SARDINE EGGS AND LARVAE AND OTHER FISH LARVAE, PACIFIC COAST, 1955

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EXPLANATORY NOTE

The series embodies results of investigations, usually of restricted scope, intended to aid or direct management or utilization practices and as guides for administrative or legislative action. It is issued in limited quantities for official use of Federal, State or cooperating agencies and in processed form for economy and to avoid delay in publication.

United States Department of the Interior, Fred A. Seaton, Secretary
Fish and Wildlife Service

SARDINE EGGS AND LARVAE AND OTHER FISH LARVAE PACIFIC COAST, 1955

Elbert H. Ahlstrom and David Kramer
Fishery Research Biologists
South Pacific Fishery Investigations
Bureau of Commercial Fisheries

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ABSTRACT

This report contains the results of quantitative sampling of fish eggs and larvae off the coasts of California and Baja California during 1955. The eggs and larvae are sampled in quantitative plankton hauls taken over a grid of stations that usually are occupied at monthly intervals.

Eggs and larvae are reported for the Pacific sardine (Sardinops caerulea), and larvae alone for the northern anchovy (Engraulis mordax), jack mackerel (Trachurus symmetricus), Pacific mackerel (Pneumatophorus diego), hake (Merluccius productus) and rockfish (Sebastodes spp.). The report includes charts showing the distribution and relative abundance in 1955 of each of the above species, except rockfish, and brief descriptive accounts of each.

SARDINE EGGS AND LARVAE AND OTHER FISH LARVAE, PACIFIC COAST, 1955

This report, the sixth in a continuing yearly series, contains the results of quantitative sampling of fish eggs and larvae off the coasts of California and Baja California during 1955. The species reported upon are the following: Pacific sardine (Sardinops caerulea), northern anchovy (Engraulis mordax), jack mackerel (Trachurus symmetricus), Pacific mackerel (Pneumatophorus diego), hake (Merluccius productus), and rockfish (Sebastodes spp.). The preceding reports in the series are listed in the bibliography.

The fish eggs and larvae were obtained in quantitative plankton hauls taken on biological-oceanographic cruises by agencies participating in the California Cooperative Oceanic Fisheries Investigations. The investigations are sponsored by the California Marine Research Committee and are carried out cooperatively by the South Pacific Fishery Investigations of the U. S. Fish and Wildlife Service, the Scripps Institution of Oceanography of the University of California, the Hopkins Marine Station of Stanford University, the California Department of Fish and Game, and the California Academy of Sciences.

As in previous reports, the data are presented in eight tables:

I. Standardized haul factors for plankton hauls taken on regular survey cruises during 1955
II. Sardine eggs, reported by age
III. Sardine larvae, reported by size
IV. Anchovy larvae, reported by size
V. Jack mackerel larvae, reported by size
VI. Pacific mackerel larvae, reported by size
VII. Hake larvae
VIII. Rockfish larvae.

The eight tables of basic data are designated by Roman numerals. A number of text tables are also included in this report: these are designated by Arabic numerals. An innovation in the present report is the inclusion of charts showing the distribution and abundance in 1955 of each of the above categories, except rockfish. Each section is also preceded by a brief descriptive account.

It is with deep pleasure that we acknowledge the cooperation given by the Scripps Institution of Oceanography in the collection of data at sea. Most personnel of the South Pacific Fishery Investigations contributed to this project, many devoting their full time to it. Robert Counts and Lois Hunter aided in the identifications, enumerations and measurements; James Thrailkill supervised the separation of fish eggs and larvae from plankton collections, and also prepared the charts included in this report.

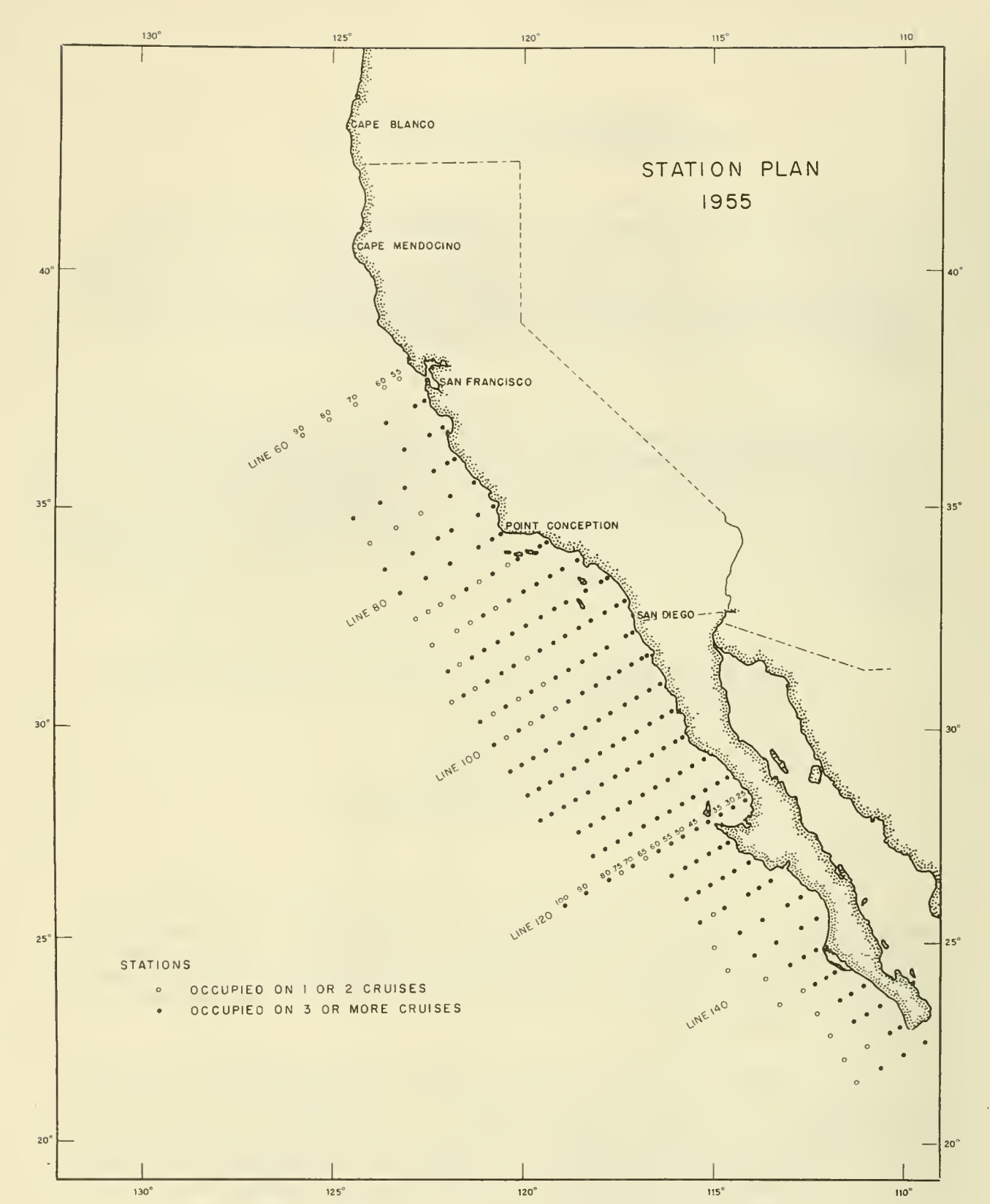

Figure 1.--Station plan, 1955, of the California Cooperative Oceanic Fisheries Investigations

AREA COVERED

The regular survey cruises of 1955 covered the area between San Francisco, California, and Cape San Lucas, Baja California (station lines 60-157). A much more extensive coverage was obtained on "Norpac" (cruise 5508), but the results of this cruise are not included in the present report. The monthly coverage during 1955 is summarized in text table 1. The stations occupied on regular survey cruises are shown in figure 1. On cruises 5509 and 5511, an area off southern California was surveyed intensively (table I, supplement). This area was covered four times on cruise 5509, twice on cruise 5511. Only a portion of the collections made during these two cruises is included in tables II to VIII.

Text table 1.--Coverage during 1955

Month	Cruise number	Station lines occupied	Number of stations occupied
January	5501	80 to 157	112
February	5502	80 to 157	117
March	5503	80 to 157	142
April	5504	80 to 137	134
May	5505	63 to 137	184
June	5506	60 to 137	189
July	5507	63 to 137	196
August	5508	"Norpac" - not included	
September	5509	83 to 90	43
October	5510	60 to 137	109
November	5511	83 to 90	43
December	5512	80 to 150	106
Total		60 to 157	1375

METHODS OF SAMPLING

The procedures followed in taking plankton hauls are similar to those outlined in previous reports in this series. Refer particularly to Ahlstrom (1952: 3-6) and Ahlstrom (1953: 4-7).

The nets are hauled obliquely from approximately 140 meters in depth to the surface (200 meters of wire out at greatest depth), except at shallow stations. The hauls are made at a vessel speed of between one and two knots. The angle of stray of the towing wire is measured continuously during a haul by means of an inclinometer suspended from the boom and riding freely on the wire. We have verified by use of a depth flow unit, that the depth of the plankton net at any instant during a haul can be approximated by multiplying the amount of towing wire out by the cosine of the angle of stray of the towing wire from the vertical.

RECORD OF STANDARDIZED HAUL FACTORS FOR OBLIQUE HAULS MADE WITH PLANKTON NETS DURING CRUISES 5501-5512, 1955

The number of fish eggs or larvae in a haul is adjusted to the number under 10 square meters of sea surface. This estimate is a valid one if the vertical distribution of eggs and larvae has been encompassed. For all species included in this report, except hake larvae, this requirement has been met. Routine plankton hauls average between 130 and 140 meters deep. From vertical distribution studies, we have established that larvae (and eggs) of the sardine, anchovy, jack mackerel, Pacific mackerel and rockfish seldom occur as deep as 100 meters, hence the layer sampled in taking a plankton haul is ordinarily at least 30 or 40 meters deeper than the depth distribution of the larvae. About 10% of hake larvae taken in special vertical distribution studies was taken below 140 meters; therefore, the abundance of hake larvae is probably underestimated by this amount.

A standardized haul factor is given for all plankton hauls taken on routine cruises during 1955 (except "Norpac"). Additional information on these hauls, including position, date and time of collection, volume of water strained, and depth of haul in meters, has been given in "Zooplankton volumes off the Pacific coast, 1955" (Special Scientific Report - Fisheries No. 177).

A dash (-) in table I indicates that the station was not occupied on the cruise under which it appears; N.Q. - haul not quantitative; N.S. - station occupied, but sample either not obtained or subsequently spoiled, broken, or lost; S.T. - only surface tow taken.

A measure of the volume of water strained during each haul was derived from current meter readings. An Atlas-type current meter was fastened in the center of the mouth of each net. The meters were calibrated before and after each cruise on which they were used.

Plankton nets used during 1955 were either constructed of No. 30xxx grit gauze, a heavy grade of silk bolting cloth, or No. 471 "Nitex", a nylon monofilament screen cloth. The mesh openings in the Nitex cloth measure approximately 471 microns. This cloth has been subjected to a thermosetting operation which imparts a permanent crimp to the fabric, giving it good stability. The mesh openings in the nets constructed of grit gauze are slightly larger than in the nets constructed of Nitex, however the grit gauze shrinks on use to approximately 0.55 mm. between threads, while the mesh openings in Nitex tend to enlarge slightly. Nets constructed of silk grit gauze are more easily cleaned and clog less than nylon nets, but they have a considerably shorter life.

Table I

Record of Standardized Haul Factors for Oblique Hauls made with Plankton Nets during Cruises 5501-5512, 1955

	Cruise and Month 1/											
Sta.	5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
60.55	-	-	-	-	-	2.55	-	-	-	2.91	-	-
.60	-	-	-	-	-	3.92	-	-	-	3.18	-	-
.70	-	-	-	-	-	3.28	-	-	-	2.79	-	-
.80	-	-	-	-	-	3.94	-	-	-	2.90	-	-
.90	-	-	-	-	-	3.27	-	-	-	3.03	-	-
63.52	-	-	-	-	3.15	4.49	2.54	-	-	2.19	-	-
.55	-	-	-	-	2.35	3.14	2.48	-	-	2.69	-	-
.65	-	-	-	-	2.65	2.66	3.36	-	-	-	-	-
67.50	-	-	-	-	1.74	3.28	1.53	-	-	2.49	-	-
.55	-	-	-	-	2.56	3.39	2.90	-	-	2.58	-	-
.65	-	-	-	-	2.73	2.84	3.24	-	-	-	-	-
70.52	-	-	-	-	2.66	2.64	3.22	-	-	2.94	-	-
.55	-	-	-	-	3.00	2.70	2.91	-	-	2.82	-	-
.60	-	-	-	-	2.94	2.95	3.27	-	-	3.27	-	-
.70	-	-	-	-	2.97	3.14	2.32	-	-	3.32	-	-
.80	-	-	-	-	-	3.23	2.97	-	-	3.04	-	-
.90	-	-	-	-	-	2.74	2.22	-	-	3.06	-	-
73.50	-	-	-	-	-	3.18	2.96	-	-	2.89	-	-
.60	-	-	-	-	-	2.68	2.39	-	-	2.88	-	-
.70	-	-	-	-	-	2.98	2.60	-	-	-	-	-
.80	-	-	-	-	-	2.86	3.12	-	-	-	-	-
.90	-	-	-	-	-	3.43	3.81	-	-	-	-	-
77.50	-	-	-	-	2.41	3.15	2.60	-	-	2.81	-	-
.55	-	-	-	-	2.72	3.20	3.59	-	-	2.93	-	-
.65	-	-	-	-	2.53	3.12	4.30	-	-	-	-	-
.70	-	-	-	-	2.84	3.49	3.46	-	-	-	-	-
.80	-	-	-	-	3.90	2.65	2.73	-	-	-	-	-
.90	-	-	-	-	2.70	3.64	3.14	-	-	-	-	-
80.51	2.76	-	1.56	3.40	5.47	3.47	2.45	-	-	2.52	-	2.42
.55	3.11	3.23	4.36	3.28	2.76	3.65	3.16	-	-	2.61	-	2.86
.60	3.19	2.25	2.37	3.06	2.82	2.90	3.67	-	-	2.86	-	2.57
.70	2.74	2.66	2.54	3.00	2.74	2.94	3.28	-	-	2.31	-	2.62
.80	3.13	2.86	2.85	2.79	2.81	2.62	2.97	-	-	3.44	-	2.47
.90	-	-	-	2.67	3.14	3.19	2.77	-	-	2.88	-	2.84
83.40	1.69	2.31	1.25	S.T.	2.07	1.52	1.54	-	*	1.25	*	1.12
.43	3.29	3.26	3.39	2.49	2.44	3.07	2.69	-	-	2.75	-	2.72
.51	2.80	2.76	3.02	2.89	2.95	2.43	2.70	-	*	2.81	*	3.37
.55	-	-	-	-	-	3.05	2.89	-	*	-	*	-

1/ Cruise 5508 - "Norpac" - to be published separately

* See Table I, Supplement

Table I (Cont'd)
Record of Standardized Haul Factors for Oblique Hauls made with Plankton Nets during Cruises 5501-5512, 1955

	Cruise and Month											
Sta.	5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
83.60	3.13	3.23	2.73	3.03	3.12	3.61	2.31	-	*	2.77	*	2.89
.65	-	-	-	-	-	2.51	5.07	-	-	-	-	-
.70	-	-	-	2.74	2.92	3.02	3.01	-	-	-	-	-
.75	-	-	-	-	-	3.46	-	-	-	-	-	-
.80	-	-	-	2.97	-	3.31	-	-	-	-	-	-
.85	-	-	-	-	-	3.12	-	-	-	-	-	-
.90	-	-	-	2.60	-	2.91	-	-	-	-	-	-
87.35	2.26	3.04	2.37	2.80	2.45	2.93	2.64	-	*	2.37	*	2.36
.40	2.65	2.93	2.92	2.36	3.19	2.49	2.28	-	*	2.84	*	2.25
.45	-	-	-	-	2.37	2.59	2.95	-	*	2.61	*	-
.50	2.89	2.85	2.39	2.39	2.61	3.01	2.56	-	*	2.09	*	3.13
.55	-	-	-	-	2.63	3.09	2.69	-	*	-	*	-
.60	3.83	3.05	-	2.69	3.10	3.61	3.23	-	*	2.49	*	3.08
.65	-	-	-	-	-	3.21	2.75	-	-	-	-	-
.70	-	-	-	3.03	-	3.71	2.77	-	-	-	-	-
.75	-	-	-	-	-	4.35	-	-	-	-	-	-
.80	-	-	-	3.10	-	3.26	-	-	-	-	-	-
.85	-	-	-	-	-	N.Q.	-	-	-	-	-	-
.90	-	-	-	2.95	-	2.89	-	-	-	-	-	-
90.28	2.74	2.52	1.84	S.T.	2.72	2.52	2.76	-	*	2.64	*	2.44
.30	2.26	3.11	2.73	2.56	2.89	2.98	1.90	-	*	2.48	*	2.40
.37	3.12	2.97	2.52	2.79	2.65	2.66	3.21	-	*	2.51	*	2.58
.45	3.74	3.12	2.92	2.90	2.78	4.13	3.22	-	*	2.69	*	3.00
.50	2.61	N.Q.	2.87	3.05	2.90	2.91	2.12	-	*	-	*	-
.55	-	-	-	-	2.96	2.81	2.68	-	*	2.83	*	2.84
.60	2.72	2.94	2.91	2.70	2.70	3.32	2.79	-	-	2.88	-	2.70
.65	-	-	-	-	2.86	3.46	3.00	-	-	-	-	-
.70	2.85	3.23	2.91	2.45	3.03	2.75	2.50	-	-	3.03	-	2.70
.75	-	-	-	-	3.08	2.60	2.59	-	-	-	-	-
.80	-	-	3.10	3.47	3.02	-	2.10	-	-	2.99	-	2.91
.85	-	-	-	-	2.94	-	3.19	-	-	-	-	-
.90	-	-	3.07	2.67	2.88	-	3.53	-	-	2.52	-	-
93.27	3.47	1.75	1.75	2.68	3.23	2.26	2.36	-	-	2.48	-	2.56
.30	3.44	2.66	2.88	2.60	3.03	2.22	2.92	-	-	2.91	-	2.53
.35	-	-	-	-	3.03	3.10	2.00	-	-	-	-	-
.40	2.95	2.81	2.69	3.23	2.81	2.97	3.13	-	-	2.71	-	2.27
.45	-	-	-	-	3.13	2.89	2.43	-	-	-	-	-
.50	2.98	3.06	3.31	3.09	3.08	2.80	2.83	-	-	2.89	-	2.97
.55	-	-	-	-	3.08	2.51	2.55	-	-	-	-	-
.60	-	-	2.68	2.84	3.06	2.74	2.78	-	-	2.77	-	-
.65	-	-	-	-	2.81	N.Q.	2.12	-	-	-	-	-

Table I (Cont'd)
Record of Standardized Haul Factors for Oblique Hauls made with Plankton Nets during Cruises 5501-5512, 1955

	Cruise and Month											
Sta.	5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
93.70	-	-	3.45	2.36	2.98	2.56	2.65	-	-	-	-	-
.75	-	-	-	-	2.96	2.74	2.78	-	-	-	-	-
.80	-	-	-	2.82	2.28	3.04	2.66	-	-	-	-	-
.85	-	-	-	-	2.78	-	3.30	-	-	-	-	-
.90	-	-	-	2.84	2.75	-	2.64	-	-	-	-	-
.95	-	-	-	-	2.80	-	-	-	-	-	-	-
97.30	1.86	2.53	2.60	2.49	2.55	2.53	1.72	-	-	2.46	-	2.34
.32	2.59	2.55	3.06	3.12	3.16	2.74	2.77	-	-	2.67	-	3.06
.35	-	-	-	-	2.79	2.60	3.12	-	-	-	-	-
.40	3.43	3.13	2.24	2.52	2.98	2.79	2.65	-	-	3.09	-	2.88
.45	-	-	-	-	3.31	3.11	3.01	-	-	-	-	-
.50	3.23	3.12	2.29	2.74	3.31	2.05	3.31	-	-	2.66	-	3.19
.55	-	-	-	-	3.23	2.52	3.21	-	-	-	-	-
.60	-	-	2.64	3.01	3.83	-	2.86	-	-	3.00	-	-
.65	-	-	-	-	3.70	-	3.04	-	-	-	-	-
.70	-	-	2.35	3.19	3.48	-	3.42	-	-	-	-	-
.75	-	-	-	-	3.06	-	2.73	-	-	-	-	-
.80	-	-	-	2.85	4.17	-	3.03	-	-	-	-	-
.85	-	-	-	-	3.75	-	2.86	-	-	-	-	-
.90	-	-	-	2.42	3.47	-	3.06	-	-	-	-	-
100.29	2.91	2.78	1.52	3.40	3.19	2.55	3.18	-	-	2.28	-	2.81
.30	2.94	2.79	2.75	2.50	3.21	2.81	2.97	-	-	3.22	-	2.72
.35	-	-	-	-	3.10	2.96	2.83	-	-	-	-	-
.40	2.96	2.89	2.62	2.44	2.83	3.44	2.33	-	-	2.54	-	3.04
.45	-	-	-	-	3.07	2.95	3.17	-	-	-	-	-
.50	3.16	3.03	3.00	3.15	3.80	2.23	2.48	-	-	2.98	-	2.28
.55	-	-	-	-	2.59	2.41	2.70	-	-	-	-	-
.60	3.49	3.01	3.44	2.89	3.17	-	3.40	-	-	3.05	-	2.44
.65	-	-	-	-	2.97	-	2.98	-	-	-	-	-
.70	2.78	3.45	2.90	2.86	2.71	-	2.87	-	-	2.33	-	2.93
.75	-	-	-	-	2.83	-	2.65	-	-	-	-	-
.80	3.49	2.92	3.46	2.75	3.03	-	2.92	-	-	2.16	-	2.97
.85	-	-	-	-	3.23	-	3.07	-	-	-	-	-
.90	-	-	3.40	3.65	3.11	-	3.02	-	-	2.90	-	-
103.30	2.21	2.33	2.21	2.51	3.05	1.84	2.30	-	-	2.02	-	1.74
.35	2.89	3.26	3.30	3.69	3.07	2.31	2.86	-	-	2.84	-	3.01
.40	2.87	3.45	2.99	2.94	3.16	2.89	2.67	-	-	3.30	-	3.02
.45	-	-	-	2.60	2.86	2.96	3.32	-	-	-	-	-
.50	3.53	3.43	3.35	2.85	3.23	2.57	3.22	-	-	-	-	3.17
.55	-	-	-	2.99	3.23	2.56	3.11	-	-	-	-	-
.60	3.02	2.92	2.74	2.79	3.10	2.88	2.80	-	-	-	-	2.77

Table I (Cont'd)
Record of Standardized Haul Factors for Oblique Hauls
made with Plankton Nets during Cruises 5501-5512, 1955

	Cruise and Month											
Sta.	5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
103.65	-	-	-	2.75	3.34	1.48	2.52	-	-	-	-	-
.70	-	-	2.44	2.57	2.89	2.87	2.96	-	-	-	-	-
.75	-	-	-	2.82	3.10	2.60	2.91	-	-	-	-	-
.80	-	-	-	3.36	2.99	2.28	2.82	-	-	-	-	-
.85	-	-	-	-	3.10	2.87	2.41	-	-	-	-	-
.90	-	-	-	-	3.17	3.23	3.36	-	-	-	-	-
107.32	2.01	2.97	3.36	3.64	3.30	3.11	2.79	-	-	2.57	-	2.71
.35	3.24	3.29	3.45	2.69	3.11	3.12	2.80	-	-	1.94	-	3.11
.40	3.06	3.33	2.91	4.23	2.47	1.86	2.60	-	-	3.73	-	2.59
.45	-	-	-	-	3.06	2.81	3.36	-	-	-	-	-
.50	3.58	3.32	3.47	3.17	3.09	3.20	3.02	-	-	-	-	2.72
.55	-	-	-	-	2.71	1.91	3.24	-	-	-	-	-
.60	2.93	2.98	3.20	2.39	2.79	2.64	3.19	-	-	-	-	2.87
.65	-	-	-	-	3.10	2.78	3.12	-	-	-	-	-
.70	-	-	2.65	2.91	3.15	2.32	2.98	-	-	-	-	-
.75	-	-	-	-	3.03	2.59	2.74	-	-	-	-	-
.80	-	-	-	3.07	2.86	2.91	3.29	-	-	-	-	-
.85	-	-	-	-	3.09	3.15	2.85	-	-	-	-	-
.90	-	-	-	-	3.00	2.46	2.59	-	-	-	-	-
110.33	2.67	2.95	2.47	3.14	2.79	1.29	2.93	-	-	1.92	-	2.32
.35	2.15	3.21	3.05	2.00	3.07	2.10	2.62	-	-	2.76	-	2.57
.40	2.85	3.25	3.22	3.71	3.18	3.09	2.89	-	-	3.77	-	3.70
.45	-	-	-	-	2.94	2.16	3.19	-	-	-	-	-
.50	2.80	3.28	2.80	3.54	2.86	2.63	3.74	-	-	2.43	-	2.93
.55	-	-	-	-	2.62	2.40	2.77	-	-	-	-	-
.60	2.91	3.05	3.38	2.51	3.17	3.16	2.67	-	-	3.05	-	2.36
.65	-	-	-	-	3.08	2.43	2.55	-	-	-	-	-
.70	2.70	2.80	3.27	2.64	3.08	2.51	2.63	-	-	2.37	-	2.62
.75	-	-	-	-	2.91	2.50	2.79	-	-	-	-	-
.80	3.10	3.36	2.95	2.32	2.73	3.05	2.60	-	-	2.92	-	3.00
.85	-	-	-	-	3.05	2.11	2.86	-	-	-	-	-
.90	-	-	3.46	3.06	2.63	2.88	2.83	-	-	2.71	-	-
113.30	2.26	2.60	2.98	1.97	2.39	1.55	2.67	-	-	4.84	-	2.45
.35	2.90	3.16	2.42	3.77	3.33	2.25	3.22	-	-	3.71	-	2.12
.40	2.73	2.97	3.15	2.66	3.26	3.07	2.81	-	-	3.11	-	2.65
.45	-	3.06	3.23	3.04	3.17	2.40	2.86	-	-	-	-	-
.50	2.75	3.70	3.13	3.19	2.83	3.07	3.28	-	-	-	-	2.45
.55	-	3.35	3.28	2.88	3.02	2.40	2.56	-	-	-	-	-
.60	3.02	3.35	3.46	2.72	3.02	2.91	2.58	-	-	-	-	2.64
.65	-	-	-	-	3.11	2.60	2.70	-	-	-	-	-
.70	-	3.06	3.88	3.64	3.71	3.01	3.01	-	-	-	-	2.86

Table I (Cont'd)
Record of Standardized Haul Factors for Oblique Hauls made with Plankton Nets during Cruises 5501-5512, 1955

	Cruise and Month											
Sta.	5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
113.75	-	-	-	-	2.95	2.86	2.65	-	-	-	-	-
.80	-	-	-	2.76	3.26	3.22	2.67	-	-	-	-	-
117.26	3.24	2.88	3.27	1.78	3.11	1.60	2.19	-	-	1.44	-	2.93
.30	2.90	3.37	3.14	2.56	3.16	2.91	3.30	-	-	2.40	-	2.94
.35	3.17	3.35	3.61	3.21	2.68	1.79	2.78	-	-	3.38	-	3.20
.40	2.98	4.00	3.36	2.64	3.29	2.66	2.45	-	-	3.28	-	2.99
.45	-	3.46	3.23	3.07	2.45	2.90	2.61	-	-	-	-	-
.50	3.20	3.14	3.08	3.65	2.23	2.32	2.54	-	-	-	-	2.63
.55	-	3.40	2.76	2.87	3.18	3.00	2.48	-	-	-	-	-
.60	3.70	3.32	3.84	2.91	2.83	3.35	2.78	-	-	-	-	2.68
.65	-	-	-	-	3.09	2.77	2.71	-	-	-	-	-
.70	-	3.67	3.24	3.51	2.69	3.31	2.76	-	-	-	-	2.88
.75	-	-	-	-	2.80	2.38	2.44	-	-	-	-	-
.80	-	-	-	2.12	2.59	1.77	3.00	-	-	-	-	-
120.25	2.66	2.91	3.16	2.45	2.77	2.09	2.02	-	-	2.88	-	2.39
.27	-	-	-	-	3.31	2.22	-	-	-	2.38	-	-
.30	3.13	3.41	3.19	2.98	2.28	2.12	2.37	-	-	2.02	-	2.70
.35	2.92	3.05	3.49	3.65	2.95	1.70	2.88	-	-	2.10	-	2.53
.40	2.32	2.67	2.71	2.26	2.31	1.95	2.30	-	-	-	-	1.63
.45	3.08	2.23	3.03	2.48	3.07	2.47	3.01	-	-	2.35	-	2.89
.50	3.30	3.60	2.78	3.80	2.99	2.99	3.00	-	-	3.48	-	2.71
.55	-	3.65	3.03	2.29	2.83	3.10	2.82	-	-	-	-	2.72
.60	3.08	2.70	2.91	2.85	N.S.	3.23	2.74	-	-	2.72	-	2.72
.65	-	-	-	2.83	-	-	-	-	-	-	-	-
.70	3.31	3.07	2.98	2.66	3.22	3.66	2.64	-	-	1.97	-	2.52
.75	-	-	-	2.49	-	-	-	-	-	-	-	-
.80	3.15	2.37	3.16	3.43	2.74	2.69	3.10	-	-	2.52	-	-
.90	2.76	2.22	3.18	-	-	-	-	-	-	2.65	-	-
.100	2.85	2.80	2.82	-	-	-	-	-	-	-	-	-
123.37	2.82	1.67	2.02	2.57	N.Q.	2.36	3.50	-	-	3.00	-	2.62
.40	3.13	2.26	3.41	2.37	2.45	2.12	3.16	-	-	2.22	-	3.47
.45	3.19	3.18	2.94	2.71	2.39	3.32	2.95	-	-	-	-	-
.50	3.09	3.41	1.77	2.96	3.14	2.97	2.97	-	-	2.95	-	2.96
.55	3.41	1.98	2.68	3.17	3.12	2.88	2.57	-	-	-	-	2.82
.60	-	-	2.69	2.68	2.74	2.84	2.76	-	-	2.52	-	-
127.34	2.61	1.83	2.63	2.18	2.30	1.23	6.17	-	-	2.18	-	2.59
.40	2.99	2.22	2.35	2.58	2.44	2.82	2.72	-	-	2.84	-	2.66
.45	3.24	2.54	2.73	2.87	2.55	2.46	2.76	-	-	-	-	-
.50	3.00	2.85	3.80	3.51	3.09	2.70	2.81	-	-	2.78	-	2.73
.55	3.16	2.20	2.82	3.37	2.93	2.97	2.43	-	-	-	-	2.79
.60	-	-	2.79	2.71	2.86	2.31	2.86	-	-	3.34	-	-

Table I (Cont'd)

Record of Standardized Haul Factors for Oblique Hauls made with Plankton Nets during Cruises 5501-5512, 1955

	Cruise and Month											
Sta.	5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
130.30	2.50	1.95	2.97	1.59	2.65	1.41	2.58	-	-	2.29	-	2.66
.35	2.79	2.98	2.87	2.16	2.44	1.89	3.80	-	-	4.24	-	2.93
.40	2.64	3.13	2.80	2.14	3.09	3.30	4.29	-	-	3.05	-	2.82
.50	3.22	2.68	2.66	2.56	3.32	2.94	2.75	-	-	2.39	-	2.80
.55	-	-	-	2.36	-	-	-	-	-	-	-	-
.60	3.06	3.23	3.32	3.47	3.33	2.64	2.63	-	-	2.46	-	-
133.25	2.47	N.Q.	1.83	2.00	2.95	1.51	2.56	-	-	3.16	-	2.61
.30	2.62	1.94	2.59	2.88	2.90	2.64	2.97	-	-	2.61	-	3.29
.40	3.30	3.06	2.52	2.89	N.Q.	3.31	2.56	-	-	-	-	2.83
.50	-	-	2.73	3.76	3.36	3.10	2.74	-	-	-	-	-
.60	-	-	1.41	-	-	-	-	-	-	-	-	-
137.23	2.73	2.71	2.42	2.33	2.55	9.12	2.28	-	-	2.44	-	2.87
.30	3.04	2.96	2.18	1.92	2.78	2.42	2.65	-	-	2.94	-	3.15
.40	2.74	2.89	2.79	3.07	2.99	2.85	2.96	-	-	-	-	2.94
.50	-	-	2.95	2.65	2.64	1.82	2.73	-	-	-	-	-
.60	-	-	3.21	-	-	-	-	-	-	-	-	-
140.30	3.39	2.71	2.38	-	-	-	-	-	-	-	-	2.80
.35	3.23	2.79	2.55	-	-	-	-	-	-	-	-	3.09
.40	3.51	3.11	2.28	-	-	-	-	-	-	-	-	4.35
.50	-	-	2.92	-	-	-	-	-	-	-	-	-
143.26	2.33	2.53	2.89	-	-	-	-	-	-	-	-	2.28
.30	3.00	2.40	3.08	-	-	-	-	-	-	-	-	3.03
.35	3.24	3.37	2.98	-	-	-	-	-	-	-	-	3.19
.40	-	-	2.40	-	-	-	-	-	-	-	-	-
.50	-	-	2.18	-	-	-	-	-	-	-	-	-
147.20	3.39	2.78	2.51	-	-	-	-	-	-	-	-	2.60
.25	2.93	2.73	1.94	-	-	-	-	-	-	-	-	2.77
.30	1.64	3.19	1.87	-	-	-	-	-	-	-	-	2.96
.40	-	-	1.66	-	-	-	-	-	-	-	-	-
150.19	3.31	2.97	3.20	-	-	-	-	-	-	-	-	2.96
.25	3.02	2.34	2.36	-	-	-	-	-	-	-	-	2.75
.30	3.04	3.04	1.92	-	-	-	-	-	-	-	-	2.73
.40	-	-	2.46	-	-	-	-	-	-	-	-	-
153.16	3.22	2.83	2.19	-	-	-	-	-	-	-	-	-
.20	3.68	2.92	2.20	-	-	-	-	-	-	-	-	-
.30	N.Q.	2.44	2.22	-	-	-	-	-	-	-	-	-
.40	-	-	3.23	-	-	-	-	-	-	-	-	-
157.10	3.36	2.96	3.22	-	-	-	-	-	-	-	-	-
.20	2.84	1.86	3.00	-	-	-	-	-	-	-	-	-
.30	3.16	2.73	3.07	-	-	-	-	-	-	-	-	-
.40	-	-	2.09	-	-	-	-	-	-	-	-	-

Table I (Supplement)
Record of Standardized Haul Factors for Oblique Hauls
made with Plankton Nets during Cruises 5501-5512, 1955

I-a: Coverage made for sardine availability studies

	5509				5511	
Station	Black Douglas (A)	Paolina T. (A)	Black Douglas (B)	Paolina T. (B)	Paolina T. (A)	(B)
83.40	1.51	0.83	2.50	1.14	0.83	1.03
.42	2.42	2.70	3.00	3.07	1.52	1.59
.44	2.58	3.19	2.42	2.93	1.83	2.33
.46	2.70	1.95	1.36	2.46	2.04	2.45
.48	1.49	2.64	2.68	3.25	2.24	1.99
.51$_5$	2.69	2.94	2.92	2.87	2.76	2.11
.52	2.29	3.18	3.28	2.24	2.31	2.13
.55$_5$	2.97	4.22	3.07	2.79	2.47	2.56
.57	2.58	3.17	3.22	2.51	2.24	2.49
.60	2.67	4.25	2.44	2.61	2.63	2.34
85.39	3.37	2.97	2.22	2.62	2.72	2.35
.40$_5$	3.09	2.48	2.60	3.11	2.57	2.37
.42	2.38	2.60	2.38	3.53	2.37	1.98
.45$_5$	3.03	2.61	2.44	3.08	2.55	2.08
.47	2.24	2.57	3.25	2.53	2.39	2.38
.50$_5$	1.66	3.28	2.95	3.07	1.97	2.36
.52	2.99	3.39	3.10	3.50	2.33	3.26
.55$_5$	3.12	2.60	3.21	2.36	2.54	2.62
.57	2.57	3.49	3.11	3.38	2.87	2.25
.60	2.50	2.40	3.09	3.65	2.30	2.27
87.35$_5$	2.56	2.89	2.59	2.95	2.49	2.41
.37	2.91	2.67	2.90	4.13	2.41	2.36
.40$_5$	2.33	2.69	3.02	3.56	2.86	2.03
.42	2.74	2.61	2.68	3.00	2.57	2.38
.45$_5$	2.69	2.88	2.67	2.96	2.40	2.57
.47	2.43	3.29	2.81	2.95	2.21	-
.50$_5$	2.18	1.89	3.00	2.76	2.18	-
.52	2.49	2.55	2.39	2.58	2.14	2.15
.55$_5$	3.12	-	3.15	2.46	2.61	2.37
.57	2.82	-	3.28	2.25	2.29	2.61
.60	2.56	-	2.99	3.28	2.80	2.34
90.28	3.56	3.41	3.16	2.15	3.18	2.75
.30$_5$	2.53	3.13	3.16	3.31	2.63	2.42
.32	2.11	2.98	2.92	3.46	2.43	2.72
.35$_5$	3.39	2.82	2.67	2.87	2.72	2.29
.37	3.06	2.75	3.12	2.76	2.07	2.19
.40$_5$	2.67	3.38	2.88	3.32	2.22	2.37
.42	2.79	3.17	3.00	2.90	2.12	2.72
.45$_5$	2.90	3.41	3.50	2.76	2.15	2.47
.47	2.95	1.83	2.51	3.27	2.71	2.28
.50$_5$	3.11	2.44	2.73	2.31	2.62	2.12
.52	2.98	2.46	2.89	3.25	2.11	2.20
.55	2.95	3.34	2.23	2.89	2.25	2.00

I-b: Extra tows made at regular stations

5504	
Station	Black Douglas
103.30	2.45
.35	2.37
.40	2.02
.50	2.58
.60	2.64
.70	2.92
.80	2.52
107.80	2.47
110.60	3.56
.80	2.40
113.60	2.82
117.60	2.75
120.35	1.88
.45	2.92
.50	2.77
.55	2.84
.60(a)	2.79
.60(b)	2.53
.70	2.63
.80	2.66
123.50	2.60
.60	2.56
127.50	2.67
.60	2.41
130.50	2.51
.60	2.46

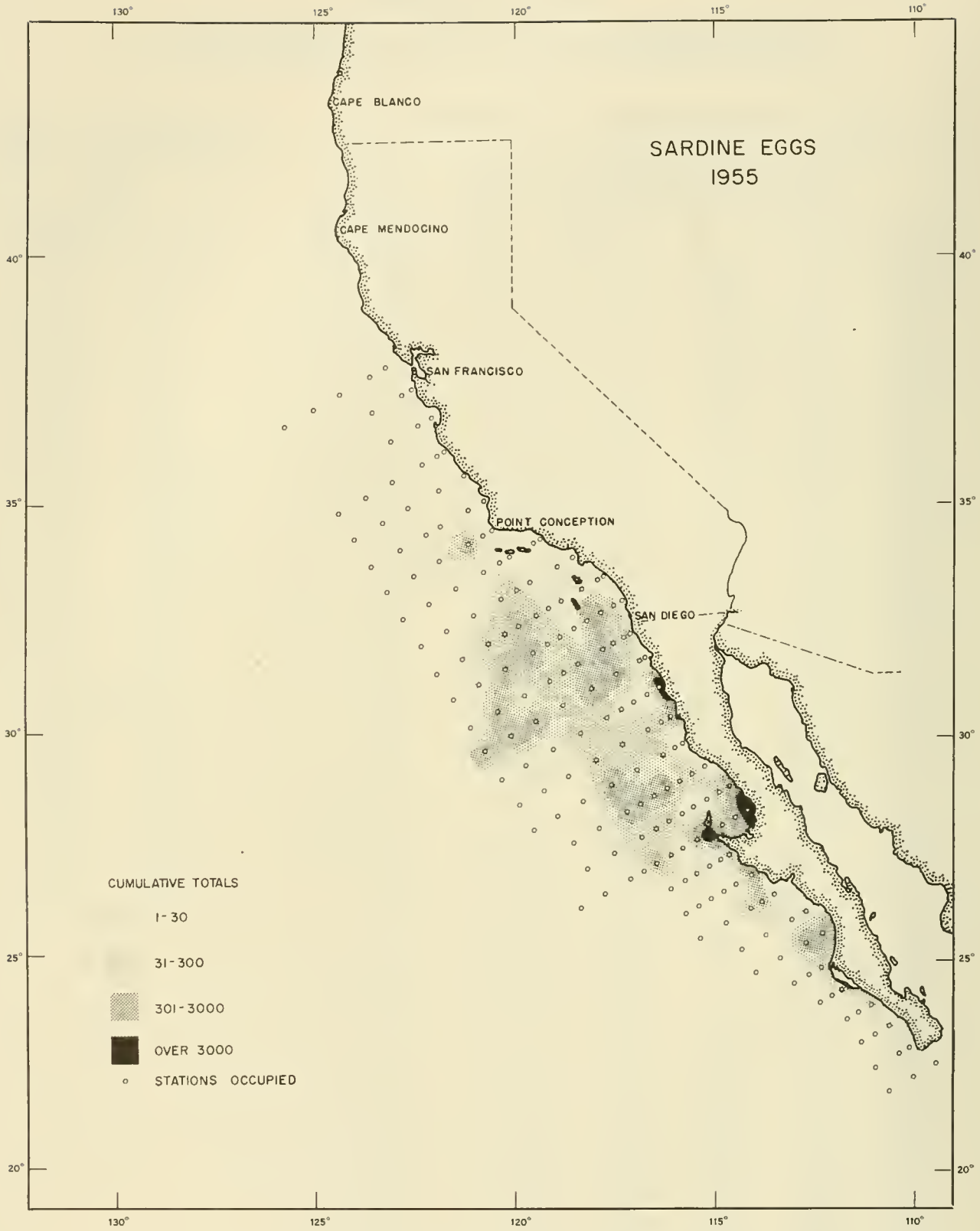

Figure 2.--Sardine eggs, 1955: distribution and relative abundance.

RECORD OF SARDINE EGGS, 1955

The distribution and relative abundance of sardine eggs in 1955 are shown in figure 2. This chart is comparable to the distributions for 1950 and 1951 in Ahlstrom (1954, figs. 7 and 8). Five categories of abundance are used: zero spawning; light spawning, 1-30 eggs; moderate spawning, 31-300 eggs; moderately heavy spawning, 301-3000 eggs; and heavy spawning, over 3000 eggs. The value plotted for each station is the cumulative standard haul total for the year.

A record of all hauls containing sardine eggs in 1955 is given in table II. The eggs are grouped under two headings: "Number of normal eggs" and "Total number of eggs". The total number includes both normally developing sardine eggs, and eggs classified as abnormal. Abnormal eggs have embryos that are stunted and misshapen; it is not known whether this is due to a diseased condition of the eggs or to mechanical injury during collection and preservation.

Age categories of eggs are designated by the letters A through D, as follows:

A - Eggs spawned within 24 hours of collection
B - Eggs spawned within 24.1 to 48 hours of collection
C - Eggs spawned within 48.1 to 72 hours of collection
D - Eggs spawned within 72.1 to 96 hours of collection
Unclassified eggs (Uncl.) includes deteriorating eggs that cannot be classified with certainty.

The occurrence and abundance of sardine eggs are summarized by month and area in text table 2. No sardine eggs were obtained off central California (station lines 60-77), consequently this area is omitted from the table.

The distribution of sardine spawning has changed quite markedly during the time period covered by the surveys (1950 to date). In 1950 and 1951, spawning was separable into two centers: a northern center off southern California and northern Baja California (lines 80-107), and a southern center off central Baja California (lines 110-137). In recent years the two centers are less well defined, and it may be misleading to continue to use these designations, except as a convenient method of subdividing the spawning area into an upper and a lower "half". In 1955, there was approximately as much spawning in the upper center as in the lower. There was also considerable spawning in the upper center in 1954. As there was practically no spawning in this center in 1952 and 1953, there must have been a marked shift in the spawning population between 1953 and 1954.

Text table 2.--Sardine eggs: occurrence and abundance (standard haul totals) of sardine eggs, by month and area, in hauls made during 1955

Cruise	Southern California 80-93		Northern Baja California 97-107		Upper central Baja California 110-120		Lower central Baja California 123-137		Southern Baja California 140-157		Total	
	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number
5501	0	0	1	8	7	4,636	2	462	4	228	14	5,334
5502	0	0	7	5,550	10	3,214	0	0	1	81	18	8,845
5503	3	517	12	1,085	9	2,359	1	8	0	0	25	3,969
5504	5	55	24	4,508	14	371	0	0	-	-	43	4,934
5505	14	2,570	14	4,523	5	4,010	2	1,935	-	-	35	13,038
5506	15	2,827	9	468	4	3,176	1	5	-	-	29	6,476
5507	2	38	1	10	4	661	3	1,028	-	-	10	1,737
5508	-	-	-	-	-	-	-	-	-	-	-	-
5509	0	0	-	-	-	-	-	-	-	-	0	0
5510	0	0	0	0	5	260	1	6	-	-	6	266
5511	0	0	0	0	-	-	-	-	-	-	0	0
5512	0	0	1	4	2	76	3	519	0	0	6	599
Total	39	6,007	69	16,156	60	18,763	13	3,963	5	309	186	45,198
Percent		13.3		35.7		41.4		8.8		0.7		99.9

Table II
Record of Sardine Eggs, 1955

Station	Number of Normal Eggs A	B	C	D	Total Number of Eggs A	B	C	D	Uncl.	n
Cruise 5501:										
107.32	-	-	4	-	-	-	8	-	-	8
113.40	24	3	0	-	66	3	0	-	6	75
.50	22	179	85	-	160	484	495	-	72	1211
.60	39	257	33	-	211	586	76	-	0	873
117.50	-	3	-	-	0	3	0	-	0	3
120.35	0	0	6	-	0	0	20	-	0	20
.40	12	260	21	12	12	2288	44	46	0	2390
.45	0	0	18	12	0	0	34	18	12	64
123.37	14	3	0	-	25	6	0	-	0	31
137.23	0	8	120	-	0	19	393	-	19	431
147.20	0	102	-	-	0	214	-	-	0	214
150.19	0	7	-	-	0	7	-	-	0	7
153.16	3	0	-	-	3	0	-	-	0	3
.20	0	0	-	-	0	4	-	-	0	4
Total	114	822	287	24	477	3614	1070	64	109	5334
Cruise 5502:										
103.30	0	718	1528	-	0	1072	2497	-	0	3569
.50	0	0	7	27	0	0	10	75	0	85
.60	6	0	0	-	29	0	0	-	0	29
107.32	0	36	665	214	0	60	1152	443	0	1655
.35	0	0	0	-	0	0	20	-	0	20
.40	0	0	53	-	3	13	150	-	0	166
.50	0	0	7	3	0	0	10	16	0	26
110.40	0	0	3	-	0	3	3	-	0	6
.50	0	0	10	-	7	0	20	-	0	27
.60	3	55	296	-	3	131	455	-	0	589
113.35	0	0	22	10	0	0	32	10	0	42
.40	0	0	3	-	0	3	21	-	0	24
.45	34	6	83	-	160	21	172	-	0	353
.50	0	599	152	-	4	1343	348	-	0	1695
117.45	0	0	0	-	0	0	4	-	0	4
.50	0	0	19	-	0	3	28	-	0	31
120.25	0	61	291	-	0	73	370	-	0	443
143.26	0	53	-	-	0	81	-	-	0	81
Total	43	1528	3139	254	206	2803	5292	544	0	8845

Table II (Cont'd)
Record of Sardine Eggs, 1955

Station	Number of Normal Eggs A	B	C	D	Total Number of Eggs A	B	C	D	Uncl.	n
Cruise 5503:										
90.70	0	23	76	-	0	69	163	-	0	232
93.30	6	0	6	0	35	0	15	0	0	50
.70	0	69	0	0	0	235	0	0	0	235
97.50	0	41	50	2	18	52	107	2	0	179
.60	5	8	26	-	23	8	50	-	0	81
.70	0	2	0	-	0	4	0	-	0	4
100.30	0	0	0	0	0	0	8	0	0	8
.50	81	0	0	-	318	0	0	-	0	318
.60	28	14	3	-	49	14	3	-	0	66
.70	3	3	142	-	3	3	278	-	0	284
.80	0	0	14	-	0	0	21	-	0	21
103.30	0	9	0	-	0	22	0	-	0	22
.70	0	0	0	-	0	0	2	-	0	2
107.50	0	0	0	-	0	4	0	-	0	4
.60	3	42	0	-	6	90	0	-	0	96
110.50	0	0	3	-	0	0	3	-	0	3
.60	0	3	-	-	0	10	-	-	0	10
.80	0	0	0	-	0	0	3	-	0	3
113.35	0	0	0	0	0	0	0	5	0	5
.55	7	72	341	-	59	236	1394	-	0	1689
117.55	3	47	19	-	22	105	60	-	0	187
.60	0	0	4	-	0	4	12	-	0	16
120.55	0	0	9	-	0	0	79	-	0	79
.60	18	26	15	-	137	73	38	-	119	367
123.60	0	0	5	-	0	0	8	-	0	8
Total	154	359	713	2	670	929	2244	7	119	3969
Cruise 5504:										
90.60	0	0	0	0	0	8	16	0	14	38
.80	0	4	0	0	0	8	0	0	0	8
93.50	0	0	0	-	0	3	0	-	0	3
.60	0	0	0	-	0	3	0	-	0	3
.80	0	3	0	-	0	3	0	-	0	3
97.40	8	174	5	-	8	353	5	-	0	366
.50	8	11	11	-	71	25	36	-	0	132
.60	0	0	0	-	3	0	3	-	0	6
.80	180	66	328	-	445	112	451	-	0	1008
100.50	3	16	76	-	6	19	89	-	0	114
.60	0	6	0	-	0	9	0	-	0	9
.70	11	40	0	-	20	57	6	-	0	83
.80	0	77	184	60	0	294	528	266	143	1231
.90	55	153	409	-	157	255	537	-	0	949

Table II (Cont'd)
Record of Sardine Eggs, 1955

Station	Number of Normal Eggs A	B	C	D	Total Number of Eggs A	B	C	D	Uncl.	n
Cruise 5504 (cont'd):										
B103.30	15	0	0	-	52	0	0	-	0	52
H .35	0	18	-	-	4	18	-	-	0	22
H .40	0	0	6	-	0	0	6	-	0	6
B .45	0	0	0	-	0	0	3	-	0	3
B .50	0	0	0	-	0	3	10	-	18	31
C .50	3	26	28	-	3	29	31	-	0	63
B .55	0	3	3	-	0	3	6	-	0	9
B .60	0	0	0	-	0	8	29	-	3	40
C .60	6	22	22	-	6	28	30	-	0	64
B .65	0	6	33	-	0	12	71	-	0	83
C .70	0	0	3	0	0	0	3	3	0	6
B .80	0	0	0	-	2	0	0	-	0	2
H107.35	0	8	0	-	0	24	0	3	0	27
H .40	8	0	4	-	8	0	8	-	0	16
H .50	0	136	6	-	0	180	6	-	0	186
H110.35	0	6	0	-	0	8	0	-	0	8
H .40	0	0	22	-	0	0	29	-	0	29
H .50	0	4	0	-	0	4	0	-	0	4
H113.45	0	0	43	-	0	0	52	-	0	52
H .50	0	0	3	-	0	0	3	-	0	3
H .55	0	20	12	-	0	23	15	-	0	38
H .60	3	30	-	-	8	63	-	-	3	74
B .60	0	6	0	-	0	9	0	-	0	9
H117.35	0	0	3	-	0	0	6	-	0	6
H .45	0	0	3	-	0	0	3	-	0	3
H .55	0	23	29	-	0	46	41	-	6	93
H .60	0	12	15	-	0	12	24	-	3	39
H .70	0	0	10	-	0	0	10	-	0	10
B120.65	0	0	0	-	0	3	0	-	0	3
Total	300	870	1258	60	793	1622	2057	272	190	4934
Cruise 5505:										
90.37	0	0	0	-	0	0	0	-	4	4
.45	0	11	0	0	0	17	6	0	0	23
.60	3	165	0	0	3	370	0	0	40	413
.65	0	0	0	0	0	0	0	0	17	17
93.35	0	3	0	-	0	3	0	-	3	6
.40	0	25	6	-	3	76	82	-	62	223
.45	0	0	0	-	0	0	3	-	0	3
.50	0	0	0	15	0	0	12	27	0	39
93.55	15	55	3	-	30	70	12	-	0	112

Table II (Cont'd)
Record of Sardine Eggs, 1955

Station	Number of Normal Eggs A	B	C	D	Total Number of Eggs A	B	C	D	Uncl.	n
Cruise 5505 (cont'd):										
93.60	0	64	6	-	52	232	104	-	52	440
.65	3	65	14	-	54	163	50	-	0	267
.70	110	78	15	-	632	87	18	-	247	984
.75	0	0	12	6	0	0	15	6	0	21
.80	0	0	0	0	0	0	18	0	0	18
97.32	0	44	130	-	16	50	187	-	6	259
.35	6	28	14	-	6	36	56	-	6	104
.40	36	230	45	-	137	510	271	-	226	1144
.45	410	0	20	-	1535	0	33	-	430	1998
.50	0	40	30	-	40	66	116	-	17	239
.55	0	0	0	-	0	0	3	-	0	3
100.40	59	20	48	-	186	40	136	-	20	382
.45	55	0	18	-	104	3	27	-	9	143
.50	0	23	11	-	87	53	49	-	11	200
103.35	0	0	9	-	3	15	9	-	0	27
.40	0	3	0	-	6	3	0	-	0	9
.45	3	0	-	-	3	3	-	-	0	6
107.35	0	0	0	-	0	0	0	-	6	6
.45	0	0	3	-	0	0	3	-	0	3
110.35	0	0	3	-	0	0	3	-	0	3
117.26	0	0	12	-	137	274	37	-	25	473
120.25	344	1784	299	-	798	1972	299	-	0	3069
.27	93	0	0	-	119	0	0	-	0	119
.30	264	46	0	-	300	46	0	-	0	346
137.23	673	133	0	-	1346	194	0	-	0	1540
.30	58	133	36	-	164	150	56	-	25	395
Total	2132	2950	734	21	5761	4433	1605	33	1206	13038
Cruise 5506:										
80.60	220	232	557	-	417	313	615	-	0	1345
.70	0	0	0	0	0	0	0	0	6	6
.80	0	5	0	0	0	5	0	0	0	5
87.35	0	0	12	-	0	0	12	-	0	12
.40	0	0	5	-	0	2	5	-	0	7
.55	0	6	31	-	0	18	49	-	6	73
.60	0	43	29	-	0	43	29	-	0	72
90.50	0	0	0	-	0	0	0	-	3	3
.55	6	11	0	-	28	11	0	-	0	39
.60	0	0	20	13	0	0	47	46	0	93

Table II (Cont'd)
Record of Sardine Eggs, 1955

Station	Number of Normal Eggs A	B	C	D	Total Number of Eggs A	B	C	D	Uncl.	n
Cruise 5506 (cont'd):										
90.65	0	0	0	14	0	0	0	14	0	14
93.27	0	2	0	-	0	2	0	-	2	4
.35	12	65	53	-	37	369	143	-	0	549
.40	0	18	48	-	0	72	161	-	24	257
.70	0	0	287	-	0	0	348	-	0	348
97.30	25	58	0	-	55	98	0	-	15	168
.35	0	3	-	-	0	3	-	-	0	3
.40	0	0	17	-	0	0	51	-	0	51
.45	0	0	0	-	0	0	3	-	0	3
.50	0	4	0	-	0	33	0	-	8	41
.55	0	91	5	-	0	136	5	-	0	141
100.45	0	0	6	-	0	6	12	-	0	18
103.30	0	2	4	-	2	4	24	-	4	34
107.35	0	3	6	-	0	3	6	-	0	9
117.26	0	10	104	18	0	13	122	24	0	159
120.25	1283	625	-	-	1544	836	-	-	0	2380
.40	0	72	164	-	0	119	513	-	0	632
.45	0	0	0	-	0	0	5	-	0	5
133.30	0	0	0	-	0	0	0	-	5	5
Total	1546	1250	1348	45	2083	2086	2150	84	73	6476
Cruise 5507:										
87.35	0	13	0	-	0	16	0	-	0	16
90.28	0	14	0	-	0	22	0	-	0	22
103.30	0	5	0	-	5	5	0	-	0	10
117.26	0	0	26	-	0	4	35	-	0	39
120.25	14	289	137	-	30	341	214	-	2	587
.30	0	5	24	-	0	5	24	-	0	29
.35	0	0	6	-	0	0	6	-	0	6
123.50	0	0	0	-	0	3	0	-	0	3
130.35	4	300	346	-	8	437	449	-	15	909
.40	0	13	103	-	0	13	103	-	0	116
Total	18	639	642	-	43	846	831	-	17	1737

Table II (Cont'd)
Record of Sardine Eggs, 1955

Station	Number of Normal Eggs A	B	C	D	Total Number of Eggs A	B	C	D	Uncl.	n
Cruise 5510:										
117.30	-	-	29	-	0	0	39	-	0	39
120.27	5	14	-	-	5	16	-	-	0	21
.30	139	16	-	-	151	16	-	-	0	167
.35	0	29	-	-	0	31	-	-	0	31
.45	0	0	0	-	0	2	0	-	0	2
133.25	0	6	0	-	0	6	0	-	0	6
Total	144	65	29	-	156	71	39	-	0	266
Cruise 5512:										
103.30	0	2	0	0	0	4	0	0	0	4
120.35	0	0	0	-	0	0	5	-	0	5
.40	47	5	6	-	60	5	6	-	0	71
123.37	0	68	26	-	0	147	42	-	0	189
.40	0	0	0	10	0	4	0	17	0	21
127.34	119	16	-	-	277	32	-	-	0	309
Total	166	91	32	10	337	192	53	17	0	599

RECORD OF SARDINE LARVAE, 1955

The distribution and relative abundance of sardine larvae in 1955 are shown in figure 3 (cf. Ahlstrom 1954, figs. 7 and 8). Five categories of abundance are used: 0 - no larvae taken; light concentration, 1-6 larvae; moderate concentration, 7-60 larvae; moderately heavy concentration, 61-600 larvae; heavy concentration, over 600 larvae. The value for each station is the cumulative standard haul total for the year.

Sardine larvae are recorded by size classes in table III. The size classes have the following midpoints and ranges:

Midpoint (in mm.)	Range (in mm.)	Midpoint (in mm.)	Range (in mm.)
3.00	2.00-4.25	12.75	12.26-13.25
4.75	4.26-5.25	13.75	13.26-14.25
5.75	5.26-6.25	14.75	14.26-15.25
6.75	6.26-7.25	15.75	15.26-16.25
7.75	7.26-8.25	17.25	16.26-18.25
8.75	8.26-9.25	19.25	18.26-20.25
9.75	9.26-10.25	21.25	20.26-22.25
10.75	10.25-11.25	23.25	22.26-24.25
11.75	11.26-12.25	25.25	24.26-26.25

Dis. - Disintegrating larvae that cannot be measured accurately.

The distribution of sardine larvae is somewhat different than the distribution of eggs, as is shown by the following tabulation:

Station lines	Sardine eggs			Sardine larvae		
	Occurrences	Number	Percent	Occurrences	Number	Percent
60-77	0	0	0	0	0	0
80-93	39	6,007	13.3	26	1,717	12.1
97-107	69	16,156	35.7	72	3,161	22.4
110-120	60	18,763	41.4	93	6,514	46.1
123-137	13	3,963	8.8	46	1,145	8.1
140-157	5	309	0.7	17	1,584	11.2
Total	186	45,198	99.9	254	14,121	99.9

There are fewer larvae taken in the northern center than eggs - 34.5% of the total, as compared to 49.0%. Larvae, on the average, are about two weeks older than the eggs, and during this period they have been carried along by the predominantly southward moving currents; as a result, larvae are usually collected to the south of the area where they are spawned.

There are more occurrences of sardine larvae than of eggs: larvae were taken in 254 collections (text table 3), as compared to 186 for eggs. This is an expected finding, since it has been repeated season after season. Of course, a collection of larvae can represent up to 45 days' accumulation (the time required for larval development) while the egg stage (embryonic period) averages less than three days.

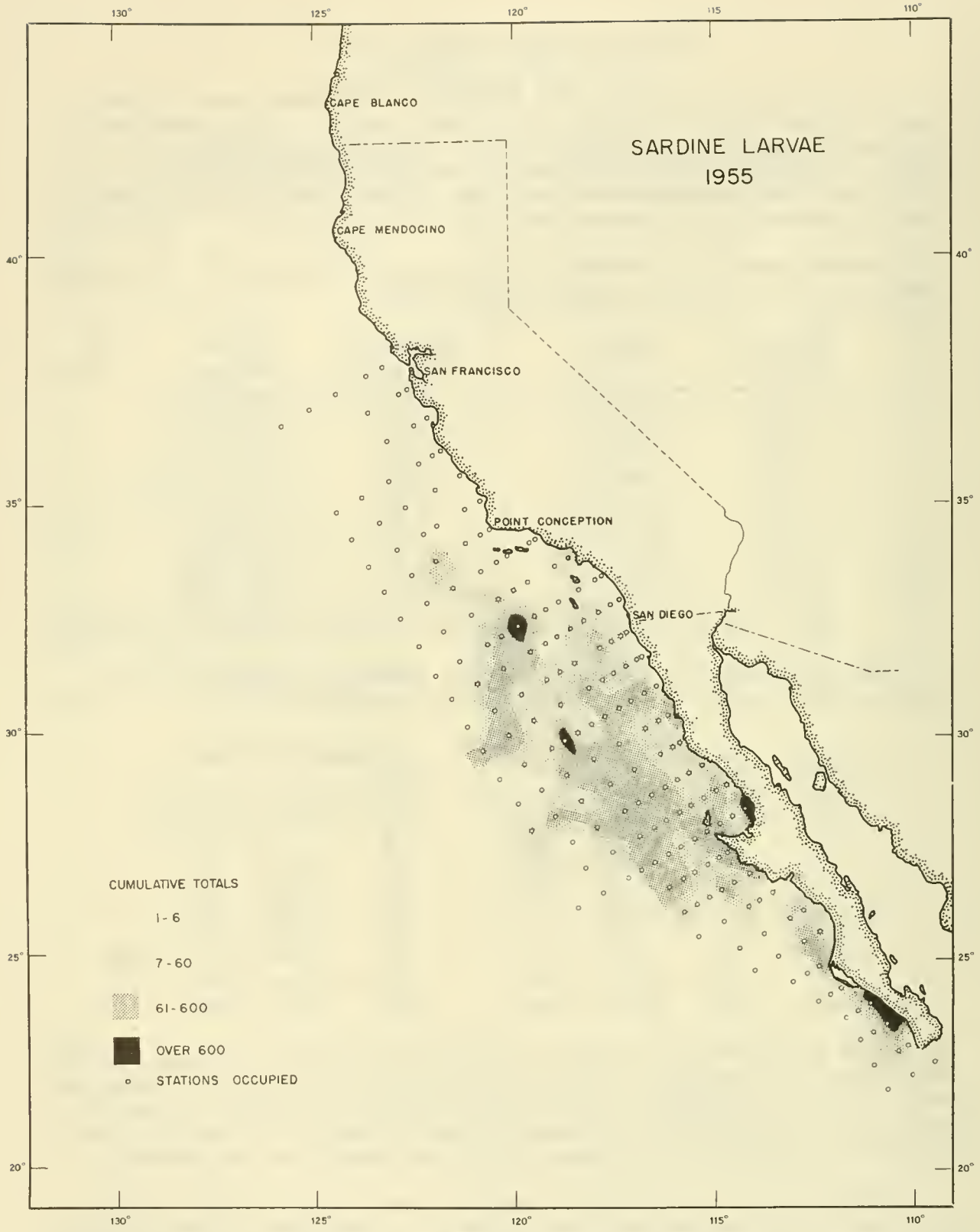

Figure 3.--Sardine larvae, 1955: distribution and relative abundance

Text table 3.--Occurrence and abundance (standard haul totals) of sardine larvae, by month and area, in hauls made during 1955

Cruise	Southern California 80-93		Northern Baja California 97-107		Upper central Baja California 110-120		Lower central Baja California 123-137		Southern Baja California 140-157		Total	
	Occur-rences	Num-ber	Occur-rences	Num-ber	Occur-rences	Num-ber	Occur-rences	Num-ber	Occur-remces	Num-ber	Occur-remces	Num-ber
5501	0	0	0	0	14	830	8	272	8	1,227	30	2,329
5502	0	0	6	175	15	2,295	9	326	7	336	37	3,132
5503	2	9	11	351	11	887	5	325	1	4	30	1,576
5504	3	16	28	2,030	26	622	4	17	-	-	61	2,685
5505	4	27	20	401	6	146	2	8	-	-	32	582
5506	10	1,444	6	198	3	604	2	29	-	-	21	2,275
5507	7	221	1	6	6	891	7	60	-	-	21	1,178
5508	-	-	-	-	-	-	-	-	-	-	-	-
5509	0	0	-	-	-	-	-	-	-	-	0	0
5510	0	0	0	0	6	93	5	36	-	-	11	129
5511	0	0	-	-	-	-	-	-	-	-	0	0
5512	0	0	0	0	6	146	4	72	1	17	11	235
Total	26	1,717	72	3,161	93	6,514	46	1,145	17	1,584	254	14,121
Percent		12.2		22.4		46.1		8.1		11.2		100.0

Table III
Record of Sardine Larvae, 1955

Midpoint of Size Class (in mm.)

Station	3.00	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	25.25	Dis.	Total
Cruise 5501:																				
110.33	10.7																			10.7
.35		4.3																		4.3
113.35	23.2																			23.2
.40	2.7			2.7																5.4
.50	143.0			8.2																151.2
.60	39.2	102.6	3.0																	144.8
117.26					3.2	3.2														6.4
.35					3.2															3.2
.50		3.2																		3.2
.60	3.7																			3.7
120.25				2.7	2.7															5.4
.35	260.0	70.1		2.9			2.9													335.9
.40	60.3	11.6							2.3											74.2
.45	12.3	6.2		3.1	3.1	3.1	12.4	3.1	3.1	9.3		3.1								58.8
123.37		5.6	8.4		2.8	2.8	2.8		2.8	2.8	2.8			2.8						33.6
.40		21.9	6.3			9.4	3.1			3.1	3.1	9.4								56.3
.45	3.2		3.2		3.2			3.2		3.2										16.0
127.34		2.6	2.6	7.8	7.8	7.8	15.6	10.4	10.4	2.6	13.0	13.0	2.6	2.6						98.8
.40				6.0																6.0
133.25						2.5		4.9		2.5		2.5								12.4
137.23	2.7			2.7	5.5	2.7	5.5	2.7			2.7									24.5
.30					6.1	6.1	9.1	3.0												24.3
140.30	57.7	3.4						3.4												64.5
143.26				2.3		2.3	2.3													6.9
.30									3.0			3.0								6.0
.35									3.2											3.2
147.20	603.5	64.4			3.4	10.2		3.4												684.9
150.19	62.9	76.1	139.1	79.4	33.1	13.2	6.6		3.3	3.3	9.9	6.6								433.5
153.20			11.1																	11.1
157.10				6.8	10.1															16.9
Total	1285.1	372.0	173.7	124.6	84.2	63.3	60.3	34.1	28.1	26.8	31.5	37.6	2.6	5.4						2329.3

Table III (Cont'd)
Record of Sardine Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	3.00	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	25.25	Dis.	Total
Cruise 5502:																				
103.40		17.3																		17.3
.50	27.5																			27.5
107.32	53.5	17.8	3.0																	74.3
.35	19.8																			19.8
.40	26.7	3.3																		30.0
.60		6.0																		6.0
110.40	6.5	13.0	3.2																	22.7
.50	62.3	39.4																		101.7
.60	27.3	149.5	115.9	18.2																310.9
.70	11.2	2.8																		14.0
113.35	3.2	3.2																		6.4
.40	5.9	14.8																		20.7
.45	24.4	97.9	85.7	21.5		3.1	3.1													235.7
.50	44.4	55.5	92.5	7.4																199.8
.70						9.2	21.4	36.7	42.8	33.7	33.6	24.5	3.1	3.1						208.1
117.40						4.0		4.0				4.0		4.0	4.0					20.0
.45		6.9	3.5	3.5	13.8	6.9		3.5	7.0	6.9		3.5	10.4	7.0	3.5	3.5				79.9
.50		40.8	9.4	3.1	9.4	6.2					3.1									72.0
.55			3.4		3.4															6.8
120.25	433.6	273.5	93.1	5.8	5.8		2.9													814.7
.40	37.3	32.1	74.7	32.0		5.3														181.4
123.40												2.3								2.3
.45		3.2				3.2														6.4
127.40					4.4	2.2	11.1	6.6		6.6	6.6	2.2	2.2							41.9
.45				5.1	10.2	10.2	35.5	35.5	50.8	25.4	20.3	10.2	25.4	15.3	5.1					249.0
.50												2.8								2.8
.55											2.2	2.2								4.4
133.30														1.9						1.9
137.23								2.7										2.7		5.4
.30												11.8								11.8
143.26	10.1																			10.1
147.20	63.9	64.0	11.2	55.6	50.0		2.8	8.4		2.8	5.6	8.4	2.8	2.8						278.3
.25	2.7	2.7	5.5		2.7	8.2		2.7												24.5
150.19										3.0										3.0
.25				2.3	2.3	2.3			2.3	2.3										11.5
.30													3.0	3.0						6.0
153.30										2.4										2.4
Total	860.3	843.7	501.1	154.5	102.0	60.8	76.8	100.1	102.9	83.1	71.4	71.9	46.9	37.1	12.6	3.5		2.7		3131.4

Table III (Cont'd)
Record of Sardine Larvae, 1955

Midpoint of Size Class (in mm.)

Station	3.00	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	25.25	Dis.	Total
Cruise 5503:																				
90.70	5.8																			5.8
93.70								3.4												3.4
97.30	1.6																			1.6
.40		2.2																		2.2
.50	2.3	2.3	2.3																	6.9
.60	2.6		2.6																	5.2
.70					2.4															2.4
100.60			3.4			3.4														6.8
.70	5.8																			5.8
103.50			3.4			6.7	3.4													13.5
107.50	3.5	45.2	10.4																	59.1
.60		3.2	3.2																	6.4
.70	8.0	151.0	79.4	2.6																241.0
110.50		22.4	33.6	11.2	2.8															70.0
.60	10.2	64.3	20.3	3.4																98.2
.70	3.3				3.3		3.3													9.9
.80	8.8	41.3	5.9		3.0	3.0														62.0
.90		24.2	3.5	3.5	3.5															34.7
113.55	114.8		3.3																	118.1
117.50		6.2	3.1	3.1		3.1														15.5
.55	27.6	82.8	11.1																	121.5
.60	107.5	38.4	3.8																	149.7
120.55	124.2	33.3			3.0	3.0	3.0													166.5
.60		17.5	5.8	11.6	5.8															40.7
123.40								3.4												3.4
.50									1.8					1.8						3.6
.55		21.5	42.9	5.4	18.7	8.0	5.4													101.9
.60		78.0	94.2	10.8	21.5															204.5
127.60				5.6	2.8										2.8					11.2
153.16		2.2	2.2																	4.4
Total	426.0	636.0	334.4	57.2	66.8	27.2	15.1	6.8	1.8					1.8	2.8					1575.9

Table III (Cont'd)
Record of Sardine Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	3.00	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	25.25	Dis.	Total
Cruise 5504:																				
87.35	2.8																			2.8
90.60	8.1																			8.1
93.60			2.8		2.8															5.6
97.40	7.5	17.7		5.0		5.0														35.2
.50	2.7	2.7	2.7																	8.1
.60		6.0	3.0	3.0										3.0						15.0
.70			6.4																	6.4
.80	82.6	39.9	20.0	2.8							2.8									148.1
100.50	6.4	28.4	3.2	3.2	9.5				3.2											53.9
.60	5.8		8.7							2.9										17.4
.70	8.6				5.7	2.9	5.8	2.9		2.9	2.9									31.7
.80	52.3	27.5	24.7	2.8																107.3
.90	21.9	36.6	3.6																	62.1
B103.35	2.4	56.8	14.2	2.4	2.4		7.1	7.1	11.8	7.1	2.4	4.7								118.4
H .35		11.1	7.4	3.7		3.7														25.9
B .40		2.0	4.0		2.0	6.1	10.1	6.0	2.0	2.0	2.0									36.2
H .40		11.7	2.9	2.9	5.8		8.8	2.9	8.8	5.9	8.8	5.9	2.9	2.9						70.2
B .45	7.8	23.4	13.0	18.2	15.6	2.6	7.8		2.6			2.6								93.6
B .50	2.6	20.6	12.9	10.3					2.6											49.0
C .50		2.8																		2.8
B .55	6.0	9.0	3.0											3.0						21.0
B .60	2.6	7.9				2.6		2.6				2.6			2.6					20.9
C .60		27.9	19.5	5.6		5.6	5.6													64.2
B .65	71.5	302.5	231.0	71.5	44.0	16.5														737.0
B .70			2.9	2.9	2.9		2.9	2.9												14.5
C .70			2.6	2.6		2.6	10.2		2.6											20.6
B .80		5.0	5.0	5.0	2.5	2.5														20.0
H107.40	4.2	12.7	4.2	4.2																25.3
H .50		3.2	38.0	15.9	44.3	9.5	15.8	3.2	9.5	9.5	3.2									152.1
H .60		14.4	14.4	19.2	7.2		4.8			2.4			2.4							64.8
H .70							2.9		2.9		2.9									8.7

Table III (Cont'd)
Record of Sardine Larvae, 1955

Midpoint of Size Class (In mm.)

Station	3.00	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	25.25	Dis.	Total
Cruise 5504 (cont'd):																				
H110.35						2.0		2.0												4.0
H .40				7.4			7.4						3.7							18.5
H .50							3.5				3.5									7.0
H .60			5.0	10.0	12.5	10.0	5.0					2.5		2.5	2.5					50.0
H .70			2.6																	2.6
H .80										2.3										2.3
H .90						3.1	3.1													6.2
H113.45			3.0	3.0			3.0	3.0	3.0											15.0
B .50		6.4	6.4	9.6		3.2		3.2	3.2	6.4	3.2									41.6
H .55		2.9		5.8	2.9															11.6
H .60		27.2	13.6	8.1																48.9
B .60	2.8	2.8	8.4				2.8							2.8						19.6
H .70	3.6	18.2	10.9		3.6					3.6										39.9
H117.40	2.6	5.3									2.6									10.5
H .45	3.1	3.1	6.1		3.1						9.2									24.6
H .50	3.6																			3.6
H .60	5.8		2.9																	8.7
H .70	3.5		3.5						7.0											14.0
B120.45				23.4																23.4
H .50								7.6												7.6
B .50									5.5											5.5
H .55					2.3		2.3					2.3								6.9
H .60		5.7	2.8		5.7		2.8													17.0
B(1).60	2.8	2.8	19.6	5.6		2.8				2.8										36.4
B(2).60			25.3	5.1		5.1														35.5
B .65	5.6	34.0	51.0	39.6	25.5	2.8				2.8										161.3
H123.55								3.2		3.2										6.4
H .60				2.7																2.7
B127.50														5.3						5.3
B .60													2.4							2.4
Total	329.2	778.2	611.2	301.5	200.3	88.6	111.7	46.6	64.7	53.8	43.5	20.6	11.4	19.5	5.1					2685.9

Table III (Cont'd)
Record of Sardine Larvae, 1955

Midpoint of Size Class (in mm.)

Station	3.00	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	25.25	Dis.	Total
Cruise 5505:																				
87.55				2.6			2.6													5.2
90.70			3.0																	3.0
93.45	3.1	9.4	3.1																	15.6
.50			3.1																	3.1
97.30									2.6											2.6
.32	12.7	9.5	6.3	6.3		3.2			6.3											44.3
.35	11.2	14.0					5.6	2.8												33.6
.40	29.8	6.0																		35.8
.50		23.1	16.5	3.3																42.9
.55	3.2																			3.2
.70				3.5	3.5	13.9		10.5	3.5	3.5	7.0									45.4
.80		4.2		4.2				4.2												12.6
100.30													3.2			3.2				6.4
.35	40.3	3.1																		43.4
.40	5.7	5.6	2.8	2.8																16.9
.45		3.1					3.1													6.2
.50		3.8		11.4		3.8	15.2	3.8		7.6										45.6
103.45	2.9																			2.9
.50		3.2				3.2		3.2		3.2	3.2	6.5								22.5
.55									9.7											9.7
107.35													6.2							6.2
.40													2.5							2.5
.45		3.1																		3.1
.50							3.1	6.2	3.1							3.1				15.5
110.45		2.9																		2.9
113.35														3.3	3.3					6.6
117.45									2.4					4.9						7.3
.50										4.5										4.5
.80										2.6										2.6
120.25	11.1	44.3	33.3	22.2	11.1															122.0
123.40												4.9								4.9
137.30	2.8																			2.8
Total	122.8	135.3	68.1	56.3	14.6	24.1	29.6	30.7	27.6	21.4	10.2	11.4	11.9	8.2	3.3	6.3				581.8

Table III (Cont'd)
Record of Sardine Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	3.00	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	25.25	Dis.	Total
Cruise 5506:																				
87.35	11.7	5.9																		17.6
.60	28.8																			28.8
90.55	22.4	168.6	5.6																	196.6
.60	66.3	345.3	265.6	26.6	6.6															710.4
.65	13.8	152.3	96.8	27.7																290.6
93.35	6.2						3.1			3.1										12.4
.40	5.9	11.9					5.9													23.7
.55												5.0								5.0
.70		10.2	30.7	51.2	51.2	10.2														153.5
.75			5.5																	5.5
97.35														2.6						2.6
.40		72.6	27.9				5.6													106.1
.55				15.1	5.0		5.0			5.0			5.0							35.1
100.45	5.9						5.9				5.9									17.7
.50		4.5		4.5	4.5	4.5							8.9	4.5						31.4
103.30	1.8	1.8		1.8																5.4
117.30		46.5	58.2	23.3	17.4	23.3														168.7
120.25	150.5	252.9	4.2		2.1															409.7
.40	19.6	4.0	2.0																	25.6
133.25		6.0			6.0															12.0
137.30					2.4	2.4	7.2	4.8												16.8
Total:	332.9	1082.5	496.5	150.2	95.2	40.4	32.7	4.8		8.1	5.9	5.0	13.9	7.1						2275.2

Table III (Cont'd)
Record of Sardine Larvae, 1955

Midpoint of Size Class (in mm.)

Station	3.00	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	25.25	Dis.	Total
Cruise 5507:																				
80.70							13.2													13.2
83.70		6.0		6.0							6.0									18.0
87.70			5.5																	5.5
90.60				2.8	8.4	8.4	11.2	5.6						2.8						39.2
.65	21.0	6.0	12.0	6.0			3.0			3.0										51.0
93.60			5.6	5.6	5.6		16.7		11.2	22.2			11.1						5.6	83.6
.80			2.7		5.3			2.7												10.7
97.32	2.8	2.8																		5.6
117.26		17.5	21.9		4.4	4.4														48.2
.55										2.5	5.0									7.5
120.25	78.7	531.3	131.3	30.3	16.2	6.0	6.1													799.9
.30						4.7														4.7
.40	18.4	9.2																		27.6
.50						3.0														3.0
123.50				3.0	3.0	3.0														9.0
.55										2.6										2.6
130.40	12.9	4.3	4.3																	21.5
133.25	5.1	5.1																		10.2
.30		8.8																		8.8
.50											2.7									2.7
137.30			5.2																	5.2
Total	138.9	591.0	188.5	53.7	42.9	29.5	50.2	8.3	11.2	30.3	13.7		11.1	2.8					5.6	1177.7
Cruise 5510:																				
113.35			3.7																	3.7
117.35												6.7								6.7
120.30	6.1	28.2	6.0	2.0																42.3
.35							2.1													2.1
.45	2.4	23.5	7.1											2.4						35.4
.80														2.5						2.5
123.60												5.0								5.0
127.40														5.7						5.7
133.25															3.2					3.2
.30												5.2	5.2							10.4
137.30												2.9		5.8	2.9					11.6
Total	8.5	51.7	16.8	2.0			2.1					19.8	5.2	16.4	6.1					128.6

Table III (Cont'd)
Record of Sardine Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	3.00	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	25.25	Dis.	Total
Cruise 5512:																				
113.30										4.9	9.8	9.8		4.9	4.9					34.3
.60											2.6			2.6						5.2
120.30		5.4																		5.4
.35	5.1		5.1			5.1														15.3
.40	14.7	52.1	8.1					1.6	1.6			1.6								79.7
.45	5.8																			5.8
123.37		18.4							10.4	2.6										31.4
.40		3.5					10.4													13.9
127.34			2.6		5.2	10.4	2.6	2.6												23.4
137.23					2.9															2.9
140.30			8.4	5.6	2.8															16.8
Total	25.6	79.4	24.2	5.6	10.9	15.5	13.0	4.2	12.0	7.5	12.4	11.4		7.5	4.9					234.1

RECORD OF ANCHOVY LARVAE, 1955

The distribution and relative abundance of anchovy larvae are shown in figure 4. Six categories of abundance are used. Four categories - zero, light, moderate, and moderately heavy concentrations of larvae - parallel the usage for sardine larvae; the other two categories are heavy concentrations, 601-6000 larvae, and very heavy, over 6000 larvae. The value for each station is the cumulative standard haul total for the year.

Anchovy larvae are recorded by size classes in table IV. The size classes have the same midpoints and ranges as sardine larvae, except that the first category defined for sardine larvae (3.00 mm.) is divided into two size classes, with the following midpoints and ranges: 2.50 mm. (1.76-3.25 mm.) and 3.75 mm. (3.26-4.25 mm.).

Anchovy larvae were taken at 616 stations of the 1375 occupied during 1955. The occurrences and abundance of anchovy larvae are summarized by month and area in text table 4. The comparative abundance of anchovy and other fish larvae is summarized in text table 5. Anchovy larvae were taken in more hauls than any kind except rockfish larvae, and they were more abundant than the combined totals of the other species dealt with in this paper. This is shown in the following summary:

Larvae	Total occurrences	Standard haul totals	Percent of total
Anchovy	616	140,183	39.03
Sardine	254	14,121	3.93
Jack mackerel	369	13,246	3.69
Pacific mackerel	92	1,950	0.54
Hake	430	60,090	16.73
Rockfish	652	29,341	8.17
All other	-	100,224	27.91
Total	(1375)	359,155	100.00

Anchovy larvae constituted 39.03% of the larvae obtained during 1955, the other species dealt with in this paper made up 33.06%, while all other larvae (flatfish, myctophids, bathylagids, etc.) made up 27.91%.

Several interesting features of the regional and seasonal abundance of anchovy larvae are brought out in text table 4. Only negligible numbers of anchovy larvae were taken off central California (lines 60-77) during the four occupancies of this area in 1955; the area off southern Baja California (station lines 140-157) was similarly unproductive of anchovy larvae. Anchovy larvae were taken on all cruises in the four subareas located between Point Conception, California, and Point San Juanico, Baja California (station lines 80-137). Over two-thirds of the larvae were taken during the first three months of 1955. The winter peak in abundance was particularly marked in the northern Baja California and upper central Baja California subareas. In the other two subareas, abundance during June and July was as great as during January and February.

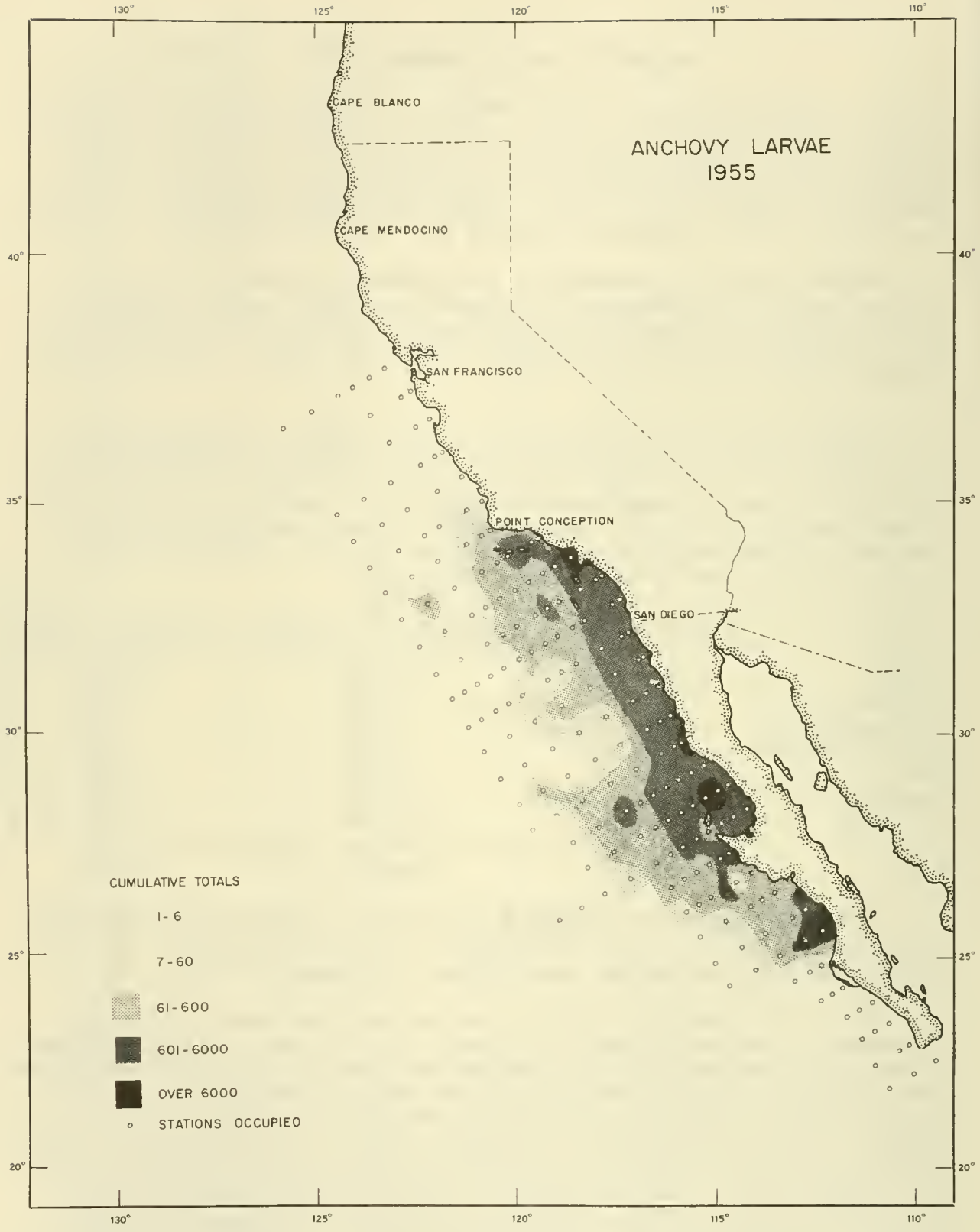

Figure 4.--Anchovy larvae, 1955: distribution and relative abundance

Text table 4.--Occurrence and abundance (standard haul totals) of anchovy larvae (Engraulis mordax), by month and area, in hauls made during 1955

Cruise	Central California 60-77		Southern California 80-93		Northern Baja California 97-107		Upper central Baja California 110-120		Lower central Baja California 123-137		Southern Baja California 140-157		Total	
	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number
5501	-	-	19	5,162	16	12,868	20	19,687	15	2,384	3	42	73	40,143
5502	-	-	22	3,822	13	5,060	24	20,303	14	1,766	0	0	73	30,951
5503	-	-	15	4,262	17	8,350	31	11,720	13	744	2	4	78	25,080
5504	-	-	19	1,750	19	2,024	37	12,498	13	218	-	-	88	16,490
5505	0	0	15	1,713	13	700	14	1,186	10	600	-	-	52	4,199
5506	2	10	26	6,743	16	576	12	1,262	10	4,064	-	-	66	12,655
5507	2	12	28	4,461	13	352	13	928	8	1,304	-	-	64	7,057
5508	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5509	-	-	22	720	-	-	-	-	-	-	-	-	22	720
5510	3	16	10	148	8	137	12	314	5	32	-	-	38	647
5511	-	-	26	1,155	-	-	-	-	-	-	-	-	26	1,155
5512	-	-	14	211	3	25	12	670	5	157	2	23	36	1,086
Total	7	38	216	30,147	118	30,092	175	68,568	93	11,269	7	69	616	140,183
Percent		0.03		21.51		21.47		48.90		8.04		0.05		100.00

Text table 5.--Abundance (standard haul totals) of fish larvae in 1955, summarized by month

	Sardine	Anchovy	Jack mackerel	Pacific mackerel	Hake	Rockfish	All other fish larvae	Total
January	2,329	40,143	0	136	13,356	6,281	10,286	72,531
February	3,132	30,951	619	14	28,973	6,206	10,099	79,994
March	1,576	25,080	1,075	215	12,535	3,653	13,792	57,926
April	2,685	16,490	3,395	608	4,757	3,533	12,125	43,593
May	582	4,199	1,063	86	176	1,895	13,464	21,465
June	2,275	12,655	5,386	667	19	1,732	14,028	36,762
July	1,178	7,057	1,706	221	3	2,676	16,531	29,372
August	-	-	-	-	-	-	-	-
September*	0	720	0	0	3	313	669	1,705
October	129	647	2	0	28	461	5,729	6,996
November*	0	1,155	0	0	5	1,897	553	3,610
December	235	1,086	0	3	235	694	2,948	5,201
Total	14,121	140,183	13,246	1,950	60,090	29,341	100,224	359,155
Percent	3.93	39.03	3.69	0.54	16.73	8.17	27.91	100.00

* - Totals for September and November are based on 43 stations occupied on lines 83-90. Only a part of these stations is included in tables VII (hake) and VIII (rockfish).

Table IV
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5501:																				
80.51	19.3	49.7	24.8	19.3	35.9	27.6	8.3	5.5												190.4
.55	6.2		9.3				6.2	3.1												24.8
.60				3.2	3.2	6.4														12.8
83.40	22.0	11.9	6.8	8.5																49.2
.43	6.6	6.6	6.6	16.5	9.9	29.6	13.2	13.2												102.2
87.35	1179.7	1125.5	153.6	54.3	22.6	31.6	13.6	4.5	4.5											2589.9
.40		2.6					2.6	2.6												7.8
.50		8.7	17.4	104.1	26.0	8.7	2.9	2.9												170.7
.60			11.5	3.8	7.7															23.0
90.28	10.9	38.4	16.4	10.9	5.5															82.1
.30	52.0	88.1	61.0	9.0	6.8	4.6	2.3		2.3										4.5	230.6
.37		53.0	99.8	74.9	25.0	18.7	3.1	3.1	3.1											280.7
.45	3.7	37.4	29.9	3.7																74.7
.50	7.8	80.9	70.5	26.1	2.6		5.2	5.2												198.3
.60											2.7									2.7
93.27	13.8	69.4	107.6	170.0	149.3	69.4	59.0	38.2	13.9	3.5										694.1
.30	6.9	24.1	44.8	10.3	10.3	3.4														99.8
.40	17.7	8.9	3.0			6.0														35.6
.50	104.3	178.8	9.0																	292.1
97.30	145.1	52.1	9.3	27.9	67.0	65.1	20.4													386.9
.32	85.5	93.3	7.8	28.5	13.0	5.2	5.2													238.5
.40	96.1	137.2	41.2	10.3	6.8															291.6
.50		25.8	25.8		25.8	25.8	25.8													129.0
100.29	369.6	183.3	8.7	2.9	26.2	20.3	2.9	5.8	8.7						2.9					631.3
.30	244.0	223.5	73.5	44.1	17.6	2.9	8.8	5.9		2.9										623.2
.40	6.0	68.1	41.4	8.9		3.0			3.0											130.4
.50		44.3	22.1																	66.4
103.30	13.2	24.3	19.8	31.0	72.9	42.0	13.3	13.2	4.4											234.1
.35	852.6	505.8	196.6	52.0	8.7	2.9														1618.6
.40	2100.9	2273.0	86.1																	4460.0
107.32	217.1	1274.3	156.8	241.2	44.2	32.2		4.0												1969.8
.35	936.4	343.5	87.5	55.1	9.7	3.2	3.2	3.2												1441.8
.40	42.9	198.9	330.4	61.2				3.1												636.5
.50			3.6	3.6																7.2
.60	2.9																			2.9
110.33	53.4	32.1		21.4	32.1	32.1	74.8	85.5	10.7	10.7		10.7								363.5
.35	40.9	193.5	187.0	58.1	19.4	10.7	2.2													511.8
.50										2.8	2.8									5.6

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5501 (cont'd):																				
113.30	291.5	113.0	49.7	54.3	33.9	4.6	4.6	4.6												556.2
.35	649.6	464.0	92.8	116.0	46.4	23.2	46.4													1438.4
.40	13.6	49.1	32.7	13.7	13.7		5.5	2.7												131.0
.50	22.0	151.2	27.5	5.5	5.5														2.8	214.5
.60										3.0										3.0
117.26	6.4	16.2	64.8	132.8	90.8	55.0	42.1	25.9		3.2										437.2
.30	388.6	420.5	417.6	1046.9	725.0	385.7	200.1	58.0	58.0			2.9								3703.3
.35	31.7	646.7	1014.4	377.3	336.1	399.5	409.0	538.9	323.4	247.3	152.2	53.9	53.9	41.2	50.7					4676.2
.40		310.0	441.0	476.8	348.7	140.1	80.5	38.7	38.7	38.7	8.9	6.0	3.0							1931.1
.50		3.2		22.4	44.8	70.4	67.2	19.2	9.6	3.2	3.2			3.2						246.4
120.25	106.4	393.7	351.1	436.3	396.4	305.9	282.0	212.8	34.6		8.0									2527.2
.30	231.7	532.1	331.8	363.0	194.0	131.4	43.9	6.3												1834.2
.35	14.6	11.7	5.8	5.8	17.6	8.7	8.7		2.9											75.8
.40	44.1	30.1	83.5	67.3	41.8	30.1	25.5	13.9	6.9											343.2
.45		12.3	33.9	43.2	46.2	92.4	101.6	160.2	58.6	33.9	21.5	9.3	6.2							619.3
.50			6.6	3.3	16.5	13.2	9.9	3.3	9.9	3.3										66.0
.60							3.1													3.1
123.37	17.0	22.6	31.1	132.6	403.2	329.9	104.3	56.4	39.5	14.1	11.2	11.2	11.3	8.5						1192.9
.40	50.1	28.1	31.3	128.4	200.4	103.3	84.5	56.4	6.3	3.1	6.2	3.1								701.2
.45				3.2	6.4	6.4	3.2													19.2
.50			12.4	30.9	24.8	3.1														71.2
.55				17.0	3.4															20.4
127.34		2.6	34.0	33.9	36.5	44.4	33.9	13.0	10.4	10.4	2.6	7.8	2.6	2.6	2.6					237.3
.40	3.0																			3.0
.45					3.2															3.2
.55				6.4	6.3															12.7
130.30	2.5			2.5		2.5	2.5								2.5					12.5
.35									2.8	2.8										5.6
133.25				2.5		4.9	2.5		5.0			2.5								17.4
.30										2.6		2.6								5.2
137.23	2.7	5.4	16.3	16.4	2.7				2.7											46.2
.30		15.2	15.2	3.0	3.0															36.4
140.30	17.0	6.8	3.4			3.4	3.4													34.0
143.26			2.3			2.3														4.6
153.16			3.2																	3.2
Total:	8550.0	10691.5	5072.0	4702.2	3695.5	2611.8	1837.4	1409.3	659.9	385.5	219.3	110.0	77.0	55.5	58.7				7.3	40142.9

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5502:																				
80.55				12.9	6.5		25.8		45.2	19.4		6.5								116.3
.60																		9.0		9.0
83.40	34.6	92.4	39.3	39.3	43.9	34.7	23.1	20.8	4.6	6.9		2.3				2.3			4.6	348.8
.43		13.0	22.8		6.6	26.1	19.6	9.8	6.5	3.3										107.7
.51	8.3	5.6	13.8	8.3		8.3		16.6	5.6	2.8	2.8									72.1
.60								3.2			6.4	3.2		3.2		3.2				19.2
87.35	18.2	36.5	72.9	103.4	139.8	130.8	73.0	79.1	39.5	3.0	3.0	3.0	3.0				3.0		6.1	714.3
.40	11.7	8.8	2.9	2.9	2.9	11.7	5.8	2.9												49.6
.50					8.5	2.8	5.6			2.8	2.8		2.8		2.8					28.1
.60									6.1											6.1
90.28	7.6	17.6	105.9	274.7	186.5	53.0	20.2	17.7	17.6	7.5										708.3
.30		34.2	37.4	34.2	56.0	18.6	6.2	12.4	24.8	15.5	3.1								6.2	248.6
.37			5.9	47.5	26.8	20.8	41.6	29.7	20.7	8.9	11.9								8.9	222.7
.45	3.1	6.2	3.1		6.2	3.1		6.2		6.2			3.1							37.2
.70						3.2						3.2								6.4
93.27		14.0	15.8	12.3	1.8	10.6	3.5	1.8												59.8
.30		2.7	8.0		2.7			5.3												18.7
.50							6.1													6.1
97.30	38.0	174.6	75.9	35.4	22.8	40.5	27.9	12.7	10.2	2.5									5.1	445.6
.32	15.4	119.8	68.8	86.8	79.1	56.0	63.7	40.8	20.4		2.6									553.4
.40			6.3	12.5					18.8											37.6
.50		3.1			3.1															6.2
100.29	275.2	447.5	50.0	25.0	30.6	25.1	19.4	13.9	11.1		2.8									900.6
.30	239.9	58.6	19.6	16.8	19.5	19.6	8.4		8.4											390.8
.40	106.9	109.9	26.0	69.4	20.3															332.5
.50						3.0	3.0		3.0	3.0										12.0
.60		33.1	51.2	18.0	9.0	6.0			3.0											120.3
.70					6.8															6.8
103.30	63.0	76.9	69.9	51.2	48.9	20.9	11.7													342.5
.35	312.9	254.2		13.0	13.0	13.0		13.0												619.1
.40	376.1											3.4								379.5
.60		2.9	5.8	2.9	17.5		2.9	2.9					2.9							37.8
107.32	282.2	430.7	50.5	104.0	38.6	62.3	26.7	32.6	8.9											1036.5
.35	362.0	144.8	52.6	98.7	52.6	65.8	65.8	19.7												862.0
.40	3.3	10.0	3.3		3.3															19.9
110.33	82.6	601.8	1038.4	1262.6	1180.0	778.8	460.2	106.2	129.8	11.8		11.8								5664.0
.35	218.3	532.9	391.6	584.2	295.3	224.7	218.3	128.4	64.2	44.9	32.1	6.4	6.4		6.4					2754.1
.40	867.8	477.8	282.8	253.5	120.3	13.0	13.0		3.2											2031.4

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis. Total
Cruise 5502 (cont'd):																			
110.50						3.3													3.3
.60		3.0	3.0		12.2	15.3	3.0	12.2		3.0									51.7
113.30		31.2	67.6	41.6	72.8	93.6	67.6	119.6	41.6	52.0	5.2	5.2			5.2				603.2
.35	268.6	1235.6	316.0	145.3	101.1	79.0	37.9	25.2	12.6	3.2	3.2								2227.7
.40	175.2	98.0	5.9	11.9	11.9	23.7													326.6
.45	208.1	1704.4	140.7	94.9	168.3	153.0	52.0	15.3	3.1	6.1									2545.9
.50	11.1	262.7	192.4	3.7	14.8	25.9	48.1	11.1	7.4	7.4									584.6
.55		3.4	3.4	3.4	6.7														16.9
.70											6.2	3.1							9.3
117.26			2.9			11.5	5.8	17.3	8.6	5.8	2.9	5.8	2.9						63.5
.30	3.4	16.9	30.3	43.8	43.8	43.8	40.4	23.6	3.4	3.4									252.8
.35		77.0	338.4	308.2	251.2	157.4	83.7	20.1	20.1	6.7	3.4				3.4			3.4	1273.0
.40					4.0	8.0	40.0	40.0	20.0	12.0		12.0	12.0		16.0	4.0	8.0		176.0
.45			3.5		6.9	10.4	55.4	110.7	141.9	51.9	34.6	38.0	45.0	24.2	55.4	10.4	3.5		591.8
.50	9.4	94.2	69.1	37.6	37.7	31.4	37.7	40.8	28.2	12.6	18.9	3.1	3.1		3.1	3.1			430.0
.55						10.2	13.6	6.8	13.6			3.4							47.6
120.25		17.5		2.9			5.8	2.9	2.9										32.0
.30			3.4	6.8	13.6	17.0	92.1	17.0	30.7	6.8	6.8	3.4							197.6
.35				12.2	18.3	36.6	97.6	67.1	97.6	36.6	12.2	6.1							384.3
.40		5.3	5.3		10.6		5.3												26.5
.70					3.1		3.1	3.1											9.3
123.37					6.7	15.0	6.7		3.3	1.7									33.4
.40		2.3	11.3	27.1	43.0	11.3	4.5	6.8	13.5	4.5	4.5		2.3						131.1
.50						3.4		6.8	37.5	13.6	6.8	10.2		3.4	3.4				85.1
.55					4.0	15.8	13.8	13.9	4.0										51.5
127.34				1.8	1.8	3.7			1.8		1.8								10.9
.40		4.4	4.4	4.4		8.9	6.7	6.7	4.4	2.2	2.2								44.3
.45	5.1	127.0	320.1	76.2	15.3	30.5	55.9	81.3	15.2	20.4	15.2	20.3	5.1						787.6
.50		77.0	108.4	17.1	14.3	22.8	37.1	31.3	8.5	17.1	14.2	8.6	5.6		5.7				367.7
.55			2.2	15.4	48.4	30.8	17.6	13.2	2.2	4.4									134.2
130.30								7.8		5.8								2.0	15.6
.35							11.9		8.9		8.9	3.0	3.0		3.0	3.0			41.7
.40								6.3	3.1	3.1	3.1	3.1	6.2						24.9
.50									2.7	2.7		5.4	5.4						16.2
137.23								2.7							10.8	2.7	5.4		21.6
Total:	4008.0	7469.5	4148.8	4023.8	3359.4	2514.7	1994.8	1285.3	988.4	421.5	217.6	170.5	108.8	30.8	115.2	28.7	19.9	9.0	36.3 30951.0

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5503:																				
80.51					1.6			3.1	3.1		1.6	1.6	1.6							12.6
83.40	16.2	38.7	55.0	18.7	12.4	2.4	5.0	2.4												150.8
.43		13.6	6.8	6.8	3.4	3.4			13.6											47.6
.51			3.0			9.1	12.1	15.1	6.0	3.0										48.3
.60					2.7		2.7													5.4
87.35	104.2	286.8	210.9	135.1	73.5	19.0	11.8	11.8		2.4	2.4									857.9
.40						5.8	2.9	2.9				5.8								17.4
90.28	130.6	483.9	206.1	180.3	110.4	27.6	18.4	22.1	7.4	11.0	7.3		1.8							1206.9
.30		2.7	10.9	5.5		2.7			5.5						2.7					30.0
.37	2.5			2.5																5.0
.50	8.6		5.7	14.3	2.9	5.7														37.2
.60									5.8				5.8							11.6
93.27	194.3	119.0	63.0	64.7	49.0	42.0	26.2	54.3	31.5	5.3	1.8									651.1
.30	2.9	25.9	72.0	92.1	57.6	31.6	8.7	31.7	37.4	28.8	5.8	2.9								397.4
.40		67.3	290.5	336.3	51.1	10.8	16.2	8.1	2.7											783.0
97.30	115.2	48.0	20.8	43.2	35.2	27.2	14.4	12.8	1.6											318.4
.32	91.8	544.7	713.0	541.6	440.6	220.3	186.7	55.1												2793.8
.40		4.5	8.9	13.5	22.4	17.9	13.4	2.2	4.5											87.3
.70									2.4											2.4
100.29		9.1	76.0	200.7	316.1	462.1	413.4	246.3	121.6	18.2	21.3	3.0	3.0	3.0						1893.8
.30	57.8	74.3	38.5	110.0	107.2	126.6	121.0	44.0	22.0	8.3										709.7
.40	7.8	7.8	13.1	52.4	83.8	62.9	26.2	20.9	7.9											282.8
.50	3.0		9.0	12.0	18.0	24.0	18.0	6.0												90.0
.60						3.4	6.8	6.9		6.8	3.4									27.3
.70																			2.9	2.9
103.30	209.9	152.5			6.6	2.2		2.2	2.2											375.6
.35	161.7	161.7	85.8	115.5	95.7	66.0	39.6													726.0
.50								3.4		3.4	3.4	3.4		3.4						17.0
107.32	121.0	84.0	53.8	37.0	16.8	3.4	3.4													319.4
.35	141.4	410.5	65.6	41.4	17.3			6.9												683.1
.40			2.9	8.7		2.9		2.9												17.4
.50									3.5											3.5
110.33	7.4	54.3	34.6	46.9	56.8	54.4	37.1	37.1	14.8	12.4	2.5									358.3
.35	957.7	335.5	61.0	91.5	109.8	30.5	18.3	6.1												1610.4
.40	58.0	270.5																		328.5
.50					11.2	11.2	16.8	14.0	8.4											61.6
.60						6.8	6.8	10.2												23.8
.70				3.3																3.3
113.30						6.0	3.0		3.0	3.0										15.0
.35	26.6	55.7	108.9	176.7	205.7	140.4	62.9	72.6	55.6	33.9	21.7	17.0	4.8							982.5

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5503 (cont'd):																				
113.40	151.2	126.0	189.0	214.2	226.8	163.8	75.6		37.8											1184.4
.45	67.9	365.0	345.6	171.2	58.2	32.3	16.2	3.2	3.2											1062.8
.50	3.1	122.1	43.8	34.4	15.7	12.5	25.1	15.7	15.6	18.8										306.8
.55				13.1	13.2	9.9	26.3	62.4	32.8	26.2	3.3		3.3							190.5
.60	3.5	58.8	20.8				7.0	3.5	3.5											97.1
117.26		26.2	49.1	42.5	13.1	36.0	45.8	29.5	26.1	9.8	19.6	9.8	3.3							310.8
.30	216.7	358.0	153.8	266.9	204.1	141.3	91.1	28.3	9.4				3.1							1472.7
.35		3.6	21.6	32.5	10.8	14.4			3.6	3.6										90.1
.40	60.5	67.2	30.3	30.3	43.7	104.2	67.2	16.8	10.1	3.4										433.7
.45	48.5	542.7	449.0	394.1	200.3	96.9	45.2	9.7	6.5											1792.9
.50				3.1			3.1		12.4	12.3	6.2									37.1
.55		2.8	33.1	52.4	13.8	16.6	27.6	16.6	5.6		2.8	2.8								174.1
.60			19.2	34.6	11.5	19.2	26.9	15.4	11.5	11.5	3.8									153.6
120.25							19.0		18.9									6.3*		44.2
.30		35.1	9.6	6.4	12.8	35.1	51.0	67.0	98.9	95.7	102.0	44.6	19.2	9.6	6.4					593.4
.35					7.0	7.0		3.5			7.0									24.5
.40		2.7	21.7	18.9	18.9	5.4	2.7		5.4											75.7
.45			3.0			6.1	3.0	6.1												18.2
.50			2.8	25.0	13.9		8.4	2.8	5.6											58.5
.55		9.1	21.2	15.2	33.4	12.2	15.2	24.3	15.1	6.1	3.0	3.0								157.8
.60		2.9	2.9	14.5	17.5	8.7		2.9	2.9											52.3
.70												3.0								3.0
.100											2.8									2.8
123.37								2.0	2.0	2.0			2.0							8.0
.40							3.4		3.4	17.0	34.1	10.2	17.0	3.4		17.0		6.8 10.2**		122.5
.45					2.9	2.9	14.7	20.6	20.6	17.7	8.8	2.9								91.1
.50									3.6	10.6	5.3	1.8	1.8	1.8	1.8					26.7
.55			2.7	13.4	16.1	13.4	2.7	8.1	8.1	8.0	5.4		5.4	2.7	2.7					88.7
.60		2.7	78.0	104.9	48.5	8.1	13.5	2.7												258.4
127.45											2.7									2.7
.55									2.8	2.8	5.6									11.2
.60							5.6	5.6	2.8	5.6	5.6	5.6	2.8							33.6
130.30								17.8	3.0	3.0									3.0	26.8
133.25							14.7	12.8	11.0	5.5	1.8									45.8
.30								2.6	2.6	5.2	5.2									15.6
.40									2.5	7.5	2.5									12.5
147.20						2.5														2.5
150.30											1.9									1.9
Total	2970.0	4975.9	3713.0	3838.3	2890.0	2176.8	1702.8	1081.0	747.8	408.8	300.6	117.4	74.9	23.9	13.6	17.0		23.3	5.9	25081.0

* - 6.3 - 27.25 mm. group
** - 3.4 - 25.5 mm. group; 6.8 - 27.25 mm. group

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.) 2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5504:																				
80.51								3.4												3.4
.55							13.1	6.6												19.7
83.43					2.5		2.5	5.0												10.0
.51					5.8			23.1		11.6	5.8									46.3
.60								24.2	12.1	24.2		24.2	12.1							96.8
87.35	30.8	117.6	137.2	224.0	103.6	72.8	39.2	11.2												736.4
.40				2.4			7.1	7.1	4.8	7.1	2.4				2.4				4.7	38.0
.50					2.4	7.2	4.8	12.0	9.6	7.2	9.6	2.4		2.4	2.4					60.0
.60						2.7			2.7									2.7*		8.1
.70										6.1										6.1
.80					3.1															3.1
90.30	25.7	102.4	161.2	92.2	23.1	12.8	7.7													425.1
.37		2.8		11.2	5.6	8.4	5.6	22.3	22.4	22.4	2.8	2.8								106.3
.45				2.9		2.9										2.9				8.7
.50				3.0																3.0
93.27	2.7	26.8	10.8	5.4	8.1	16.1	10.7	13.4	13.4	2.7										110.1
.30		5.2	5.2	5.2	2.6		15.6	7.8			5.2	2.6								49.4
.40		3.2						6.5		3.2									3.2	16.1
.50			3.1																	3.1
97.30		5.0	2.5																	7.5
.32	71.7	268.3	31.2	40.5	43.6	37.4	56.1	15.6	9.3											573.7
.40		15.1	17.6					2.5							2.5	2.5				40.2
.50								2.7												2.7
.60							3.0				3.0									6.0
.70										6.4										6.4
100.29			3.4	3.4	6.8	3.4		10.2	3.4	3.4	3.4									37.4
.30				7.5	12.5	10.0	2.5		10.0	7.5	5.0	2.5								57.5
.40	14.6	51.2	43.9	21.9	4.9	4.9	4.9	14.6												160.9
.50				3.2	3.2		3.2			3.2										12.8
B103.30	41.6	56.3	22.0	17.1	12.2	27.0	17.2	7.3												200.7
H .30	2.5	2.5		5.0				5.0												15.0
H .35			3.7		3.7		3.7													11.1
H .40			2.9																	2.9
B .55											3.0									3.0
B .60					2.6	10.6	15.8	7.9												36.9
H107.35	51.1	113.0	24.2	8.1																196.4
B .80				4.9	27.1	195.1	227.2	103.7	19.8	5.0	2.5									585.3
H .80							12.3	18.4	18.4	3.1	9.2	6.2								67.6
H110.33	15.7	56.6	44.0	43.9	18.8	34.6	37.7	15.7	6.2											273.2
H .35	8.0	2.0		6.0		4.0	2.0													22.0
B .40									3.7	7.4	7.4									18.5
H .50				3.5			7.1	10.6	17.7											38.9
B .60				10.7	14.3	32.1	25.0	14.3	7.1		7.2			3.6						114.3
H .70				7.9	47.6	29.0	39.6	10.6	5.2	5.3	2.6	7.9								155.7
H .80					2.3				2.3											4.6
H113.35				3.8	3.8	3.8	3.8													15.2

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.) 2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5504 (cont'd):																				
H113.40		5.3	21.2	10.6			10.6		10.6											58.3
H .45	6.1	63.9	12.2			3.0	3.0													88.2
H .55				2.9		2.9	2.9	2.9	5.8				2.9							20.3
H .60	5.4		59.8	146.9	24.5	19.1	29.9	27.2	8.1	8.1	2.7	8.1								339.8
B .60			11.3	56.4	93.1	188.9	183.3	84.6	28.2	22.6	8.4	2.8	2.8		2.8					685.2
H .70			61.9	160.1	102.0	94.7	47.3	18.2	3.6		3.6		3.6							495.0
H117.26						28.4	14.2	7.1	7.1			14.2								71.0
H .35	349.9	372.4	22.5		3.2	16.0	9.6													773.6
H .40	126.7	377.5	174.2	81.9	21.1	60.7	66.0	63.4	21.1	2.6	5.3									1000.5
H .45		12.3	6.2	6.2	12.3	15.4	3.1													55.5
H .50	3.6	32.9	102.2	18.3	3.6	14.6	25.5	36.4	11.0											248.1
H .55			34.4	103.3	63.1	34.4	51.7	28.7	11.5		5.7	5.7					5.7			344.2
H .60			2.9	8.7	55.3	130.9	139.7	52.4	14.5	2.9	5.8									413.1
B .60					11.0	22.0	143.0	132.0	121.0	11.0	11.0	11.0								462.0
H .70		3.5	28.1	80.7	80.8	42.1	73.7	38.6	21.0											368.5
H120.25						4.9	14.7	9.8	24.5	19.6	9.8	4.9	4.9							93.1
H .30									23.8		23.8	23.8		23.8						95.2
H .35									14.6											14.6
B .35		7.5	90.2	263.2	240.6	112.8	60.1	75.2	67.7	30.1	22.5	15.0		7.5						992.4
H .45							9.9		9.9											19.8
B .45												11.7								11.7
H .50						7.6	3.8	22.8	22.8	7.6	3.8								3.8	72.2
B .50	116.3	875.3	415.5	858.7	858.7	520.8	133.0	72.0	116.3	66.4	11.0	5.5								4049.5
H .55							4.6		11.5	13.8	6.9	2.3	2.3	4.6	2.3					48.3
B .55					2.8	5.7	14.2	8.5	5.7											36.9
H .60					2.8	8.6	2.8	2.8	2.8	5.7										25.5
B(1).60				2.8	5.6	8.4	2.8	8.4			2.8									30.8
B(2).60		10.2				10.1		20.2		10.1										50.6
B .65			5.7	62.2	198.1	212.3	169.8	141.5	67.9	25.5	5.6	2.8								891.4
H123.37					2.6		2.6	2.6												7.8
H .40						4.7	14.2	9.5	4.7		4.7			4.7						42.5
H .45						2.7		2.7	8.1	2.7		2.7								18.9
B .50							2.6	5.2												7.8
H .60								2.7												2.7
H127.34				4.4																4.4
H .50								3.5			3.5									7.0
H .55						3.4		3.4	3.4	3.4	13.4	6.8								33.8
H .60									2.7	13.5	2.7	2.7								21.6
H130.30				1.6									1.6							3.2
H .35			4.3		4.3				4.3											12.9
H .40	21.4	2.1	17.2	4.3	6.4	2.1														53.5
B .55															2.4					2.4
Total	893.8	2590.9	1582.7	2406.9	2152.1	2092.0	1806.0	1264.0	822.3	371.4	222.1	168.6	30.2	46.6	14.8	5.4	5.7	2.7	11.7	16489.9

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5505:																				
83.43			4.9	19.5	53.7	97.6	78.1	34.1	9.8	9.8		9.8								317.3
87.35	2.4	4.9	9.8	39.2	24.4	46.6	22.1	19.6	7.3	7.3	4.9					2.4				190.9
.40		3.2		12.8	19.2	38.2	25.6	6.4	3.2	3.2		6.4								118.2
.45				4.7	4.7		4.8	2.4			4.7									21.3
.50					2.6		5.2													7.8
.60															3.1					3.1
90.28		2.7	2.7			5.4	2.7			2.7										16.2
.30		17.4	14.5	2.9	2.9	5.8	8.7		2.9	5.8	2.9									63.8
.37		2.6	13.2	29.1	23.9	15.9	10.6	13.2	2.6	5.2		2.6								118.9
.45				16.7	2.8	2.8	5.6	2.8												30.7
93.27	22.6	29.0	19.4	9.7	6.4	3.2		3.2	3.2	3.2										99.9
.30	18.6	12.4	12.4	12.4	18.6	24.8	6.2	18.6	37.2	18.6	6.2	6.2								192.2
.35		3.0	6.0	3.0			3.0	3.0	3.0											21.0
.40	2.8	8.4	28.1	98.4	134.9	89.9	47.7	36.5	30.9	25.2		2.8	2.8							508.4
.50																	3.1			3.1
97.30		2.6			10.2	30.6	61.2	74.0	58.6	25.5	17.9	25.5	10.2		5.2					321.5
.32					3.2	9.5	12.6	12.6	15.8	15.8	6.4		9.5							85.4
.35				2.8		5.6	2.8	8.4		2.8	2.8									25.2
.40	47.7	14.9			6.0	6.0	9.0		3.0	3.0										89.6
.45							6.6		6.6											13.2
100.30											3.2									3.2
.50								3.8												3.8
.55										2.6										2.6
103.30										15.3		3.0								18.3
.50														3.2						3.2
.55									3.2											3.2
107.32									6.6											6.6
.35								6.2	31.1	43.5	37.3	6.2								124.3
110.33								5.6	11.2	22.3	5.6	5.6								50.3
.35										18.4			3.1		3.1	3.1				27.7
113.30								9.6	23.9	33.5	28.6	4.8	23.9	4.8	14.4	4.8				148.3
117.26	12.4		49.8	12.4	49.8	37.3														161.7
.30					12.6	12.6														25.2
.40										3.3										3.3
120.25				22.2	22.2															44.4
.27		145.6	52.9	92.7				13.2												304.4
.30	9.1	145.9	91.2	45.6	18.2		9.1	9.1												328.2
.35				11.8	11.8															23.6
.40									9.2	9.2										18.4
.55								22.6												22.6
.70												6.4	12.9			6.4				25.7
.80																2.7				2.7

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5505 (cont'd):																				
123.40							14.7	4.9	9.8	14.7	4.9	4.9	4.9	4.9						63.7
127.40			2.4																	2.4
.50										6.2										6.2
130.30											10.6	10.6	10.6		21.2	10.6				63.6
.35								4.9					4.9			4.9				14.7
133.25			5.9																	5.9
.30				2.9			5.8	8.7												17.4
137.23	40.8	51.0	10.2																	102.0
.30	169.6	119.6	25.0	2.8															5.6	322.6
.40							3.0													3.0
Total	326.0	563.2	348.4	441.6	428.1	431.8	345.1	323.4	279.1	297.1	136.0	94.8	82.8	12.9	47.0	34.9	3.1		5.6	4200.9
Cruise 5506:																				
77.55					3.2			3.2												6.4
.90																3.6				3.6
80.51	6.9	7.0		13.8	7.0	6.9	10.4	3.5												55.5
83.40					1.5															1.5
.43	21.5	104.3	172.0	214.9	107.4	98.2	46.0	46.0	15.3		3.1									828.7
.51	7.3	34.0	87.5	87.5	80.2	53.4	70.5	34.1	21.9	7.3									9.7	493.4
.55		6.1	15.3	24.4	3.0	6.1	9.2	15.3	15.3			3.0								97.7
.80																			13.2	13.2
87.35	375.0	709.1	539.1	322.3	169.9	175.8	93.8	29.3	17.6											2431.9
.40	592.6	301.3	54.8	42.3	10.0	19.9	5.0	2.5	2.5											1030.9
.45	10.4	20.7						10.4												41.5
.50	12.0	30.1	6.0		6.0	12.0	6.0	6.0	6.0											84.1
.55		6.2	12.4	6.2	12.4	18.5	24.7	49.4		18.6										148.4
.60			14.4	43.3	14.4	14.4													14.4	100.9
90.28					5.0	5.0	20.1	5.0	10.0	5.0	10.0									60.1
.30	9.0	29.8	9.0	12.0	41.7	47.7	32.8	26.8	20.9	9.0									3.0	241.7
.37	8.0	2.7	2.7	8.0	13.3	13.3		8.0	5.3											61.3
.45					33.0				33.0											66.0
.50	2.9	32.0	81.5	90.2	58.2	23.3	14.5	5.8	11.6	14.5	5.8								5.8	346.1
.55						11.2			11.2											22.4
.60									6.6						6.6					13.2
.65															13.8					13.8
93.27	13.5	9.1					2.3													24.9
.30	2.2			2.2																4.4
.35									3.1											3.1

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5506 (cont'd):																				
93.40				23.7	11.8	29.7	17.7	5.9			5.9	5.9				5.9				106.5
.45	98.2	109.8	17.4	11.6	28.9	69.4	46.2	23.1												404.6
.50	22.4	5.6					5.6	5.6			2.8		2.8		2.8					47.6
97.30	43.0	22.7	25.3	7.6	20.2	12.7	2.5	2.5												136.5
.32	8.2	8.2	2.7																	19.1
.40															5.6					5.6
.45																			3.1	3.1
.50		4.1					4.1	16.4	12.3	4.1			4.1		4.1			4.1		53.3
.55	30.2	5.0																		35.2
100.30	19.6	33.7	50.6	33.8	8.4	5.6	2.8													154.5
.35		3.0			8.9	3.0														14.9
.45						5.9										11.8				17.7
.55												2.4								2.4
103.30	20.2	29.5	1.8	1.8																53.3
.35				2.3																2.3
.40			5.8	8.7																14.5
107.40					3.7		1.9	1.9												7.5
.45									5.6	5.6										11.2
.50				3.2	3.2	12.8	16.0	3.2	6.4											44.8
110.35																		2.1		2.1
.45						2.2			4.3											6.5
113.30													6.2		6.2					12.4
.75				2.9																2.9
117.26	1.6	1.6		4.8	9.6	56.0	49.6	49.6	33.6	6.4	4.8	4.8	3.2							225.6
.30	11.6	29.1	81.5	110.6	81.5	58.2	29.1		5.8	5.8	5.8								5.8	424.8
120.25	2.1	20.9	33.4	33.4	39.7	25.0	18.8	29.2	8.4	2.1										213.0
.27		4.4	4.4	4.4	8.9	4.4	8.8	40.0	8.9			4.4								88.6
.30	4.2	8.5			4.2	12.7	21.2	12.7	8.4		8.4					4.2				84.5
.35				3.4	10.2	20.4	15.3	18.7	3.4	3.4	3.4	1.7		1.7						81.6
.40			2.0	3.9	7.8	13.6	13.6	21.5	2.0	2.0										66.4
.45	4.9	4.9		4.9	4.9	4.9	19.7			9.9										54.1
127.50								10.8		10.8										21.6
130.40							3.3													3.3
133.25		6.0	24.2	114.8	157.1	138.9	42.3	24.2	6.0	6.0										519.5
.30		15.9				15.9	42.2	31.7												105.7
.40		6.6		3.3	16.5	16.5	9.9	26.5	13.2	16.5	3.3	3.3							3.3	118.9
.50								3.1	3.1											6.2
137.23			36.5	218.9	291.8	255.3	291.9	218.9	109.4	73.0	36.5								36.5	1568.7
.30	2.4	9.7	118.6	370.3	554.2	254.1	94.4	53.3	29.0	4.8	7.2	2.4							7.3	1507.7
.40			37.1	68.4	17.1	31.3	34.2	17.2	5.7											211.0
.50								1.8												1.8
Total	1329.9	1621.6	1436.0	1903.8	1854.8	1554.2	1126.4	863.1	445.8	204.8	97.0	27.9	16.3	1.7	39.1	25.5		6.2	102.1	12656.2

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5507:																				
77.50																		5.2		5.2
.55											7.2									7.2
80.51							2.4	2.4												4.8
.55				3.2	6.3		3.2													12.7
.90												2.8								2.8
83.40		1.5					3.1													4.6
.43		16.1	26.9	16.2	26.9	10.8	10.8	21.5	5.4	5.4										140.0
.51			2.7		2.7			2.7	2.7	2.7										13.5
.55							5.8					5.8								11.6
87.35	958.3	380.2	103.0	105.6	89.7	42.3	31.7	36.9	18.5	2.6			2.6							1771.4
.40	4.6		4.6	2.3	11.4	16.0	9.2	6.8	4.6											59.5
.50						2.6				2.6										5.2
.55						5.4	16.2		16.2		5.4									43.2
.65							11.0													11.0
90.28	49.7	2.8	11.1	35.9	30.3	27.6	22.1	11.0	5.6	2.8										198.9
.30	26.6	83.6	96.9	96.9	64.6	28.5	17.1	5.7	1.9	3.8										425.6
.37	16.0	12.8	32.1	41.7	28.8	9.6	22.4													163.4
.45		3.2											3.2							6.4
.50					4.2	8.5		4.2	8.5											25.4
.55						10.8	10.8	16.1	10.7		10.7	5.4	5.4	26.8	5.4					102.1
.60						2.8	8.4		11.2	36.3	61.4	28.0	2.8	8.4						159.3
.65					3.0	9.0	15.0	24.0	21.0	21.0	15.0	9.0	3.0	6.0	3.0					129.0
93.27			37.8	18.9	37.8	37.8	18.9		18.9											170.1
.30	245.3	151.9	64.2	76.0	23.3	11.7	5.8	11.7			5.8									595.7
.35				6.0	14.0	20.0	4.0	4.0	2.0	4.0		6.0	4.0							64.0
.40								3.1		3.1										6.2
.50						5.7	5.7		22.7	5.7										39.8
.55							10.2	5.1	20.4	35.7	40.8	10.2	15.3	15.3	35.7	5.1				193.8
.60								22.3		5.6	16.7	16.7	11.2	11.1	11.2					94.8
.85									3.3				3.3							6.6
97.30	5.2	5.1	10.4	18.9	8.6	10.3	1.7		1.7	1.7										63.6
.32	2.8	8.3	24.9	27.7	24.9	2.8		2.8												94.2
.40						5.3					5.3	15.9	21.2	26.5	21.2					95.4

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5507 (cont'd):																				
97.45								3.0		3.0										6.0
.50									3.3											3.3
.70							3.4					3.4	10.3		3.4					20.5
.75							5.5													5.5
.80																	6.1			6.1
100.35								2.8												2.8
.40									2.3	2.3	2.3		2.3	2.3	2.3	4.7				18.5
103.40				2.7	5.4		2.7								2.7					13.5
.45					6.6	6.6			6.6											19.8
.50												3.2								3.2
110.33			2.9												2.9					5.8
.50																3.7				3.7
113.30	5.3	10.6	5.3	5.3			10.6	26.7	21.3		5.3									90.4
.35			3.2				6.4													9.6
117.26		8.8	13.2		21.9	21.9	17.6	13.2	8.8		4.4									109.8
.30				3.3	46.2	19.8	6.6	3.3												79.2
120.25					4.0	4.0	16.2	14.2	12.2	2.0	2.0									54.6
.30		14.2	14.2	28.4	90.0	104.3	94.8	14.2	4.7	4.7			4.7							374.2
.35		5.8	34.5	57.6	40.3	28.8	5.8	5.8												178.6
.40					2.3															2.3
.45									6.0											6.0
.50								3.0												3.0
.70				5.3	5.3															10.6
123.55									2.6	2.6										5.2
130.30			2.6																	2.6
.35		3.8	3.8																	7.6
.40	38.6																			38.6
133.25				5.1	20.4	5.1														30.6
.30	8.9		8.9	6.0		3.0														26.8
137.23				9.1			27.4		9.1			9.1			9.1					63.8
.30		2.6	2.6	129.8	318.0	405.5	164.4	61.0	16.0	15.9	10.6	2.6								1129.0
Total	1361.3	711.3	505.8	701.9	936.9	866.5	596.9	327.5	268.2	163.5	192.9	118.1	89.3	96.4	96.9	13.5	6.1	5.2		7058.2

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5509: 1/																				
83.42	9.6		9.7	9.7	9.6	4.8	4.8		2.4											50.6
.44		7.8	2.6			7.8	2.6	2.6												23.4
.46					5.4	2.7	2.7													10.8
.48								1.5												1.5
.51	8.1					2.7														10.8
.55	3.0		6.0																	9.0
85.39				3.4																3.4
.40			3.1																	3.1
87.35 5		17.9	23.0	2.6	12.8	5.2	12.8	10.2	2.6	5.1										92.2
.37 5		2.9	2.9	2.9																8.7
.40 5					2.3	11.7	9.3	4.7												28.0
.42 5						2.7														2.7
.45 5						5.4														5.4
.52 5					2.5		2.5													5.0
90.28	3.6	17.8	10.7	7.1	7.2	7.2	14.3	3.6	3.6		3.6									78.7
.30		7.6	12.6	7.6	2.5	12.6	12.7	10.2		2.5										68.3
.35 5	10.2	6.8	6.8				3.4													27.2
.37 5		6.2	39.8	45.9	33.6	12.2	6.1		3.1											146.9
.40 5			2.7	8.0	8.0	8.0	2.7	2.7	2.7											34.8
.42 5					2.8	2.8	5.6	16.8	2.8	5.6	2.8		2.8							42.0
.45 5							23.2	5.8		5.8	11.6									46.4
.47 5							5.9	3.0	8.9			3.0								20.8
Total	34.5	67.0	119.9	87.2	86.7	85.8	108.6	61.1	26.1	19.0	18.0	3.0	2.8							719.7

1/ First occupancy of "Black Douglas" used.

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5510:																				
60.80	5.8																			5.8
63.52						2.2			2.2											4.4
77.55						5.9														5.9
83.43					2.8															2.8
.51							2.8	11.2	2.8	2.8										19.6
87.40					2.8		2.8													5.6
.50				4.2			6.3													10.5
.60					2.5															2.5
90.28				7.9		13.2	7.9	5.3	2.6											36.9
.30			2.5	12.4	12.4	14.8	10.0	5.0			2.5									59.6
.37					2.5															2.5
93.27		2.5				2.5														5.0
.30						2.9														2.9
97.30									2.5	2.5										5.0
.50	2.7																			2.7
100.29		4.6				4.6		4.6						4.6						18.4
.30				3.2		3.2		3.2												9.6
103.30								4.0		4.0	4.0	12.1	16.2	4.0	4.0	4.0				52.3
.35								8.5	5.6	8.5		11.4								34.0
.40								6.6	3.3	3.3										13.2
107.35						1.9														1.9
110.60									3.0											3.0
113.30		19.3	38.7	38.6	9.7															106.3
.35							3.7	3.7		3.7				11.1	11.1	3.7	3.7	3.7*		44.4
117.30		4.8		4.8	4.8			4.8												19.2
.35			13.4	13.5	26.9	13.4	13.4									6.7				87.3
.40					3.3	6.6														9.9
120.27					2.4			2.4												4.8
.30				4.0	4.0															8.0
.35			2.1	4.2	2.1															8.4
.45			2.4	9.4		2.4		2.4												16.6
.50									3.5											3.5
.80													2.5							2.5
123.40										4.4					4.4					8.8
.50				5.9		3.0														8.9
127.34					2.2	4.4				2.2										8.8
.50						2.8														2.8
137.30											2.9									2.9
Total	8.5	31.2	59.1	108.1	78.4	83.8	46.9	61.7	25.5	31.4	9.4	23.5	18.7	19.7	19.5	14.4	3.7	3.7		647.2

* - 3.7 - 25.5 mm. group.

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5511:[1]																				
83.40		1.7																		1.7
.42	13.7	9.1	4.5	3.0						3.0										33.3
.44		1.8			1.8															3.6
.51						2.8	2.8											2.8*		8.4
.52			9.2			4.6											4.6			18.4
.55										4.9										4.9
85.39		2.7	2.7	8.1																13.5
.40				2.6																2.6
.42				2.4																2.4
.45				2.6		2.6														5.2
87.35		2.5	17.5	17.4	5.0	7.5														49.9
.37		2.4	4.8																	7.2
.42				5.1																5.1
.45			12.0	9.6	7.2		2.4													31.2
.50			2.2	10.9																13.1
.52			2.1	2.1																4.2
.55				2.6																2.6
90.28	73.1	273.5	50.8	35.0	35.0	12.7					3.2									483.3
.30					2.6															2.6
.35										2.7										2.7
.37			12.4	12.4	20.7	22.8	10.3	2.1	2.1		4.2									87.0
.40		8.8	17.7	26.6	17.8	48.8	17.8	4.4												141.9
.42				42.4	50.9	16.9			4.2	8.4										122.8
.45			2.2	30.1	21.5	19.4	2.2	8.6	6.5	6.5										97.0
.47				2.7	2.7				2.7											8.1
.50									2.6											2.6
Total	86.8	302.5	138.1	215.6	165.2	138.1	35.5	15.1	18.1	25.5	7.4						4.6	2.8		1155.3

1/ First occupancy of "Paolina T" used.

* - 2.8 - 25.5 mm. group.

Table IV (Cont'd)
Record of Anchovy Larvae, 1955

Station	Midpoint of Size Class (in mm.)																		
	2.50	3.75	4.75	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.75	17.25	19.25	21.25	23.25	Dis.	Total
Cruise 5512:																				
80.55							2.9		2.9											5.8
83.40				1.1	3.4	3.3	2.2		1.1											11.1
.43					5.4					2.7										8.1
.51		6.8								3.4										10.2
.60											2.9									2.9
87.35					2.4	4.8	4.7	7.1	14.2	2.4	4.7									40.3
.40	4.5			2.2	4.5	4.4	2.2	9.0	4.5		2.2		2.2							35.7
.50	3.1	3.1							3.1											9.3
90.28					2.4		4.9	4.8												12.1
.30				2.4		4.8	7.2					2.4								16.8
.37			7.8						2.6		2.6									13.0
.45		3.0		3.0	3.0	3.0		6.0												18.0
93.27						5.2														5.2
.40	4.5					4.5				4.5	4.5			4.5						22.5
97.32						3.1														3.1
100.29						5.6		11.2												16.8
.30				5.4																5.4
110.33		4.6				4.6			9.2	9.3	18.6									46.3
.40					3.7															3.7
113.30				9.8	9.8	19.6	44.1	83.3	49.0	19.6			19.6	9.8	4.9	4.9				274.4
.35	19.1	29.7	14.9	4.2			4.2		2.1	6.4	2.1	2.1			2.1					86.9
.60						2.6				2.6										5.2
117.30		2.9	8.8	29.4	5.8			5.8												52.7
.35	6.4	9.6	3.2	3.2																22.4
.40		3.0		3.0	15.0	6.0		6.0	3.0											36.0
.50	7.9		2.6	7.9	2.6	2.6														23.6
120.25		2.4					2.4		2.4	2.4										9.6
.30		5.4		5.4	16.2	5.4	5.4													37.8
.35			5.1	5.1		5.1	10.2	25.3	10.2	10.1										71.1
130.30	74.5	5.3																		79.8
.35		8.8	17.6	20.5	8.8															55.7
.40						2.8														2.8
133.25	15.6																			15.6
137.23				2.9																2.9
140.30	2.8			5.6	8.4	2.8														19.6
143.35			3.2																	3.2
Total	138.4	84.6	63.2	111.1	91.4	90.2	90.4	158.5	104.3	63.4	37.6	4.5	21.8	14.3	7.0	4.9				1085.6

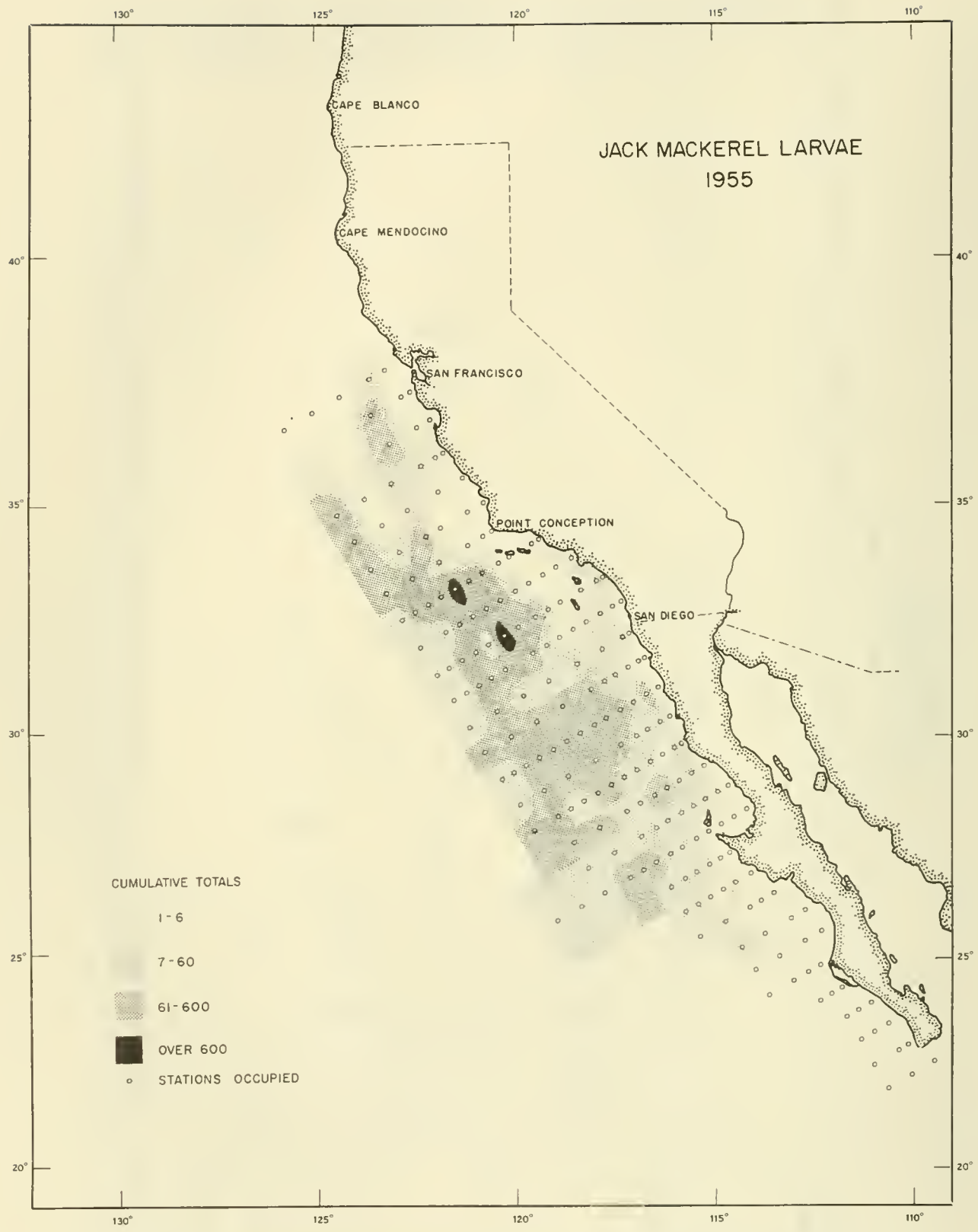

Figure 5.--Jack mackerel larvae, 1955: distribution and relative abundance.

RECORD OF THE LARVAE OF THE JACK MACKEREL (TRACHURUS SYMMETRICUS), 1955

The distribution and relative abundance of jack mackerel larvae are shown in figure 5. The categories of abundance are identical to those already described for sardine larvae; individual station values represent the cumulative standard haul total for the year.

The larvae are recorded by size classes in table V. They have the following midpoints and ranges:

Midpoint (in mm.)	Range (in mm.)	Midpoint (in mm.)	Range (in mm.)
2.00	1.76-2.25	7.75	7.26-8.25
2.50	2.26-2.75	8.75	8.26-9.25
3.00	2.76-3.25	9.75	9.26-10.25
3.50	3.26-3.75	10.75	10.26-11.25
4.00	3.76-4.25	11.75	11.26-12.25
4.50	4.26-4.75	12.75	12.26-13.25
5.00	4.76-5.25	13.75	13.26-14.25
5.75	5.26-6.25	14.75	14.26-15.25
6.75	6.26-7.25	15.26 and over	

The data are summarized in text table 6 by month and area. There were no occurrences of jack mackerel larvae off southern Baja California, and only 1.7% of the larvae was taken off lower central Baja California. The greatest abundance occurred off southern California (43.2% of total), and the next highest abundance was in the adjoining area to the south.

Latitudinal changes in distribution month by month were more marked than in previous years (cf. Ahlstrom and Ball 1954, tables 7 and 8). No larvae were obtained during January. In February, most larvae were taken in the area off Cedros Island (lines 110-120). Larvae were moderately abundant during a five-month period in this area, with the peak occurring in April. The peak also occurred in April off northern Baja California. Larvae were uncommon off southern California until May, and a marked peak occurred in June. No larvae were obtained off central California in May, but fair numbers were taken in June and July. There was only one occurrence after July on the regular survey cruises.

The interesting distribution found on "Norpac" (cruise 5508) has been commented upon by Ahlstrom (1956: 39, fig. 19): jack mackerel eggs and larvae were taken as far north as Washington, and as far offshore as 150° W. longitude (over 1000 miles offshore). The egg and larval collections taken by Pacific Oceanic Fishery Investigations (POFI) on "Norpac" have been examined subsequently to determine if jack mackerel eggs and larvae occurred in the area between 155°-180° W. longitude, and 40°-50° N. latitude. None were found.

Text table 6.--Occurrence and abundance (standard haul totals) of jack mackerel larvae (*Trachurus symmetricus*), by month and area, in hauls made during 1955

Cruise	Central California 60-77		Southern California 80-93		Northern Baja California 97-107		Upper central Baja California 110-120		Lower central Baja California 123-137		Southern Baja California 140-157		Total	
	Occur-rences	Num-ber	Occur-rences	Num-ber	Occur-rences	Num-ber	Occur-rences	Num-ber	Occur-rences	Num-ber	Occur-rences	Num-ber	Occur-rences	Num-ber
5501	-	-	0	0	0	0	0	0	0	0	0	0	0	0
5502	-	-	0	0	4	27	13	544	3	48	0	0	20	619
5503	-	-	2	6	12	857	12	202	3	10	0	0	29	1,075
5504	-	-	7	22	36	2,446	34	892	5	35	-	-	82	3,395
5505	0	0	15	120	32	444	24	468	3	31	-	-	74	1,063
5506	9	276	31	4,529	21	292	25	266	4	23	-	-	90	5,386
5507	13	384	28	1,039	12	124	13	85	7	74	-	-	73	1,706
5508	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5509	-	-	0	0	-	-	-	-	-	-	-	-	0	0
5510	0	0	0	0	1	2	0	0	0	0	-	-	1	2
5511	-	-	0	0	-	-	-	-	-	-	-	-	0	0
5512	-	-	0	0	0	0	0	0	0	0	0	0	0	0
Total	22	660	83	5,716	118	4,192	121	2,457	25	221	0	0	369	13,246
Percent		5.0		43.2		31.6		18.5		1.7		0		100.0

Table V

Record of the Larvae of Jack Mackerel (Trachurus symmetricus), 1955

Station	Midpoint of Size Class (in mm.)																		
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.26 and over	Dis.	Total
Cruise 5502:																				
100.70	10.4	3.4																		13.8
.80	2.9																			2.9
107.40			3.3																	3.3
.50		3.3	3.3																	6.6
110.80	47.0	63.8	70.6	87.4	33.6															302.4
113.60			6.7	3.4		10.0														20.1
.70	27.5	24.5	6.1		3.1															61.2
117.60			10.0	3.3	13.3		3.3	3.3												33.2
.70		7.3			3.7	3.7	3.7													18.4
120.45						2.2	2.2													4.4
.50					3.6															3.6
.55				7.3	3.6															10.9
.60		5.4	13.5	5.4		8.1	5.4	8.1	2.7											48.6
.70		3.1																		3.1
.80		7.1	4.7		4.7															16.5
.90		4.4	6.7		2.2															13.3
.100			5.6	2.8																8.4
123.45							3.2													3.2
.55		4.0	7.9	5.9	9.9	5.9	5.9	2.0												41.5
127.50						2.8														2.8
Total	87.8	126.3	138.4	115.5	77.7	32.7	23.7	13.4	2.7											618.2
Cruise 5503:																				
93.40				2.7																2.7
.70									3.4											3.4
97.50	6.9	2.3																		9.2
.60		2.6		2.6																5.2
100.50				3.0		3.0														6.0
.60			3.4																	3.4
.70	26.1	14.5	17.4	2.9	2.9	2.9														66.7
.80	31.1	45.0	20.8	10.4	10.4	6.9	3.5													128.1
.90	68.0	98.6	129.2	57.8	10.2	10.2	3.4													377.4
103.50			3.4			6.7	3.4		3.4											16.9
.70	31.7	43.9	24.4	22.0	2.4			2.4												126.8
107.50			17.4		3.5	3.5	3.5													27.9
.60		3.2	6.4	6.4	9.6	9.6	6.4													41.6
.70		5.3	18.6	10.6	5.3	2.6	2.6		2.6											47.6
110.50			8.4	11.2	2.8															22.4
.60	3.4			3.4		3.4														10.2
.70		3.3																		3.3
.80			20.6	14.8	5.9	3.0	3.0													47.3

Table V (Cont'd)
Record of the Larvae of Jack Mackerel (Trachurus symmetricus), 1955

Station	Midpoint of Size Class (in mm.) 2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.26 and over	Dis.	Total
Cruise 5503 (cont'd):																				
110.90			6.9	13.8	6.9			10.4												38.0
117.45					3.2															3.2
.50					3.1	3.1														6.2
.70					3.2															3.2
120.55	6.1																			6.1
.70	8.9	20.9	8.9																	38.7
.90			6.4																	6.4
.100	5.6		2.8	8.5																16.9
123.50					1.8															1.8
127.60						5.6														5.6
133.50		2.7																		2.7
Total	187.8	242.3	295.0	170.1	71.2	60.5	25.8	12.8	9.4											1074.9
Cruise 5504:																				
83.80							3.0													3.0
87.35			2.8																	2.8
.60	2.7																			2.7
93.60			2.8	2.8																5.6
.70		2.4																		2.4
.80							2.8													2.8
.90				2.8																2.8
97.32			3.1																	3.1
.40			5.0			2.5	2.5	2.5												12.5
.50				2.7																2.7
.60		3.0			3.0		3.0	3.0												12.0
.70			6.4	12.8			6.4	12.8												38.4
.80	8.6	5.7	17.1	14.2	14.2	8.6														68.4
.90								4.8												4.8
100.30					2.5		2.5													5.0
.50				6.3	3.2	9.4		9.5	6.4											34.8
.60	2.9	2.9	2.9	17.3	14.4	2.9	5.8	2.9												52.0
.70	2.9	2.9		2.9	5.7	5.7		5.7												25.8
C100.80	2.8	5.5	22.0	11.0	5.5	2.8	2.8													52.4
.90	3.6		7.3	14.6	7.3	3.6	11.0													47.4
B103.35	7.1	19.0	14.2	4.7	7.1	4.7	9.5	11.9	2.4											80.6
H .35	3.7		7.4		3.7		11.1	25.9	7.4	3.7										62.9
B .40			2.0	10.1	6.1	8.1	8.1	6.1												40.5
H .40				8.8	17.6	17.6	8.8	11.8												64.6
B .45		2.6	13.0	18.2	36.4	20.8	18.2	18.2	5.2											132.6
B .50			5.2	5.2	2.6	10.3	15.5	10.3												49.1
C .50	2.8						2.8		2.8											8.4

Table V (Cont'd)
Record of the Larvae of Jack Mackerel (Trachurus symmetricus), 1955

Station	Midpoint of Size Class (in mm.) 2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.26 and over	Dis.	Total
Cruise 5504 (cont'd):																				
B103.55	3.0		3.0	6.0	3.0	6.0	6.0	12.0		3.0										42.0
B .60			7.9	5.3	10.6	5.3	5.3													34.4
C .60	5.6	2.8	11.2	11.2	14.0	14.0	8.4	19.6	2.8	2.8										92.4
B .65	11.0	16.5	16.5	88.0	33.0	5.5	11.0		11.0	5.5										198.0
B .70		2.9	14.6	40.9	35.0	14.6	35.0	35.0	5.8											183.8
C .70	5.1	7.7	5.1	18.0	28.3	15.4	7.7	2.6	5.1											95.0
B .75	5.6	11.3	31.0	33.8	28.2	25.4	5.6	14.1											2.8	157.8
B .80	2.5	10.1	37.8	110.9	88.2	68.0	15.1	30.2	2.5	2.5										367.8
C .80		3.4	6.7	10.1	3.4	6.7	3.4	6.7	16.8											57.2
H107.35	10.8																			10.8
H .40			4.2		16.9	4.2	8.5	4.2												38.0
H .50			3.2	19.0	41.2	47.6	41.2	25.3												177.5
H .60		2.4	9.6	21.5	12.0	14.3	16.7	21.5	7.2	2.4										107.6
H .70	2.9		2.9		8.7		2.9	11.6	14.5											43.5
B .80	2.5	4.9		2.5	4.9		2.5	4.9		2.5	2.5									27.2
H .80						3.1	3.1	6.2	3.1											15.5
H110.33	3.1	3.1								3.1										9.3
H .35			2.0				4.0	6.0	2.0	2.0										16.0
H .60							2.5	2.5												5.0
B .60				14.2	42.7	35.6	24.9	10.7	14.3											142.4
H .70			2.6	2.6	2.6			2.6	2.6											13.0
H .80					2.3	2.3	2.3	4.6	2.3											13.8
B .80	2.4		7.2		2.4	2.4		2.4												16.8
H .90				9.2	6.1	15.3	6.1	6.2												42.9
H113.45		3.0	9.1	3.0	12.2	9.1	12.2	6.1	3.0	6.1										63.8
H .50			3.2	12.8	9.6	9.6	12.8	16.0	3.2											67.2
H .55						2.9	8.6													11.5
H .60					2.7	16.3	16.3	16.3												51.6
B .60				2.8		2.8		5.6	2.8	2.8										16.8
H .70		3.6	7.3	10.9																21.8
B .80		2.8	2.8	2.8	11.0				2.8											22.2
H117.30							10.2													10.2
H .35									6.4											6.4
H .40									7.9											7.9
H .45	3.1			3.1				6.2	9.2	9.2										30.8
H .50			3.6	3.6	3.6		3.6		3.6											18.0
H .55					5.7															5.7
H .60		2.9		2.9																5.8
B .60			11.0																	11.0
H .70		3.5	3.5	7.0	7.0		7.0	3.5												31.5
B .80		4.2	4.2					2.1												10.5

Table V (Cont'd)
Record of the Larvae of Jack Mackerel (Trachurus symmetricus), 1955

Station	Midpoint of Size Class (in mm.)																		
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.26 and over	Dis.	Total
Cruise 5504 (cont'd):																				
B120.50	5.5	22.1	11.1	5.5	5.5				5.5											55.2
H120.55					2.3															2.3
H .60						2.8														2.8
B(1).60		2.8	11.2	11.2	5.6	11.2		2.8												44.8
B(2).60			5.1		5.1															10.2
B .65		2.8	17.0	11.3	2.8	8.5	11.3	19.8	8.5											82.0
H .70		2.7	8.0	2.7	2.7	10.6	5.3													32.0
B .70					5.3	2.6														7.9
B .75		2.5																		2.5
H123.50							3.0													3.0
H .55				3.2																3.2
H .60			2.7		8.0	8.0	2.7													21.4
H127.50																		5.3		5.3
B .60											2.4									2.4
Total	100.2	162.0	376.5	610.4	601.9	467.1	419.0	432.7	167.1	45.6	4.9							5.3	2.8	3395.5
Cruise 5505:																				
80.90		3.1																		3.1
87.55			2.6																	2.6
.60				3.1																3.1
90.65				11.4																11.4
.70		3.0																		3.0
.75			6.2																	6.2
.80					3.0															3.0
.90		8.6	2.9	2.9	2.9				2.9											20.2
93.45					3.1															3.1
.50						6.2														6.2
.55				9.2	3.1															12.3
.60					3.1															3.1
.75		3.0				5.9		3.0												11.9
.90								2.8												2.8
.95		2.8	8.4	8.4	8.4															28.0
97.32	3.2				3.2															6.4
.40		8.9		3.0																11.9
.50			3.3	6.6																9.9
.65				3.7																3.7
.70	7.0	3.5																		10.5
.80	4.2	16.7	8.3	25.0						8.3										62.5
.85								7.5												7.5
.90		3.5	3.5						3.5	3.5					3.5					17.5

Table V (Cont'd)
Record of the Larvae of Jack Mackerel (Trachurus symmetricus), 1955

Station	Midpoint of Size Class (in mm.)																		
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.26 and over	Dis.	Total
Cruise 5505 (cont'd):																				
100.40	2.8	2.8	2.8																	8.4
.45	3.1																			3.1
.60				6.3	3.2	3.2														12.7
.65							3.0													3.0
.80				3.0			3.0			3.0										9.0
.85			6.5																	6.5
.90			6.2			3.1														9.3
103.45			2.9																	2.9
.50			3.2		3.2	3.2	3.2	3.2												16.0
.55				3.2	3.2			6.5												12.9
.65						3.3														3.3
.70				2.9	2.9								2.9							8.7
.75				3.1	3.1	3.1		6.2	3.1					3.1						21.7
.90			3.2	3.2	3.2	6.3														15.9
107.40	2.5																			2.5
.45		3.1	3.1	6.1																12.3
.50			6.2	3.1	12.4	6.2	3.1			6.2										37.2
.55									2.7											2.7
.65				12.4	6.2	3.1		3.1												24.8
.70			3.2					3.2												6.4
.75					3.0		3.0													6.0
.80				5.7	22.9	14.3	5.7	2.9												51.5
.85			3.1		6.2	6.2	3.1	3.1	3.1											24.8
.90					3.0	3.0	3.0		3.0											12.0
110.45		5.9		2.9	2.9		2.9	2.9												17.5
.55		2.6		2.6																5.2
.60			3.2																	3.2
.65			3.1	6.2	3.1															12.4
.70	6.2	6.2	3.1	3.1				3.1												21.7
.75	11.6	11.6	8.7																	31.9
.80			5.5	2.7																8.2
.85	3.0	12.2	18.3	12.2	3.0															48.7
.90	2.6				5.3															7.9
113.35				6.7				3.3												10.0
.40								3.3												3.3
.45			6.3	15.8		3.2		12.6												37.9
.50		2.8	5.7				5.7	28.3	8.5											51.0
.55			9.1	3.0																12.1
.75				3.0				3.0												6.0
.80	22.8	32.6	6.5	3.3		3.3		3.3												71.8
117.35								2.7												2.7
.40				3.3		3.3														6.6

Table V (Cont'd)
Record of the Larvae of Jack Mackerel (Trachurus symmetricus), 1955

Station	Midpoint of Size Class (in mm.) 2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.26 and over	Dis.	Total
Cruise 5505 (cont'd):																				
117.45	7.4	9.8	2.4	2.4				2.4				2.4								26.8
.50	2.2		2.2		4.5	2.2		2.2	2.2											15.5
.55	6.4	15.9	9.5	3.2																35.0
.60	5.7							2.8	5.7											14.2
.70			5.4																	5.4
.80	2.6	2.6	2.6	2.6								2.6								13.0
123.45					4.8	4.8		4.8	4.8											19.2
.60									5.5											5.5
130.50			6.6																	6.6
Total	93.3	161.2	173.8	195.3	122.9	83.9	35.7	116.2	45.0	21.0		5.0	2.9	3.1	3.5					1062.8
Cruise 5506:																				
60.60				15.7																15.7
63.65			10.6	21.3	10.6															42.5
67.65	2.8	5.7	5.7	8.5																22.7
70.70		6.3																		6.3
.90	5.5	27.4	16.4	8.2		2.7														60.2
73.70				6.0	6.0															12.0
77.70	14.0	17.4	20.9		3.5															55.8
.80	2.6																			2.6
.90		3.6	21.8	18.2	3.6	7.3	3.6													58.1
80.70		5.9						5.9												11.8
.80	5.2	5.2	5.2																	15.6
.90		25.5	51.0	38.3	12.8															127.6
83.55				3.0																3.0
.60			57.8	130.0	50.5	7.2	7.2	7.2												259.9
.65			25.1	45.2	10.0						5.0									85.3
.70	18.1	42.3	157.0	217.4	54.4															489.2
.75		20.8	242.2	221.4	62.3															546.7
.80	13.2	26.5	53.0																	92.7
.85		37.4	49.9	62.4																149.7
.90				23.3																23.3
87.55				6.2																6.2
.60		14.4	43.3																	57.7
.65	3.2	9.6	22.5	28.9	3.2															67.4
.70			14.8																	14.8
.75	52.2	34.8	121.8	104.4	52.2	34.8														400.2
.80		6.5	13.0						6.5											26.0
.90	5.8	8.7	5.8	2.9			2.9													26.1
90.28			5.0																	5.0
.50	2.9	5.8	11.6					2.9												23.2
.55	22.5	73.1	56.2	33.7																185.5

Table V (Cont'd)
Record of the Larvae of Jack Mackerel (Trachurus symmetricus), 1955

Station	Midpoint of Size Class (in mm.)																		
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.26 and over	Dis.	Total
Cruise 5506 (cont'd):																				
90.60	39.8	73.0	112.9	66.4	13.3		6.6													312.0
.65	41.5	290.6	470.6	110.7			13.8													927.2
.70			11.0					5.5		5.5										22.0
.75		5.2	15.6	36.4	15.6	5.2														78.0
93.35		3.1		3.1				3.1												9.3
.40		5.9																		5.9
.55					5.0					5.0										10.0
.70	20.5	51.2	92.2	184.3	81.9															430.1
.75			11.0	49.3	16.4	5.5	11.0													93.2
.80			6.1		12.2						6.1									24.4
97.40			5.6	11.2																16.8
.55	5.0	10.1	15.1	15.1	15.1	5.0														65.4
100.35		3.0																		3.0
.40	3.4		3.4	3.4																10.2
.45		17.7			5.9															23.6
.50		4.5	13.4	35.7	17.8															71.4
.55	2.4		2.4	4.8																9.6
103.50			2.6																	2.6
.55			2.6	5.1					2.6	2.6										12.9
.60		2.9	2.9																	5.8
.70		2.9																		2.9
.75								2.6												2.6
.80			2.3	2.3					2.3											6.9
.85		2.9	5.7				2.9	5.8												17.3
107.45			5.6																	5.6
.60						2.6					2.6	2.6	2.6							10.4
.65							2.8						2.8							5.6
.75					5.2		2.6													7.8
.80		2.9																		2.9
.85				3.2																3.2
.90		2.5							2.5											5.0
110.35		2.1	4.2																	6.3
.45			2.2																	2.2
.55					2.4			2.4		2.4										7.2
.60		12.6																		12.6
.65	19.4	14.6	12.2			4.9	2.4			2.4										55.9
.70									2.5											2.5
.75			2.5																	2.5
.80						3.0	3.0	3.0	3.0											12.0
.85				4.2	2.1		2.1													8.4
.90	2.9	8.6	8.6																	20.1
113.35			2.2			4.5	2.2													8.9
.40	3.1		3.1		3.1	6.1	6.1		3.1											24.6
.45			2.4	4.8	9.6		4.8			2.4										24.0

Table V (cont'd)
Record of the Larvae of Jack Mackerel (Trachurus symmetricus), 1955

Station	Midpoint of Size Class (in mm.)																		
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.26 and over	Dis.	Total
Cruise 5506 (cont'd):																				
113.50					3.1	3.1														6.2
.75							2.9													2.9
.80		3.2	12.9																	16.1
117.35													1.8							1.8
.40					2.7		2.7													5.4
.50	4.6																			4.6
.55								3.0												3.0
.75											4.8									4.8
.80					7.1	3.5		3.6		8.8										23.0
120.50								3.0												3.0
.55								3.1												3.1
.80			5.4																	5.4
127.40		11.3																		11.3
.55					5.9															5.9
130.60			2.6																	2.6
137.40			2.8																	2.8
Total	290.6	907.7	1852.7	1535.0	493.5	95.4	79.6	51.1	22.5	29.1	18.5	2.6	7.2							5385.5
Cruise 5507:																				
63.65					13.4		26.9		13.4											53.7
67.50							3.1													3.1
.65					25.9			25.9		13.0										64.8
70.55				23.3																23.3
.60								13.1												13.1
.70						9.3	9.3	9.3	9.3											37.2
.80		3.0						3.0												6.0
.90		2.2	2.2				2.2	2.2												8.8
73.70		10.4						20.8												31.2
.90				30.5		15.2		30.5	15.2											91.4
77.70		20.8	6.9																	27.7
.80			10.9																	10.9
.90				6.3			6.3													12.6
80.70					13.1	13.1	13.1	6.6												45.9
.80		23.8	71.3	41.6	8.9	3.0	3.0	3.0	3.0											157.6
.90			2.8	5.5	8.3		2.8	5.6		2.8	5.5	2.8								36.1
83.43			5.4																	5.4
.70	12.0	54.2	30.1		6.0		6.0	12.0	6.0											126.3
87.35	2.6	15.8	7.9	2.6																28.9
.70				5.5	5.5		16.6	72.1	27.7											127.4
90.28	8.3																			8.3
.30	1.9	9.5	1.9	1.9																15.2

Table V (Cont'd)
Record of the Larvae of Jack Mackerel (Trachurus symmetricus), 1955

Station	Midpoint of Size Class (in mm.)																		
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.26 and over	Dis.	Total
Cruise 5507 (cont'd):																				
90.37			3.2																	3.2
.60		8.4	11.2	5.6		5.6		5.6	5.6											42.0
.65		6.0	3.0		3.0			3.0	3.0											18.0
.70		5.0			5.0		5.0	5.0												20.0
.75									5.2											5.2
.80						25.2	21.0	16.8	4.2	4.2										71.4
.85			3.2			9.6	9.6	3.2	3.2	3.2	3.2									35.2
.90		7.1			7.1															14.2
93.30								5.8												5.8
.60				5.6		5.6	5.6	44.5	27.8	5.6										94.7
.65								12.7	4.2	8.4	4.2									29.5
.70								2.6												2.6
.75						2.8	2.8	2.8	2.8			2.8								14.0
.80		2.7			2.7	8.0	13.3	13.3	29.3	13.3			2.7							85.3
.85				3.3			3.3	6.6	3.3											16.5
97.32					2.8															2.8
.55											6.4									6.4
.60															2.9					2.9
.90												18.4								18.4
100.70	2.9																			2.9
.80									2.9											2.9
.85				3.1								3.1								6.2
.90							6.0	6.0	6.0		6.0	6.0								30.0
103.60										2.8										2.8
.65										5.0		5.0								10.0
.70					3.0	3.0														6.0
.80									2.8											2.8
.90									3.4											3.4
107.70				6.0	6.0		3.0													15.0
.75					11.0	8.2			2.7											21.9
.80				9.9	3.3	6.6														19.8
110.45	3.2																			3.2
.60			2.7					2.7												5.4
.70		2.6																		2.6
.90											2.8									2.8
113.55							5.1													5.1
.70										6.0										6.0
.75									2.6						2.6					5.2
.80							2.7													2.7
117.40														2.4						2.4
.65					2.7										2.7					5.4
120.45				6.0																6.0
.50		3.0	12.0	6.0	6.0															27.0
.60								2.7	5.4					2.7						10.8

Table V (Cont'd)
Record of the Larvae of Jack Mackerel (Trachurus symmetricus), 1955

Station	Midpoint of Size Class (in mm.)																		
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.26 and over	Dis.	Total
Cruise 5507 (cont'd):																				
123.50		17.8	11.9		3.0	5.9														38.6
.60					2.8	2.8														5.6
127.40						2.7														2.7
.55					2.4															2.4
130.50				2.8																2.8
.60		2.6																		2.6
133.50		2.7	2.7	11.0		2.7														19.1
Total	30.9	197.6	189.3	176.5	141.9	129.3	166.7	337.4	189.0	64.3	28.1	38.1	2.7	5.1	8.2					1705.1
Cruise 5510:																				
100.80													2.2							2.2
Total													2.2							2.2

RECORD OF THE LARVAE OF THE PACIFIC MACKEREL (PNEUMATOPHORUS DIEGO), 1955

The distribution and abundance of Pacific mackerel larvae in 1955 are shown in figure 6. The categories of abundance are identical to those already described for other species; individual station values represent the cumulative standard haul total for the year.

The larvae are reported by size class in table VI. The size classes have the same midpoints and ranges as those given for the jack mackerel. The data are further summarized in text table 8.

Pacific mackerel larvae are much less abundant than those of the other fishes included in this report. They make up only slightly more than one-half percent of the larvae collected in 1955; they were obtained in 92 collections. The larvae were taken in all areas south of Point Conception. The largest number was obtained off upper central Baja California (lines 110-120); they were collected from March through July in this region. Off southern California, Pacific mackerel larvae were collected in June and July; there were only seven occurrences in this region. The coverage off southern Baja California was too fragmentary to delimit the seasonal distribution in this area.

The lack of Pacific mackerel larvae during the last five months of the year must partly reflect the sparse coverage during these months in 1955. Certainly, larger numbers were taken during these months in previous years, as can be seen by comparing the monthly totals for 1955 with those of the four previous years (text table 7).

Text table 7.--Monthly abundance of Pacific mackerel larvae, 1951-1955. (standard haul totals)

	1951	1952	1953	1954	1955
January	0	5	27	1,219	136
February	4	43	32	22	14
March	58	54	122	153	215
April	114	184	115	84	608
May	204	150	259	90	86
June	77	116	320	472	667
July	14	95	44	167	221
August	455	43	251	214	-
September	83	104	58	-	0
October	0	46	59	58	0
November	89	10	-	-	0
December	9	-	21	86	3
Total	1,107	850	1,308	2,565	1,950

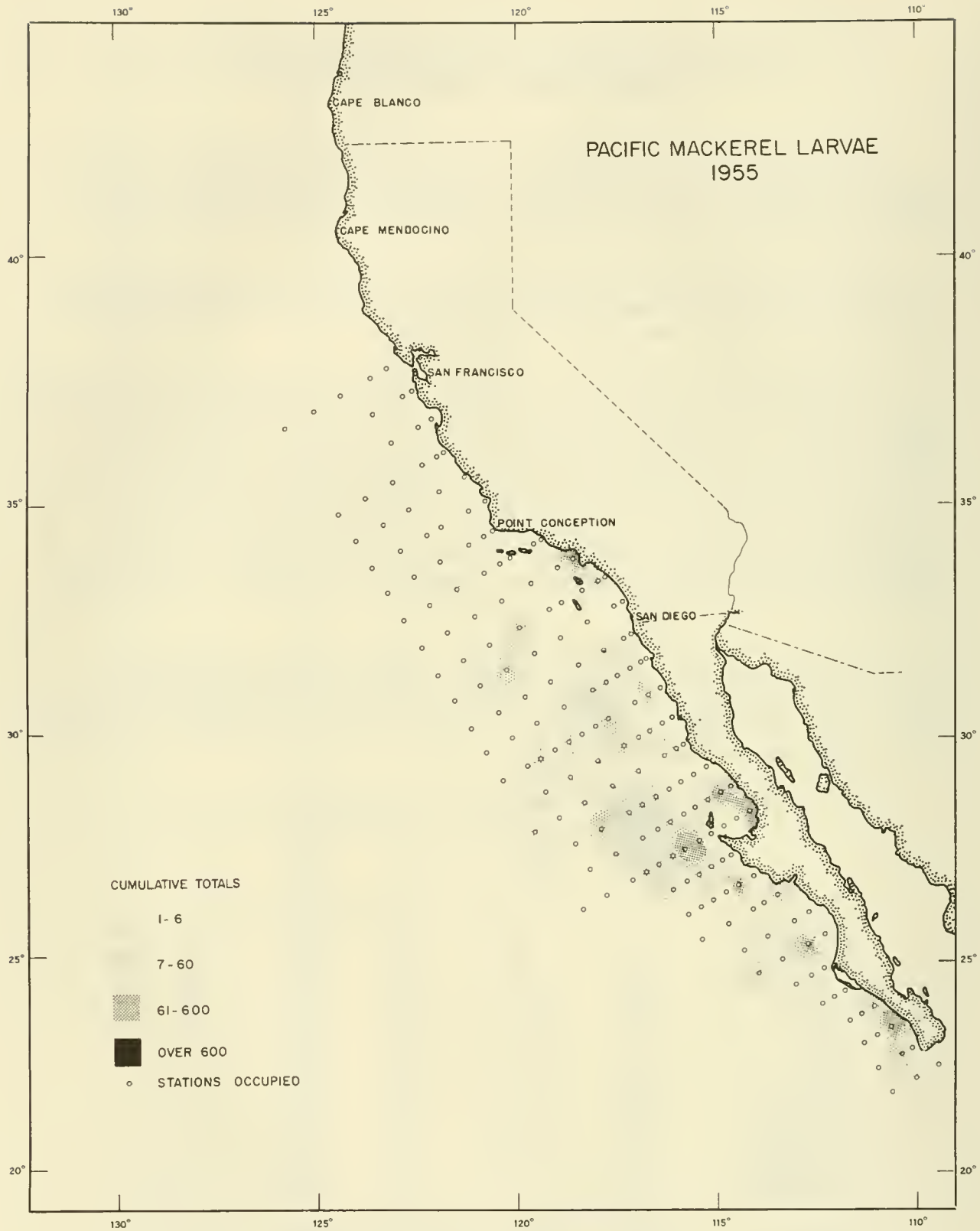

Figure 6.--Pacific mackerel larvae, 1955: distribution and relative abundance.

Text table 8.--Occurrence and abundance (standard haul totals) of Pacific mackerel larvae (*Pneumatophorus diego*), by month and area, in hauls made during 1955

Cruise	Central California 60-77		Southern California 80-93		Northern Baja California 97-107		Upper central Baja California 110-120		Lower central Baja California 123-137		Southern Baja California 140-157		Total	
	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number
5501	-	-	0	0	0	0	0	0	0	0	3	136	3	136
5502	-	-	0	0	0	0	0	0	0	0	1	14	1	14
5503	-	-	0	0	0	0	4	66	7	147	1	2	12	215
5504	-	-	0	0	11	96	22	507	2	5	-	-	35	608
5505	0	0	0	0	6	40	3	18	3	28	-	-	12	86
5506	0	0	4	39	3	16	6	524	2	88	-	-	15	667
5507	0	0	3	97	0	0	5	103	5	21	-	-	13	221
5508	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5509	-	-	0	0	-	-	-	-	-	-	-	-	0	0
5510	0	0	0	0	0	0	0	0	0	0	-	-	0	0
5511	-	-	0	0	-	-	-	-	-	-	-	-	0	0
5512	-	-	0	0	0	0	0	0	0	0	1	3	1	3
Total	0	0	7	136	20	152	40	1,218	19	289	6	155	92	1,950
Percent		0		7.0		7.8		62.4		14.8		7.9		99.9

Table VI

Record of the Larvae of Pacific Mackerel (Pneumatophorus diego), 1955

Station	Midpoint of Size Class (in mm.)																		
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.26	Dis.	Total
Cruise 5501:																				
150.19		36.4	26.5	19.9	3.3			6.6												92.7
153.20	11.0	18.4	11.0																	40.4
157.20						2.8														2.8
Total	11.0	54.8	37.5	19.9	3.3	2.8		6.6												135.9
Cruise 5502:																				
147.20	8.3			5.6																13.9
Total	8.3			5.6																13.9
Cruise 5503:																				
117.50			9.2	3.1																12.3
.55	8.3	11.0																		19.3
.60	3.8																			3.8
120.55	3.0	12.1	15.2																	30.3
123.50	1.8																			1.8
.55			2.7																	2.7
.60		2.7																		2.7
127.40	4.7	30.6	87.0	7.0																129.3
130.40			2.8	2.8																5.6
.50	2.7																			2.7
137.30		2.2																		2.2
147.25	1.9																			1.9
Total	26.2	58.6	116.9	12.9																214.6
Cruise 5504:																				
100.50			6.3																	6.3
.60			2.9																	2.9
H103.35			7.4																	7.4
B .65			5.5	5.5																11.0
B .75		5.6	16.9																	22.5
B .80			2.5				2.5													5.0
H107.40		4.2																		4.2
H .50				6.3	12.7	3.2														22.2
H .60					4.8															4.8
H .70		2.9	2.9																	5.8
H .80									3.1											3.1
H110.40							3.7													3.7
H .50				3.5																3.5

Table VI (Cont'd)
Record of the Larvae of Pacific Mackerel (Pneumatophorus diego), 1955

Station	Midpoint of Size Class (in mm.)																		
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.26	Dis.	Total
Cruise 5504 (cont'd):																				
B110.60							3.6													3.6
H .70			2.6			2.6														5.2
H .90								6.1	3.1											9.2
H113.45				3.0																3.0
H .50					6.4						3.2									9.6
H .55			5.8		2.9					2.9										11.6
H .60		5.4	16.3	10.9	16.3															48.9
B .60	2.8	2.8	2.8	5.6		2.8														16.8
H .70			21.8	10.9	14.6			3.6												50.9
H117.35			3.2																	3.2
H .40	2.6		2.6																	5.2
H .55			11.5																	11.5
H .60						2.9	11.6	8.7	2.9											26.1
H .70	3.5	3.5	17.6	17.6		3.5	7.0													52.7
B120.50			16.6	72.0	16.6															105.2
B .55									2.8											2.8
H .60								5.7												5.7
B(1).60			5.6	11.2	14.0	11.2	8.4	14.0												64.4
B(2).60										5.1										5.1
B .65			2.8	8.5	19.8	11.3	2.8	5.6	5.6	2.8										59.2
B123.50								2.6												2.6
H127.40									2.6											2.6
Total	8.9	24.4	153.6	155.0	108.1	37.5	39.6	46.3	20.1	10.8	3.2									607.5
Cruise 5505:																				
97.30		5.1																		5.1
.40			3.0																	3.0
103.35						3.1	6.1	3.1												12.3
.50			3.2			3.2		3.2	3.2											12.8
.55			3.2																	3.2
107.45						3.1														3.1
110.35		3.1	3.1	6.1																12.3
113.45			3.2																	3.2
117.35			2.7																	2.7
123.45				4.8	4.8	4.8														14.4
130.30			10.6																	10.6
137.30		2.8																		2.8
Total		11.0	29.0	10.9	4.8	14.2	6.1	6.3	3.2											85.5

Table VI (Cont'd)
Record of the Larvae of Pacific Mackerel (Pneumatophorus diego), 1955

Station	Midpoint of Size Class (in mm.)																	
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.75	6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75	14.75	15.26	Dis.	Total
Cruise 5506:																				
83.70				6.0																6.0
87.40			2.5																	2.5
90.60		6.6	13.3																	19.9
93.70				10.2																10.2
100.35			3.0		3.0															6.0
.45			5.9																	5.9
.50			4.5																	4.5
117.30		34.9	221.2	58.2	5.8	23.3	5.8													349.2
.35			5.4																	5.4
.50			2.3																	2.3
120.25	2.1	2.1	14.6	31.4	12.5	2.1	2.1												2.1	69.0
.45	4.9	59.3	19.8						4.9											88.9
.50		6.0																	3.0	9.0
137.30	7.3	21.8	38.7	7.3	2.4															77.5
.50		5.5	5.5																	11.0
Total	14.3	136.2	336.7	113.1	23.7	25.4	7.9		4.9										5.1	667.3
Cruise 5507:																				
87.35	26.4	37.0	5.3	7.9		2.6														79.2
90.28		2.8																		2.8
.30		3.8	11.4																	15.2
117.26				4.4	8.8	4.4	4.4	4.4							4.4					30.8
120.25	6.1	20.2	20.2	4.0		2.0														52.5
.40	2.3	2.3																		4.6
.45						6.0														6.0
.50	3.0		3.0			3.0														9.0
123.40							6.3													6.3
.45								3.0												3.0
.50					3.0															3.0
.60									2.8			2.8								5.6
127.50			2.8																	2.8
Total	37.8	66.1	42.7	16.3	11.8	18.0	10.7	7.4	2.8			2.8			4.4					220.8
Cruise 5512:																				
147.20											2.6									2.6
Total											2.6									2.6

RECORD OF THE LARVAE OF HAKE (MERLUCCIUS PRODUCTUS), 1955

The larvae of the hake have not been routinely measured, hence table VII contains only the standard haul total of hake larvae at stations occupied during 1955. The data are further summarized in text table 10, and illustrated in figure 7.

No hake larvae were obtained off central California in 1955, but inasmuch as no cruises were made in this area during January through April, the failure to collect hake larvae probably reflects the inadequate coverage in this area rather than their actual absence from the area. Hake larvae were obtained off central California in all previous surveys (1949 through 1954).

The greatest abundance occurred off upper central Baja California (lines 110-120) in 1955. The center of abundance is further south than in 1951 or 1952. In 1951, the largest concentration of larvae occurred off southern California, and in 1952 off northern Baja California.

This species ranked second in abundance in 1955, constituting one larva out of every six collected. Although hake larvae were taken throughout the year, over 99% of them were obtained during the first four months of 1955. This is the usual period of abundance. A similar seasonal distribution was reported by Ahlstrom and Counts (1955) for 1951 and 1952; 98.6% of hake larvae were obtained during these months in 1951, and 99.5% in 1952. However, in both 1951 and 1952, the month of peak abundance of larvae was March, while it was February in 1953 and 1955, and January in 1954. The monthly abundance of hake larvae in 1951 through 1955 is summarized in text table 9.

Text table 9.--Monthly abundance of hake larvae, 1951-1955
(standard haul totals)

	1951	1952	1953	1954	1955
January	222	784	9,206	20,764	13,356
February	6,751	17,224	19,116	10,352	28,973
March	41,548	24,081	8,045	17,592	12,535
April	13,411	15,020	1,544	6,100	4,757
May	584	466	753	954	176
June	174	108	159	127	19
July	17	3	19	17	3
August	2	5	17	24	-
September	14	0	19	-	3
October	10	9	41	25	28
November	17	0	39	-	5
December	64	-	295	324	235
Total	62,814	57,700	39,253	56,279	60,090

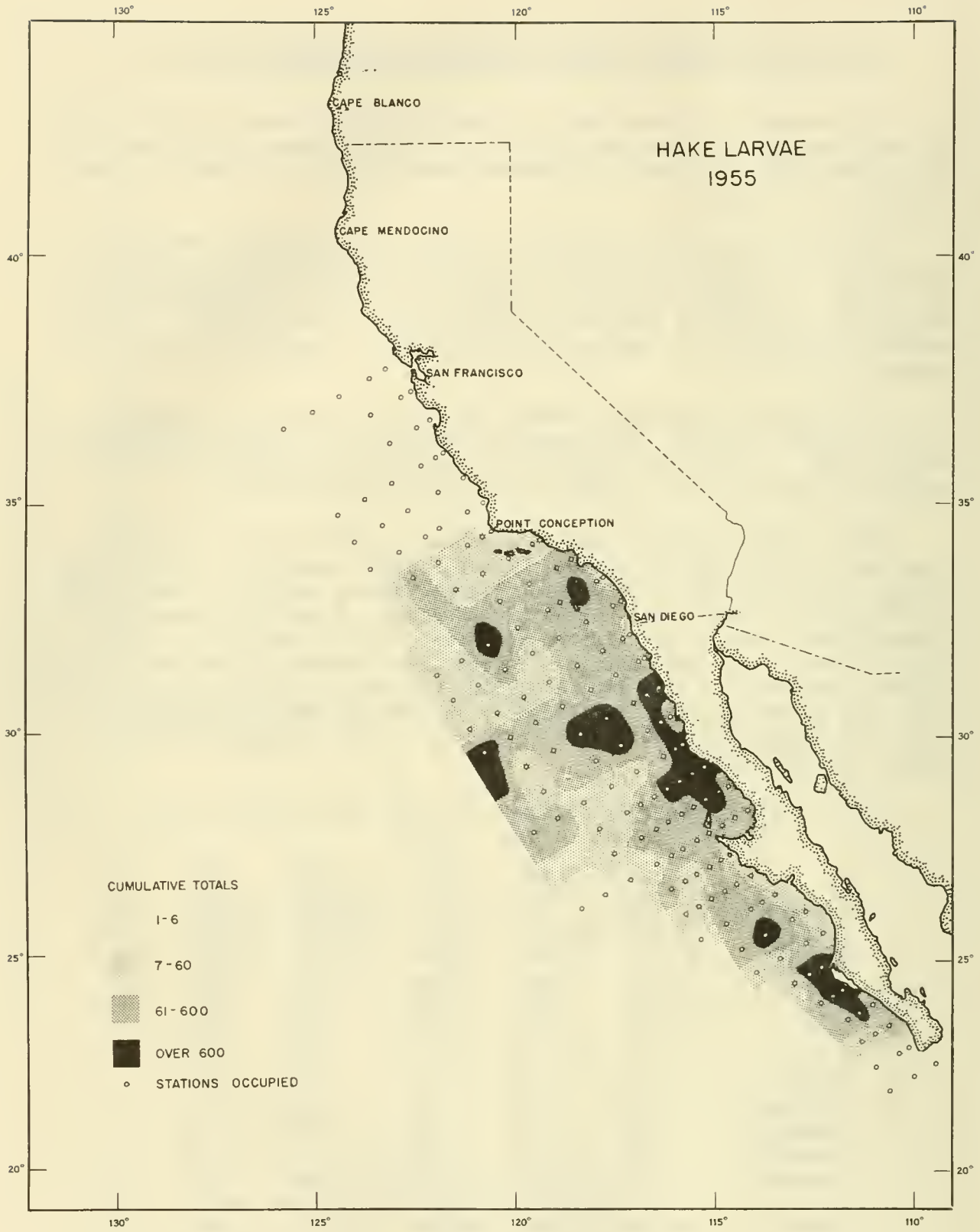

Figure 7.--Hake larvae, 1955: distribution and relative abundance

Text table 10.--Occurrence and abundance (standard haul totals), of hake larvae (Merluccius productus), by month and area, in hauls made during 1955

Cruise	Central California 60-77		Southern California 80-93		Northern Baja California 97-107		Upper central Baja California 110-120		Lower central Baja California 123-137		Southern Baja California 140-157		Total	
	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number
5501	-	-	16	1,331	16	660	21	3,430	9	120	8	7,815	70	13,356
5502	-	-	22	2,834	20	5,391	26	15,588	16	1,260	11	3,900	95	28,973
5503	-	-	23	422	24	6,997	30	2,818	24	1,291	16	1,007	117	12,535
5504	-	-	12	326	32	2,886	29	1,469	10	76	-	-	83	4,757
5505	0	0	8	32	8	40	9	33	6	71	-	-	31	176
5506	0	0	1	6	0	0	1	3	2	10	-	-	4	19
5507	0	0	0	0	0	0	0	0	1	3	-	-	1	3
5508	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5509	-	-	1	3	0	0	0	0	0	0	-	-	1	3
5510	0	0	1	2	2	10	3	16	0	0	-	-	6	28
5511	-	-	1	5	0	0	0	0	0	0	-	-	1	5
5512	-	-	4	17	2	7	12	196	2	12	1	3	21	235
Total	0	0	89	4,978	104	15,991	131	23,553	70	2,843	36	12,725	430	60,090
Percent		0		8.3		26.6		39.2		4.7		21.2		100.0

Table VII

Record of the Larvae of Hake (Merluccius productus), 1955

	Cruise and Month											
	5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept. 1/	5510 Oct.	5511 Nov. 2/	5512 Dec.
60.55	-	-	-	-	-		-	N	S		S	-
.60	-	-	-	-	-		-	O	P		P	-
.70	-	-	-	-	-		-	R	E		E	-
.80	-	-	-	-	-		-	P	C		C	-
.90	-	-	-	-	-		-	A	I		I	-
63.52	-	-	-	-				C	A		A	-
.55	-	-	-	-				-	L		L	-
.65	-	-	-	-				-	-	-	-	-
67.50	-	-	-	-				-	-		-	-
.55	-	-	-	-				-	-		-	-
.65	-	-	-	-				-	-	-	-	-
70.52	-	-	-	-				-	-		-	-
.55	-	-	-	-				-	-		-	-
.60	-	-	-	-				-	-		-	-
.70	-	-	-	-				-	-		-	-
.80	-	-	-	-	N.Q.			-	-		-	-
.90	-	-	-	-	-			-	-		-	-
73.50	-	-	-	-	-			-	-		-	-
.60	-	-	-	-	-			-	-		-	-
.70	-	-	-	-	-			-	-	-	-	-
.80	-	-	-	-	N.Q.			-	-	-	-	-
.90	-	-	-	-	-			-	-	-	-	-
77.50	-	-	-	-				-	-		-	-
.55	-	-	-	-				-	-		-	-
.65	-	-	-	-				-	-	-	-	-
.70	-	-	-	-				-	-	-	-	-
.80	-	-	-	-				-	-	-	-	-
.90	-	-	-	-				-	-	-	-	-
80.51		-	3					-	-		-	
.55		13	17					-	-		-	9
.60		9						-	-		-	
.70		37	10					-	-		-	
.80		386	11					-	-		-	
.90	-	-	-					-	-		-	
83.40		37	2	S.T.				-				
.43	16	10	3		5			-	-		-	
.51	6	14	12					-				
.55	-	-	-	-	-			-		-		-
.60	3	32						-				

1/ First occupancy of "Black Douglas" on regular stations used

2/ First occupancy of "Paolina T." on regular stations used

Table VII (Cont'd)
Record of the Larvae of Hake (Merluccius productus), 1955

Sta.	Cruise and Month 5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
83.65	-	-	-	-	-			-	-	-	-	-
.70	-	-	-	27	3			-	-	-	-	-
.75	-	-	-	-	-		-	-	-	-	-	-
.80	-	-	-		-		-	-	-	-	-	-
.85	-	-	-	-	-		-	-	-	-	-	-
.90	-	-	-		-		-	-	-	-	-	-
87.35		100	31	6				-	3		5	2
.40	26	32	32					-				2
.45	-	-	-	-				-				-
.50	29	390			3			-				
.55	-	-	-	-				-		-		-
.60	61	61	-	27				-				
.65	-	-	-	-	-			-		-	-	-
.70	-	-	-		-			-	-	-	-	-
.75	-	-	-	-	-		-	-	-	-	-	-
.80	-	-	-		-		-	-	-	-	-	-
.85	-	-	-	-	-	N.Q.	-	-	-	-	-	-
.90	-	-	-		-		-	-	-	-	-	-
90.28		5	2	S.T.				-				
.30	9	50	3					-		2		
.37	25	576	10	6				-				
.45	82	162	26		3			-				
.50	433	N.Q.	6					-		-		-
.55	-	-	-	-				-				
.60	27	162	12	14				-	-		-	
.65	-	-	-	-				-	-	-	-	-
.70	14	388	23	181	3			-	-		-	
.75	-	-	-	-				-	-	-	-	-
.80	-	-	31	17		-		-	-		-	
.85	-	-	-	-		-		-	-	-	-	-
.90	-	-	9			-		-	-		-	-
93.27	62	7	5	3				-	-		-	
.30	34	19	23	5	6			-	-		-	
.35	-	-	-	-				-	-	-	-	-
.40	298	93	48					-	-		-	4
.45	-	-	-	-	6			-	-	-	-	-
.50	206	251						-	-		-	
.55	-	-	-	-				-	-	-	-	-
.60	-	-	24	3	3			-	-		-	-
.65	-	-	-	-		N.Q.		-	-	-	-	-
.70	-	-	79					-	-	-	-	-
.75	-	-	-	-				-	-	-	-	-

Table VII (Cont'd)
Record of the Larvae of Hake (Merluccius productus), 1955

Sta.	Cruise and Month 5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
93.80	-	-	-	23		6		-	-	-	-	-
.85	-	-	-	-		-		-	-	-	-	-
.90	-	-	-	14		-		-	-	-	-	-
.95	-	-	-	-		-	-	-	-	-	-	-
97.30	24	15						-	-	5	-	
.32	34	46	156	6				-	-		-	
.35	-	-	-	-	3			-	-	-	-	-
.40	48	44	69	18	3			-	-		-	
.45	-	-	-	-				-	-	-	-	
.50	233	78	34					-	-		-	
.55	-	-	-	-				-	-	-	-	-
.60	-	-	50	9		-		-	-		-	-
.65	-	-	-	-		-		-	-	-	-	-
.70	-	-	31	6		-		-	-	-	-	-
.75	-	-	-	-		-		-	-	-	-	-
.80	-	-	-	14		-		-	-	-	-	-
.85	-	-	-	-		-		-	-	-	-	-
.90	-	-	-	24	10	-		-	-	-	-	-
100.29	32	245	61	7			-	-	-	5		
.30	21	112	25	38			-	-	-			3
.35	-	-	-	-			-	-	-	-		-
.40	12	38	29	42			-	-	-			
.45	-	-	-	-	9		-	-	-	-		-
.50	3	154	72	6			-	-	-			
.55	-	-	-	-	3		-	-	-	-		-
.60		403	69	29		-	-	-	-			
.65	-	-	-	-		-	-	-	-	-		-
.70		45	78	43		-	-	-	-			
.75	-	-	-	-		-	-	-	-	-		-
.80		44	45	33		-	-	-	-			
.85	-	-	-	-		-	-	-	-	-		-
.90	-	-	5052	15		-	-	-	-			-
103.30	9	140	35	2			-	-	-			4
.35	20	1069	122	284			-	-	-			
.40	12	141	96	349			-	-	-			
.45	-	-	-	73			-	-	-	-		-
.50	28	268	338	8			-	-	-	-		
.55	-	-	-	9			-	-	-	-		-
.60	151	718	14	93	6		-	-	-	-		
.65	-	-	-	468			-	-	-	-		-
.70	-	-		173			-	-	-	-		-

Table VII (Cont'd)
Record of the Larvae of Hake (Merluccius productus), 1955

Sta.	Cruise and Month 5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
103.75	-	-	-	73			-	-	-	-		-
.80	-	-	-	48			-	-	-	-		-
.85	-	-	-	-			-	-	-	-		-
.90	-	-	-	-			-	-	-	-		-
107.32	20	428	50	7			-	-	-			
.35	10	1263	24	100			-	-	-			
.40	3	113	18	355			-	-	-			
.45	-	-	-	-			-	-	-	-		-
.50		27	337	333	3		-	-	-	-		
.55	-	-	-	-	3		-	-	-	-		-
.60			144	91			-	-	-	-		
.65	-	-	-	-			-	-	-	-		-
.70	-	-	48	79			-	-	-	-		-
.75	-	-	-	-			-	-	-	-		-
.80	-	-	-	51			-	-	-	-		-
.85	-	-	-	-			-	-	-	-		-
.90	-	-	-	-			-	-	-	-		-
110.33	502	2726	111	16			-	-	-			9
.35	206	2099	92	286	3		-	-	-			5
.40	3	202	13	41	6		-	-	-			4
.45	-	-	-	-	3		-	-	-	-		-
.50	3	7		42	3	3	-	-	-			
.55	-	-	-	-			-	-	-	-		-
.60	3	18	3	8			-	-	-			
.65	-	-	-	-			-	-	-	-		-
.70		6		5			-	-	-			
.75	-	-	-	-			-	-	-	-		-
.80			360					-	-		-	
.85	-	-	-	-				-	-	-	-	-
.90	-	-	187					-	-		-	-
113.30		2028	15	4				-	-		-	10
.35	23	2389	111	53				-	-		-	25
.40	8	855	164	69				-	-		-	5
.45	-	1909	23	198				-	-	-	-	-
.50	11	152	28	86				-	-	-	-	
.55	-	17	223					-	-	-	-	-
.60		3	14	11				-	-	-	-	
.65	-	-	-	-				-	-	-	-	-
.70	-			40				-	-	-	-	
.75	-	-	-	-				-	-	-	-	-
.80	-	-	-	3				-	-	-	-	-

Table VII (Cont'd)
Record of the Larvae of Hake (Merluccius productus), 1955

Sta.	Cruise and Month											
	5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
117.26	65	37	36	28				-	-		-	
.30	505	647	176					-	-	10	-	15
.35	1319	1832	7	22	5			-	-		-	51
.40	15	192	64	21	3			-	-		-	
.45	-	69	16	49	2			-	-	-	-	-
.50	16	50	12	91	2			-	-	-	-	
.55	-	3	364	195				-	-	-	-	-
.60	4		227	23				-	-	-	-	
.65	-	-	-	-				-	-	-	-	-
.70	-			46				-	-	-	-	
.75	-	-	-	-				-	-	-	-	-
.80	-	-	-					-	-	-	-	-
120.25	213	6	13					-	-		-	2
.27	-	-	-	-			-	-	-	2	-	-
.30	257	119	140	24				-	-	4	-	38
.35	20	79	4	11				-	-		-	30
.40	60	112	3					-	-	-	-	2
.45	148	27		17				-	-		-	
.50	46	4	70	22				-	-		-	
.55	-		318	3				-	-	-	-	
.60			15	7	-			-	-		-	
.65	-	-	-	48	-	-	-	-	-	-	-	-
.70					6			-	-		-	
.75	-	-	-		-	-	-	-	-	-	-	-
.80	3							-	-		-	-
.90			6	-	-	-	-	-	-		-	-
.100			3	-	-	-	-	-	-	-	-	-
123.37	11	5	24		N.Q.			-	-		-	
.40	34	14	27					-	-		-	
.45	3	64	9					-	-	-	-	-
.50			11					-	-		-	
.55			24					-	-	-	-	
.60	-	-	124					-	-		-	-
127.34	3	18	8	4				-	-		-	
.40		82	59		2			-	-		-	
.45		81	6	9				-	-	-	-	-
.50		77	11					-	-		-	
.55		11	6	3				-	-	-	-	
.60	-	-	8					-	-		-	-
130.30	2	4	6	8	11			-	-		-	
.35	6	80	413	9				-	-		-	9

Table VII (Cont'd)

Record of the Larvae of Hake (*Merluccius productus*), 1955

Sta.	Cruise and Month 5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
130.40	8	241	67	11	12			-	-		-	
.50		48	24		7			-	-		-	
.55	-	-	-		-	-	-	-	-	-	-	-
.60				2				-	-		-	-
133.25		N.Q.	16	12				-	-		-	
.30		8	114					-	-		-	
.40	7	453	126	12	N.Q.	3		-	-	-	-	
.50	-	-	96					-	-	-	-	-
.60	-	-		-	-	-	-	-	-	-	-	-
137.23					31			-	-		-	3
.30	46	65	35		8	7	3	-	-		-	
.40		9	8	6				-	-	-	-	
.50	-	-	50					-	-	-	-	-
.60	-	-	19	-	-	-	-	-	-	-	-	-
140.30	319	602		-	-	-	-	-	-	-	-	
.35	6848	170	18	-	-	-	-	-	-	-	-	
.40	7	16	14	-	-	-	-	-	-	-	-	
.50	-	-	3	-	-	-	-	-	-	-	-	-
143.26		1455	572	-	-	-	-	-	-	-	-	
.30	33	1226	25	-	-	-	-	-	-	-	-	3
.35	6	27	30	-	-	-	-	-	-	-	-	
.40	-	-	2	-	-	-	-	-	-	-	-	-
.50	-	-		-	-	-	-	-	-	-	-	-
147.20	129	33	33	-	-	-	-	-	-	-	-	
.25	460	308	62	-	-	-	-	-	-	-	-	
.30		19	47	-	-	-	-	-	-	-	-	
.40	-	-		-	-	-	-	-	-	-	-	-
150.19	13		170	-	-	-	-	-	-	-	-	
.25		26	7	-	-	-	-	-	-	-	-	
.30		18	15	-	-	-	-	-	-	-	-	
.40	-	-		-	-	-	-	-	-	-	-	-
153.16			2	-	-	-	-	-	-	-	-	-
.20			4	-	-	-	-	-	-	-	-	-
.30	N.Q.			-	-	-	-	-	-	-	-	-
.40	-	-		-	-	-	-	-	-	-	-	-
157.10				-	-	-	-	-	-	-	-	-
.20				-	-	-	-	-	-	-	-	-
.30			3	-	-	-	-	-	-	-	-	-
.40	-	-		-	-	-	-	-	-	-	-	-
Total	13356	28973	12535	4757	176	19	3	-	3	28	5	235

RECORD OF THE LARVAE OF ROCKFISH (SEBASTODES SPP.), 1955

All of the preceding tabulations have dealt with individual species, but a number of species of Sebastodes are grouped together in the tabulations of rockfish larvae (table VIII). Rockfish larvae can be identified to genus without difficulty, but no attempt has been made to determine the species composition. There are over 50 species of Sebastodes, most of which occur in the area being studied.

Rockfish are temperate water species, decreasing in abundance along the coast of Baja California. The percent occurrence of larvae is higher off California than off Baja California. The percent occurrence decreases markedly between lower central Baja California and southern Baja California. The average number of larvae taken per haul is also higher off California than Baja California. These data are summarized in the following tabulation:

Station lines	Total samples taken	Occurrences of rockfish larvae	Percent occurrence	Total number of larvae taken	Percent taken in each area	Average number per haul
60-77	86	58	67.44	2,893	10.2	33.6
80-93	391	250	63.94	13,503	47.8	34.5
97-107	290	133	45.86	3,721	13.2	12.8
110-120	334	133	39.82	6,336	22.4	19.0
123-137	202	75	37.13	1,796	6.3	8.9
140-157	72	3	4.17	24	0.1	0.3
Total	1,375	652	47.42	28,273	100.0	20.6

Rockfish larvae are collected throughout the year (text table 11). In 1955, the largest numbers were obtained in January, approximately 22.2% of the year's total. The next largest month was February, with 22.0%. February was the month of peak abundance in 1953 and 1954, but April was the peak month in 1951 and 1952, as is shown in the following tabulation:

Year	Number rockfish larvae	Month of peak abundance	Percent taken in peak month
1950	11,831	March	24.8
1951	18,667	April	28.8
1952	21,697	April	20.8
1953	36,045	February	31.0
1954	50,844	February	28.4
1955	28,273	January	22.2

Text table 11.--Occurrence and abundance (standard haul totals) of rockfish larvae (*Sebastodes* spp.), by month and area, in hauls made during 1955

Cruise	Central California 60-77		Southern California 80-93		Northern Baja California 97-107		Upper central Baja California 110-120		Lower central Baja California 123-137		Southern Baja California 140-157		Total	
	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number	Occurrences	Number
5501	-	-	23	3,343	11	796	19	1,611	9	528	1	3	63	6,281
5502	-	-	20	3,301	12	1,321	20	1,393	10	188	1	3	63	6,206
5503	-	-	23	1,048	15	561	24	1,557	14	469	1	18	77	3,653
5504	-	-	29	2,029	19	362	22	872	8	270	-	-	78	3,533
5505	9	147	34	999	29	249	13	380	10	120	-	-	95	1,895
5506	19	466	40	800	19	190	13	128	11	148	-	-	102	1,732
5507	17	2,124	28	373	17	91	6	52	7	36	-	-	75	2,676
5508	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5509	-	-	10	140	-	-	-	-	-	-	-	-	10	140
5510	13	156	12	235	6	32	6	22	3	16	-	-	40	461
5511	-	-	11	1,002	-	-	-	-	-	-	-	-	11	1,002
5512	-	-	20	233	5	119	10	321	3	21	0	0	38	694
Total	58	2,893	250	13,503	133	3,721	133	6,336	75	1,796	3	24	652	28,273
Percent		10.2		47.8		13.2		22.4		6.3		0.1		100.0

Table VIII

Record of the Larvae of Rockfish (Sebastodes spp.), 1955

	Cruise and Month											
Sta.	5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept. 1/	5510 Oct.	5511 Nov. 2/	5512 Dec.
60.55	-	-	-	-	-	133	-	N	S	6	S	-
.60	-	-	-	-	-	47	-	O	P	6	P	-
.70	-	-	-	-	-	26	-	R	E	6	E	-
.80	-	-	-	-	-	24	-	P	C	12	C	-
.90	-	-	-	-	-		-	A	I	6	I	-
63.52	-	-	-	-	16	27	168	C	A	7	A	-
.55	-	-	-	-	2	25	1196	-	L	32	L	-
.65	-	-	-	-	5		81	-	-	-	-	-
67.50	-	-	-	-	21	16	6	-	-	10	-	-
.55	-	-	-	-		14	249	-	-	16	-	-
.65	-	-	-	-		6	52	-	-	-	-	-
70.52	-	-	-	-	11	11	26	-	-	15	-	-
.55	-	-	-	-	24		23	-	-	17	-	-
.60	-	-	-	-	35		52	-	-		-	-
.70	-	-	-	-		13	9	-	-		-	-
.80	-	-	-	-	N.Q.			-	-		-	-
.90	-	-	-	-	-		7	-	-		-	-
73.50	-	-	-	-	-	6		-	-	6	-	-
.60	-	-	-	-	-	16	10	-	-		-	-
.70	-	-	-	-	-	18		-	-	-	-	-
.80	-	-	-	-	N.Q.		25	-	-	-	-	-
.90	-	-	-	-	-	7		-	-	-	-	-
77.50	-	-	-	-		6		-	-	17	-	-
.55	-	-	-	-	22	58	122	-	-		-	-
.65	-	-	-	-		9	17	-	-	-	-	-
.70	-	-	-	-			48	-	-	-	-	-
.80	-	-	-	-			33	-	-	-	-	-
.90	-	-	-	-	11	4		-	-	-	-	-
80.51	58	-	53	41	11		2	-	-		-	5
.55	103	691	35	52	28	33	10	-	-		-	17
.60	22	198	10	214	23	23	29	-	-		-	8
.70	3	5	91	24	27	6	7	-	-		-	
.80		11	57	28	11	5		-	-		-	2
.90	-	-	-	3		13	14	-	-		-	3
83.40	8	44	6	S.T.	24		6	-	2	4		2
.43	145	610	132	42		18		-	-	3	-	5
.51	151	519	12	87	3	12	3	-	5	70	246	37
.55	-	-	-	-	-	6	6	-	9	-	62	-
.60	75	407	150	133	16	22		-		3	5	12

1/ First occupancy of "Black Douglas" on regular stations used

2/ First occupancy of "Paolina T." on regular stations used

Table VIII (Cont'd)
Record of the Larvae of Rockfish (Sebastodes spp.), 1955

Sta.	Cruise and Month 5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
83.65	-	-	-	-	-	10	41	-	-	-	-	-
.70	-	-	-	25	38	42	12	-	-	-	-	-
.75	-	-	-	-	-	21	-	-	-	-	-	-
.80	-	-	-	3	-	66	-	-	-	-	-	-
.85	-	-	-	-	-	12	-	-	-	-	-	-
.90	-	-	-		-	12	-	-	-	-	-	-
87.35	235	143	142	34	12	6	50	-	38	7	5	
.40	379	23	120	92	10	2	5	-	23	3	26	4
.45	-	-	-	-	14	31		-	5	3	427	-
.50	1038	123	10	459	39	54		-	6	115	196	75
.55	-	-	-	-	100	25		-		-	26	-
.60	172	37	-	326	34	43		-		15		6
.65	-	-	-	-	-	13	22	-	-	-	-	-
.70	-	-	-	73	-	15	11	-	-	-	-	-
.75	-	-	-	-	-	17	-	-	-	-	-	-
.80	-	-	-		-	6	-	-	-	-	-	-
.85	-	-	-	-	-	N.Q.	-	-	-	-	-	-
.90	-	-	-	3	-		-	-	-	-	-	-
90.28	25	96	11	S.T.	3		33	-	39	3		
.30	11	90	6	38	26	6	2	-	10	7		2
.37	87	119	66	59	3	8		-		2	2	3
.45	67	25	18	29	53		3	-			4	
.50	650	N.Q.	12	110	52	96	4	-	3	-	3	-
.55	-	-	-	-	89	79	5	-				11
.60	5	38	47	51	73	13	8	-	-		-	3
.65	-	-	-	-	46	14		-	-	-	-	-
.70	14	26			45			-	-		-	5
.75	-	-	-	-				-	-	-	-	-
.80	-	-		4		-		-	-		-	
.85	-	-	-	-		-		-	-	-	-	-
.90	-	-				-		-	-		-	-
93.27	73	51	37	19	3	16	57	-	-		-	13
.30	7	45	14		25		6	-	-		-	2
.35	-	-	-	-	9	9	2	-	-	-	-	-
.40	3		13	10	28			-	-		-	18
.45	-	-	-	-	25	6	2	-	-	-	-	-
.50	12			15	102	6		-	-		-	
.55	-	-	-	-	3	5	5	-	-	-	-	-
.60	-	-	3	23		3		-	-		-	-
.65	-	-	-	-		N.Q.	17	-	-	-	-	-
.70	-	-	3	12	15	20	3	-	-	-	-	-
.75	-	-	-	-	6	6	8	-	-	-	-	-

Table VIII (Cont'd)
Record of the Larvae of Rockfish (Sebastodes spp.), 1955

Sta.	Cruise and Month 5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
93.80	-	-	-	20				-	-	-	-	-
.85	-	-	-	-		-		-	-	-	-	-
.90	-	-	-			-		-	-	-	-	-
.95	-	-	-	-	3	-	-	-	-	-	-	-
97.30	240	66	16	2	18	13	16	-	-		-	
.32	54	444	18	6	13	6		-	-	3	-	
.35	-	-	-	-	3	3	9	-	-	-	-	-
.40		100	4	5	15			-	-		-	
.45	-	-	-	-	7		6	-	-	-	-	
.50		3		14	13	16		-	-		-	
.55	-	-	-	-	3	10	6	-	-	-	-	-
.60	-	-		12		-	3	-	-		-	-
.65	-	-	-	-	4	-		-	-	-	-	-
.70	-	-		6	7	-		-	-	-	-	-
.75	-	-	-	-	6	-		-	-	-	-	-
.80	-	-	-	3	4	-	6	-	-	-	-	-
.85	-	-	-	-	8	-	6	-	-	-	-	-
.90	-	-	-		4	-		-	-	-	-	-
100.29	82	164	170	34	10	10		-	-		-	
..30	79	53	91	25	10	20		-	-	6	-	46
.35	-	-	-	-		3	3	-	-	-	-	-
.40	9		10	34	17	3	2	-	-		-	
.45	-	-	-	-	12	6		-	-	-	-	-
.50			3	16		13		-	-		-	2
.55	-	-	-	-		10		-	-	-	-	-
.60	4	18	3		3	-		-	-		-	
.65	-	-	-	-		-		-	-	-	-	-
.70						-	3	-	-		-	
.75	-	-	-	-		-		-	-	-	-	-
.80						-	3	-	-		-	
.85	-	-	-	-	6	-		-	-	-	-	-
.90	-	-				-		-	-		-	-
103.30	159	191	68	74	12	22		-	-	8	-	2
.35	12	124	40	4	3	14	3	-	-	6	-	45
.40			9	8			3	-	-	7	-	
.45	-	-	-			12	13	-	-	-	-	-
.50					3			-	-	-	-	
.55	-	-	-	3	6			-	-	-	-	-
.60		3		1		9		-	-	-	-	
.65	-	-	-					-	-	-	-	-
.70	-	-						-	-	-	-	-

Table VIII (Cont'd)
Record of the Larvae of Rockfish (Sebastodes spp.), 1955

Sta.	Cruise and Month 5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
103.75	-	-	-		9			-	-	-	-	-
.80	-	-	-		3			-	-	-	-	-
.85	-	-	-	-				-	-	-	-	-
.90	-	-	-	-				-	-	-	-	-
107.32	145	89	81	29	26		3	-	-		-	24
.35	3	66	38	78	12			-	-	2	-	
.40	9		6	8		11	3	-	-		-	
.45	-	-	-	-	9	6		-	-	-	-	-
.50			4		3	3	3	-	-	-	-	
.55	-	-	-	-				-	-	-	-	-
.60								-	-	-	-	
.65	-	-	-	-				-	-	-	-	-
.70	-	-						-	-	-	-	-
.75	-	-	-	-				-	-	-	-	-
.80	-	-	-					-	-	-	-	-
.85	-	-	-	-				-	-	-	-	-
.90	-	-	-	-				-	-	-	-	-
110.33	246	212	358	47	45	5		-	-		-	37
.35	49	71	140	8	28	6		-	-		-	41
.40		16			19			-	-		-	
.45	-	-	-	-				-	-	-	-	-
.50							4	-	-	2	-	
.55	-	-	-	-		2	3	-	-	-	-	-
.60								-	-		-	
.65	-	-	-	-				-	-	-	-	-
.70	22			3				-	-		-	
.75	-	-	-	-				-	-	-	-	-
.80	6		9					-	-	3	-	6
.85	-	-	-	-				-	-	-	-	-
.90	-	-						-	-		-	-
113.30	500	291	122	12	10		5	-	-		-	206
.35	23	294	249	34				-	-	4	-	13
.40	14	15	25	53				-	-		-	3
.45	-	3	13					-	-	-	-	-
.50	6	4	16					-	-	-	-	
.55	-		7					-	-	-	-	-
.60			4	8				-	-	-	-	
.65	-	-	-	-				-	-	-	-	-
.70	-			18				-	-	-	-	
.75	-	-	-	-				-	-	-	-	-
.80	-	-	-					-	-	-	-	-

Table VIII (Cont'd)
Record of the Larvae of Rockfish (Sebastodes spp.), 1955

Sta.	Cruise and Month 5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
117.26	220	89	78		37	8	4	-	-		-	6
.30	168	47	119	10	25	6	3	-	-		-	
.35	32	151	11	16	16			-	-	7	-	3
.40	51	112	249	198	148	13		-	-		-	
.45	-	7	32	22	15	6		-	-	-	-	-
.50	16	6		7		7		-	-	-	-	
.55	-		8	144				-	-	-	-	-
.60	4		4	6				-	-	-	-	
.65	-	-	-	-				-	-	-	-	-
.70	-			109				-	-	-	-	
.75	-	-	-	-				-	-	-	-	-
.80	-	-	-					-	-	-	-	-
120.25	77	6			11			-	-		-	
.27	-	-	-	-		18	-	-	-		-	-
.30	119	17	38		9	13	33	-	-	4	-	
.35	18	37	4	15				-	-		-	
.40	9	11	11			2		-	-	-	-	
.45	31	2	39	84		30		-	-		-	3
.50			3	57		12		-	-		-	
.55	-		15	3	11			-	-	-	-	3
.60				7	-			-	-		-	
.65	-	-	-	11	-	-	-	-	-	-	-	-
.70					6			-	-	2	-	
.75	-	-	-		-	-	-	-	-	-	-	-
.80								-	-		-	-
.90		2		-	-	-	-	-	-		-	-
.100			3	-	-	-	-	-	-	-	-	-
123.37	212	100	148	92	N.Q.			-	-		-	8
.40	153	14	34	52	15	9		-	-	9	-	10
.45	6		24	11	14		9	-	-	-	-	-
.50	3		4	1			3	-	-		-	
.55	3		3			12	8	-	-	-	-	
.60	-	-	13		16			-	-		-	-
127.34	130	7	5	17	28			-	-	4	-	
.40	15	4	2		2	11		-	-		-	
.45		20			5			-	-	-	-	-
.50	3	3		2	6		3	-	-	3	-	3
.55		2					2	-	-	-	-	
.60	-	-	3					-	-		-	-
130.30						11		-	-		-	
.35		27	6	78		4		-	-		-	

Table VIII (Cont'd)
Record of the Larvae of Rockfish (Sebastodes spp.), 1955

Sta.	Cruise and Month 5501 Jan.	5502 Feb.	5503 Mar.	5504 Apr.	5505 May	5506 June	5507 July	5508 Aug.	5509 Sept.	5510 Oct.	5511 Nov.	5512 Dec.
130.40		3		17	25	3		-	-		-	
.50								-	-		-	
.55	-	-	-		-	-	-	-	-	-	-	-
.60								-	-		-	-
133.25		N.Q.	2			6		-	-		-	
.30	3	8	176		3			-	-		-	
.40			43		N.Q.	10	3	-	-	-	-	
.50	-	-						-	-	-	-	-
.60	-	-		-	-	-	-	-	-	-	-	-
137.23						73		-	-		-	
.30			6			7	8	-	-		-	
.40					6			-	-	-	-	
.50	-	-				2		-	-	-	-	-
.60	-	-		-	-	-	-	-	-	-	-	-
140.30				-	-	-	-	-	-	-	-	
.35			18	-	-	-	-	-	-	-	-	
.40				-	-	-	-	-	-	-	-	
.50	-	-		-	-	-	-	-	-	-	-	-
143.26				-	-	-	-	-	-	-	-	
.30				-	-	-	-	-	-	-	-	
.35				-	-	-	-	-	-	-	-	
.40	-	-		-	-	-	-	-	-	-	-	-
.50	-	-		-	-	-	-	-	-	-	-	-
147.20				-	-	-	-	-	-	-	-	
.25	3			-	-	-	-	-	-	-	-	
.30				-	-	-	-	-	-	-	-	
.40	-	-		-	-	-	-	-	-	-	-	-
150.19				-	-	-	-	-	-	-	-	
.25				-	-	-	-	-	-	-	-	
.30				-	-	-	-	-	-	-	-	
.40	-	-		-	-	-	-	-	-	-	-	-
153.16				-	-	-	-	-	-	-	-	-
.20				-	-	-	-	-	-	-	-	-
.30	N.Q.			-	-	-	-	-	-	-	-	-
.40	-	-		-	-	-	-	-	-	-	-	-
157.10				-	-	-	-	-	-	-	-	-
.20				-	-	-	-	-	-	-	-	-
.30		3		-	-	-	-	-	-	-	-	-
.40	-	-		-	-	-	-	-	-	-	-	-
Total	6281	6206	3653	3533	1895	1732	2676	-	140	461	1002	694

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