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ICHTHYOPLANKTON AND STATION DATA FOR MANTA (SURFACE) TOWS TAKEN ON CALIFORNIA COOPERATIVE OCEANIC FISHERIES INVESTIGATIONS SURVEY CRUISES IN 1985

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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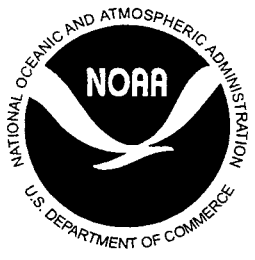

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National Oceanic and Atmospheric Administration
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Southwest Fisheries Science Center
8604 La Jolla Shores Drive
La Jolla, California, USA 92037

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U.S. DEPARTMENT OF COMMERCE
Donald L. Evans, Secretary
National Oceanic and Atmospheric Administration
Scott B. Gudes, Acting Under Secretary for Oceans and Atmosphere
National Marine Fisheries Service
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ABSTRACT

This report provides ichthyoplankton data and associated station and tow data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations (CalCOFI) cruises in 1985. It is the fourth report in a series that presents surface tow data for all biological-oceanographic CalCOFI surveys from 1977 to the present. A total of 224 net tow stations was occupied during four quarterly cruises over the core survey area which extended from Avila Beach to San Diego, California and seaward in a southwesterly direction to a maximum of approximately 330 n. mi. The most seaward station, 90.120, was approximately 400 n. mi. west of Punta Baja, Baja California, Mexico. A total of 193 Manta net tows was taken during 1985. The data for stations on which Manta tows were taken are listed in a series of four tables; the background, methodology, and information necessary for interpretation of the data are presented in an accompanying text. All pertinent station and tow data, including volumes of water filtered are listed in the first table. Another table lists, by station and month, standardized counts of each of the 63 larval fish categories identified from Manta tows taken on the survey. This series of reports makes the CalCOFI ichthyoplankton and station data available to all investigators and serves as a guide to the computer data base.

INTRODUCTION

This report, the fourth in a series of surface tow data reports, provides ichthyoplankton and associated station and Manta net tow data from California Cooperative Oceanic Fisheries Investigations (CalCOFI) joint biological-oceanographic survey cruises conducted in 1985. This program was initiated in 1949, under the sponsorship of the Marine Research Committee of the State of California, to study the population fluctuations of the Pacific sardine (*Sardinops sagax*) and the environmental factors that may play a role in these fluctuations. CalCOFI is a partnership among the Southwest Fisheries Science Center (SWFSC) of the National Marine Fisheries Service (NMFS), the Scripps Institution of Oceanography (SIO), and the California Department of Fish and Game (CDFG). NMFS and SIO supply ships and personnel to conduct the sea surveys, NMFS processes the plankton samples and analyzes the ichthyoplankton from them. SIO processes and analyzes hydrographic and biological samples and analyzes invertebrate groups from the plankton samples.

The boundaries, station placement, and sampling frequency for the CalCOFI surveys were based on the results of joint biological-oceanographic cruises conducted by NMFS and SIO during 1939–41. Originally, CalCOFI cruises were designed to collect sardine eggs and larvae in oblique net tows and hydrographic data associated with the tows over the entire areal and seasonal spawning range of the species. From 1951 to 1960 the surveys were annual with cruises conducted monthly. The survey area was occupied quarterly during 1961–1965 and in 1966 the surveys became triennial with monthly cruises. Beginning in 1985 annual surveys were resumed, with quarterly cruises occupying only the Southern California Bight region (see Hewitt 1988; Moser et al. 1993, 1994, 2001a for summaries of historical CalCOFI sampling effort). Neuston[1] sampling with the Manta net (Figure 1) was initiated in 1977-78. Station and ichthyoplankton data for oblique tows taken on the 1985 CalCOFI survey are published in Ambrose et al. (1999). Ahlstrom and Stevens (1976), Gruber et al. (1982) and Doyle (1992a, b) provided initial information

[1]Usage of the term "neuston" for surface-living marine organisms is controversial because it was applied originally to organisms associated with the surface film in freshwater habitats (Naumann 1917). Banse (1975) reviewed in detail the evolution of the usage of this term, a related term, "pleuston", and the various subdivisions of each. Neuston is now used by most workers in referring to the uppermost (upper ~10–20 cm) layer of the sea and to the assemblage of organisms that lives in that zone, either permanently or facultatively (Zaitsev 1970; Hempel and Weikert 1972; Peres 1982; Doyle 1992b). We accept this definition and use it interchangeably with the more general term "surface" (e.g., surface waters, surface zone, surface tow, surface assemblage).

on the distribution and abundance of surface ichthyoplankton in the northeastern Pacific.

Hydrographic and biological data from the 1985 CalCOFI survey were published by the Scripps Institution of Oceanography (Univ. of Calif., SIO 1985, 1986). All available records for Manta tows on the 1999 CalCOFI surveys were verified and edited to produce this data report. The CalCOFI ichthyoplankton data reports make CalCOFI ichthyoplankton and station data available to all investigators and serve as guides to the ichthyoplankton computer data base. They are the basic documents against which changes in the data base can be compared as it is modified to correct errors and update earlier identifications. Citations for previous reports in this series are:

Survey	Report
1977-78	Moser et al. 2001b
1980-81	Ambrose et al. 2002
1984	Charter et al. 2002

SAMPLING AREA AND PATTERN

The 1985 CalCOFI survey consisted of four quarterly cruises on which a total of 193 Manta net tows was taken at the 224 standard CalCOFI net tow stations occupied during the survey (Table 1; Figures 2–3). Three vessels were employed on the survey, the NOAA vessels RV *David Starr Jordan* and RV *McArthur*, and the SIO vessel RV *New Horizon*. Dates and numbers of stations sampled with the Manta net in 1985 (Figures 2 and 3) are summarized below:

8502, RV *McArthur*, 46 stations, February 19–March 4;

8505, RV *David Starr Jordan*, 40 stations, May 1–18;

8508, RV *New Horizon*, 59 stations, August 9–22;

8511, RV *New Horizon*, 48 stations, November 1–13.

The survey area extended from Avila Beach to San Diego, California and seaward on six survey lines to approximately 120–330 n. mi. (Figures 2 and 3). The most seaward station, 90.0 120.0, was approximately 400 n. mi. west of Punta Baja, Baja California, Mexico. On the 1985 and 1986 CalCOFI surveys, offshore coverage was somewhat different from the standard pattern of subsequent years when lines 76.7 and 80.0 extended to station 100.0, lines 83.3 and 86.7 to station 110.0, and lines 90.0 and 93.3 to station 120.0 (Moser et al. 2001a). In 1985, line 76.7 extended to station 80.0 on the first two cruises of the year and to station 120.0 on the last two cruises (Figures 2 and 3). Coverage on line 80.0 extended to station 120.0, except on cruise 8505, when it stopped at station 90.0. Lines 83.3 and 86.7 extended seaward to station 70.0 and lines 90.0 and 93.3 extended to station 120.0 on this pattern Offshore coverage of Manta net tows on these survey lines varied between cruises because Manta net tows were not taken on all stations (Figures 2 and 3).

SAMPLING GEAR AND METHODS

Plankton tows were made with a modified version of the Manta net originally designed by Brown and Cheng (1981). It consists of a rectangular mouth 15.5 cm deep and 86 cm wide attached to a frame that supports square lateral extensions covered with plywood and urethane foam (Figure 1). These extensions stabilize the net when it is towed and keep the top of the net at the sea surface. The net is constructed of

0.505 mm nylon mesh. The towing bridle is asymmetrical with one side longer than the other; when the net is towed this bridle arrangement forces the mouth away from the ship at a slight angle. A General Oceanics flowmeter was suspended across the center of the net mouth to measure the amount of water filtered during each tow. At each Manta tow station the tow line from the bridle was attached to the hydrographic wire and then lowered to slightly below the surface of the water before the net was deployed. The net was towed at a ship speed of 1.0–2.0 knots for 15 minutes. Samples were preserved in 5% buffered formalin and returned to the plankton sorting laboratory at the SWFSC at the end of the cruise.

LABORATORY PROCEDURES

The ichthyoplankton was removed from the invertebrate portion of each sample and bottled separately in 3% buffered formalin. In addition to fish eggs and larvae, some samples contained surface-living juvenile, and occasionally adult, stages of fishes; these were removed and bottled separately in 3% formalin. The volume of water filtered by each net was computed from the flowmeter readings. A "standard haul factor" is used for oblique CalCOFI net tows to calculate the total number of ichthyoplankters of a taxon per unit surface area (Kramer et al 1972; Smith and Richardson 1977; Moser et al. 1993). A requirement for this is the entire depth distribution of the taxon must be encompassed during the tow. The Manta net samples only the upper ~15.5 cm of the water column and most, if not all, ichthyoplankton taxa that inhabit the surface zone have a vertical range > 15.5 cm. Even taxa associated with the immediate surface layer may range deeper than 15.5 cm as a result of diel migratory patterns or vertical mixing (Hempel and Weikert 1972; Doyle 1992b). Calculation of total numbers of eggs or larvae per unit surface area from Manta net samples awaits accurate information on the fine-scale vertical distribution of these organisms in the upper region of the water column. Even if there are few species whose larvae are restricted to the upper 15.5 cm of the water column, the time series of Manta samples provides a useful index of relative abundance for species whose larvae appear in these samples. In this report we express quantities of eggs or larvae in each sample as unadjusted counts or as numbers of eggs or larvae per unit volume of water filtered by the net.

IDENTIFICATION

Constituent taxa in the samples were identified by the senior author. Early ontogenetic stages of fishes are difficult to identify; most identifications were based on descriptions of ontogenetic series of fishes in published identification guides to early stages of fishes in the northeastern Pacific (Matarese et al. 1989; Moser 1996). Larval specimens that could not be identified with these guides were identified by establishing ontogenetic series on the basis of morphology, meristics, and pigmentation, and then linking these series through overlapping features to known metamorphic, juvenile, or adult stages (Miller and Lea 1972; Eschmeyer et al. 1983; Powles and Markle 1984). Except for damaged specimens, most of the larvae and juvenile/adults taken in the surface tows could be identified to species. A total of 63 larval fish categories (including the disintegrated category) was identified: 54 to species and 8 to genus.

The following taxonomic categories in Tables 2–4 require special explanation:

Nannobrachium – Zahuranec (2000) moved the subgroup of *Lampanyctus* characterized by small or absent pectoral fins in adults to the genus *Nannobrachium*; two *Nannobrachium* species, *N. ritteri* (formerly *L. ritteri*) and *N. regale* (formerly *L. regalis*), occur commonly in the present CalCOFI survey pattern; larvae of these species > ~ 5 mm have been identified in oblique tow samples since 1954; beginning in 1985, larvae of two other species, *N. bristori* and *N. hawaiiensis*, have been identified and included in the CalCOFI data base for oblique tows; in previous oblique tow data reports these were referred to as *Lampanyctus* "niger" and *Lampanyctus* "no pectorals", respectively (see Moser 1996).

Vinciguerria lucetia – V. lucetia, an eastern tropical Pacific species, is common in the present CalCOFI region whereas the central water mass species *V. poweriae* is rarely encountered; a small percentage of *V. poweriae* larvae may have been included in the *V. lucetia* category because of the difficulty in separating early larvae of the two species.

SPECIES SUMMARY

Of the five most abundant larvae, northern anchovy (*Engraulis mordax*) ranked first in abundance with 38.7% of the total fish larvae and second in occurrence with larvae collected in 33.7% of the total samples. (Tables 2 and 3). They were similar in abundance to the second most abundant species, Pacific sardine (*Sardinops sagax*) which had 37.4% of the total larvae and ranked fourth in occurrence (9.8% of the total samples). The rockfish genus *Sebastes* was the third most abundant taxon with 9.9% of the total larvae and ranked third in frequency of occurrence (17.1% of the samples). Blacksmith (*Chromis punctipinnis*) ranked fourth in abundance (2.9% of total larvae) and 12th in total occurrences (3.1% of the samples). Pacific saury (*Cololabis saira*) ranked fifth in abundance (2.8% of total larvae) and first in total occurrences (37.8% of the samples). The next five most abundant taxa were jacksmelt *Atherinopsis californiensis* (1.6% of total larvae), Pacific mackerel *Scomber japonicus* (1.2%), unidentified larvae of the seabass genus *Paralabrax* (1.1%), mussel blenny *Hypsoblennius jenkinsi* (1.1%), and cabezon *Scorpaenichthys marmoratus* (1.0%). These species ranked tied for 6th,11th, tied for 13th, 7th, and tied for 4th in frequency of occurrence, respectively. The ten most abundant taxa comprised 97.7% of all the larvae collected in Manta net tows on CalCOFI cruises in 1985. The remaining 2.3% was distributed among 53 other taxa. Of the ten most abundant taxa, half were coastal demersal taxa, four were coastal pelagic species, and one was epipelagic.

In contrast to the surface collections, among the 140 taxa collected in the oblique tows during the 1985 survey, northern anchovy also ranked first in abundance (38.7% of the total), followed by Pacific hake *Merluccius productus* (21.5%), and California smoothtongue *Leuroglossus stilbius* (7.2%). Jacksmelt were not collected in the oblique samples and the combined abundances of blacksmith, Pacific saury, and jacksmelt represented only 0.2% of the total larvae (Ambrose et al. 1999).

EXPLANATION OF TABLES

Table 1. This table lists for each tow the pertinent station and tow data, the volume of water filtered, and the total number of fish eggs and larvae for ichthyoplankton stations occupied during the 1985 CalCOFI survey. Cruises are designated by a six character alphanumeric code; the first two digits indicate the year and the second two the month, followed by the ship code, JD (*David Starr Jordan*), NH (*New Horizon*), or M4 (*McArthur*). Within each cruise the data are listed in order of increasing line and station number (southerly and seaward directions); the order of station occupancy is shown on the station charts (Figures 2 and 3). Stations are designated by two groups of numbers; the first set indicates the line and decimal fraction and the second set indicates the station and decimal fraction. Time is listed as Pacific Standard Time at the start of each tow in 24-hour designation. The values for total fish eggs and larvae are raw counts (unadjusted for volume of water filtered). The listings for station latitude and longitude in this table may differ from values given for the same station in the SIO data reports, reflecting the slight difference in position of the net tow and hydrocast.

Table 2. Pooled occurrences of all larval fish taxa taken in Manta nets on the RV *David Starr Jordan*, RV *New Horizon*, and RV *McArthur* during the 1985 CalCOFI survey. Taxa are listed in rank order.

Table 3. Pooled counts (unadjusted for volume of water filtered) of all larval fish taxa taken in Manta net

tows on the the RV *David Starr Jordan*, RV *New Horizon* , and RV *McArthur* during the 1985 CalCOFI survey. Taxa are listed in rank order.

Table 4. Numbers of fish larvae for each taxon taken in Manta net tows on the RV *David Starr Jordan*, RV *New Horizon* , and RV *McArthur* during the 1985 CalCOFI survey. Numbers of larvae are listed as number per 100 m^3 of water filtered. Orders and families are listed in phylogenetic sequence (Eschmeyer 1998); other taxa are listed alphabetically.

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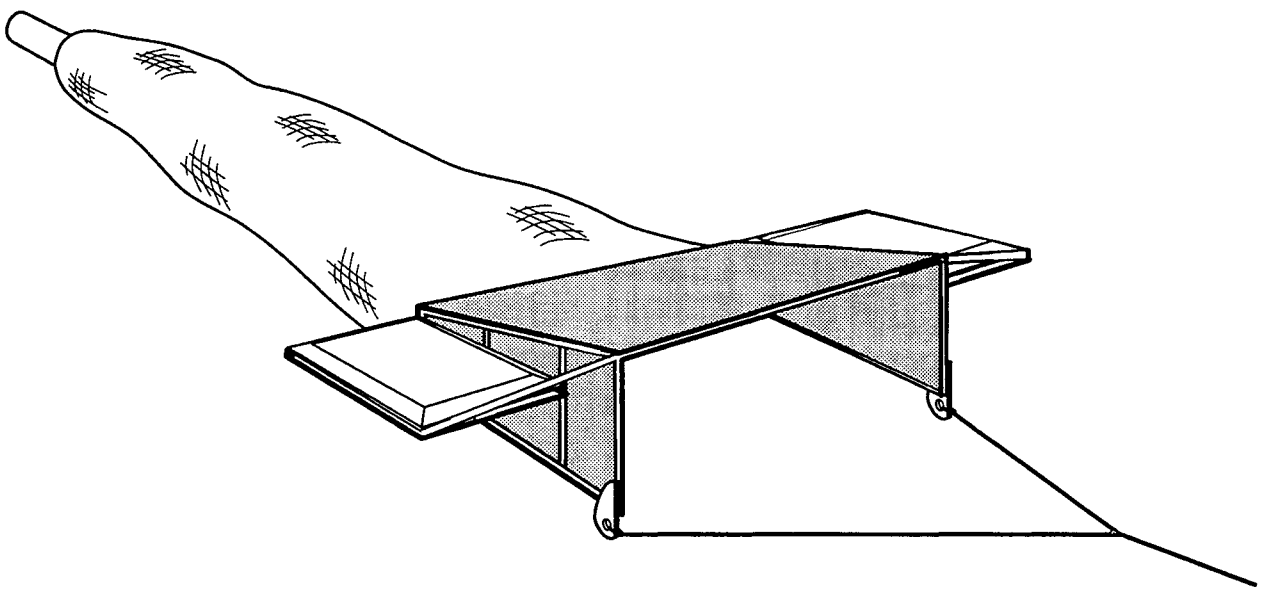

Figure 1. Diagram of the Manta net used on CalCOFI surveys.

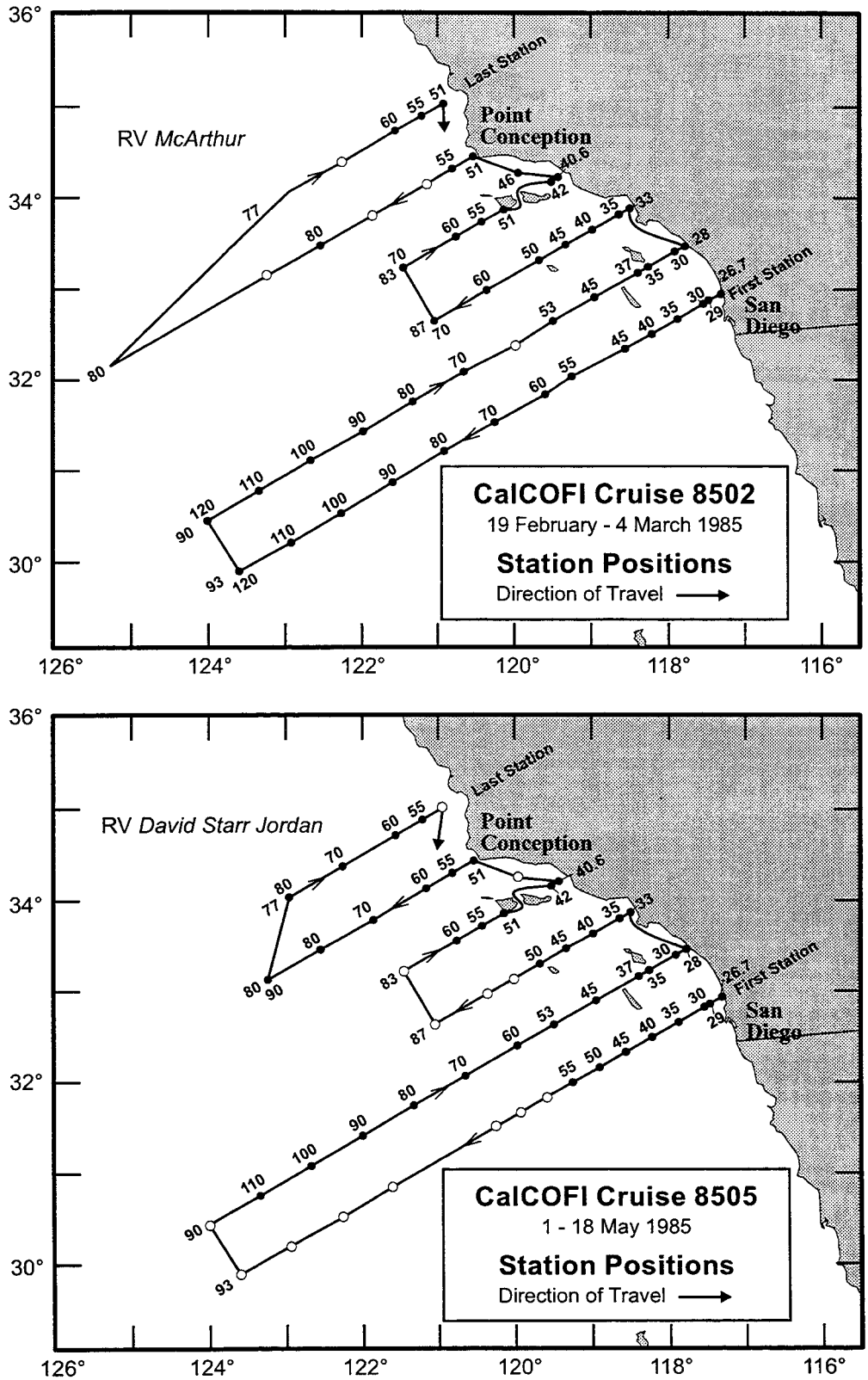

Figure 2. Stations and cruise tracks for CalCOFI cruises 8502 (above) and 8505 (below). Dots indicate stations where Manta and oblique tows were taken; open circles indicate stations where only oblique tows were taken. A Manta tow without an accompanying oblique tow was taken on cruise 8505 at station 80.0 51.0.

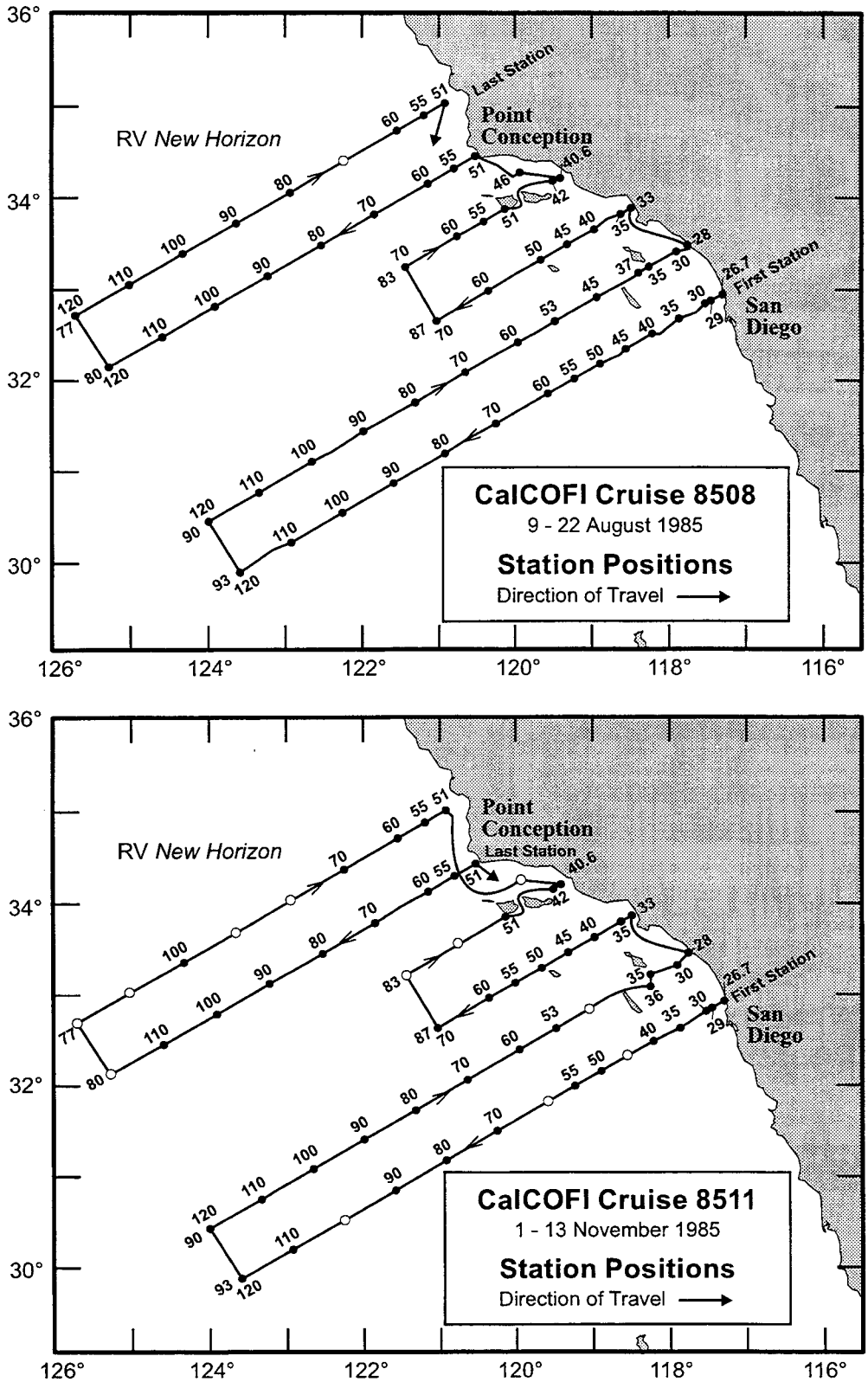

Figure 3. Stations and cruise tracks for CalCOFI cruises 8508 (above) and 8511 (below). Symbols as in Figure 2.

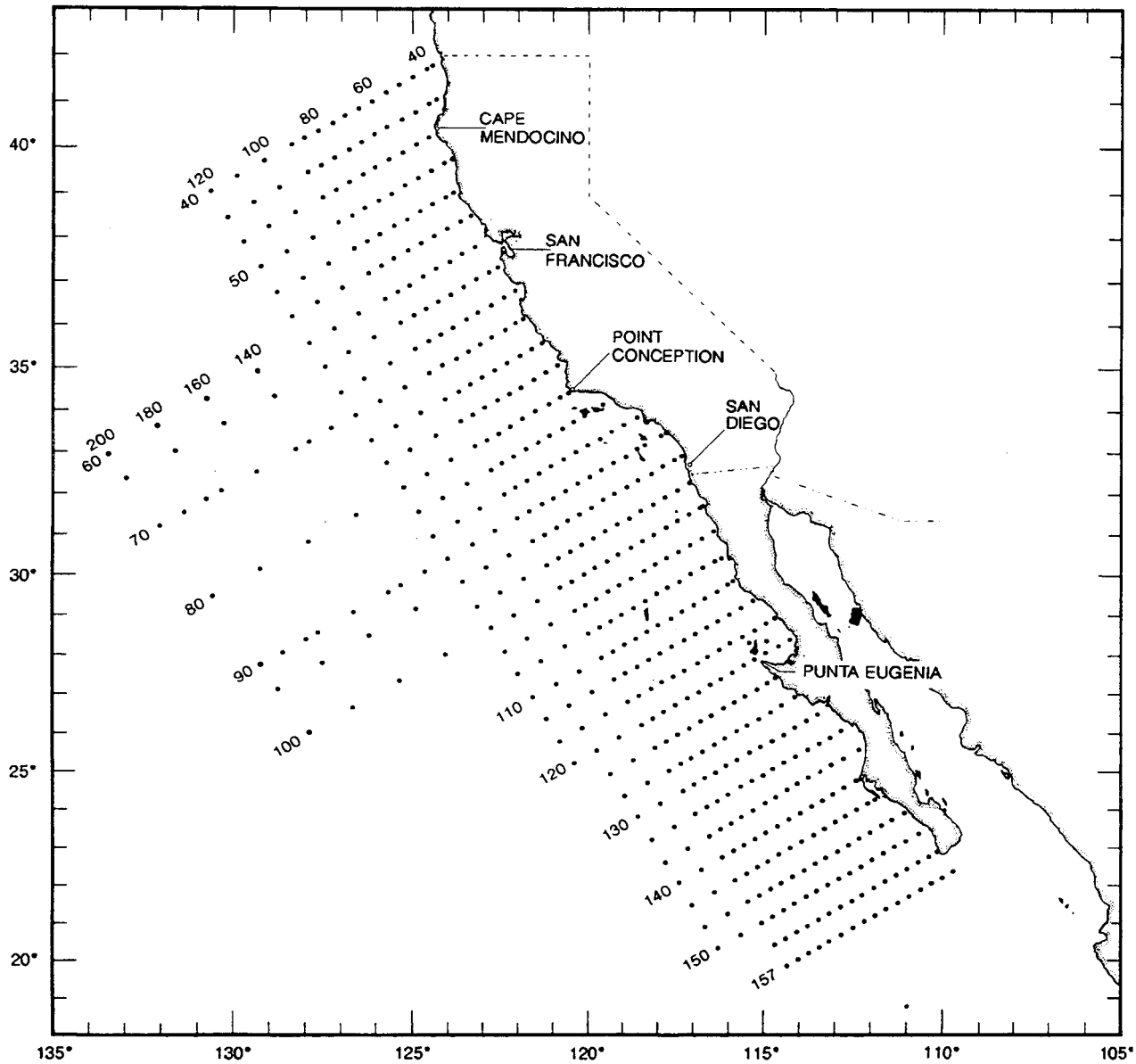

Figure 4. The basic station plan for CalCOFI cruises from 1950 - 1984.

TABLE 1. Station and plankton tow data for Manta tows taken on the 1985 CalCOFI survey. Numbers of fish eggs and larvae are raw counts, unadjusted for volume (cubic meters) of water filtered.

CalCOFI Cruise 8502

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
76.7	51.0	35	01.3	120	55.0	M4	85	03	04	1907	76	57	9
76.7	55.0	34	53.2	121	12.2	M4	85	03	04	1530	73	1	9
76.7	60.0	34	43.6	121	33.2	M4	85	03	04	1120	79	9	51
80.0	51.0	34	27.0	120	31.5	M4	85	02	28	1815	64	974	7
80.0	55.0	34	19.1	120	48.0	M4	85	02	28	2150	66	17	285
80.0	80.0	33	29.0	122	31.9	M4	85	03	01	1140	67	0	0
82.0	46.0	34	16.4	119	56.3	M4	85	02	28	1230	53	1	7
83.3	40.6	34	13.5	119	24.6	M4	85	02	28	0742	67	2799	111
83.3	42.0	34	10.6	119	30.4	M4	85	02	28	0525	85	237	720
83.3	51.0	33	52.5	120	07.7	M4	85	02	28	0020	65	113	670
83.3	55.0	33	44.6	120	24.7	M4	85	02	27	2151	78	124	71
83.3	60.0	33	34.9	120	45.0	M4	85	02	27	1820	68	0	70
83.3	70.0	33	14.4	121	26.6	M4	85	02	27	1240	57	1	262
86.7	33.0	33	53.3	118	29.3	M4	85	02	26	0648	49	185	3136
86.7	35.0	33	49.4	118	37.7	M4	85	02	26	0914	62	2	48
86.7	40.0	33	39.3	118	58.4	M4	85	02	26	1310	65	1	256
86.7	45.0	33	29.4	119	19.0	M4	85	02	26	1645	69	5	732
86.7	50.0	33	19.4	119	39.9	M4	85	02	26	1945	70	30	193
86.7	60.0	32	59.6	120	20.8	M4	85	02	27	0125	44	3	55
86.7	70.0	32	39.3	121	02.0	M4	85	02	27	0630	65	1	10
90.0	28.0	33	28.6	117	46.5	M4	85	02	26	0110	76	19	34
90.0	30.0	33	25.1	117	54.6	M4	85	02	25	2335	84	21	3000
90.0	35.0	33	15.2	118	14.9	M4	85	02	25	1941	53	42	5802
90.0	37.0	33	11.0	118	23.2	M4	85	02	25	1719	39	5	69
90.0	45.0	32	55.1	118	56.4	M4	85	02	25	1022	60	3	208
90.0	53.0	32	39.2	119	28.9	M4	85	02	25	0710	85	2	83
90.0	70.0	32	05.2	120	38.7	M4	85	02	24	2138	53	1	25
90.0	80.0	31	45.2	121	19.0	M4	85	02	24	1547	90	1	0
90.0	90.0	31	25.3	121	58.2	M4	85	02	24	1004	38	0	4
90.0	100.0	31	05.6	122	39.6	M4	85	02	24	0300	75	7	150
90.0	110.0	30	45.1	123	19.9	M4	85	02	23	2113	61	9	23
90.0	120.0	30	25.0	124	00.0	M4	85	02	23	1600	93	0	3
93.3	26.7	32	57.2	117	18.1	M4	85	02	19	1340	69	57	6
93.3	29.0	32	53.2	117	28.0	M4	85	02	19	1707	67	0	0
93.3	30.0	32	50.7	117	32.0	M4	85	02	19	2019	42	23	178
93.3	35.0	32	40.5	117	52.5	M4	85	02	20	0105	63	2	130
93.3	40.0	32	30.4	118	12.3	M4	85	02	20	0445	41	5	230
93.3	45.0	32	20.7	118	33.2	M4	85	02	21	1205	97	1	256
93.3	55.0	32	02.1	119	14.2	M4	85	02	21	1755	126	8	487
93.3	60.0	31	49.9	119	35.0	M4	85	02	21	2151	64	2	267
93.3	70.0	31	31.4	120	14.5	M4	85	02	22	0340	53	0	68
93.3	80.0	31	12.0	120	54.1	M4	85	02	22	0857	96	0	1
93.3	90.0	30	50.8	121	35.0	M4	85	02	22	1630	95	0	45
93.3	100.0	30	30.1	122	15.5	M4	85	02	22	2233	62	1	10
93.3	110.0	30	10.1	122	54.7	M4	85	02	23	0335	44	2	6
93.3	120.0	29	50.6	123	35.2	M4	85	02	23	1012	81	1	6

TABLE 1. (cont.)

CalCOFI Cruise 8505

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
76.7	55.0	34	53.3	121	11.9	JD	85	05	18	0925	67	1	335
76.7	60.0	34	43.3	121	33.0	JD	85	05	18	0529	75	2	49
76.7	70.0	34	23.2	122	14.9	JD	85	05	17	2330	78	0	11
76.7	80.0	34	03.2	122	56.5	JD	85	05	17	1815	93	0	91
80.0	51.0	34	27.1	120	31.5	JD	85	05	16	1157	79	1	44
80.0	55.0	34	19.0	120	48.2	JD	85	05	16	1543	105	0	29
80.0	60.0	34	09.0	121	09.0	JD	85	05	16	1935	100	13	70
80.0	70.0	33	48.7	121	50.5	JD	85	05	17	0105	86	16	39
80.0	80.0	33	29.0	122	32.0	JD	85	05	17	0616	93	9	27
80.0	90.0	33	09.0	123	13.3	JD	85	05	17	1138	88	0	4
83.3	40.6	34	13.5	119	24.6	JD	85	05	14	1110	102	0	1170
83.3	42.0	34	10.5	119	30.6	JD	85	05	14	0853	72	2	815
83.3	51.0	33	52.7	120	08.0	JD	85	05	14	0245	83	22	1065
83.3	55.0	33	44.6	120	24.7	JD	85	05	13	2300	74	7	8
83.3	60.0	33	34.7	120	45.2	JD	85	05	13	1838	93	0	9
86.7	33.0	33	53.4	118	29.4	JD	85	05	11	1722	86	0	22
86.7	35.0	33	49.4	118	37.9	JD	85	05	11	1939	78	44	62
86.7	40.0	33	39.3	118	58.5	JD	85	05	11	2341	73	35	4489
86.7	45.0	33	29.4	119	19.1	JD	85	05	12	0412	75	1	55
86.7	50.0	33	19.4	119	39.8	JD	85	05	12	0827	76	7	29
90.0	28.0	33	29.1	117	46.2	JD	85	05	07	2100	101	47	3856
90.0	30.0	33	25.2	117	54.4	JD	85	05	07	1852	106	9	2186
90.0	35.0	33	15.1	118	15.0	JD	85	05	07	1410	97	1	176
90.0	37.0	33	11.2	118	23.3	JD	85	05	07	1123	90	1	899
90.0	45.0	32	55.1	118	56.0	JD	85	05	07	0453	101	14	3
90.0	53.0	32	39.1	119	28.9	JD	85	05	06	2246	78	2	8
90.0	60.0	32	25.2	119	57.7	JD	85	05	06	1749	99	3	443
90.0	70.0	32	05.0	120	38.3	JD	85	05	06	1048	94	1	42
90.0	80.0	31	45.3	121	19.0	JD	85	05	06	0407	91	6	11
90.0	90.0	31	25.1	121	59.3	JD	85	05	05	2150	79	1	0
90.0	100.0	31	05.1	122	39.7	JD	85	05	05	1602	93	11	17
90.0	110.0	30	44.9	123	19.8	JD	85	05	05	0926	76	6	7
93.3	26.7	32	57.4	117	18.2	JD	85	04	30	2355	119	34	819
93.3	29.0	32	52.8	117	27.9	JD	85	05	01	0437	105	3	1960
93.3	30.0	32	50.8	117	32.0	JD	85	05	01	0810	105	41	2205
93.3	35.0	32	40.8	117	52.4	JD	85	05	01	1605	91	4	5976
93.3	40.0	32	30.7	118	12.8	JD	85	05	01	2028	86	16	69
93.3	45.0	32	20.8	118	33.3	JD	85	05	02	0125	96	2	1
93.3	50.0	32	10.7	118	53.5	JD	85	05	02	2126	68	8	0
93.3	55.0	32	00.7	119	14.0	JD	85	05	03	0213	86	2	1

CalCOFI Cruise 8508

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
76.7	51.0	35	01.3	120	55.2	NH	85	08	22	0434	85	23	1
76.7	55.0	34	53.3	121	12.0	NH	85	08	22	0050	82	2	0
76.7	60.0	34	43.4	121	33.0	NH	85	08	21	2112	69	3	2
76.7	80.0	34	03.2	122	56.4	NH	85	08	21	0921	100	2	5
76.7	90.0	33	43.4	123	38.1	NH	85	08	21	0358	90	9	0

TABLE 1. (cont.) CalCOFI Cruise 8508 (cont.)

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
76.7	100.0	33	23.3	124	19.6	NH	85	08	20	2220	88	1	1
76.7	110.0	33	03.4	125	00.7	NH	85	08	20	1629	88	2	1
76.7	120.0	32	43.3	125	41.6	NH	85	08	20	1030	88	4	5
80.0	51.0	34	27.0	120	31.5	NH	85	08	18	1348	103	9	110
80.0	55.0	34	18.9	120	48.2	NH	85	08	18	1725	82	2	19
80.0	60.0	34	09.0	121	09.0	NH	85	08	18	2116	96	14	19
80.0	70.0	33	49.1	121	50.6	NH	85	08	19	0252	65	0	5
80.0	80.0	33	29.0	122	32.0	NH	85	08	19	0810	101	2	2
80.0	90.0	33	08.9	123	13.4	NH	85	08	19	1330	84	2	7
80.0	100.0	32	49.0	123	54.5	NH	85	08	19	1900	88	0	3
80.0	110.0	32	29.0	124	35.3	NH	85	08	20	0011	86	0	22
80.0	120.0	32	09.0	125	16.1	NH	85	08	20	0524	79	9	4
82.0	46.0	34	16.2	119	56.3	NH	85	08	18	0734	70	11	82
83.3	40.6	34	12.6	119	24.9	NH	85	08	18	0344	95	4229	1150
83.3	42.0	34	10.7	119	30.5	NH	85	08	18	0208	115	451	1603
83.3	51.0	33	52.7	120	08.0	NH	85	08	17	2040	128	70	1470
83.3	55.0	33	44.7	120	24.6	NH	85	08	17	1750	91	0	5
83.3	60.0	33	34.8	120	45.6	NH	85	08	17	1328	98	2	5
83.3	70.0	33	14.7	121	26.6	NH	85	08	17	0727	80	0	2
86.7	33.0	33	53.4	118	29.4	NH	85	08	15	2140	79	14	501
86.7	35.0	33	49.4	118	37.6	NH	85	08	16	0025	62	7	4
86.7	40.0	33	39.4	118	58.5	NH	85	08	16	0555	68	1	135
86.7	45.0	33	29.4	119	19.3	NH	85	08	16	1035	74	0	51
86.7	50.0	33	19.5	119	39.8	NH	85	08	16	1356	116	1	143
86.7	60.0	32	59.3	120	21.0	NH	85	08	16	2028	88	9	8
86.7	70.0	32	39.4	121	02.0	NH	85	08	17	0205	97	3	18
90.0	28.0	33	29.2	117	46.2	NH	85	08	15	1625	105	0	244
90.0	30.0	33	25.0	117	54.4	NH	85	08	15	1258	102	0	18
90.0	35.0	33	15.1	118	15.3	NH	85	08	15	0911	91	10	452
90.0	37.0	33	11.1	118	23.4	NH	85	08	15	0655	100	13	342
90.0	45.0	32	55.0	118	56.3	NH	85	08	15	0015	65	0	54
90.0	53.0	32	39.1	119	28.9	NH	85	08	14	1629	98	1	15
90.0	60.0	32	25.1	119	57.6	NH	85	08	14	0905	65	0	25
90.0	70.0	32	05.3	120	39.3	NH	85	08	14	0247	75	9	46
90.0	80.0	31	45.1	121	18.8	NH	85	08	13	2115	56	5	95
90.0	90.0	31	25.9	121	59.0	NH	85	08	13	1543	94	0	260
90.0	100.0	31	05.3	122	39.6	NH	85	08	13	0915	93	0	666
90.0	110.0	30	44.5	123	20.5	NH	85	08	13	0400	86	0	31
90.0	120.0	30	25.1	123	59.6	NH	85	08	12	2209	80	0	174
93.3	26.7	32	56.8	117	18.5	NH	85	08	09	1154	86	2	236
93.3	29.0	32	52.7	117	27.9	NH	85	08	09	1528	110	0	2
93.3	30.0	32	50.9	117	32.1	NH	85	08	09	1820	100	1	0
93.3	35.0	32	41.0	117	52.4	NH	85	08	09	2357	67	2	7
93.3	40.0	32	31.0	118	12.8	NH	85	08	10	0715	116	1	38
93.3	45.0	32	20.8	118	33.3	NH	85	08	10	1110	95	2	160
93.3	50.0	32	10.8	118	53.6	NH	85	08	10	1702	102	3	53
93.3	55.0	32	00.9	119	13.9	NH	85	08	10	2313	82	5	175
93.3	60.0	31	50.9	119	34.4	NH	85	08	11	0300	64	8	1
93.3	70.0	31	30.8	120	14.8	NH	85	08	11	0835	91	1	22
93.3	80.0	31	10.7	120	55.2	NH	85	08	11	1527	96	1	615

TABLE 1. (cont.) CalCOFI Cruise 8508 (cont.)

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
93.3	90.0	30	50.8	121	35.5	NH	85	08	11	2112	72	1	25
93.3	100.0	30	30.9	122	15.6	NH	85	08	12	0254	81	14	82
93.3	110.0	30	10.9	122	55.4	NH	85	08	12	0915	81	3	19
93.3	120.0	29	50.8	123	35.3	NH	85	08	12	1617	95	0	12

CalCOFI Cruise 8511

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
76.7	51.0	35	01.3	120	55.3	NH	85	11	10	0245	90	10	7
76.7	55.0	34	53.3	121	11.9	NH	85	11	10	0624	88	4	0
76.7	60.0	34	43.3	121	32.9	NH	85	11	10	1051	109	0	0
76.7	70.0	34	23.2	122	14.8	NH	85	11	10	1641	86	1	1
76.7	100.0	33	23.3	124	19.5	NH	85	11	11	0945	96	5	2
80.0	51.0	34	27.0	120	31.4	NH	85	11	13	2036	97	163	312
80.0	55.0	34	19.0	120	48.2	NH	85	11	13	1757	69	27	2
80.0	60.0	34	09.0	121	09.1	NH	85	11	13	1405	89	1	47
80.0	70.0	33	49.0	121	50.6	NH	85	11	13	0802	99	5	0
80.0	80.0	33	29.0	122	31.9	NH	85	11	13	0255	26	1	1
80.0	90.0	33	09.1	123	13.1	NH	85	11	12	2122	105	1	4
80.0	100.0	32	48.9	123	54.4	NH	85	11	12	1610	90	3	5
80.0	110.0	32	29.0	124	35.3	NH	85	11	12	1009	87	1	1
83.3	40.6	34	13.5	119	24.7	NH	85	11	09	1355	70	1	1361
83.3	42.0	34	10.6	119	30.5	NH	85	11	09	1206	106	0	7
83.3	51.0	33	52.7	120	08.0	NH	85	11	09	0530	80	13	58
86.7	33.0	33	53.4	118	29.4	NH	85	11	07	0709	82	1	403
86.7	35.0	33	49.4	118	37.7	NH	85	11	07	0938	91	1	118
86.7	40.0	33	39.3	118	58.6	NH	85	11	07	1333	83	0	78
86.7	45.0	33	29.4	119	19.2	NH	85	11	07	1731	91	5	6
86.7	50.0	33	19.3	119	39.9	NH	85	11	07	2033	103	2	1
86.7	55.0	33	09.5	120	00.5	NH	85	11	08	0001	106	0	0
86.7	60.0	32	59.5	120	21.1	NH	85	11	08	0336	85	0	5
86.7	70.0	32	39.5	121	02.0	NH	85	11	08	0925	101	0	0
90.0	28.0	33	29.1	117	46.1	NH	85	11	07	0140	56	3	77
90.0	30.0	33	21.1	117	54.4	NH	85	11	06	2345	85	45	54
90.0	35.0	33	15.1	118	15.0	NH	85	11	06	1956	65	13	0
90.0	53.0	32	39.3	119	28.9	NH	85	11	06	0311	44	0	0
90.0	60.0	32	25.2	119	57.5	NH	85	11	05	2225	97	13	3
90.0	70.0	32	05.1	120	38.4	NH	85	11	05	1655	88	7	1
90.0	80.0	31	44.8	121	19.4	NH	85	11	05	1101	82	4	1
90.0	90.0	31	25.1	121	59.6	NH	85	11	05	0526	78	20	3
90.0	100.0	31	05.3	122	39.6	NH	85	11	04	2335	103	17	12
90.0	110.0	30	45.1	123	19.9	NH	85	11	04	1805	83	27	4
90.0	120.0	30	25.1	124	00.0	NH	85	11	04	1221	64	1	5
90.6	36.0	33	07.2	118	15.0	NH	85	11	06	1739	80	40	1
93.3	26.7	32	57.4	117	18.2	NH	85	11	01	1225	57	3	5
93.3	29.0	32	52.8	117	27.9	NH	85	11	01	1527	36	0	1256
93.3	30.0	32	50.6	117	32.1	NH	85	11	01	1813	84	15	54
93.3	35.0	32	39.4	117	52.3	NH	85	11	01	2233	101	0	134

TABLE 1. (cont.) CalCOFI Cruise 8511 (cont.)

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
93.3	40.0	32	30.9	118	12.9	NH	85	11	02	0218	43	0	19
93.3	50.0	32	10.8	118	53.6	NH	85	11	02	1035	88	0	36
93.3	55.0	32	00.9	119	14.0	NH	85	11	02	1530	72	1	6
93.3	70.0	31	30.8	120	14.8	NH	85	11	03	0040	61	2	6
93.3	80.0	31	11.0	120	55.2	NH	85	11	03	0635	97	2	20
93.3	90.0	30	50.9	121	35.4	NH	85	11	03	1233	66	1	14
93.3	110.0	30	10.7	122	55.5	NH	85	11	04	0032	50	14	6
93.3	120.0	29	50.9	123	35.0	NH	85	11	04	0622	79	14	39

TABLE 2. Pooled occurrences of fish larvae taken in Manta tows on the 1985 CalCOFI survey.

Rank	Taxon	Occurrences
1	*Cololabis saira*	73
2	*Engraulis mordax*	65
3	*Sebastes* spp.	33
4	*Sardinops sagax*	19
4	*Scorpaenichthys marmoratus*	19
6	*Atherinopsis californiensis*	14
7	*Hypsoblennius jenkinsi*	12
8	*Medialuna californiensis*	9
8	*Cheilopogon* spp.	9
10	*Sebastes diploproa*	8
11	*Scomber japonicus*	7
12	*Chromis punctipinnis*	6
13	*Paralabrax* spp.	4
13	*Pleuronichthys coenosus*	4
13	*Stenobrachius leucopsarus*	4
13	*Sphyraena argentea*	4
13	*Trachurus symmetricus*	4
13	*Ceratoscopelus townsendi*	4
19	*Aristostomias scintillans*	3
19	*Oxyjulis californica*	3
19	*Halichoeres semicinctus*	3
19	*Hypsoblennius* spp.	3
19	*Hexagrammos decagrammus*	3
19	*Neoclinus* spp.	3
25	*Sebastes aurora*	2
25	*Sebastes jordani*	2
25	*Anoplopoma fimbria*	2
25	*Sternoptyx* spp.	2
25	Disintegrated fish larvae	2
25	*Semicossyphus pulcher*	2
25	*Genyonemus lineatus*	2
32	*Bathophilus flemingi*	1
32	*Merluccius productus*	1
32	*Triphoturus mexicanus*	1
32	*Vinciguerria lucetia*	1
32	*Cyclothone signata*	1
32	*Stomias atriventer*	1
32	*Cyclothone* spp.	1
32	*Ophidion scrippsae*	1
32	*Brosmophycis marginata*	1
32	*Caulophryne pelagica*	1
32	*Leuroglossus stilbius*	1
32	*Nannobrachium ritteri*	1
32	*Chilara taylori*	1
32	*Rathbunella alleni*	1
32	*Pleuronichthys decurrens*	1
32	*Citharichthys stigmaeus*	1
32	*Citharichthys sordidus*	1
32	*Peprilus simillimus*	1

TABLE 2. (cont.)

Rank	Taxon	Occurrences
32	*Tetragonurus cuvieri*	1
32	*Coryphopterus nicholsii*	1
32	*Hypsoblennius gilberti*	1
32	*Oxylebius pictus*	1
32	*Neoclinus blanchardi*	1
32	*Fodiator acutus*	1
32	*Hypsypops rubicundus*	1
32	*Girella nigricans*	1
32	*Seriphus politus*	1
32	*Clinocottus analis*	1
32	*Ophiodon elongatus*	1
32	*Hirundichthys marginatus*	1
32	*Hirundichthys* spp.	1
32	*Hypsoblennius gentilis*	1
	Total	362

TABLE 3. Pooled raw counts of fish larvae taken in Manta tows on the 1985 CalCOFI survey.

Rank	Taxon	Count
1	*Engraulis mordax*	4106
2	*Sardinops sagax*	3963
3	*Sebastes* spp.	1047
4	*Chromis punctipinnis*	306
5	*Cololabis saira*	295
6	*Atherinopsis californiensis*	171
7	*Scomber japonicus*	128
8	*Paralabrax* spp.	118
9	*Hypsoblennius jenkinsi*	112
10	*Scorpaenichthys marmoratus*	106
11	*Cheilopogon* spp.	27
12	*Trachurus symmetricus*	20
13	*Sebastes diploproa*	18
14	*Genyonemus lineatus*	17
15	*Sphyraena argentea*	15
16	*Medialuna californiensis*	13
17	*Halichoeres semicinctus*	11
18	*Vinciguerria lucetia*	10
19	*Pleuronichthys coenosus*	9
20	*Stenobrachius leucopsarus*	8
20	*Ceratoscopelus townsendi*	8
22	*Anoplopoma fimbria*	7
23	*Oxyjulis californica*	5
23	*Neoclinus* spp.	5
23	*Brosmophycis marginata*	5
23	*Hypsypops rubicundus*	5
23	*Ophiodon elongatus*	5
23	*Hypsoblennius* spp.	5
29	*Aristostomias scintillans*	4
30	*Hexagrammos decagrammus*	3
30	*Citharichthys sordidus*	3
30	*Sebastes jordani*	3
33	*Semicossyphus pulcher*	2
33	Disintegrated fish larvae	2
33	*Cyclothone signata*	2
33	*Seriphus politus*	2
33	*Hirundichthys* spp.	2
33	*Sebastes aurora*	2
33	*Sternoptyx* spp.	2
33	*Neoclinus blanchardi*	2
33	*Citharichthys stigmaeus*	2
42	*Merluccius productus*	1
42	*Pleuronichthys decurrens*	1
42	*Stomias atriventer*	1
42	*Cyclothone* spp.	1
42	*Chilara taylori*	1
42	*Leuroglossus stilbius*	1
42	*Triphoturus mexicanus*	1
42	*Bathophilus flemingi*	1

TABLE 3. (cont.)

Rank	Taxon	Count
42	*Ophidion scrippsae*	1
42	*Fodiator acutus*	1
42	*Hirundichthys marginatus*	1
42	*Rathbunella alleni*	1
42	*Hypsoblennius gilberti*	1
42	*Hypsoblennius gentilis*	1
42	*Peprilus simillimus*	1
42	*Tetragonurus cuvieri*	1
42	*Coryphopterus nicholsii*	1
42	*Clinocottus analis*	1
42	*Caulophryne pelagica*	1
42	*Girella nigricans*	1
42	*Oxylebius pictus*	1
42	*Nannobrachium ritteri*	1
	Total	10598

TABLE 4. Numbers of fish larvae taken in Manta net tows on the 1985 CalCOFI survey, listed by taxon, station, and month. Numbers of larvae are expressed as larvae per 100 cubic meters of water filtered. Unoccupied stations are indicated by a dash.

Sardinops sagax

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7	51.0	-	-	0.0	-	-	-	-	1.7	-	-	0.0	-
80.0	51.0	-	0.0	-	-	0.0	-	-	6.2	-	-	1.0	-
80.0	55.0	-	0.0	-	-	0.0	-	-	1.6	-	-	0.7	-
82.0	46.0	-	0.0	-	-	-	-	-	3.5	-	-	-	-
83.3	40.6	-	0.0	-	-	0.0	-	-	3416.2	-	-	0.0	-
83.3	42.0	-	0.0	-	-	0.0	-	-	284.5	-	-	0.0	-
83.3	51.0	-	0.0	-	-	1.7	-	-	25.7	-	-	0.0	-
86.7	33.0	-	17.1	-	-	0.0	-	-	3.1	-	-	0.0	-
86.7	35.0	-	0.0	-	-	0.0	-	-	1.9	-	-	0.0	-
90.0	28.0	-	0.0	-	-	0.0	-	-	0.0	-	-	0.6	-
90.0	30.0	-	0.0	-	-	5.3	-	-	0.0	-	-	0.0	-
90.0	35.0	-	0.0	-	-	0.0	-	-	0.0	-	-	2.6	-
90.0	70.0	-	0.0	-	-	0.0	-	-	0.7	-	-	0.0	-
90.6	36.0	-	-	-	-	-	-	-	-	-	-	18.3	-
93.3	30.0	-	0.0	-	-	0.0	-	-	0.0	-	-	3.4	-

Engraulis mordax

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7	51.0	-	-	8.4	-	-	-	-	0.0	-	-	0.0	-
76.7	60.0	-	-	0.0	-	0.8	-	-	0.0	-	-	0.0	-
80.0	51.0	-	58.3	-	-	0.0	-	-	1.0	-	-	135.7	-
80.0	55.0	-	4.6	-	-	0.0	-	-	0.0	-	-	12.4	-
80.0	60.0	-	-	-	-	9.0	-	-	0.0	-	-	0.0	-
80.0	70.0	-	-	-	-	12.0	-	-	0.0	-	-	0.0	-
82.0	46.0	-	0.5	-	-	-	-	-	0.7	-	-	-	-
83.3	40.6	-	1822.3	-	-	0.0	-	-	182.4	-	-	0.7	-
83.3	42.0	-	191.5	-	-	0.0	-	-	16.1	-	-	0.0	-
83.3	51.0	-	70.3	-	-	13.2	-	-	14.1	-	-	0.8	-
83.3	55.0	-	61.2	-	-	3.7	-	-	0.0	-	-	-	-
83.3	60.0	-	0.0	-	-	0.0	-	-	1.0	-	-	-	-
86.7	33.0	-	34.2	-	-	0.0	-	-	2.4	-	-	0.0	-

TABLE 4. (cont.)

Engraulis mordax (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 35.0	-	0.6	-	-	29.6	-	-	0.6	-	-	0.0	-
86.7 40.0	-	0.0	-	-	18.2	-	-	0.0	-	-	0.0	-
86.7 45.0	-	2.1	-	-	0.7	-	-	0.0	-	-	4.6	-
86.7 50.0	-	16.0	-	-	2.3	-	-	0.0	-	-	0.0	-
86.7 60.0	-	1.3	-	-	-	-	-	3.5	-	-	0.0	-
90.0 28.0	-	1.5	-	-	8.1	-	-	0.0	-	-	0.6	-
90.0 30.0	-	10.1	-	-	1.1	-	-	0.0	-	-	38.3	-
90.0 35.0	-	17.6	-	-	0.0	-	-	1.8	-	-	5.2	-
90.0 37.0	-	1.5	-	-	0.9	-	-	0.0	-	-	-	-
90.0 60.0	-	-	-	-	1.0	-	-	0.0	-	-	0.0	-
90.0 70.0	-	0.0	-	-	0.9	-	-	0.0	-	-	0.0	-
90.0 80.0	-	0.0	-	-	1.8	-	-	0.0	-	-	0.0	-
90.6 36.0	-	-	-	-	-	-	-	-	-	-	11.2	-
93.3 26.7	-	6.9	-	0.0	-	-	-	0.0	-	-	1.7	-
93.3 30.0	-	8.4	-	-	40.8	-	-	0.0	-	-	5.0	-
93.3 35.0	-	0.6	-	-	1.8	-	-	0.0	-	-	0.0	-
93.3 40.0	-	0.0	-	-	11.2	-	-	0.0	-	-	0.0	-
93.3 45.0	-	0.0	-	-	1.9	-	-	0.0	-	-	-	-
93.3 50.0	-	-	-	-	4.8	-	-	0.0	-	-	0.0	-
93.3 55.0	-	10.0	-	-	1.7	-	-	0.0	-	-	0.0	-
93.3 60.0	-	1.3	-	-	-	-	-	1.3	-	-	-	-

Leuroglossus stilbius

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 40.0	-	0.4	-	-	0.0	-	-	0.0	-	-	0.0	-

***Cyclothone* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	-	0.0	-	-	0.0	-	-	1.0	-	-	0.0	-

Cyclothone signata

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 100.0	-	0.0	-	-	-	-	-	1.6	-	-	-	-

***Sternoptyx* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 53.0	-	0.8	-	-	0.0	-	-	0.0	-	-	0.0	-

TABLE 4. (cont.)

***Sternoptyx* spp.** (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 110.0	-	0.4	-	-	-	-	-	0.0	-	-	0.0	-

Vinciguerria lucetia

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 100.0	-	0.0	-	-	-	-	-	8.1	-	-	-	-

Stomias atriventer

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 51.0	-	0.7	-	-	0.0	-	-	0.0	-	-	0.0	-

Bathophilus flemingi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 110.0	-	0.0	-	-	0.0	-	-	0.0	-	-	0.8	-

Aristostomias scintillans

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 120.0	-	-	-	-	-	-	-	0.9	-	-	-	-
90.0 100.0	-	0.0	-	-	0.9	-	-	0.0	-	-	0.0	-
90.0 110.0	-	0.0	-	-	1.5	-	-	0.0	-	-	0.0	-

Ceratoscopelus townsendi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 120.0	-	-	-	-	-	-	-	3.1	-	-	-	-
90.0 60.0	-	-	-	-	0.0	-	-	0.0	-	-	1.0	-
90.0 100.0	-	0.0	-	-	0.9	-	-	0.0	-	-	0.0	-
93.3 100.0	-	0.0	-	-	-	-	-	1.6	-	-	-	-

Nannobrachium ritteri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	-	0.0	-	-	-	-	0.9	-	-	0.0	-

Stenobrachius leucopsarus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 55.0	-	0.7	-	-	0.0	-	-	0.0	-	-	0.0	-
83.3 40.6	-	2.7	-	-	0.0	-	-	0.0	-	-	0.0	-
83.3 51.0	-	0.0	-	-	1.7	-	-	0.0	-	-	0.0	-
90.0 30.0	-	0.0	-	-	1.1	-	-	0.0	-	-	0.0	-

TABLE 4. (cont.)

Triphoturus mexicanus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 51.0	-	0.0	-	-	0.0	-	-	1.3	-	-	0.0	-

Merluccius productus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	-	0.8	-	-	-	-	0.0	-	-	0.0	-

Chilara taylori

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	-	0.0	-	-	0.0	-	-	1.0	-	-	0.0	-

Ophidion scrippsae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	-	0.0	-	-	1.1	-	-	0.0	-

Brosmophycis marginata

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 50.0	-	3.5	-	-	0.0	-	-	0.0	-	-	0.0	-

Caulophryne pelagica

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 120.0	-	0.0	-	-	-	-	-	0.0	-	-	0.6	-

Atherinopsis californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	-	1.3	-	-	0.0	-	-	1.0	-	-	0.0	-
83.3 42.0	-	4.3	-	-	0.0	-	-	0.0	-	-	0.0	-
86.7 33.0	-	13.2	-	-	0.0	-	-	0.0	-	-	0.0	-
86.7 35.0	-	0.0	-	-	0.8	-	-	0.0	-	-	0.0	-
86.7 40.0	-	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-
86.7 50.0	-	0.0	-	-	0.8	-	-	0.0	-	-	0.0	-
90.0 28.0	-	13.0	-	-	38.5	-	-	0.0	-	-	0.6	-
90.0 30.0	-	0.0	-	-	1.1	-	-	0.0	-	-	0.0	-
90.0 35.0	-	2.1	-	-	0.0	-	-	0.0	-	-	0.0	-
93.3 26.7	-	29.0	-	35.8	-	-	-	0.0	-	-	0.0	-

Cololabis saira

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 55.0	-	-	0.0	-	0.0	-	-	4.1	-	-	0.9	-

TABLE 4. (cont.)

Station		Jan.	Feb.	Mar.	Apr.	*Cololabis saira* (cont.) May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7	70.0	-	-	-	-	0.0	-	-	-	-	-	0.9	-
76.7	80.0	-	-	-	-	0.0	-	-	2.0	-	-	-	-
76.7	90.0	-	-	-	-	-	-	-	8.1	-	-	-	-
76.7	100.0	-	-	-	-	-	-	-	0.0	-	-	4.8	-
76.7	110.0	-	-	-	-	-	-	-	1.8	-	-	-	-
76.7	120.0	-	-	-	-	-	-	-	2.6	-	-	-	-
80.0	60.0	-	-	-	-	0.0	-	-	12.5	-	-	0.9	-
80.0	70.0	-	-	-	-	0.9	-	-	0.0	-	-	5.0	-
80.0	80.0	-	-	0.0	-	0.0	-	-	2.0	-	-	0.3	-
80.0	90.0	-	-	-	-	0.0	-	-	0.8	-	-	1.1	-
80.0	100.0	-	-	-	-	-	-	-	0.0	-	-	2.7	-
80.0	110.0	-	-	-	-	-	-	-	0.0	-	-	0.9	-
80.0	120.0	-	-	-	-	-	-	-	3.1	-	-	-	-
83.3	40.6	-	0.0	-	-	0.0	-	-	1.0	-	-	0.0	-
83.3	42.0	-	4.3	-	-	0.0	-	-	0.0	-	-	0.0	-
83.3	51.0	-	2.0	-	-	0.0	-	-	0.0	-	-	0.0	-
86.7	33.0	-	1.5	-	-	0.0	-	-	0.0	-	-	0.8	-
86.7	50.0	-	0.7	-	-	0.0	-	-	0.0	-	-	1.0	-
86.7	70.0	-	0.6	-	-	-	-	-	2.9	-	-	0.0	-
90.0	30.0	-	6.7	-	-	0.0	-	-	0.0	-	-	0.0	-
90.0	35.0	-	1.6	-	-	0.0	-	-	0.9	-	-	0.0	-
90.0	37.0	-	0.0	-	-	0.0	-	-	1.0	-	-	-	-
90.0	45.0	-	0.6	-	-	12.1	-	-	0.0	-	-	-	-
90.0	53.0	-	0.0	-	-	0.8	-	-	1.0	-	-	0.0	-
90.0	60.0	-	-	-	-	2.0	-	-	0.0	-	-	11.7	-
90.0	70.0	-	0.5	-	-	0.0	-	-	5.2	-	-	6.2	-
90.0	80.0	-	0.9	-	-	3.7	-	-	2.8	-	-	3.3	-
90.0	90.0	-	0.0	-	-	0.8	-	-	0.0	-	-	15.7	-
90.0	100.0	-	5.3	-	-	0.0	-	-	0.0	-	-	16.5	-
90.0	110.0	-	5.5	-	-	0.0	-	-	0.0	-	-	21.5	-
93.3	26.7	-	0.0	-	0.0	-	-	-	0.9	-	-	0.0	-
93.3	30.0	-	1.3	-	-	2.1	-	-	1.0	-	-	0.0	-
93.3	35.0	-	0.0	-	-	1.8	-	-	0.7	-	-	0.0	-
93.3	40.0	-	1.6	-	-	2.6	-	-	0.0	-	-	0.0	-
93.3	45.0	-	1.0	-	-	0.0	-	-	0.0	-	-	-	-

TABLE 4. (cont.)

Cololabis saira (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 55.0	-	0.0	-	-	0.0	-	-	2.5	-	-	0.7	-
93.3 60.0	-	0.0	-	-	-	-	-	3.2	-	-	-	-
93.3 70.0	-	0.0	-	-	-	-	-	0.9	-	-	1.2	-
93.3 80.0	-	0.0	-	-	-	-	-	1.0	-	-	1.9	-
93.3 90.0	-	0.0	-	-	-	-	-	0.7	-	-	0.7	-
93.3 110.0	-	0.4	-	-	-	-	-	0.0	-	-	7.0	-
93.3 120.0	-	0.8	-	-	-	-	-	0.0	-	-	11.1	-

***Cheilopogon* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 100.0	-	-	-	-	-	-	-	0.9	-	-	0.0	-
80.0 90.0	-	-	-	-	0.0	-	-	0.8	-	-	0.0	-
80.0 120.0	-	-	-	-	-	-	-	0.8	-	-	-	-
86.7 50.0	-	0.0	-	-	0.0	-	-	1.2	-	-	0.0	-
90.0 35.0	-	0.0	-	-	0.0	-	-	5.4	-	-	0.0	-
90.0 37.0	-	0.0	-	-	0.0	-	-	12.0	-	-	-	-
93.3 35.0	-	0.0	-	-	0.0	-	-	0.7	-	-	0.0	-
93.3 45.0	-	0.0	-	-	0.0	-	-	0.9	-	-	-	-
93.3 50.0	-	-	-	-	0.0	-	-	3.1	-	-	0.0	-

Fodiator acutus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	-	0.0	-	-	1.1	-	-	0.0	-

***Hirundichthys* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 110.0	-	0.0	-	-	-	-	-	1.6	-	-	0.0	-

Hirundichthys marginatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 110.0	-	0.0	-	-	-	-	-	0.8	-	-	0.0	-

***Sebastes* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	-	24.4	-	-	-	-	0.9	-	-	0.0	-
76.7 55.0	-	-	0.0	-	0.7	-	-	0.0	-	-	0.0	-
76.7 60.0	-	-	0.0	-	0.8	-	-	0.0	-	-	0.0	-
80.0 51.0	-	556.4	-	-	0.0	-	-	0.0	-	-	0.0	-

TABLE 4. (cont.)

Sebastes spp. (cont.)

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0	55.0	-	4.6	-	-	0.0	-	-	0.0	-	-	0.7	-
80.0	60.0	-	-	-	-	4.0	-	-	0.0	-	-	0.0	-
80.0	70.0	-	-	-	-	0.9	-	-	0.0	-	-	0.0	-
83.3	40.6	-	41.4	-	-	0.0	-	-	0.0	-	-	0.0	-
83.3	42.0	-	0.0	-	-	1.4	-	-	0.0	-	-	0.0	-
83.3	51.0	-	0.0	-	-	0.0	-	-	0.0	-	-	0.8	-
83.3	55.0	-	1.6	-	-	1.5	-	-	0.0	-	-	-	-
86.7	33.0	-	16.6	-	-	0.0	-	-	0.0	-	-	0.0	-
86.7	35.0	-	0.6	-	-	2.3	-	-	0.0	-	-	0.0	-
86.7	40.0	-	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-
86.7	45.0	-	1.4	-	-	0.0	-	-	0.0	-	-	0.0	-
86.7	50.0	-	0.7	-	-	2.3	-	-	0.0	-	-	0.0	-
90.0	28.0	-	0.0	-	-	1.0	-	-	0.0	-	-	0.0	-
90.0	30.0	-	0.8	-	-	0.0	-	-	0.0	-	-	0.0	-
90.0	35.0	-	0.0	-	-	1.0	-	-	0.0	-	-	0.0	-
90.0	37.0	-	0.4	-	-	0.0	-	-	0.0	-	-	-	-
90.0	45.0	-	1.2	-	-	2.0	-	-	0.0	-	-	-	-
90.0	53.0	-	0.8	-	-	0.8	-	-	0.0	-	-	0.0	-
93.3	26.7	-	2.8	-	0.0	-	-	-	0.0	-	-	0.0	-
93.3	29.0	-	0.0	-	-	1.0	-	-	0.0	-	-	0.0	-
93.3	35.0	-	0.6	-	-	0.0	-	-	0.0	-	-	0.0	-
93.3	50.0	-	-	-	-	0.7	-	-	0.0	-	-	0.0	-

Sebastes aurora

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0	51.0	-	0.6	-	-	0.0	-	-	0.0	-	-	0.0	-
80.0	55.0	-	0.7	-	-	0.0	-	-	0.0	-	-	0.0	-

Sebastes diploproa

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7	51.0	-	-	0.0	-	-	-	-	7.7	-	-	0.9	-
76.7	55.0	-	-	0.0	-	0.0	-	-	0.0	-	-	0.9	-
76.7	60.0	-	-	0.0	-	0.0	-	-	0.7	-	-	0.0	-
80.0	51.0	-	0.0	-	-	0.0	-	-	0.0	-	-	1.0	-
80.0	55.0	-	0.0	-	-	0.0	-	-	0.0	-	-	1.4	-
86.7	50.0	-	0.0	-	-	0.0	-	-	0.0	-	-	1.0	-

TABLE 4. (cont.)

Sebastes diploproa (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 60.0	-	0.0	-	-	-	-	-	1.8	-	-	0.0	-

Sebastes jordani

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	-	1.5	-	-	-	-	0.0	-	-	0.0	-
86.7 33.0	-	0.5	-	-	0.0	-	-	0.0	-	-	0.0	-

Anoplopoma fimbria

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	-	1.5	-	-	-	-	0.0	-	-	0.0	-
76.7 60.0	-	-	4.0	-	0.0	-	-	0.0	-	-	0.0	-

Oxylebius pictus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 55.0	-	0.8	-	-	0.0	-	-	0.0	-	-	-	-

Hexagrammos decagrammus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	-	0.8	-	-	-	-	0.0	-	-	0.0	-
76.7 60.0	-	-	0.8	-	0.0	-	-	0.0	-	-	0.0	-
86.7 40.0	-	0.6	-	-	0.0	-	-	0.0	-	-	0.0	-

Ophiodon elongatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	-	3.2	-	-	0.0	-	-	0.0	-	-	0.0	-

Clinocottus analis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 51.0	-	0.0	-	-	0.8	-	-	0.0	-	-	0.0	-

Scorpaenichthys marmoratus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	-	4.6	-	-	-	-	0.0	-	-	8.1	-
76.7 55.0	-	-	0.0	-	0.0	-	-	0.0	-	-	1.8	-
76.7 60.0	-	-	2.4	-	0.0	-	-	0.0	-	-	0.0	-
80.0 51.0	-	4.5	-	-	0.8	-	-	0.0	-	-	9.7	-
80.0 55.0	-	0.7	-	-	0.0	-	-	0.0	-	-	1.4	-

TABLE 4. (cont.)

Scorpaenichthys marmoratus (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	-	0.7	-	-	0.0	-	-	0.0	-	-	0.0	-
83.3 42.0	-	1.7	-	-	0.0	-	-	0.0	-	-	0.0	-
83.3 51.0	-	0.7	-	-	0.0	-	-	0.0	-	-	8.0	-
83.3 55.0	-	33.7	-	-	0.0	-	-	0.0	-	-	-	-
83.3 70.0	-	0.6	-	-	-	-	-	0.0	-	-	-	-
86.7 33.0	-	1.0	-	-	0.0	-	-	0.0	-	-	0.0	-
86.7 40.0	-	0.0	-	-	1.5	-	-	0.0	-	-	0.0	-
90.0 35.0	-	1.1	-	-	0.0	-	-	0.0	-	-	0.0	-
93.3 29.0	-	0.0	-	-	1.0	-	-	0.0	-	-	0.0	-

***Paralabrax* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
82.0 46.0	-	0.0	-	-	-	-	-	1.4	-	-	-	-
83.3 40.6	-	0.0	-	-	0.0	-	-	68.4	-	-	0.0	-
83.3 42.0	-	0.0	-	-	0.0	-	-	47.0	-	-	0.0	-
83.3 51.0	-	0.0	-	-	0.0	-	-	3.8	-	-	0.0	-

Trachurus symmetricus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 80.0	-	-	0.0	-	5.6	-	-	0.0	-	-	0.0	-
83.3 40.6	-	0.0	-	-	0.0	-	-	1.9	-	-	0.0	-
90.0 100.0	-	0.0	-	-	7.4	-	-	0.0	-	-	0.0	-
90.0 110.0	-	0.0	-	-	3.0	-	-	0.0	-	-	0.0	-

Genyonemus lineatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	-	0.0	-	-	0.0	-	-	0.0	-	-	5.8	-
86.7 33.0	-	5.4	-	-	0.0	-	-	0.0	-	-	0.0	-

Seriphus politus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	-	0.0	-	-	2.3	-	-	0.0	-

Girella nigricans

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 60.0	-	0.0	-	-	-	-	-	0.6	-	-	-	-

TABLE 4. (cont.)

Medialuna californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
82.0 46.0	-	0.0	-	-	-	-	-	1.4	-	-	-	-
83.3 40.6	-	0.0	-	-	0.0	-	-	2.9	-	-	0.0	-
83.3 60.0	-	0.0	-	-	0.0	-	-	1.0	-	-	-	-
86.7 35.0	-	0.0	-	-	0.0	-	-	0.0	-	-	0.9	-
86.7 40.0	-	0.0	-	-	0.0	-	-	0.7	-	-	0.0	-
90.0 100.0	-	0.0	-	-	0.0	-	-	0.0	-	-	1.0	-
93.3 40.0	-	0.0	-	-	0.0	-	-	1.2	-	-	0.0	-
93.3 45.0	-	0.0	-	-	0.0	-	-	0.9	-	-	-	-
93.3 55.0	-	0.0	-	-	0.0	-	-	1.6	-	-	0.0	-

Chromis punctipinnis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	-	0.0	-	-	0.0	-	-	168.2	-	-	0.0	-
83.3 42.0	-	0.0	-	-	0.0	-	-	137.6	-	-	0.0	-
86.7 35.0	-	0.0	-	-	0.0	-	-	0.6	-	-	0.0	-
86.7 60.0	-	0.0	-	-	-	-	-	0.9	-	-	0.0	-
90.6 36.0	-	-	-	-	-	-	-	-	-	-	2.4	-
93.3 30.0	-	0.0	-	-	0.0	-	-	0.0	-	-	3.4	-

Hypsypops rubicundus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	-	0.0	-	-	0.0	-	-	4.8	-	-	0.0	-

Halichoeres semicinctus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	-	0.0	-	-	0.0	-	-	8.6	-	-	0.0	-
83.3 42.0	-	0.0	-	-	0.0	-	-	1.1	-	-	0.0	-
90.0 70.0	-	0.0	-	-	0.0	-	-	0.7	-	-	0.0	-

Oxyjulis californica

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	-	0.0	-	-	0.0	-	-	2.9	-	-	0.0	-
83.3 42.0	-	0.0	-	-	0.0	-	-	1.1	-	-	0.0	-
83.3 51.0	-	0.0	-	-	0.8	-	-	0.0	-	-	0.0	-

TABLE 4. (cont.)

Semicossyphus pulcher

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	-	0.0	-	-	0.0	-	-	1.0	-	-	0.0	-
83.3 42.0	-	0.0	-	-	0.0	-	-	1.1	-	-	0.0	-

Rathbunella alleni

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	-	0.7	-	-	0.0	-	-	0.0	-	-	0.0	-

***Neoclinus* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	-	0.0	-	-	0.0	-	-	0.0	-	-	2.9	-
83.3 42.0	-	0.0	-	-	0.0	-	-	1.1	-	-	0.0	-
86.7 33.0	-	0.0	-	-	0.0	-	-	0.8	-	-	0.0	-

Neoclinus blanchardi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	-	0.0	-	-	0.0	-	-	1.9	-	-	0.0	-

***Hypsoblennius* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	-	1.0	-	-	0.0	-	-	0.0	-	-	0.0	-
86.7 40.0	-	0.0	-	-	1.5	-	-	0.0	-	-	0.0	-
93.3 30.0	-	0.0	-	-	0.0	-	-	0.0	-	-	0.8	-

Hypsoblennius gentilis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 51.0	-	0.0	-	-	0.0	-	-	0.0	-	-	0.8	-

Hypsoblennius gilberti

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	-	0.0	-	-	0.0	-	-	1.0	-	-	0.0	-

Hypsoblennius jenkinsi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	-	0.0	-	-	-	-	8.5	-	-	0.0	-
76.7 60.0	-	-	0.0	-	0.0	-	-	1.4	-	-	0.0	-
80.0 51.0	-	0.0	-	-	0.0	-	-	0.0	-	-	1.9	-
80.0 55.0	-	0.0	-	-	0.0	-	-	0.0	-	-	0.7	-
83.3 40.6	-	0.0	-	-	0.0	-	-	50.4	-	-	0.0	-

TABLE 4. (cont.)

Hypsoblennius jenkinsi (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	-	0.0	-	-	18.4	-	-	0.0	-
83.3 51.0	-	0.0	-	-	0.0	-	-	20.5	-	-	0.0	-
86.7 33.0	-	0.0	-	-	0.0	-	-	2.4	-	-	0.0	-
86.7 35.0	-	0.0	-	-	0.0	-	-	1.2	-	-	0.0	-
86.7 60.0	-	0.0	-	-	-	-	-	1.8	-	-	0.0	-
90.0 35.0	-	0.0	-	-	0.0	-	-	0.0	-	-	0.6	-
93.3 26.7	-	0.0	-	4.8	-	-	-	0.0	-	-	0.0	-

Coryphopterus nicholsii

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	-	0.0	-	-	1.1	-	-	0.0	-

Sphyraena argentea

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
82.0 46.0	-	0.0	-	-	-	-	-	0.7	-	-	-	-
83.3 40.6	-	0.0	-	-	0.0	-	-	7.6	-	-	0.0	-
83.3 51.0	-	0.0	-	-	0.0	-	-	6.4	-	-	0.0	-
90.0 30.0	-	0.0	-	-	1.1	-	-	0.0	-	-	0.0	-

Scomber japonicus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 80.0	-	-	0.0	-	2.8	-	-	0.0	-	-	0.0	-
83.3 40.6	-	0.0	-	-	0.0	-	-	97.9	-	-	0.0	-
83.3 42.0	-	0.0	-	-	0.0	-	-	3.4	-	-	0.0	-
83.3 51.0	-	0.0	-	-	0.0	-	-	18.0	-	-	0.0	-
86.7 33.0	-	0.0	-	-	0.0	-	-	2.4	-	-	0.0	-
90.0 35.0	-	0.0	-	-	0.0	-	-	0.9	-	-	0.0	-
93.3 26.7	-	0.0	-	0.0	-	-	-	0.9	-	-	0.0	-

Tetragonurus cuvieri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 100.0	-	0.0	-	-	0.9	-	-	0.0	-	-	0.0	-

Peprilus simillimus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 29.0	-	0.0	-	-	1.0	-	-	0.0	-	-	0.0	-

TABLE 4. (cont.)

Citharichthys sordidus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	-	2.0	-	-	0.0	-	-	0.0	-	-	0.0	-

Citharichthys stigmaeus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	-	1.5	-	-	-	-	0.0	-	-	0.0	-

Pleuronichthys coenosus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 55.0	-	0.0	-	-	0.0	-	-	0.0	-	-	1.4	-
86.7 35.0	-	0.0	-	-	1.6	-	-	0.0	-	-	0.0	-
86.7 40.0	-	0.0	-	-	2.9	-	-	0.0	-	-	0.0	-
93.3 26.7	-	0.7	-	0.0	-	-	-	0.0	-	-	0.0	-

Pleuronichthys decurrens

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 55.0	-	-	0.7	-	0.0	-	-	0.0	-	-	0.0	-

Disintegrated fish larvae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 60.0	-	-	-	-	0.0	-	-	1.0	-	-	0.0	-
93.3 100.0	-	0.6	-	-	-	-	-	0.0	-	-	-	-

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ALPHABETICAL INDEX TO TABLE 4

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