19.9	20.0	22.3	21.9
September	17.3	15.7*	20.5	20.0*	22.6	22.0*
October	17.1		20.3		22.6	

* Hand tabulated.

AREA B-2

Area B-2 fishermen spent 2 days of exploratory fishing (April 19 and 22) but were unable to find marketable shrimp in quantity. Only 495 lb were landed. Small shrimp were located between Fort Ross and Salt Point in 55 fm. One fisherman caught shrimp in one tow at a rate of 6,000 lb per hr. However, the fisherman decided to leave them alone. Two of the vessels departed for Area B-1 and the remainder returned to bottomfish fishing. A record 1,187,719 lb were landed in 1975.

Sampling of the catch revealed a strong 1975 year class (1-year-olds) which averaged 75.8% by number. Average heads-on count per lb was 171. Percent composition by number was: I - 75.8, II - 19.7, III - 4.5. Only 2 of 115 females were ovigerous (1.7%).

AREA C

Only 5,328 lb were landed in this area in mostly incidental catches during trawling for spot prawns in the Santa Barbara area. In 1975, 62,009 lb were taken off Point San Luis and landed in the Morro Bay-Avila area.

OUTLOOK

The outlook for the Area A fishery is good based on the large catches and strong showing of the 1975 year class in September and October. This year class is now of marketable size and should dominate the 1977 fishery. The strength of the 1976 year class will not be known until sampling is conducted during the 1977 season.

The outlook for Area B-1 in 1977 is very good based on the productive areas fished during the 1976 season and the very strong 1975 year class (84.2% in September) which should carry the 1977 fishery. The strength of

the 1976 year class is unknown. However, in June and August fishermen reported many young-of-the-year shrimp ranging from 3.2 to 4.3 mm carapace length which we did not note in last year's catch, possibly indicating a strong 1976 year class.

The outlook for Area B-2 looks promising with the 1975 year class expected to be strong and of a size to produce marketable size shrimp in quantity. This year class will be 2 years old in April.

The status of the shrimp stocks in Area C is unknown because of very little fishing effort.

ACKNOWLEDGMENTS

We thank the fishermen and dealers for their continued interest and cooperation in assisting us in gathering the information contained in this report. We also thank John Geibel, Bernice Hammer and Alice Bernard (Operations Research Branch) for their invaluable assistance with putting the sampling information into a usable form.