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DEPARTMENT OF FISH AND GAME

OCEAN SHRIMP REPORT
1977 SEASON

BY

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TWENTY-FIRST ANNUAL SHRIMP REPORT

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ABSTRACT

Statewide Pacific ocean shrimp, *Pandalus jordani*, landings totaled 15,639,585 lb, more than triple the 1975 record catch of 4,992,233 lb. Record landings were recorded in Area A (Eureka-Crescent City), Area B-2 (Bodega Bay) with catches totaling 13,025,844 and 2,028,607 lb, respectively. Area B-1 (Fort Bragg) landings totaled 585,133 lb and no landings were reported from Area C (Avila-Morro Bay). In Area A the average catch per hour for the season for single-rig vessels was 1,241 lb and 2,228 lb for double-rig vessels. Area B-2 average catch per hour by the single-rig vessels was 2,536 lb. Two-year-old (1975 year class) shrimp dominated the catches in all areas. The outlook for the 1978 season in all areas is questionable because of the relatively weak showing of the incoming 1977 year class but it might make a significant contribution if abundant and of a marketable size.

1/ Marine Resources Administrative Report No. 78-13 October 1978.

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INTRODUCTION

California's 1977 Pacific ocean shrimp, *Pandalus jordani*, totaled 15,639,584 lb. This more than triples the previous record of 4,992,233 lb landed in 1975.

Record landings were recorded at Eureka-Crescent City and at Bodega Bay. A strong 1975 year class (two-year-old shrimp) was well represented in the catches in both areas.

Price to the fishermen remained at 23¢ per lb throughout the season.

AREA A

Area A (Eureka-Crescent City) shrimp landings for 1977 totaled 13,025,844 lb. That total was nearly five times the previous season's landings of 2,673,819 lb and more than three times 1970's record catch of 3,806,800 lb. The poundage taken off the Area A bed was greater than reported because: (1) near the end of the season a number of boats from Oregon and Washington were fishing in Area A and returning to their home ports with the catch and not reporting the source. For example, one Washington vessel whose logs were obtained after the close of the season, landed an estimated 114,500 lb from Area A in Washington, and (2) due to large landings and high price, some dealers were rumored to have reported less poundage than was actually landed in order to lower the price paid to the fisherman without showing it.

The season opened April 16 and the first deliveries were made April 20. The catch and effort increased during the first few weeks and then remained at a high level throughout the season with only a couple of short periods of decreased catch and effort due to adverse weather.

Because of the high catch, most boats were on limits for most of the season.

During April, effort was concentrated off the Klamath River and north of Trinidad Head (Figure 1). During May and the first half of June, fishing was conducted mainly around Redding Rock. The effort spread throughout the bed from Oregon to Trinidad Head during the last part of June through the middle of August. From the middle of August to October, the fishing was concentrated around Redding Rock again. In October the fishing was mainly off Pt. St. George.

The average catch per hour for the season for the 22 single-rig and 13 double-rig vessels was 1,241 lb and 2,288 lb, respectively (Table 1).

Two-year-old, 1975 year class, shrimp dominated the fishery in percent by number and percent by weight throughout the season (Table 2).

The percentage of one-year-old male shrimp increased steadily from 6.2% in April to a high of 26.36% in September (Table 3).

One-year-old, 1976 year class, shrimp were larger throughout the season than one-year-olds in 1976. Two- and three-year-old shrimp, however, were smaller than the corresponding age shrimp in 1976 (Table 4).

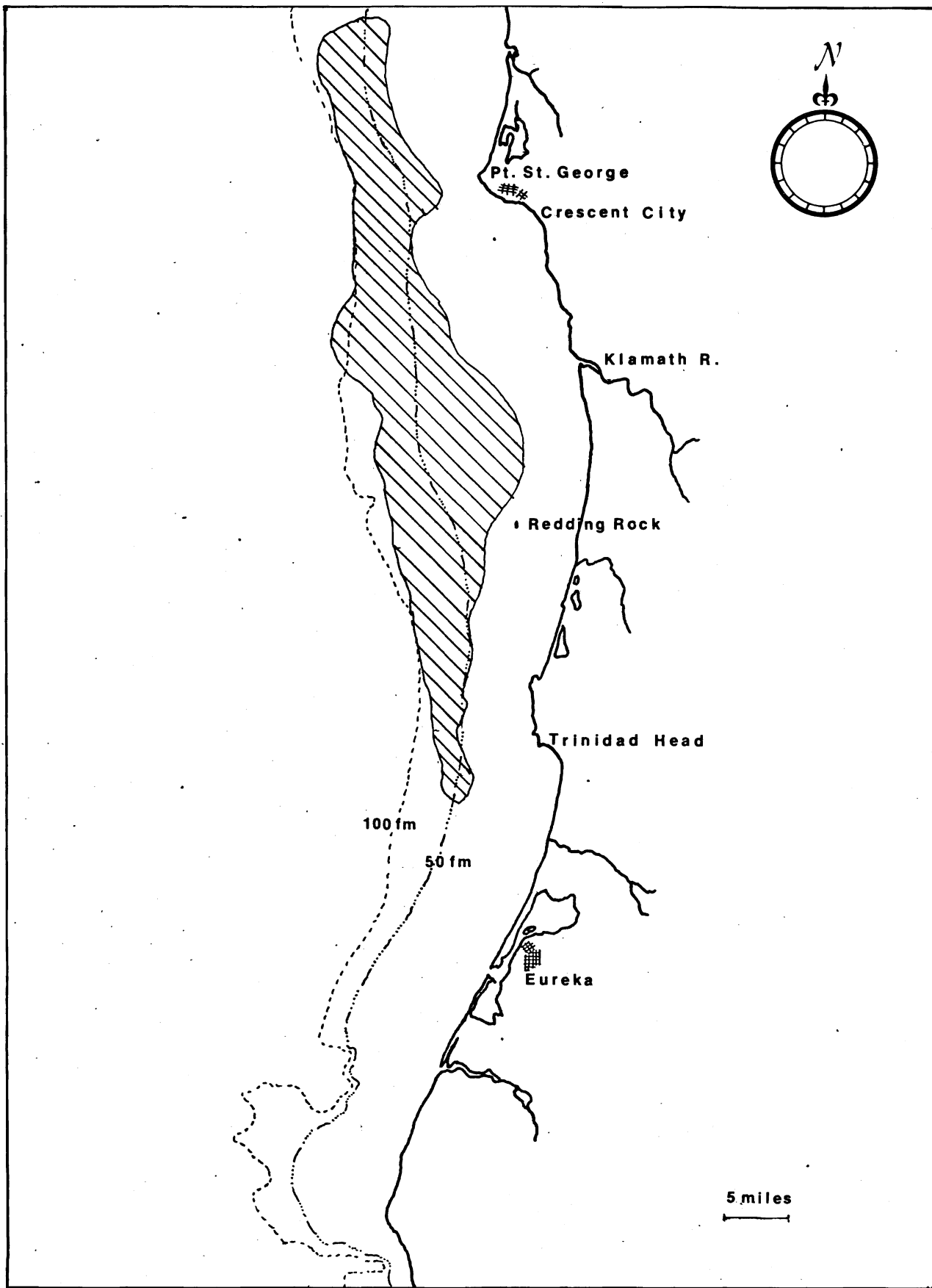


FIGURE 1. Area A Pacific ocean shrimp, *Pandalus jordani*, catch locations, 1977.

TABLE 1. Area A Monthly Catch and Effort Data, 1977.

Month	Pounds landed	Effort (hours)	Pounds per hour	Vessels	Trips
<u>Single-rig vessels</u>					
April	129,907	96.9	1,341	4	24
May	730,995	558.7	1,308	9	122
June	696,644	478.7	1,455	10	93
July	1,191,334	1330.2	896	14	173
August	1,371,178	1073.1	1,278	16	214
September	1,208,303	743.5	1,626	16	165
October	1,200,319	895.8	1,222	21	180
Totals	6,528,680	5176.9	1,241*	22 ⁺	971
* Mean					
+ Total vessels that made landings					
<u>Double-rig vessels</u>					
April	51,524	33.6	1,532	2	6
May	1,178,697	498.8	2,363	4	46
June	784,602	381.5	2,057	5	31
July	402,912	333.9	1,207	4	19
August	1,269,884	480.6	2,623	5	45
September	1,644,045	578.8	2,801	10	61
October	1,165,500	507.3	2,248	13	52
Totals	6,497,164	2814.5	2,288*	13 ⁺	260
<u>All Vessels</u>					
Season Totals	13,025,844	7991.4	1,630*	35 ⁺	1,231
* Mean					
+ Total vessels that made landings					

TABLE 2. Area A Count Per Pound and Year Class Composition of Shrimp, 1977 Season

Month	Count per lb	Age class percent by number				Age class percent by weight			
		0	I	II	III	0	I	II	III
April	137	-	6.3	83.7	10.0	-	2.4	79.5	18.1
May	137	-	14.6	78.1	7.3	-	6.6	80.5	12.9
June	132	-	16.4	78.5	5.1	-	8.5	82.6	8.9
July	120	-	18.4	76.1	5.5	-	10.7	79.8	9.5
August	105	-	16.9	77.0	6.1	-	9.7	79.9	10.4
September	107	0.5	29.8	65.2	4.5	0.1	19.6	72.7	7.6
October	102	3.3	36.7	53.1	6.9	0.6	25.8	61.6	12.0

TABLE 3. Year Class and Sex Composition of Area A Shrimp by Month, 1977 Season (Percentages)

Month	0	Males		Transitionals		Females		
		I	II	I	II	I	II	III
April	-	6.2	29.25	-	33.65	-	20.80	9.98
May	-	14.57	19.85	-	18.97	-	39.25	7.31
June	-	16.25	18.82	.16	22.99	-	36.71	5.07
July	-	17.20	10.23	1.19	35.95	.04	29.88	5.50
August	-	15.22	9.61	1.57	32.48	.12	34.90	6.11
September	.55	26.36	11.20	3.22	21.58	.17	32.43	4.48
October	3.27	24.83	2.30	11.65	8.36	.23	42.42	6.94

TABLE 4. Average Carapace Length (mm) of Area A Shrimp, 1976 and 1977 Seasons

Season (Year Class)	I		II		III	
	1976 (1975)	1977 (1976)	1976 (1974)	1977 (1975)	1976 (1973)	1977 (1974)
April	12.0	13.4	18.0	17.7	21.9	22.0
May	12.6	13.8	18.7	18.0	22.2	21.9
June	12.8	14.2	19.0	18.1	23.3	21.9
July	14.4	15.2	19.8	18.8	23.7	22.6
August	15.0	15.7	20.3	19.1	23.8	22.8
September	15.4	16.3	20.8	19.5	23.9	22.8
October	16.3	16.8	21.2	20.3	24.1	23.4

OUTLOOK

The outlook for Area A looks questionable because of the relatively weak showing of the 1976 year class which accounted for 29.8 and 36.7% of the shrimp in September and October, respectively. The success of the fishing will depend on the abundance of the incoming 1977 year class. However, most of this year class may be too small to be marketed, especially early in the season.

AREA B-1

Area B-1 (Fort Bragg) shrimp landings for the 1977 season totaled 585,133 lb, compared to last year's near record catch of 720,549 lb.

Fishing began on June 12. Although five local vessels obtained permits, only one trawler from Fort Bragg entered the fishery.

In June and July, fishing effort concentrated off Cape Vizcaino in comparatively deep water (70-80 fm, Figure 2). Smaller shrimp were reported in shallower water (60 fm), and juvenile slender sole, *Lyopsetta exilis*, gilling in the net, hampered fishing operations. Exploratory tows off Abalone Point and Kibesillah in June were unproductive.

As the high catch-per-unit-of-effort dropped at Bodega Bay (Area B-2), vessels began consistently fishing Area B-1 in September. September and October accounted for 90% of the landings and 79% of the effort.

Effort in September shifted south to between Cape Vizcaino and Wages Creek in 55 to 75 fm. October's effort was scattered from Cottoneva Creek to Westport in 55 to 75 fm. The most productive area shifted southward during October. Exploratory tows off Usal Rock and off Kibesillah produced no shrimp.

An area of zero fishing effort was evident between the zones of June-July effort and September-October effort (Figure 2). Although each tow is plotted by hand on a chart and some error will occur, this zone appears to have been unfished during the season.

Market limits of 5,000 to 10,000 lb were imposed beginning October 2 and lifted October 8. Catch rates soared during that period with single tows exceeding the market limit. The highest catch recorded was a single 35-minute tow of 9,545 lb or 16,362 lb per hour.

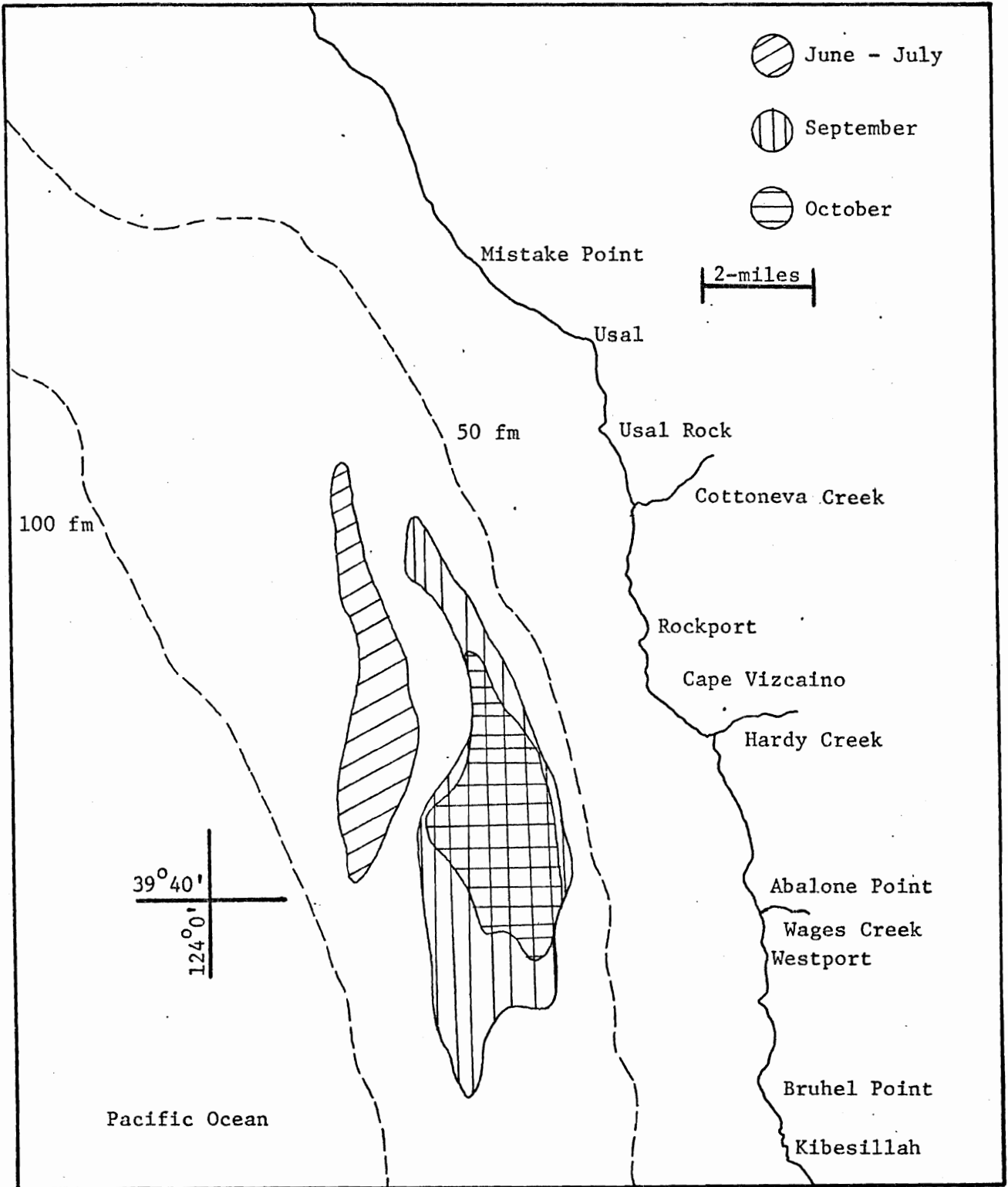


FIGURE 2. Area B-1 Pacific ocean shrimp, *Pandalus jordani*, catch locations, 1977.

Incidental catches of fish, primarily juvenile hake, *Merluccius productus* (5 to 6 inches total length), became a problem about mid-September. The problem increased in severity through the end of the season requiring extensive sorting.

Seven single-rig trawlers made 100 trips in Area B-1, averaging 1,732 lb per hour. Two double-rig trawlers each made a trip in October, averaging 683 lb per hour (Table 5).

TABLE 5. Area B-1 Monthly Catch and Effort Data, 1977 (California Ports Only)

Month	Pounds landed	Effort (hours)	Pounds per hour	Vessels	Trips
June	44,015	43.6	1,010	2	8
July	16,130	25.3	638	2	5
August		No Fishing Effort			
September	208,879	87.1	2,398	4	24
October	308,073	177.3	1,737	7	63
Totals	577,097	333.3	1,732*	7 ⁺	100

Double-rig vessels

June	-	-	-	-	-
July	-	-	-	-	-
August	-	-	-	-	-
September	-	-	-	-	-
October	8,036	11.75	683	2	2

All Vessels

Season Totals 585,133 345 1,696* 9⁺ 102

* Mean

+ Total vessels which made landings.

Two-year-old shrimp dominated the catch by numbers and weight throughout the season (Table 6).

TABLE 6. Area B-1 Count per Pound and Year Class Composition of Shrimp, 1977 Season

Month	Count per pound	Age class percent by number				Age class percent by weight			
		0	I	II	III	0	I	II	III
June	126	-	7.9	89.6	2.5	-	4.5	91.5	4.0
July	129	-	36.8	55.6	7.6	-	22.6	64.3	13.1
August		No Fishing Effort							
September	95	-	22.5	69.3	8.2	-	13.6	74.5	11.9
October	95	-	25.5	70.9	3.6	-	15.6	78.2	6.2

Two-year-old females dominated the catch by percent, except in July when the total catch was quite small (Table 7). Primary females and transitionals each contributed 0.7% at the end of the season. By comparison, in September 1976 (the final fishing month of that season) primary transitionals and females combined accounted for 26.1% of the total.

TABLE 7. Year Class and Sex Composition of Area B-1 Shrimp by Month, 1977 Season (Percentages).

Month	0	Males		Transitionals		I	Females		III
		I	II	I	II		I	II	
June	-	6.4	21.2	1.4	24.1	-	44.4	2.5	
July	-	27.9	4.4	7.6	24.6	1.2	26.6	7.7	
August		No Fishing Effort							
September	-	18.9	12.4	1.3	13.1	2.3	43.8	8.2	
October	-	24.1	8.8	0.7	7.1	0.7	55.1	3.5	

Average carapace lengths for 1977 were comparable to 1976 two-year-olds, but longer for one and three-year-olds (Table 8). Growth rates of two-year-olds during this season were also comparable to 1976; however, one and three-year-olds grew at a faster rate in 1977.

TABLE 8. Average Carapace Length (mm) of Area B-1 Shrimp, 1976 and 1977 Season

Month	I		II		III	
	1976	1977	1976	1977	1976	1977
June	13.8	14.7	19.2	18.7	21.8	22.4
July	14.6	15.4	19.4	19.3	21.8	22.3
August	No Fishing Effort					
September	15.7	16.1	20.0	20.0	22.0	22.6
October	-	16.8	-	20.5	-	23.0

Headroe observations were first made during week number 23 (September 11-17) and totaled 8.9% of the females, rising to 50% by week number 25 (September 25 to October 1). Ovigerous shrimp were noted in the loads during week number 25 but did not occur in the samples. Headroe observations dropped to 24% of the females the final two weeks of the season, probably reflecting a more accurate percentage.

OUTLOOK

The relative strength of the 1977 year class is unknown. However, due to the low percentage (29% one-year-olds during the final two weeks of the fishery), the outlook for Area B-1 is only fair at best. This year class is expected to provide most of next year's catch as two-year-olds.

AREA B-2

Area B-2 (Bodega Bay) fishermen broke all existing records with landings of 2,028,607 lb. The previous record was 1,188,000 lb, which was landed in 1975. No landings were made last season because most of the shrimp were small, unmarketable one-year-olds.

The season started on April 16, but the fishermen were unable to get out until April 20 because of rough seas.

Fishing began off Salt Point in 67 to 71 fm (Figure 3). During May the effort shifted northward to Stewart's Point and Black Point in waters 55 to 72 fm deep.

During June, July and most of August, fishing was generally in the same location in 68 to 83 fm. After the catches declined during the last part of August and first part of September, the fleet conducted exploratory trawling from Bodega Head in 40 fm to off Stewart's Point in 80 fm but were not able to locate shrimp in commercial quantities.

Average catch per hour for the season was a very high 2,536 lb. This is the second highest catch per hour on record. The record catch per hour is 2,722 lb per hour for 246,000 lb landed in 1973. Average catch per hour ranged from a high of 3,717 lb in April to a low of 95 and 0 lb for September and October, respectively (Table 9).

The highest monthly catch was also made in April with landings of 508,546 lb.

A total of eight single-rig vessels fished in Area B-2 during the season. No double-rigs fished.

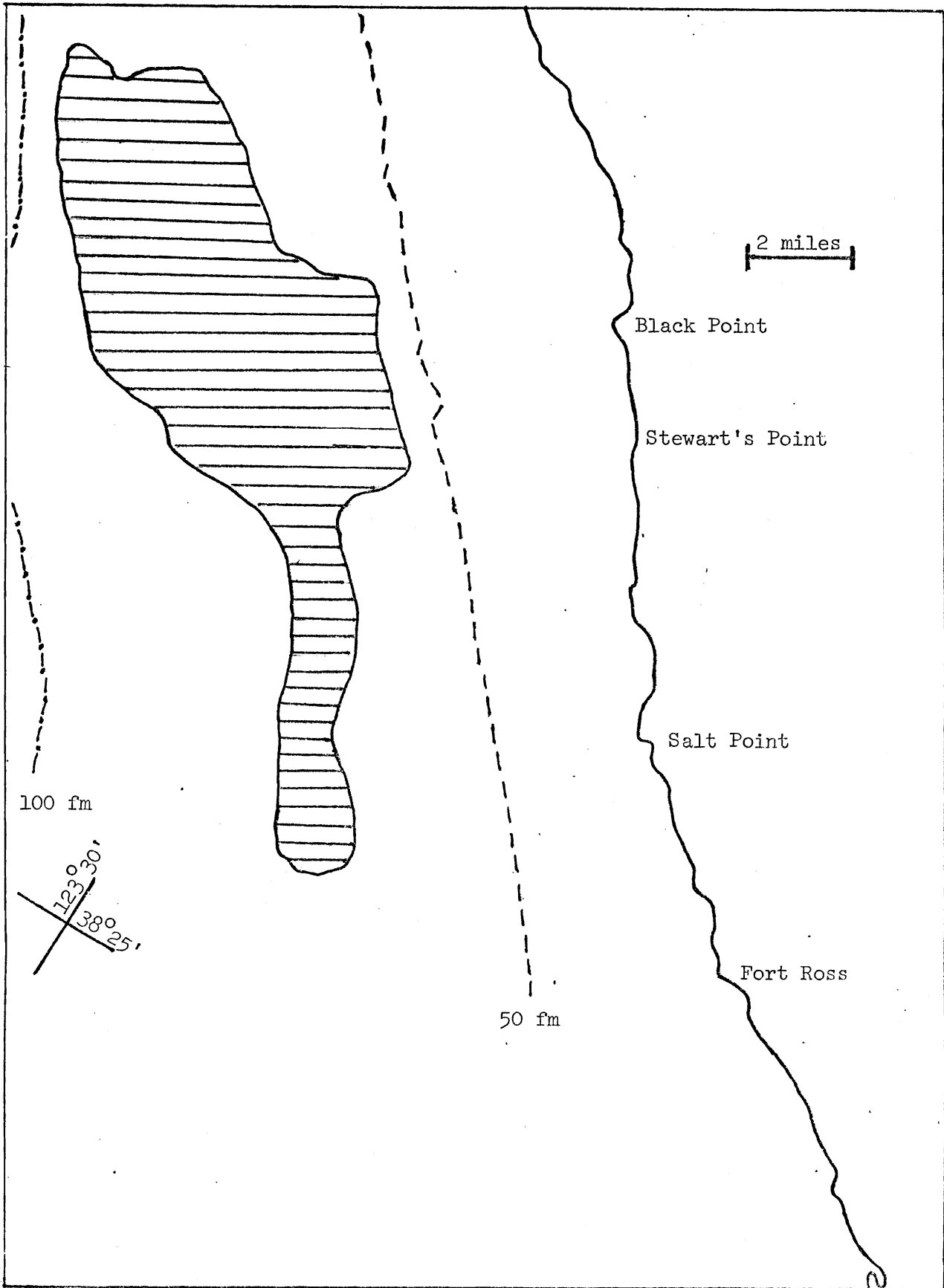


FIGURE 3. Area B-2 Pacific ocean shrimp, *Pandalus jordani*, catch locations 1977

TABLE 9. Monthly Shrimp Landings and Effort for Area B-2, 1977 Season

Month	Pounds landed	Effort (hours)	Pounds per hour	Vessels	Trips
April	508,546	136.8	3,717	7	46
May	366,269	188.0	1,948	7	44
June	406,070	157.0	2,586	7	43
July	385,873	131.1	2,943	8	29
August	359,394	153.4	2,225 †	8	39
September	2,455	25.8	95	4	8
October	0	2.6	0	1	1
Totals	2,028,607	794.7	2,536 *	8 ⁺	210

* Mean

+ Total vessels that made landings

† Based on effort for 345,910 lb

Sampling of the catch throughout the season revealed a strong 1975 year class (two-year-olds), which showed an average of 93.8% by number and 93.5% by weight in the samples (Table 10). The 1976 year class (one-year-olds) and the 1974 year class (three-year-olds) represented 3.1% and 3.1% by number and 1.6% and 4.9% by weight, respectively. Average heads-on-counts per lb ranged from 128 in April to 106 in September. The season average, weighted by monthly landings, was 122.

Two-year-old females and males contributed an average of 46.0% and 42.1% of the catch, respectively (Table 11). One-year-old males, two-year-old transitionals, and three-year-old females made up the remainder in about equal amounts. No primary females (one-year-old females and transitionals) were evident - not even during August and September. The high percentage of two-year-old males in August and September indicates

that some may not make the change from male to female (secondary females) by the start of the 1979 season and will still be males or transitional. This is not normal for the shrimp population in this area.

TABLE 10. Area B-2 Count Per Pound and Year Class Composition of Shrimp, 1977 Season

Month	Heads-on Count per pound	Age class percent by number			Age class percent by weight		
		I	II	III	I	II	III
April	128	1.2	94.9	3.9	0.5	93.4	6.1
May	121	1.6	94.1	4.3	0.7	92.5	6.8
June	127	4.4	92.2	3.4	2.1	92.3	5.6
July	119	2.0	95.1	2.9	1.0	94.6	4.4
August	116	6.8	92.7	0.5	4.1	95.1	0.8
September	106	7.3	91.7	1.0	4.2	94.1	1.7
Seasonal Average	122	3.1	93.8	3.1	1.6	93.5	4.9

TABLE 11. Area B-2 Year Class Composition, 1977 Season

Month	Males		Percent by number Transitionals		Females		
	I	II	I	II	I	II	III
April	1.2	39.5	0.0	0.6	0.0	54.7	3.9
May	1.6	28.1	0.0	3.8	0.0	62.2	4.3
June	4.4	49.1	0.0	6.7	0.0	36.4	3.4
July	2.0	42.1	0.0	10.1	0.0	42.9	2.9
August	6.8	52.1	0.0	9.0	0.0	31.6	0.5
September	7.3	40.7	0.0	13.8	0.0	37.2	1.0
Seasonal average	3.1	42.1	0.0	5.7	0.0	46.0	3.1

One-year-old shrimp grew approximately 2.0 mm (0.08 inches), two-year-olds grew about 1.0 mm, and three-year-olds grew about 1.2 mm from April to September (Table 12). Growth rates for the one-year-old shrimp were similar to 1975, but the average size of each of these year classes were definitely smaller by slightly less than 0.9 mm.

TABLE 12. Average Carapace Length (mm), Area B-2, 1977 Season

Month	1-year-old 1976-year-class	2-year-old 1975-year-class	3-year-old 1974-year-class
April	14.1	18.3	21.6
May	13.7	18.4	21.7
June	14.5	18.5	22.1
July	15.0	18.7	22.0
August	15.6	19.1	22.4
September	16.1	19.3	22.8

OUTLOOK

The outlook for Area B-2 does not look promising from a fishery standpoint. The 1976 year class is weak and will not contribute much to the 1978 fishery. A strong 1977 year class is expected but these one-year-old shrimp will likely be unmarketable, especially during the first few months of the season. This would be similar to the 1976 season when small shrimp were available but the fishermen decided to let them grow another year. The spawning stock which produced the 1977 year class was one of the largest ever observed on this bed. The season did not open up until most of the females had released the larvae.

AREA C

No landings were reported from this area. During September, one vessel made three exploratory tows off Point Buchon and Point San Luis

in 84 to 140 fm. Although some shrimp were found, they were not present in commercial quantity.

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 (Planning Branch) for their invaluable assistance with putting the sampling information into a usable form.