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## AGE COMPOSITION OF SARDINE LANDINGS ON THE PACIFIC COAST OF THE UNITED STATES AND MEXICO IN 1964-1965<sup>1</sup>

by

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**California landings of Pacific sardines, *Sardinops caeruleus* (Girard), during the 1964-65 season amounted to 5,297 tons. During the interseason, 994 tons were landed.**

**Baja California sardine landings totaled 24,675 tons for this period, almost all of which came from San Sebastian Vizcaino Bay and Bahia de la Magdalena.**

**The age structure of the catch and low landings off California and northern Baja California reflect continued failure of the sardine population in the north to produce good year-classes.**

### INTRODUCTION

The rise and fall of the fishery for Pacific sardines is well known. Because of the continued interest in the sardine population and its apparent interaction with the northern anchovy, *Engraulis mordax* Girard, we continue to sample the landings for age and length composition.

Detailed reports of age and length composition of landings through the 1963-64 season have been reported in *California Fish and Game*. Beginning with the 1964-65 season, the reports will be abbreviated and follow the present format. A more detailed discussion of the sardine fisheries on the Pacific Coast of the United States and Mexico for 1964-65 and subsequent periods is available in various Marine Resources Region Reference Reports and may be obtained from the Marine Resources Region, 350 Golden Shore, Long Beach, California, 90802.

This report, the 19th of a series, summarizes the age composition of the 1964-65 period landings. We wish to acknowledge the assistance of John MacGregor, National Marine Fisheries Service; Harold Hyatt and Richard Wood, California Department of Fish and Game; and William W. Hatton, California Academy of Sciences.

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TABLE 1—Age and Year Class Composition of the Sardine Catch in the 1964-65 Season

	Numbers of fish in thousands by age and year class										
	Catch		1	2	3	4	5	6	7	8	9
	Tons	Number	1963	1962	1961	1960	1959	1958	1957	1956	1955
Central California											
"August" <sup>1</sup> , 2	41	181	--	--	--	18	76	87	--	--	--
"September" <sup>3</sup>	118	511	--	--	--	15	157	213	126	--	--
"October" <sup>4</sup>	57	321	64	141	13	--	45	58	58	--	--
"November" <sup>5</sup>	14	65	--	5	2	--	22	27	9	--	--
"December" <sup>6</sup>	68	308	--	24	41	35	31	57	78	14	28
"January" <sup>7</sup>	1	4	--	--	--	.6	.4	1.5	.8	.5	.2
"February" <sup>8</sup>	5	19	--	--	--	3	2	7	4	2	1
"March" <sup>9</sup>	--	--	--	--	--	--	--	--	--	--	--
Total Central California	304	1,409	64	170	56	71.6	288.4	437.5	275.8	16.5	20.2
Percentage	--	99.99	4.54	12.07	3.97	5.08	20.47	31.05	19.57	1.17	2.07
Southern California											
"September" <sup>3</sup>	3,556	29,066	--	3,895	13,806	5,755	3,168	1,599	814	29	--
"October" <sup>4</sup>	589	4,359	--	863	1,726	1,160	357	122	131	--	--
"November" <sup>5</sup>	450	3,484	7	418	1,345	1,526	125	32	31	--	--
"December" <sup>6</sup>	311	2,100	--	158	588	746	462	73	73	--	--
"January" <sup>7</sup>	31	179	--	11	39	36	79	14	--	--	--
"February" <sup>8</sup>	4	27	--	--	7.3	11	7.2	.5	1	--	--
"March" <sup>9</sup>	52	296	--	--	80	122	80	4	10	--	--
Total Southern California	4,983	39,511	7	5,345	17,591.3	9,356	4,278.2	1,844.5	1,060	29	--
Percentage	--	100.00	.02	13.53	44.52	23.68	10.83	4.67	2.68	.07	--
Total California	5,297	40,920	71	5,515	17,647.3	9,427.6	4,566.6	2,282	1,335.8	45.5	29.2
Percentage	--	100.00	.17	13.48	43.13	23.04	11.16	5.58	3.26	.11	.07

SARDINE AGE COMPOSITION

Northern Baja California												
"September" <sup>1</sup>	38	236	--	--	21	97	104	14	--	--	--	--
"October" <sup>2</sup>	215	1,449	--	--	406	609	319	72	43	--	--	--
"November" <sup>3</sup>	899	5,784	--	--	983	2,892	1,678	231	--	--	--	--
"December" <sup>4</sup>	967	6,264	--	--	1,064	3,132	1,817	251	--	--	--	--
"January" <sup>5</sup>	262	1,698	--	--	289	849	492	68	--	--	--	--
"February" <sup>6</sup>	145	839	--	--	160	469	272	38	--	--	--	--
"March" <sup>7</sup>	109	709	--	--	121	354	206	28	--	--	--	--
Total Northern Baja California	2,635	17,079	--	--	3,044	8,402	4,888	702	43	--	--	--
Percentage	--	100.00	--	--	17.82	49.20	28.62	4.11	.25	--	--	--
Central Baja California												
"September" <sup>8</sup>	651	5,510	--	309	1,435	1,899	1,391	397	88	--	--	--
"October" <sup>9</sup>	1,363	11,436	--	640	2,974	3,934	2,892	823	183	--	--	--
"November" <sup>10</sup>	775	6,500	--	182	1,378	2,382	2,288	130	130	--	--	--
"December" <sup>11</sup>	970	8,117	--	349	1,567	3,060	2,167	869	105	--	--	--
"January" <sup>12</sup>	734	6,489	--	260	2,660	1,492	1,493	584	--	--	--	--
"February" <sup>13</sup>	1,439	12,056	--	--	1,929	6,028	2,170	723	1,206	--	--	--
"March" <sup>14</sup>	633	5,573	--	56	836	2,062	1,616	1,003	--	--	--	--
Total Central Baja California	6,565	55,690	--	1,796	12,779	20,867	14,007	4,529	1,712	--	--	--
Percentage	--	99.99	--	3.22	22.95	37.47	25.15	8.13	3.07	--	--	--
Total Baja California <sup>15</sup>	9,200	72,769	--	1,796	15,823	29,269	18,895	5,231	1,755	--	--	--
Percentage	--	100.00	--	2.47	21.74	40.22	26.37	7.19	2.41	--	--	--

<sup>1</sup> August 1-21  
<sup>2</sup> No samples; ages estimated from "July" sampling.  
<sup>3</sup> No samples; ages estimated from "February" sampling.  
<sup>4</sup> February 16-March 2 landings.  
<sup>5</sup> September 1-20.  
<sup>6</sup> No samples; ages estimated from "March" sampling.  
<sup>7</sup> No samples; ages estimated from "November" sampling.  
<sup>8</sup> No samples; ages estimated from "October" sampling.  
<sup>9</sup> Includes Cedros Island and Ensenada only—2,847 tons from southern Baja California not sampled.

### THE FISHERY

Fishing off California was poor with catches consisting primarily of sardines mixed with mackerel (jack mackerel, *Trachurus symmetricus*, and Pacific mackerel, *Scomber japonicus*). The age structure of landings for central and southern California (Table 1) reflected the continuing failure of the sardine population in the north to produce good year-classes.

In California the sardine season (also called the canning season) extends from August 1 through March 2 in central California (Pt. Arguello north) and September 1 through March 2 in southern California. The interseason for each area represents the period between successive seasons. Baja California landings are summarized on the same interseason and season basis.

During the interseason, California landings totaled 994 tons, with only 3 tons landed in central California. Season landings were 5,297 tons with 304 tons taken in central California and 4,993 tons landed in southern California. This brought the California total to 6,291 tons for the period March 3, 1964 to March 2, 1965.

The fleet off central California during the season consisted of two large (60 ft or over) and two small purse seiners and 12 lampara boats. The large purse seiners spent part of the season in southern California because of fish scarcity in central California. The fishermen were paid \$65 per ton for sardines and \$52.50 per ton for mixed sardines (30-70% sardines) and mackerel.

A total of 38 large purse seiners and 25 small purse seiners and lampara boats fished exclusively in southern California (two other large purse seiners from Monterey joined the southern California fleet during part of the season). One cannery in Oxnard and five in the Los Angeles-Long Beach area processed fish.

The sardine industry in Baja California has been processing a greater portion of the Pacific Coast catch in recent years. Sardine fishing here is permitted throughout the year; but for purposes of comparison with southern California catch statistics, the fishing period is divided into similar season and interseason periods.

Catches of sardines in the Ensenada (northern Baja California) area were insignificant. The bulk of sardines processed at Ensenada came from San Sebastián Vizcaíno Bay, which also provided fish for the cannery at Cedros Island (central Baja California). The cannery at Puerto Adolfo López Mateos (southern Baja California) was supplied with fish caught in Bahía de la Magdalena.

Season landings in the Ensenada, Cedros Island, and Puerto Adolfo López Mateos areas amounted to 12,047 tons (Table 1), and interseason landings amounted to 12,628 tons (Table 2). These landings (total) represent an increase of 27%, as compared to the 1963-64 period landings of 18,115 tons.

A total of 33 purse seiners and lampara boats fished in Baja California waters; 25 were based and landed catches at Ensenada, 4 at Cedros Island, and 4 at Puerto Adolfo López Mateos. Two of Ensenada's larger purse seiners equipped with refrigerated holds were based at Cedros Island during a part of the fishing season.

SARDINE AGE COMPOSITION

TABLE 2—Age and Year Class Composition of the Sardine Catch in the 1964-65 Baja California I Interseason

	Catch		Numbers of fish in thousands by age and year class							
	Tons	Numbers	0	1	2	3	4	5	6	7
			1964	1963	1962	1961	1960	1959	1958	1957
<b>Northern Baja California</b>										
"March" <sup>1</sup>	244	2,797	--	--	895	503	504	699	196	--
"April" <sup>2</sup>	134	1,499	--	--	445	474	58	193	279	--
"May" <sup>3</sup>	148	2,141	--	364	1,263	514	--	--	--	--
"June" <sup>4</sup>	214	2,531	202	339	1,522	84	--	--	--	--
"July" <sup>5</sup>	873	9,758	781	1,307	5,982	1,366	322	--	--	--
"August" <sup>6</sup>	511	5,197	--	--	--	729	2,183	1,663	--	624
"September" <sup>2, 3</sup>	5	52	--	--	--	7	22	17	--	6
Total Northern Baja California	2,129	23,925	983	2,010	10,136	3,945	3,173	2,572	475	630
Percentage	--	100.00	4.11	8.40	42.37	16.49	13.26	10.75	1.99	2.63
<b>Central Baja California</b>										
"March" <sup>4</sup>	598	4,738	--	--	569	2,085	1,611	473	--	--
"April" <sup>4</sup>	847	6,710	--	--	805	2,953	2,281	671	--	--
"May" <sup>4</sup>	373	3,020	--	--	362	1,329	1,027	302	--	--
"June" <sup>4</sup>	370	2,989	--	--	360	1,320	1,019	300	--	--
"July" <sup>4</sup>	1,130	9,450	--	--	567	3,591	4,158	851	283	--
"August" <sup>4</sup>	1,185	9,188	--	--	478	1,691	3,532	1,874	1,213	--
"September" <sup>2</sup>	54	427	--	--	24	111	147	108	37	--
Total Central Baja California	4,566	36,532	--	--	3,165	13,080	14,175	4,579	1,533	--
Percentage	--	99.99	--	--	8.66	35.80	38.80	12.53	4.20	--
Total Baja California	6,695	60,457	983	2,010	13,302	17,025	17,348	7,151	2,008	630
Percentage	--	100.00	1.63	3.32	22.00	28.16	26.70	11.83	3.32	1.04

<sup>1</sup> Includes Cedros Island and Ensenada only—5,933 tons from southern Baja California cannery not sampled.

<sup>2</sup> August 22-September 1 landings.

<sup>3</sup> No samples; ages estimated from "August" sampling.

<sup>4</sup> No samples; ages estimated from "May" sampling.

Five canneries operated in the Ensenada area, one on Cedros Island, and one at Puerto Adolfo López Mateos. The domestic demand for canned sardines was good and the price to the fishermen (\$32-\$42/ton) fluctuated very little with \$40 per ton being the average price paid during the 1964-65 period.