

**NORTHERN ANCHOVY
AGE AND SIZE COMPOSITION,
1974-75 SEASON**



**by
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ABSTRACT

The California anchovy reduction fishery amounted to 105,767 megagrams (116,588 short tons) for the 1974-75 season. Southern California catch was dominated by age-group II (1972 year class) with substantial numbers of age groups III (1971 year class) and IV (1970 year class). Central California's anchovy catch consisted of similar age groups II, III and IV. (1972, 1971 and 1970 year classes).

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INTRODUCTION

This report is the eighth in a series determining age, length, and sex composition of California's 1974-75 anchovy reduction catch. The methods of sampling and age determination used were those described by Collins (1971). Estimated numbers by length, year class, weight, maturity, and sex were calculated from samples taken at Terminal Island and Moss Landing.

A total of 527 samples taken at Terminal Island, contained 6,474 individual fish, and 46 samples from Moss Landing contained 484 fish.

THE FISHERY

Southern Permit Area

The season began on September 15, 1974 and ended May 15, 1975 with a record catch of 99,717 megagrams (109,919 short tons) of which 82% was landed at Terminal Island and 18% at Port Hueneme (Table 1). The seasonal quota of 100,000 short tons or 90,718 Mg was increased to 115,000 short tons or 104,326 Mg on May 2, 1975.

The initial anchovy price was \$35 per short ton but dropped to \$30.25 at season's end. Because of a price dispute, the San Pedro fleet did not fish until November. Fishing was good until March when erratic fish behavior reduced catches, although fishing improved during April and May (Table 1). Port Hueneme landings were greatest during the fall with decreasing landings in winter and spring (Table 1).

TABLE 1. Anchovy Landings (weight in Megagrams) for the 1974-75 Season.

Months	LOCATION			Total
	Monterey	Port Hueneme	Terminal Island	
August	361	0	0	361 0.3%
September	229	1,407	0	1,636 1.5%
October	549	3,558	1,383	5,490 5.2%
November	2,485	3,845	16,585	22,916 21.7%
December	103	2,317	10,763	13,183 12.5%
January	1,332	2,662	12,854	16,848 15.9%
February	811	1,543	6,374	8,728 8.2%
March	180	432	3,830	4,442 4.2%
April	0	1,010	16,044	17,054 16.1%
May	0	987	14,122	15,109 14.3%
Total	6,050	17,761	81,956	105,767
%	5.7	16.8	77.5	100%
Total short tons	6,669	19,578	90,341	116,588

The San Pedro fleet numbered 42 boats although only 30 were considered full-time anchovy boats. These vessels had a combined hold capacity of 2,540 Mg (2,800 short tons) although cannery processing capacity was only 1,450 Mg (1,600 short tons) per day. Cannery imposed daily limits of 23 to 59 Mg (25 to 65 short tons). The Port Hueneme fleet consisted of three vessels, with a hold capacity of 318 Mg (350 short tons) although maximum processing capacity was only 227 Mg (250 short tons).

Northern Permit Area

The season commenced August 1, 1974, and concluded May 15, 1975, with a seasonal total of 6,050 Mg (6,669 short tons). Largest catches occurred during fall months (Table 1). The quota remained at 15,000 short tons, or 13,608 Mg. The opening anchovy price was \$42.50 per short ton, but soon dropped to \$30 per short ton.

The Monterey fleet consisted of 8 lampara boats and 2 purse seiners, with a combined hold capacity of 200 Mg (220 short tons), and the reduction capacity was 200 Mg (220 short tons) per day.

AGE COMPOSITION OF THE CATCH

Otoliths were used for age determination, and age was assigned according to methods devised by Collins and Spratt (1969).

Southern California

The commercial catch was dominated by age group II (1972 year class), comprising 39% by number and 37% by weight of the Terminal Island landings (Table 2). Age groups III (1971 year class) and IV (1970 year class) constituted nearly 37% by number and 40% by weight (Table 2). These age groups appeared in unusually large proportions during April and May (Figure 1). Age group I (1973 year class) and young-of-the-year fish (1974 year class) contributed 23% by number and 20% by weight of the commercial catch (Table 2). Recruitment of these groups occurred in January and

TABLE 2. Estimated Weight and Number of Anchovies in Year Class and Age Landed at Terminal Island for Reduction in Southern California During 1974-75 Season.

	1974 (0)	1973 (1)	1972 (2)	1971 (3)	1970 (4)	1969 (5)	1968 (6)	Total
Megagrams	2,678	13,781	30,415	23,542	9,631	1,458	198	81,703
Standard deviation	255	387	535	500	372	151	60	
Percent	3.27	16.86	37.22	28.81	11.78	1.78	0.24	99.96
Number	182,124,000	728,326,000	1,522,930,000	1,036,963,500	378,768,500	50,071,000	5,583,000	3,934,766,000
Standard deviation	19,561,488	21,030,557	28,032,566	21,608,141	14,032,445	4,962,905	1,669,121	
Percent	4.62	18.51	39.46	26.35	9.62	1.27	0.14	99.84

TABLE 3. Estimated Weight and Number of Anchovies by Year Class and Age Landed at Monterey for Reduction in Central California During 1974-75 Season.

	1974 (0)	1973 (1)	1972 (2)	1971 (3)	1970 (4)	1969 (5)	1968 (6)	Total
Megagrams	25	309	1,346	2,574	1,312	359	22	5,947
Standard deviation	33	103	297	541	337	114	37	
Percent	.41	5.18	22.62	43.28	22.0	6.0	.37	99.86
Number	1,412,200	16,283,700	58,584,300	104,209,100	47,952,800	10,300,100	753,400	239,495,600
Standard deviation	160,824	4,670,557	12,853,004	22,905,242	10,537,407	3,643,746	1,259,353	
Percent	.6	6.8	24.0	43.8	20.0	4.0	.3	99.5

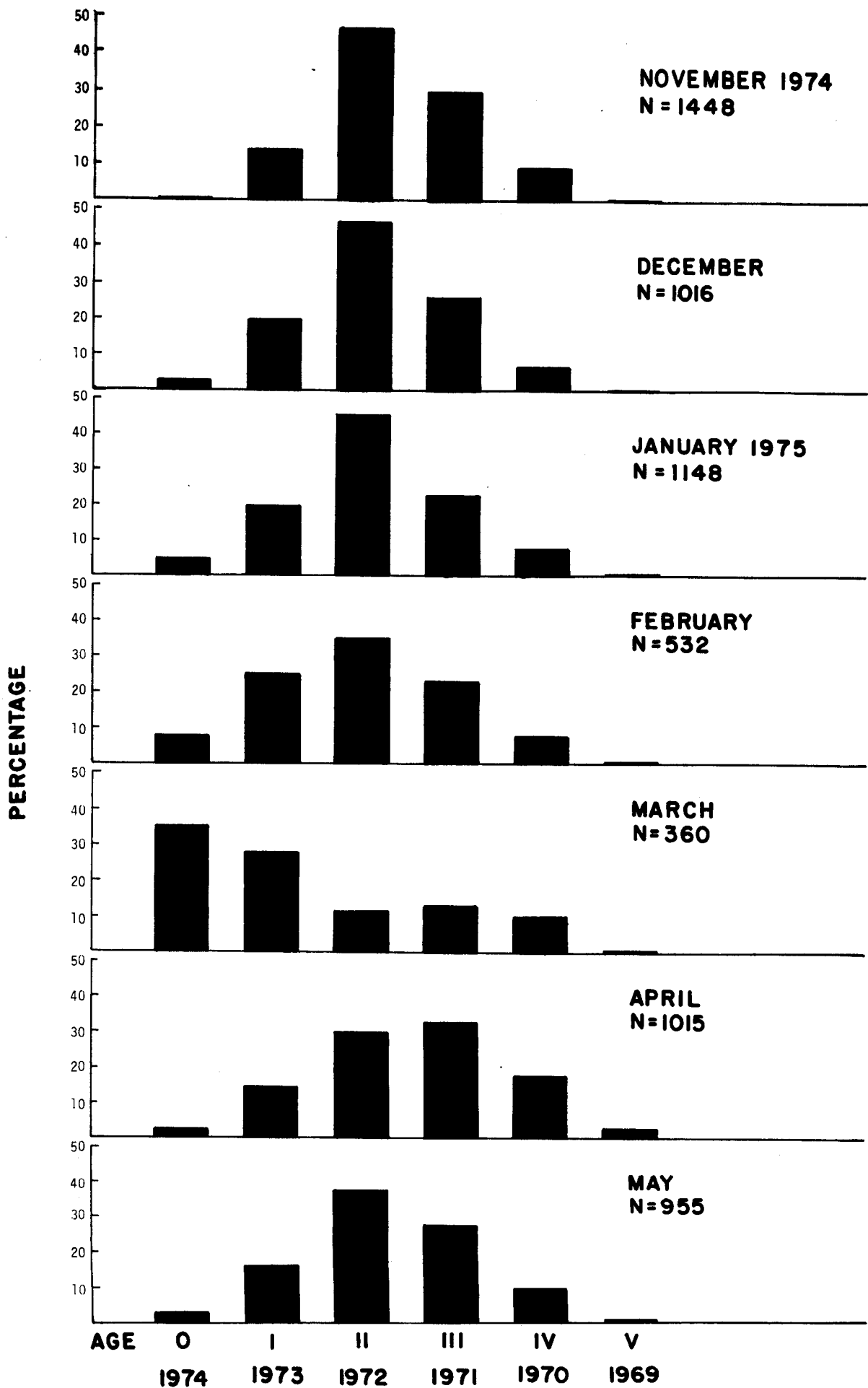


FIGURE I. Southern California anchovy age composition by month 1974-1975 season

reached a peak in March when they constituted 58% of the catch, but diminished in following months (Figure 1).

Central California

Age group III (1971 year class) dominated the commercial catch consisting of 44% by number and 43% by weight of the landings (Table 3). Age groups II (1972 year class) and IV (1970 year class) constituted 44% by number and 45% by weight (Table 3). Young-of-the-year fish (1974 year class) and age group I (1973 year class) contributed only 7% by number and 6% by weight as compared with 31% by number and 22% by weight (Figure 2) for the previous season (Sunada, 1976).

LENGTH COMPOSITION OF THE CATCH

Southern California

Approximately 48% of the estimated 3.9 billion fish were greater than 125 mm (4.9 inches) standard length although the lengths varied from 85 mm to 173 mm (3.3 to 6.8 inches) SL (Table 4). This percentage was considerably larger than 17% in 1972-73 season and 29% in 1973-74 season (Sunada, 1975, 1976). This increase was the effect of greater proportions of age groups III (1971 year class) and IV (1970 year class).

TABLE 4. Estimated Number of Anchovies by Length Group Landed at Terminal Island During 1974-75 Season.

Length group (mm SL)	Estimated number	Standard deviation	Percent of landings
75-84			
85-94	9,604,000	3,619,805	0.24
95-104	64,195,000	12,263,646	1.63
105-114	440,954,500	25,408,033	11.20
115-124	1,522,304,500	32,423,994	38.68
125-134	1,308,135,000	25,751,755	33.24
135-144	481,488,000	16,385,026	12.23
145-154	91,447,000	6,859,037	2.32
155-164	15,252,000	3,021,962	0.38
165-174	1,385,500	937,904	0.03
Total	3,934,766,000		99.95

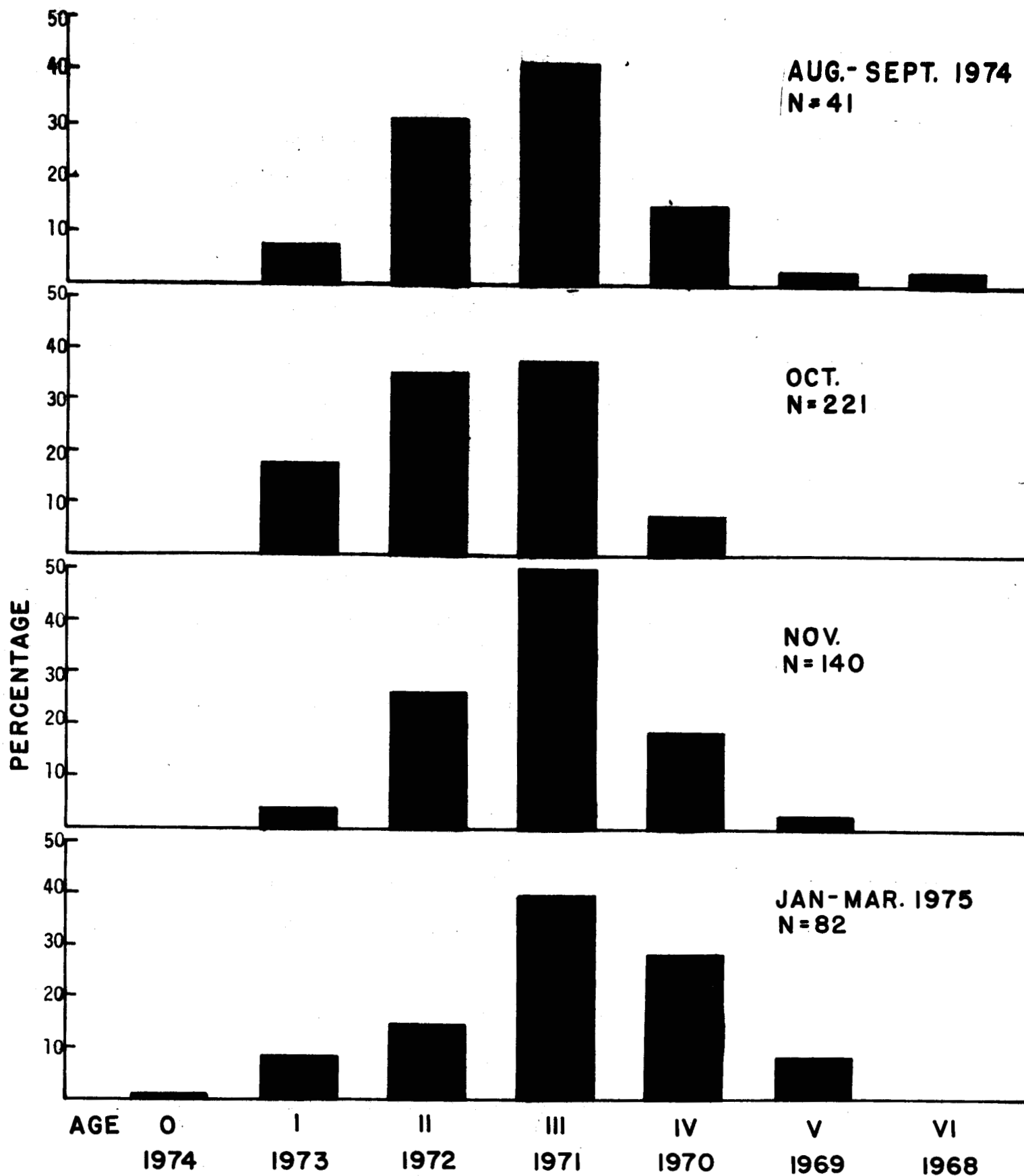


FIGURE 2 Central California anchovy age composition by month for the 1974-75 season.

The mean length of the sampled catch was 125 mm (4.9 inches) SL as compared to 116 mm (4.6 inches) SL for the 1972-73 season and 119 mm (4.7 inches) SL for the 1973-74 season (Sunada, 1975, 1976).

Recruitment of small fish in March accounted for the average fish length of 119 mm (4.7 inches) SL while the reappearance of large fish in April increased the mean length to 132 mm (5.2 inches) SL (Figure 3).

Length at age for all age groups was slightly larger than the 1973-74 season's lengths (Table 5). Females were larger than males for all age groups (Table 6).

Central California

Central California anchovies ranged from 100 mm to 184 mm (3.9 to 7.2 inches) SL, with 40% of the estimated 240 million anchovies greater than 135 mm (5.3 inches) SL (Table 7). This percentage was considerably smaller than the 55% during 1973-74 season and 85% in 1972-73 season (Sunada, 1975, 1976).

Average fish length for the season was 131 mm (5.1 inches) SL which was similar to 133 mm (5.2 inches) SL for the 1973-74 season (Sunada, 1976). Mean lengths of females were larger than males for all year classes (Table 8). Monthly length frequencies indicated an influx of smaller fish during the winter (Figure 4).

SEX AND WEIGHT RATIO

Southern California

The female to male numerical ratio was 1.6:1 and the weight ratio was 1.7:1 (Table 9). These ratios were less than those of the 1973-74 season which were 2.01:1 by number and 2.2:1 by weight (Sunada, 1976). The increased numbers of age groups 0 (1974 year class) and I (1973 year class), consisting of equal proportions of males and females, reduced the effects of older age groups with its preponderance of females (Figure 5).

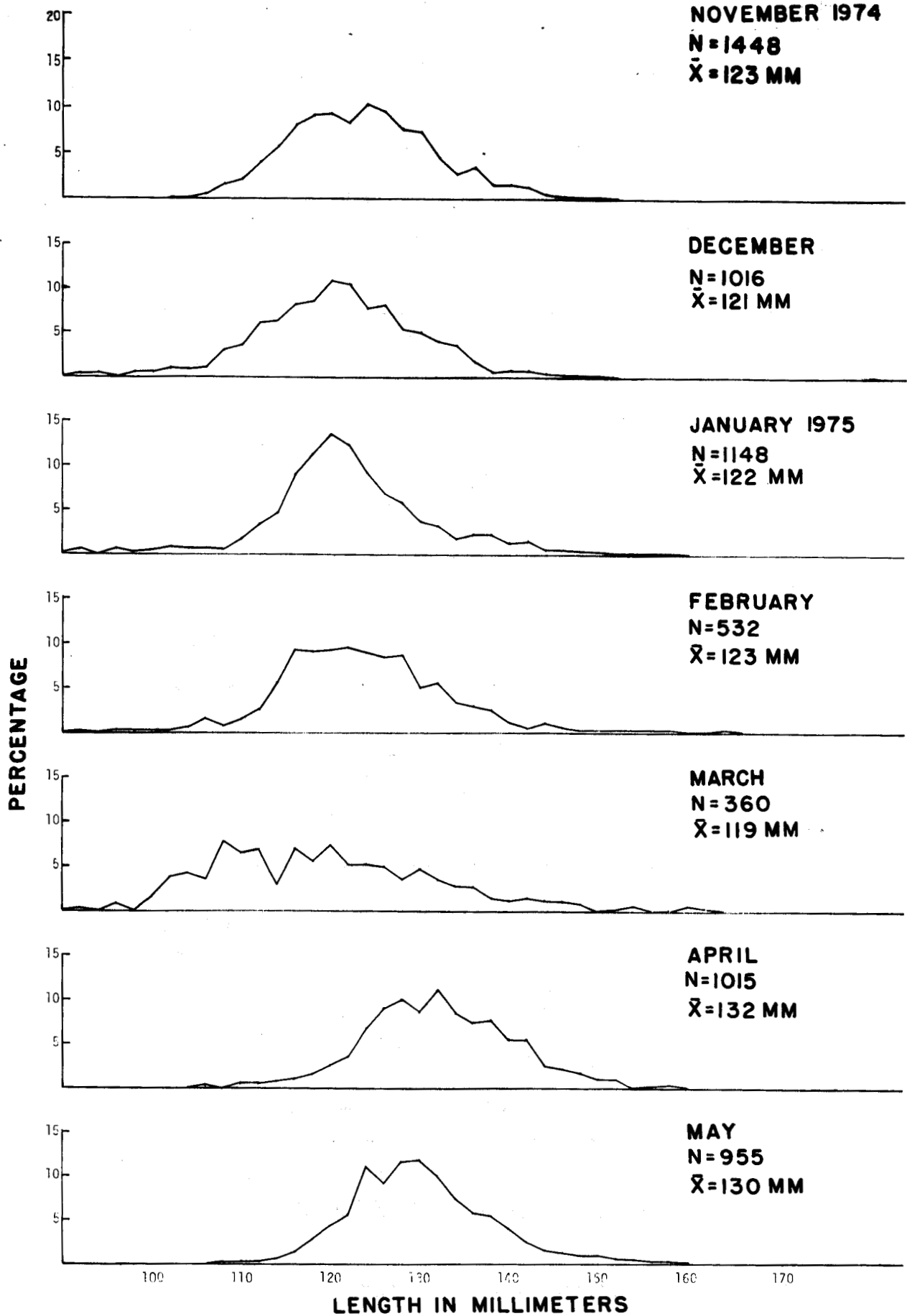


FIGURE 3 Length distribution of anchovies landed at Terminal Island for the 1974-75 season

PERCENTAGE

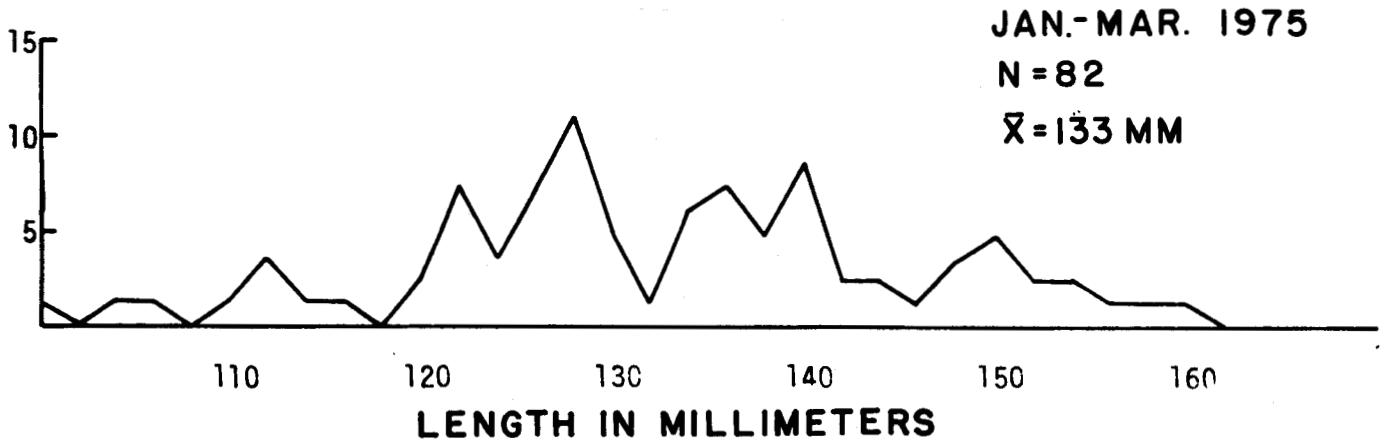
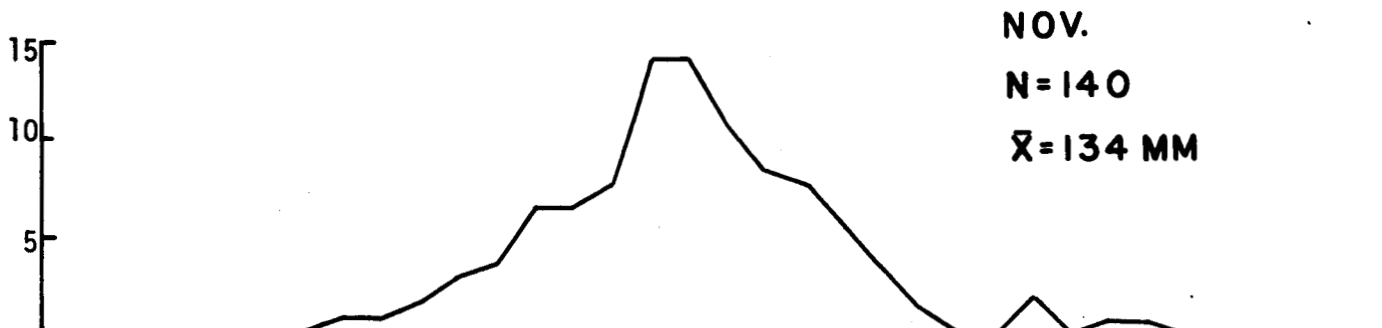
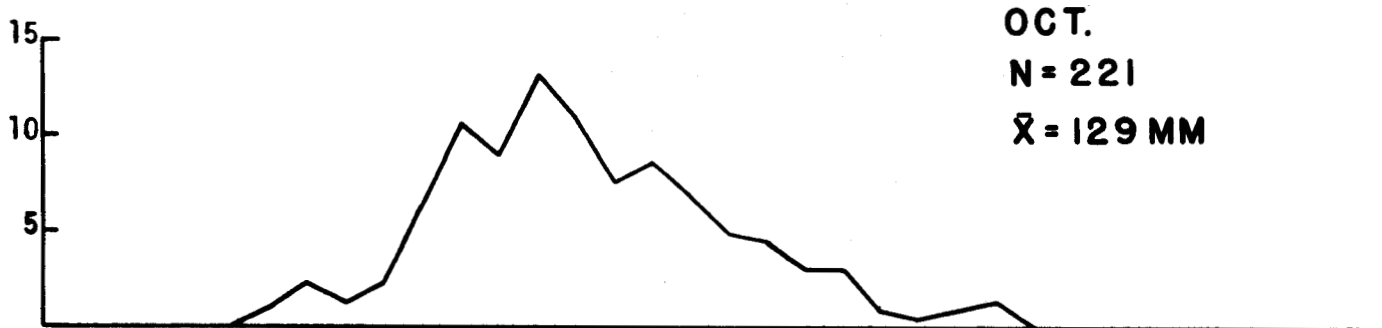
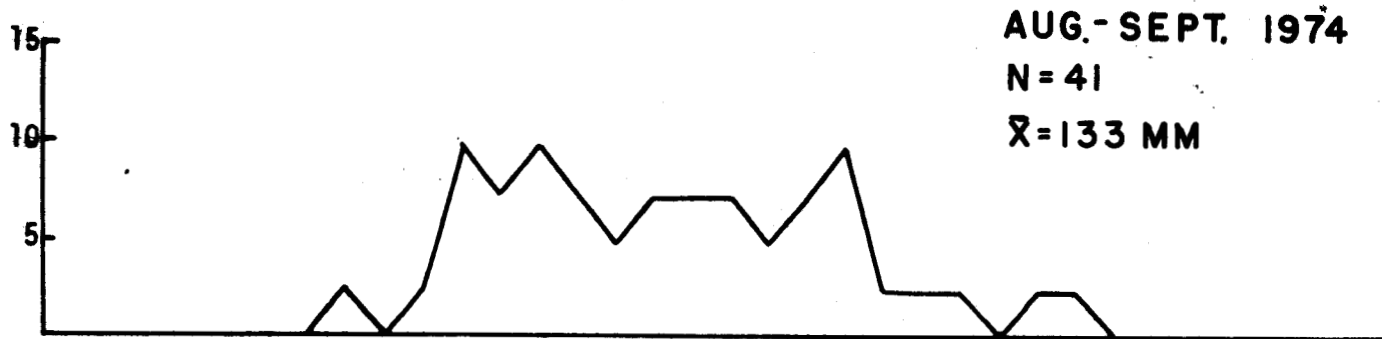


FIGURE 4. Length distribution of anchovies landed at Moss Landing for the 1974-75 season.

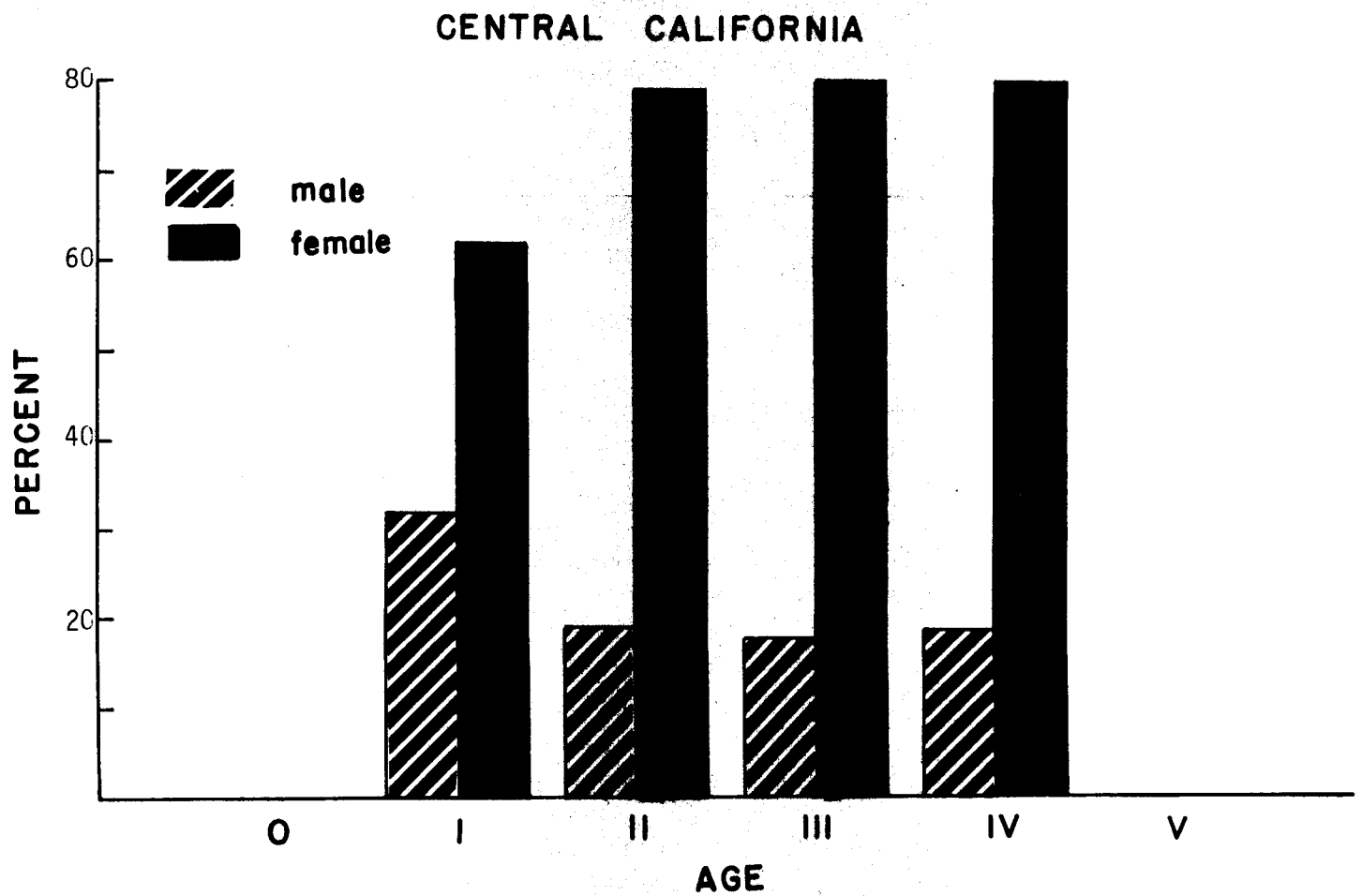
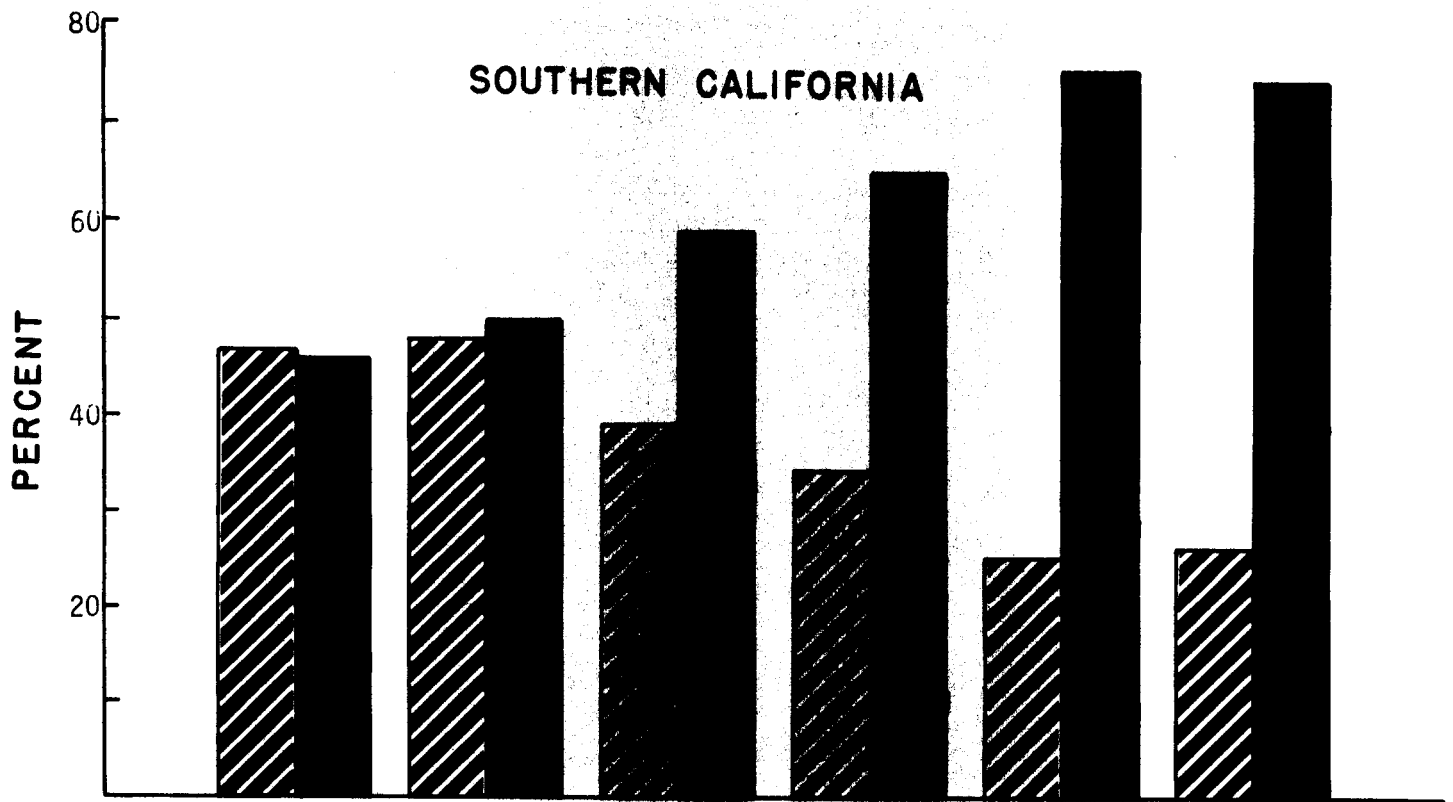


FIGURE 5 Percentage of northern anchovy males and females by age groups from the 1974-75 season

TABLE 5. Length Frequency of Anchovy (all fish) for Southern California During the 1974-75 Season.

Length	Year class (age)							Total
	1974 (0)	1973 (1)	1972 (2)	1971 (3)	1970 (4)	1969 (5)	1968 (6)	
80								
82								
84								
86	1							1
88								
90	2							2
92	10	1						11
94	3							3
96	11							11
98	8	1						9
100	15	1	1					17
102	23	7	6					36
104	22	6	4	1				33
106	20	12	12	3	1			48
108	28	25	32	6	1			92
110	27	35	50	9	1	1		123
112	17	47	109	25	3	1		202
114	19	78	119	29	9			254
116	22	117	185	56	19	2		401
118	11	134	215	77	21	1		459
120	20	134	272	85	26	1		538
122	15	115	271	101	20	2		524
124	10	131	287	110	34	3		575
126	12	99	240	149	38	1		539
128	5	84	218	152	36	3		498
130	4	61	163	172	40	2	1	443
132	1	40	131	175	42	5		394
134		33	74	134	37	4		282
136		9	66	139	34	1	2	251
138	1	12	35	91	53	7		199
140		5	24	71	45	6	1	152
142		5	11	60	42	12		130
144			7	22	33	4		66
146			3	21	28	3		55
148			2	12	24	2		40
150		1	3	5	16	5		30
152				4	9	7		20
154			1		5	2	1	9
156					4	3		7
158					3	5	1	9
160					3	2		5
162							2	2
164						1		1
166					1			1
168								
170								
172							1	1
174								
Total	307	1193	2541	1710	628	86	9	6473
\bar{x}	110	121	123	129	133	140	150	125
S. E. M.	0.548	.209	.145	.202	.416	1.301	4.967	

TABLE 6. Mean Length (mm SL) of Males and Females Landed at Terminal Island and Moss Landing by Year Class.

	Year Class (age)							Mean length for all year classes
	1974 (0)	1973 (I)	1972 (II)	1971 (III)	1970 (IV)	1969 (V)	1968 (VI)	
<u>Terminal Island</u>								
Males								
Mean length	109	120	122	127	132	138	130	123
Females								
Mean length	112	122	124	130	134	141	152	126
<u>Moss Landing</u>								
Males								
Mean length		122	127	131	135	143		129
Females								
Mean length	123	124	128	133	139	150	150	132

TABLE 7. Estimated Numbers by Length Group Landed at Monterey During 1974-75 Season.

Length group (mm SL)	Estimated number	Standard deviation	Percent of landings
95-104	3,067,000	4,399,279	1.28
105-114	7,425,100	3,744,327	3.10
115-124	36,085,900	12,634,955	15.07
125-134	97,502,500	16,305,058	40.73
135-144	69,783,400	16,475,490	29.15
145-154	19,347,100	8,428,622	8.08
155-164	6,125,200	2,466,329	2.55
165-174			
175-	159,400	161,050	0.06
Total	239,495,600		99.96

TABLE 8. Length Frequency of Anchovy (all fish) from Central California During the 1974-75 Season.

Length	1974 (0)	1973 (1)	1972 (2)	1971 (3)	1970 (4)	1969 (5)	1968 (6)	Total
100		1						1
102								
104				1				1
106		1						1
108								
110				1				1
112		3	1	1				5
114		3	2	1				6
116		2	3	1				6
118		2	4					6
120	1	3	8	6	1			19
122		11	15	10	1			37
124	1	4	14	11	1			31
126	1	9	23	10	5			48
128		4	15	22	4			45
130		4	14	12	4			34
132		1	14	22	6			43
134		2	11	23	7			43
136		2	3	25	4	1		35
138			5	15	6	1	1	28
140			3	17	8			28
142			4	8	6	3		21
144			1	6	3			10
146				2	3			5
148		1		3	1			6
150				3	4			7
152					3	3		6
154					3			3
156			1			1		2
158						2		2
160						1		1
162						1	1	2
184					1			1
Total	3	53	141	200	72	13	2	484
\bar{x}	123	123	127	132	138	149	150	131
S.E.M.	1.73	1.07	.6	.5	1.11	2.4	12.0	

Central California

Females outnumbered the males by a ratio of 2.7:1 by number and 2.9:1 by weight (Table 9). These figures were substantially larger than 1.1:1 by number and 1.3:1 by weight ratios for the 1973-74 season (Sunada, 1976). Females were present in greater proportions among all age groups (Figure 5).

TABLE 9. Sex Ratio by Number and Weight of Anchovy Landings for 1974-75 Season.

Sex ratio by number	Terminal Island	Moss Landing
Males		
Number	1,502,690,000	63,671,074
Percent	38.19	26.6
Females		
Number	2,363,292,000	169,575,416
Percent	60.06	70.8
Unknown		
Number	68,784,000	6,249,148
Percent	1.74	2.6
Sex ratio		
Female:Male	1.57:1	2.66:1

Weight in Megagrams	Terminal Island	Moss Landing
Males		
Weight	29,703	1,496
Percent	36.35	25.2
Females		
Weight	50,960	4,338
Percent	62.37	72.9
Unknown		
Weight	1,040	112
Percent	1.27	1.9
Sex ratio		
Female:Male	1.72:1	2.90:1

CONCLUSION

Several variations in the sampled catch occurred in southern California. The appearance of older fish during spring deviated from the normal trend of recruitment of incoming age groups. Although the seasonal proportions of age groups 0 (1974 year class) and I (1973 year class) were normal, their declining numbers during spring were unusual. The presence of the successful 1970 year class was still evident, as it comprised 10% of the catch.

Central California age and catch data indicated a dominance of older fish and a notable absence of younger age groups.

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