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NOAA-TM-NMFS-SWFSC-334

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

LIST OF FIGURES

Page

LIST OF TABLES

Page

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 1998. It is the 17th report in a series that presents surface tow data for all biological-oceanographic CalCOFI surveys from 1977 to the present. A total of 288 net tow stations was occupied during four quarterly cruises over the survey area which extended from Avila Beach (one cruise as far north as Monterey) 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 285 Manta net tows was taken during 1998. 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 70 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 17th 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 1998. 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 1998 CalCOFI survey are published in Charter et al.

[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).

(1999). Ahlstrom and Stevens (1976), Gruber et al. (1982) and Doyle (1992a, b) provided initial information on the distribution and abundance of surface ichthyoplankton in the northeastern Pacific.

Hydrographic and biological data from the 1998 CalCOFI survey were published by the Scripps Institution of Oceanography (Univ. of Calif., SIO 1999a, b). All available records for Manta tows on the 1998 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	Survey	Report
1977–78	Moser et al. 2001b	1990	Charter et al. 2002c
1980–81	Ambrose et al. 2002a	1991	Sandknop et al. 2002b
1984	Charter et al. 2002a	1992	Watson et al. 2002b
1985	Ambrose et al. 2002b	1993	Ambrose et al. 2002d
1986	Charter et al. 2002b	1994	Charter et al. 2002d
1987	Sandknop et al. 2002a	1995	Sandknop et al. 2002c
1988	Watson et al. 2002a	1996	Watson et al. 2002c
1989	Ambrose et al. 2002c	1997	Ambrose et al. 2002e

SAMPLING AREA AND PATTERN

The 1998 CalCOFI survey primarily consisted of four quarterly cruises on which a total of 285 Manta net tows was taken on the 288 standard CalCOFI net tow stations occupied during the survey (Table 1; Figures 2–4)[2]. Two vessels were employed on the survey, the NOAA vessel RV *David Starr Jordan* and the SIO vessel RV *New Horizon*. Dates and numbers of stations sampled with the Manta net in 1998 are summarized below:

9802, RV *David Starr Jordan*, 64 stations, 23 January–10 February;

9804, RV *David Starr Jordan*, 85 stations, 2–21 April;

9807, RV *New Horizon*, 70 stations, 9–25 July;

9809, RV *New Horizon*, 66 stations, 13–27 September.

The core survey area extended from Avila Beach, California to San Diego, California and seaward on six survey lines to approximately 120–330 n. mi (Cruise 9807 occupied five lines, Cruise 9804 nine lines);

[2]Seven "mini" CalCOFI cruises surveyed lines 83 and 90 in March, May, June, August, October, November, and December. Ichthyoplankton and station data for these cruises will be presented in a separate data report.

(Figures 2and 3). The most seaward station, 90.0 120.0, was approximately 400 n. mi. west of Punta Baja, Baja California, Mexico. On Cruise 9804, CalCOFI lines 66.7, 70.0, and 73.3 extended seaward to station 80.0. Line 70.0 extended to station 65.0 on Cruise 9807. On all cruises, lines 76.7 and 80.0 extended seaward to station 100.0, lines 83.3 and 86.7 extended to station 110.0, and lines 90.0 and 93.3 extended to station 120.0 (Figures 2and 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 70 larval fish categories

was identified: 58 to species, 10 to genus, and 2 to family.

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

Diaphus spp. – *Diaphus theta* is the dominant *Diaphus* species in the survey area and most, if not all, of the larvae from the Southern California Bight region are this species; the generic category is used because a small proportion of the *Diaphus* larvae captured at the outer margin of the survey pattern may represent other species whose larvae are identical to those of *D. theta.*

Lampanyctus spp. – most of the larvae in this category are small (< 5 mm), often damaged, specimens belonging to the subgroup of *Lampanyctus,* characterized by small or absent pectoral fins in adults, placed by Zahuranec (2000) in 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, Pacific sardine (*Sardinops sagax*) ranked first in abundance with 52.4% of the total fish larvae and first in occurrence with larvae collected in 23.5% of the total samples. (Tables 2 and 3). They were more than twice as abundant as the second most abundant species, northern anchovy (*Engraulis mordax*) which had 19.7% of the total larvae and ranked second in occurrence (22.5% of the total samples). Mussel blenny (*Hypsoblennius jenkinsi*) was the third most abundant taxon with 6.0% of the total larvae and ranked sixth in frequency of occurrence (9.1% of the samples). Jacksmelt (*Atherinopsis californiensis*) ranked fourth in abundance (4.3% of total larvae) and twelfth in total occurrences (3.2% of the samples). Pacific saury (*Cololabis saira*) ranked fifth in abundance (3.2% of total larvae) and third in total occurrences (17.9% of the samples). The next five most abundant taxa were Panama lightfish *Vinciguerria lucetia* (2.6% of total larvae), jack mackerel *Trachurus symmetricus* (1.9%), the rockfish genus *Sebastes* (1.4%), Pacific mackerel *Scomber japonicus* (1.1%), and cabezon *Scorpaenichthys marmoratus* (1.0%). These species ranked 3rd, tied for 6th, 5th, 9th, and 8th in frequency of occurrence, respectively. The ten most abundant taxa comprised 93.6% of all the larvae collected in Manta net tows on CalCOFI cruises in 1998. The remaining 6.4% was distributed among 60 other taxa. Of the ten most abundant taxa, half were coastal pelagic species, two were coastal demersal taxa, two were mesopelagic species, and one was an epipelagic species.

In contrast to the surface collections, among the 153 taxa collected in the oblique tows during the 1998 survey, Panama lightfish ranked first in abundance (32.8% of the total), followed by Pacific sardine (22.6% of the total), and northern anchovy (15.9%). Pacific saury and jacksmelt were not collected in the oblique samples and mussel blenny ranked 49th in abundance (Charter 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 1998 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*) or NH (*New Horizon*). 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* and the RV *New Horizon* during the 1998 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 RV *David Starr Jordan* and the RV *New Horizon* during the 1998 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* and the RV *New Horizon* during the 1998 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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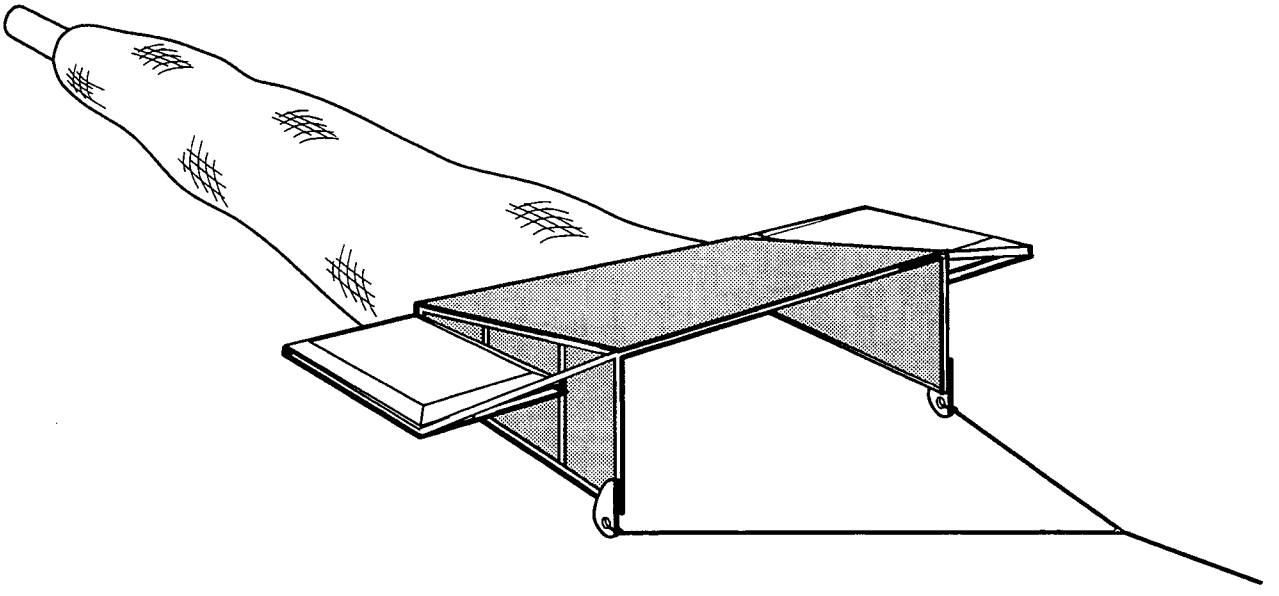

Figure 1. Diagram of the Manta net used on CalCOFI surveys.

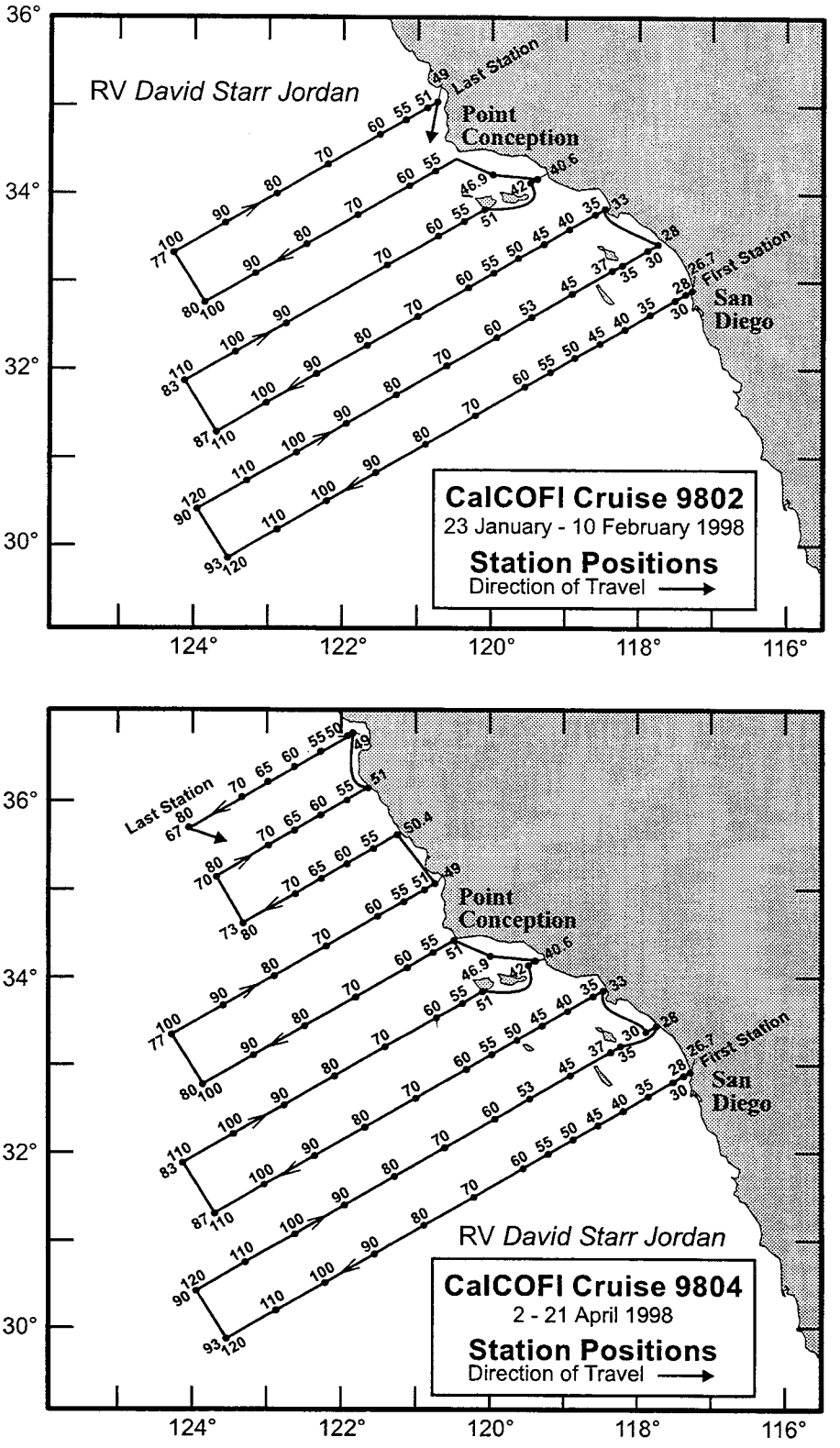

Figure 2. Stations and cruise tracks for CalCOFI cruises 9802 (above) and 9804 (below). Dots indicate stations where Manta and oblique tows were taken; open circles indicate stations where only oblique tows were taken. Manta tows without accompanying oblique tows were taken at station 80.60 on Cruise 9802 and at 86.7 on Cruise 9804.

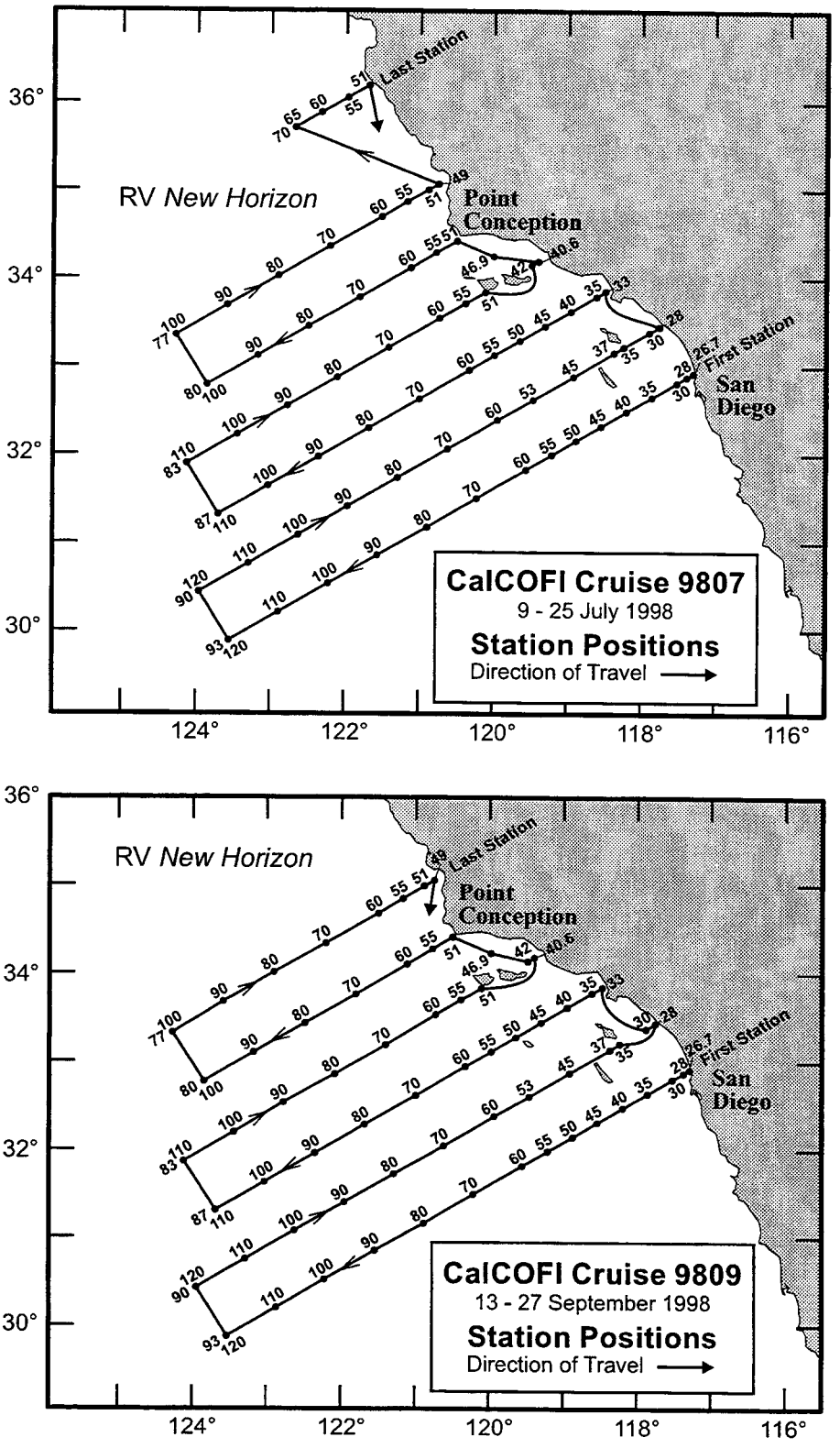

Figure 3. Stations and cruise tracks for CalCOFI cruises 9807 (above) and 9809 (below). Symbols as in Figure 2.

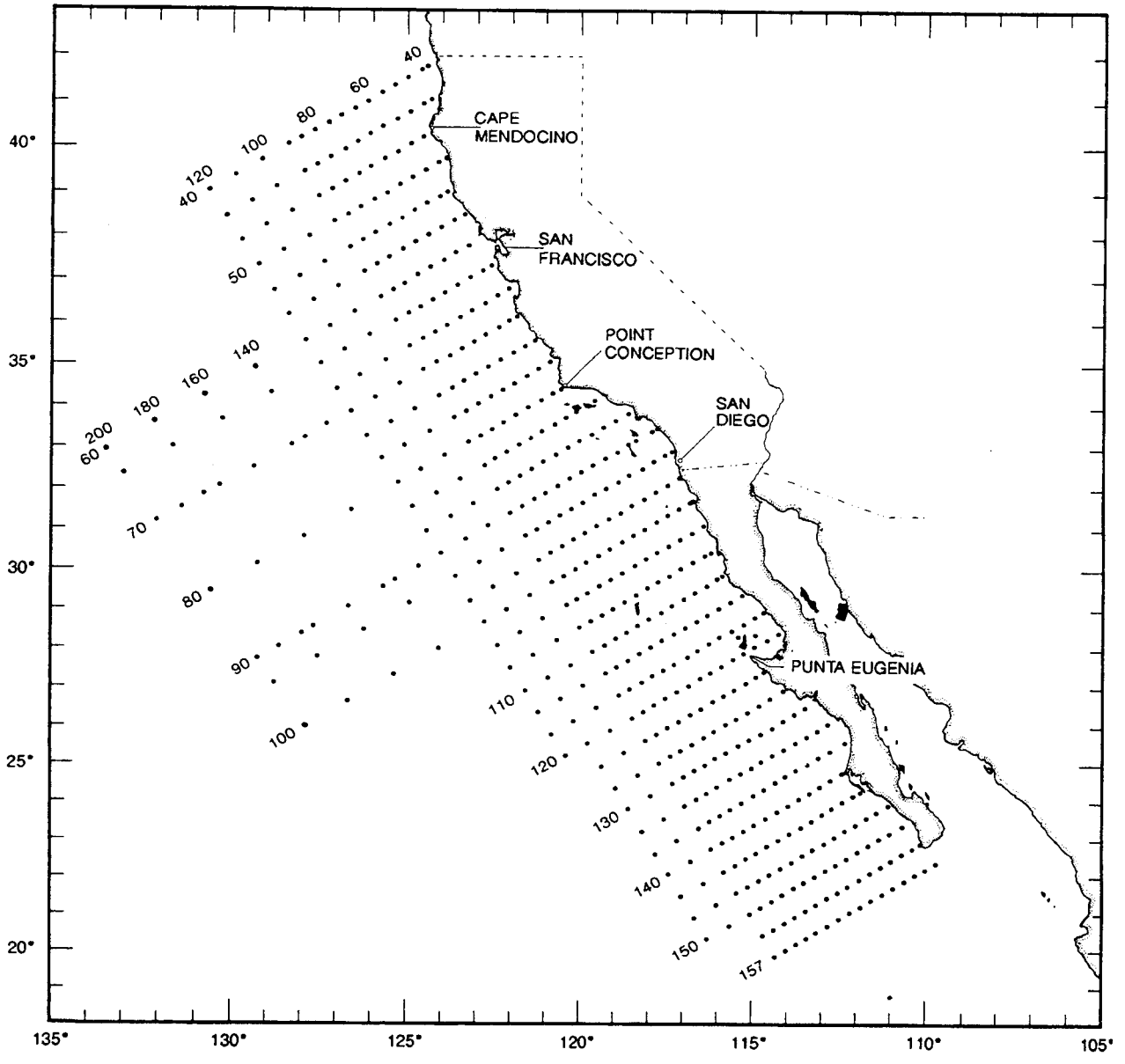

Figure 4. The basic station plan for CalCOFI cruises from 1950 - 1984.

TABLE 1. Station and plankton tow data for Manta tows taken on the 1998 CalCOFI survey. Numbers of fish eggs and larvae are raw counts, unadjusted for volume (cubic meters) of water filtered.

CalCOFI Cruise 9802

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	49.0	35	05.3	120	46.6	JD	98	02	10	1718	81	4	0
76.7	51.0	35	01.4	120	54.6	JD	98	02	10	1501	58	3	0
76.7	55.0	34	53.3	121	11.9	JD	98	02	10	0848	84	1	0
76.7	60.0	34	43.3	121	32.9	JD	98	02	10	0509	73	4	0
76.7	70.0	34	23.3	122	14.9	JD	98	02	09	2302	75	2	0
76.7	80.0	34	03.2	122	56.4	JD	98	02	09	1722	69	0	14
76.7	90.0	33	43.3	123	38.0	JD	98	02	09	0839	73	3	2
76.7	100.0	33	23.2	124	19.4	JD	98	02	09	0110	78	5	0
80.0	55.0	34	18.9	120	48.0	JD	98	02	07	0230	80	7	3
80.0	60.0	34	09.0	121	09.0	JD	98	02	07	0726	73	3	1
80.0	70.0	33	49.0	121	50.6	JD	98	02	07	1910	65	1	1
80.0	80.0	33	29.0	122	31.9	JD	98	02	08	0137	77	4	0
80.0	90.0	33	09.0	123	13.3	JD	98	02	08	0842	73	5	0
80.0	100.0	32	48.9	123	54.3	JD	98	02	08	1730	74	5	1
81.8	46.9	34	16.4	120	01.2	JD	98	02	05	1611	80	2	27
83.3	40.6	34	13.5	119	24.7	JD	98	02	05	0945	85	8	957
83.3	42.0	34	10.7	119	30.5	JD	98	02	05	0653	80	14	357
83.3	51.0	33	52.7	120	08.0	JD	98	02	05	0021	79	5	278
83.3	55.0	33	44.7	120	24.6	JD	98	02	04	2052	70	6	1
83.3	60.0	33	34.7	120	45.3	JD	98	02	04	1555	68	3	1
83.3	70.0	33	14.7	121	26.5	JD	98	02	04	0739	69	2	1
83.3	90.0	32	34.7	122	48.7	JD	98	02	02	0842	73	0	0
83.3	100.0	32	14.7	123	29.6	JD	98	02	02	0038	76	0	5
83.3	110.0	31	54.7	124	10.2	JD	98	02	01	1838	77	0	2
86.7	33.0	33	53.3	118	29.4	JD	98	01	29	1940	75	24	1011
86.7	35.0	33	49.4	118	37.3	JD	98	01	29	2156	71	9	264
86.7	40.0	33	39.5	118	58.5	JD	98	01	30	0224	72	21	95
86.7	45.0	33	29.4	119	19.1	JD	98	01	30	0646	76	0	8
86.7	50.0	33	19.5	119	39.9	JD	98	01	30	1010	67	0	9
86.7	55.0	33	09.4	120	00.4	JD	98	01	30	1902	81	18	1
86.7	60.0	32	59.4	120	21.0	JD	98	01	30	2358	81	3	1
86.7	70.0	32	39.5	121	01.9	JD	98	01	31	0847	89	2	5
86.7	80.0	32	19.5	121	42.8	JD	98	01	31	1714	76	1	1
86.7	90.0	31	59.4	122	23.6	JD	98	01	31	2303	82	1	1
86.7	100.0	31	39.4	123	04.2	JD	98	02	01	0522	77	1	23
86.7	110.0	31	19.4	123	44.6	JD	98	02	01	1219	80	0	11
90.0	28.0	33	29.1	117	46.1	JD	98	01	29	0850	84	9	1014
90.0	30.0	33	25.1	117	54.3	JD	98	01	29	0455	83	33	13
90.0	35.0	33	14.9	118	14.9	JD	98	01	29	0104	81	21	103
90.0	37.0	33	11.1	118	23.2	JD	98	01	28	2242	86	6	21
90.0	45.0	32	55.1	118	56.1	JD	98	01	28	1735	87	6	2
90.0	53.0	32	39.1	119	28.9	JD	98	01	28	1204	81	3	17
90.0	60.0	32	25.1	119	57.6	JD	98	01	28	0625	83	11	6
90.0	70.0	32	05.1	120	38.3	JD	98	01	28	0039	78	0	4
90.0	80.0	31	45.1	121	18.9	JD	98	01	27	1836	84	2	3
90.0	90.0	31	25.1	121	59.4	JD	98	01	27	1238	86	0	1
90.0	100.0	31	05.1	122	39.8	JD	98	01	27	0558	86	0	2

TABLE 1. (cont.) CalCOFI Cruise 9802 (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
90.0	110.0	30	45.1	123	19.9	JD	98	01	27	0015	89	6	105
90.0	120.0	30	25.2	124	00.0	JD	98	01	26	1832	78	0	12
93.3	26.7	32	57.3	117	18.3	JD	98	01	23	1230	98	0	0
93.3	28.0	32	54.8	117	23.7	JD	98	01	23	1555	89	1	0
93.3	30.0	32	50.8	117	31.9	JD	98	01	23	1845	87	1	2
93.3	35.0	32	40.8	117	52.4	JD	98	01	23	2226	83	2	63
93.3	40.0	32	30.8	118	12.7	JD	98	01	24	0234	77	7	0
93.3	45.0	32	20.8	118	33.3	JD	98	01	24	0632	86	9	3
93.3	50.0	32	10.8	118	53.6	JD	98	01	24	1148	76	0	1
93.3	55.0	32	00.8	119	13.8	JD	98	01	24	1629	84	0	1
93.3	60.0	31	50.8	119	34.3	JD	98	01	24	2048	81	4	4
93.3	70.0	31	30.8	120	14.9	JD	98	01	25	0243	82	0	9
93.3	80.0	31	10.8	120	55.2	JD	98	01	25	0840	85	3	4
93.3	90.0	30	50.9	121	35.2	JD	98	01	25	1703	89	1	0
93.3	100.0	30	30.8	122	15.5	JD	98	01	25	2255	92	3	32
93.3	110.0	30	10.9	122	55.3	JD	98	01	26	0440	99	1	84
93.3	120.0	29	50.8	123	35.2	JD	98	01	26	0932	95	1	9

CalCOFI Cruise 9804

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
66.7	49.0	36	49.2	121	59.1	JD	98	04	21	0204	75	9	307
66.7	50.0	36	47.2	122	03.4	JD	98	04	21	0400	80	15	358
66.7	55.0	36	37.2	122	24.9	JD	98	04	21	0734	69	24	1309
66.7	60.0	36	27.2	122	46.4	JD	98	04	21	1208	77	19	3248
66.7	65.0	36	17.2	123	07.8	JD	98	04	21	1640	69	2	142
66.7	70.0	36	07.2	123	29.1	JD	98	04	21	2010	80	7	72
66.7	80.0	35	47.2	124	11.7	JD	98	04	22	0139	70	22	14
70.0	51.0	36	10.9	121	43.7	JD	98	04	20	1902	82	8	28
70.0	55.0	36	02.9	122	00.6	JD	98	04	20	1412	72	40	545
70.0	60.0	35	52.9	122	21.9	JD	98	04	20	0821	76	27	709
70.0	65.0	35	42.8	122	43.2	JD	98	04	20	0505	78	243	421
70.0	70.0	35	32.9	123	04.4	JD	98	04	20	0022	83	62	58
70.0	80.0	35	12.3	123	46.4	JD	98	04	19	1804	78	22	62
73.3	50.4	35	37.6	121	17.0	JD	98	04	18	0746	79	11	72
73.3	55.0	35	28.6	121	36.5	JD	98	04	18	1226	79	63	412
73.3	60.0	35	18.6	121	57.7	JD	98	04	18	1714	75	197	190
73.3	65.0	35	08.6	122	18.8	JD	98	04	18	2104	81	16	8
73.3	70.0	34	58.6	122	39.8	JD	98	04	19	0058	90	8	2
73.3	80.0	34	38.6	123	21.9	JD	98	04	19	0802	82	3	9
76.7	49.0	35	05.3	120	46.6	JD	98	04	18	0142	79	17	67
76.7	51.0	35	01.3	120	55.1	JD	98	04	17	2135	79	370	729
76.7	55.0	34	53.3	121	11.8	JD	98	04	17	1810	82	317	124
76.7	60.0	34	43.3	121	32.9	JD	98	04	17	1258	74	144	557
76.7	70.0	34	23.3	122	14.8	JD	98	04	17	0608	73	10	6
76.7	80.0	34	03.3	122	56.5	JD	98	04	17	0008	82	0	0
76.7	90.0	33	43.3	123	37.9	JD	98	04	16	1810	81	0	0
76.7	100.0	33	23.3	124	19.4	JD	98	04	16	1135	82	1	2

TABLE 1. (cont.) CalCOFI Cruise 9804 (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
80.0	51.0	34	27.0	120	31.4	JD	98	04	14	2033	84	19	152
80.0	55.0	34	19.0	120	48.1	JD	98	04	14	2344	83	15	6315
80.0	60.0	34	09.0	121	09.0	JD	98	04	15	0335	87	64	20
80.0	70.0	33	49.0	121	50.6	JD	98	04	15	0825	79	54	528
80.0	80.0	33	29.0	122	32.0	JD	98	04	15	1708	72	14	10
80.0	90.0	33	09.0	123	13.3	JD	98	04	15	2257	73	7	2
80.0	100.0	32	49.0	123	54.4	JD	98	04	16	0446	77	5	184
81.8	46.9	34	16.5	120	01.5	JD	98	04	14	1621	81	7	21
83.3	40.6	34	13.5	119	24.7	JD	98	04	14	0907	91	0	1019
83.3	42.0	34	10.6	119	30.5	JD	98	04	14	0646	79	5	19
83.3	51.0	33	52.7	120	08.0	JD	98	04	14	0003	79	23	535
83.3	55.0	33	44.7	120	24.5	JD	98	04	13	2048	81	427	402
83.3	60.0	33	34.7	120	45.3	JD	98	04	13	1649	77	2	237
83.3	70.0	33	14.7	121	26.6	JD	98	04	13	0813	76	0	41
83.3	80.0	32	54.7	122	07.7	JD	98	04	13	0112	83	10	64
83.3	90.0	32	34.6	122	48.6	JD	98	04	12	1911	78	4	45
83.3	100.0	32	14.7	123	29.5	JD	98	04	12	1228	77	2	392
83.3	110.0	31	54.7	124	10.2	JD	98	04	12	0522	76	1	46
86.7	33.0	33	53.4	118	29.4	JD	98	04	09	0737	95	9	1257
86.7	35.0	33	49.4	118	37.7	JD	98	04	09	0929	98	43	1001
86.7	40.0	33	39.3	118	58.4	JD	98	04	09	1550	85	15	1424
86.7	45.0	33	29.4	119	19.1	JD	98	04	09	1937	78	10	224
86.7	50.0	33	19.4	119	39.8	JD	98	04	09	2307	79	45	1510
86.7	55.0	33	09.4	120	00.4	JD	98	04	10	0237	80	34	216
86.7	60.0	32	59.4	120	21.0	JD	98	04	10	0826	83	1	750
86.7	70.0	32	39.4	121	02.0	JD	98	04	10	1655	89	1	5601
86.7	80.0	32	19.4	121	42.9	JD	98	04	10	2230	81	3	130
86.7	90.0	31	59.4	122	23.6	JD	98	04	11	0424	82	0	249
86.7	100.0	31	39.4	123	04.2	JD	98	04	11	1310	79	1	278
86.7	110.0	31	19.4	123	44.6	JD	98	04	11	2027	75	2	101
90.0	28.0	33	29.1	117	46.1	JD	98	04	08	2304	97	198	1329
90.0	30.0	33	25.1	117	54.3	JD	98	04	09	0141	89	25	1008
90.0	35.0	33	15.1	118	15.0	JD	98	04	08	1658	78	3	20
90.0	37.0	33	11.1	118	23.1	JD	98	04	08	1423	87	0	359
90.0	45.0	32	55.1	118	56.1	JD	98	04	08	0608	76	40	98
90.0	53.0	32	39.1	119	28.9	JD	98	04	08	0052	86	4	11
90.0	60.0	32	25.1	119	57.6	JD	98	04	07	1928	87	4	3
90.0	70.0	32	05.1	120	38.3	JD	98	04	07	1254	83	1	167
90.0	80.0	31	45.1	121	18.9	JD	98	04	07	0532	79	1	138
90.0	90.0	31	25.1	121	59.4	JD	98	04	06	2355	91	0	154
90.0	100.0	31	05.1	122	39.6	JD	98	04	06	1759	83	10	279
90.0	110.0	30	45.1	123	19.9	JD	98	04	06	0834	89	0	90
90.0	120.0	30	25.0	123	59.8	JD	98	04	06	0039	81	1	30
93.3	26.7	32	57.4	117	18.3	JD	98	04	02	1533	94	15	2
93.3	28.0	32	54.8	117	23.7	JD	98	04	02	1859	92	346	0
93.3	30.0	32	50.8	117	31.9	JD	98	04	02	2215	82	36	3
93.3	35.0	32	40.8	117	52.4	JD	98	04	03	0230	95	298	0
93.3	40.0	32	30.8	118	12.8	JD	98	04	03	0649	84	8	228
93.3	45.0	32	20.8	118	33.3	JD	98	04	03	1228	94	1	23

TABLE 1. (cont.) CalCOFI Cruise 9804 (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	50.0	32	10.8	118	53.6	JD	98	04	03	1807	86	1	5
93.3	55.0	32	00.8	119	14.0	JD	98	04	03	2228	67	4	15
93.3	60.0	31	50.8	119	34.3	JD	98	04	04	0232	85	4	32
93.3	70.0	31	30.8	120	14.7	JD	98	04	04	0833	88	0	7
93.3	80.0	31	10.9	120	55.2	JD	98	04	04	1806	88	1	66
93.3	90.0	30	50.8	121	35.4	JD	98	04	04	2358	92	6	311
93.3	100.0	30	30.8	122	15.5	JD	98	04	05	0536	100	4	158
93.3	110.0	30	10.8	122	55.5	JD	98	04	05	1219	88	0	43
93.3	120.0	29	50.7	123	35.2	JD	98	04	05	1845	82	2	37

CalCOFI Cruise 9807

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
70.0	51.0	36	10.8	121	43.6	NH	98	07	25	2115	90	6	328
70.0	55.0	36	02.9	122	00.8	NH	98	07	25	1747	85	1	1
70.0	60.0	35	52.8	122	21.9	NH	98	07	25	1315	96	0	10
70.0	65.0	35	42.8	122	43.1	NH	98	07	25	0828	95	10	34
76.7	49.0	35	05.2	120	46.7	NH	98	07	24	0438	82	33	370
76.7	51.0	35	01.3	120	54.9	NH	98	07	24	0214	68	11	3
76.7	55.0	34	53.2	121	11.9	NH	98	07	23	2255	80	5	0
76.7	60.0	34	43.2	121	32.8	NH	98	07	23	1855	76	0	30
76.7	70.0	34	23.2	122	14.8	NH	98	07	23	1209	100	2	167
76.7	80.0	34	03.3	122	56.4	NH	98	07	23	0551	85	1	11
76.7	90.0	33	43.3	123	37.9	NH	98	07	23	0010	71	0	222
76.7	100.0	33	23.0	124	19.2	NH	98	07	22	1822	74	0	10
80.0	51.0	34	26.9	120	31.3	NH	98	07	21	0407	84	147	249
80.0	55.0	34	19.1	120	48.3	NH	98	07	21	0749	92	0	0
80.0	60.0	34	09.0	121	08.9	NH	98	07	21	1144	74	0	1
80.0	70.0	33	49.0	121	50.2	NH	98	07	21	1826	78	0	23
80.0	80.0	33	29.0	122	31.8	NH	98	07	22	0014	62	6	381
80.0	90.0	33	09.0	123	13.1	NH	98	07	22	0600	78	11	151
80.0	100.0	32	49.0	123	54.2	NH	98	07	22	1220	71	2	30
81.8	46.9	34	16.5	120	01.4	NH	98	07	21	0010	83	40	288
83.3	40.6	34	13.4	119	24.7	NH	98	07	20	1758	85	17	13
83.3	42.0	34	10.7	119	30.5	NH	98	07	20	1607	89	3	35
83.3	51.0	33	52.5	120	08.1	NH	98	07	20	0858	84	0	34
83.3	55.0	33	44.8	120	24.5	NH	98	07	20	0617	89	2	7
83.3	60.0	33	34.6	120	45.2	NH	98	07	20	0202	56	4	414
83.3	70.0	33	14.6	121	26.8	NH	98	07	19	1943	73	1	3
83.3	80.0	32	54.1	122	08.5	NH	98	07	19	1226	67	0	135
83.3	90.0	32	34.5	122	48.7	NH	98	07	19	0536	64	8	151
83.3	100.0	32	14.7	123	29.6	NH	98	07	18	2324	81	10	81
83.3	110.0	31	54.6	124	10.2	NH	98	07	18	1702	74	5	29
86.7	33.0	33	53.3	118	30.0	NH	98	07	15	2301	95	42	4317
86.7	35.0	33	49.4	118	37.5	NH	98	07	16	0119	27	19	144
86.7	40.0	33	39.4	118	58.4	NH	98	07	16	0532	92	0	13
86.7	45.0	33	29.4	119	19.0	NH	98	07	16	0854	93	0	3
86.7	50.0	33	19.4	119	39.6	NH	98	07	16	1452	71	0	403

TABLE 1. (cont.) CalCOFI Cruise 9807 (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
86.7	55.0	33	09.4	120	00.3	NH	98	07	16	1856	73	2	3
86.7	60.0	32	59.4	120	21.0	NH	98	07	16	2327	71	1	199
86.7	70.0	32	39.4	121	01.7	NH	98	07	17	0513	67	0	24
86.7	80.0	32	19.4	121	42.8	NH	98	07	17	1213	54	0	101
86.7	90.0	31	59.3	122	23.4	NH	98	07	17	1841	73	9	280
86.7	100.0	31	39.3	123	03.9	NH	98	07	18	0136	88	9	104
86.7	110.0	31	19.4	123	44.6	NH	98	07	18	0818	64	2	21
90.0	28.0	33	29.0	117	46.1	NH	98	07	15	1638	98	1	2410
90.0	30.0	33	25.1	117	54.2	NH	98	07	15	1216	63	1	7
90.0	35.0	33	15.1	118	15.1	NH	98	07	15	0737	97	4	1
90.0	37.0	33	11.1	118	23.1	NH	98	07	15	0450	102	1	3
90.0	45.0	32	55.0	118	56.1	NH	98	07	14	2328	85	0	5
90.0	53.0	32	38.9	119	28.8	NH	98	07	14	1801	72	1	69
90.0	60.0	32	25.0	119	57.6	NH	98	07	14	1218	86	0	16
90.0	70.0	32	04.9	120	38.4	NH	98	07	14	0535	75	2	4
90.0	80.0	31	45.0	121	18.9	NH	98	07	13	2318	63	17	995
90.0	90.0	31	24.9	121	59.5	NH	98	07	13	1707	76	5	72
90.0	100.0	31	05.0	122	39.5	NH	98	07	13	0802	70	3	22
90.0	110.0	30	45.0	123	19.9	NH	98	07	13	0032	57	7	337
90.0	120.0	30	24.9	123	59.9	NH	98	07	12	1818	73	7	22
93.3	26.7	32	57.3	117	18.3	NH	98	07	09	1100	89	0	1222
93.3	28.0	32	54.8	117	23.5	NH	98	07	09	1353	75	0	7
93.3	30.0	32	50.7	117	31.8	NH	98	07	09	1705	41	2	0
93.3	35.0	32	40.8	117	52.1	NH	98	07	09	2112	64	2	0
93.3	40.0	32	30.9	118	12.7	NH	98	07	10	0117	63	5	2
93.3	45.0	32	20.7	118	33.2	NH	98	07	10	0632	76	0	1
93.3	50.0	32	10.8	118	53.6	NH	98	07	10	0929	62	0	0
93.3	55.0	32	00.8	119	13.5	NH	98	07	10	1457	71	0	67
93.3	60.0	31	50.7	119	34.3	NH	98	07	10	1908	79	3	0
93.3	70.0	31	30.8	120	14.5	NH	98	07	11	0133	84	8	1
93.3	80.0	31	10.3	120	54.9	NH	98	07	11	0805	86	0	823
93.3	90.0	30	50.9	121	35.2	NH	98	07	11	1557	75	3	271
93.3	100.0	30	30.7	122	15.5	NH	98	07	11	2157	82	30	7
93.3	110.0	30	10.8	122	55.2	NH	98	07	12	0406	77	3	114
93.3	120.0	29	50.5	123	35.5	NH	98	07	12	0853	80	0	4

CalCOFI Cruise 9809

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	49.0	35	05.2	120	46.6	NH	98	09	27	2114	77	8	102
76.7	51.0	35	01.2	120	55.0	NH	98	09	27	1859	77	14	0
76.7	55.0	34	52.8	121	11.9	NH	98	09	27	1554	72	0	1
76.7	60.0	34	42.8	121	32.1	NH	98	09	27	0916	86	0	46
76.7	70.0	34	22.7	122	14.8	NH	98	09	27	0427	75	2	3
76.7	80.0	34	03.3	122	56.5	NH	98	09	26	2233	81	2	36
76.7	90.0	33	43.2	123	37.9	NH	98	09	26	1653	75	1	21
76.7	100.0	33	22.5	124	18.9	NH	98	09	26	0828	72	4	9
80.0	51.0	34	27.0	120	31.4	NH	98	09	24	1843	70	34	36

TABLE 1. (cont.) CalCOFI Cruise 9809 (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
80.0	55.0	34	19.0	120	48.1	NH	98	09	24	2155	59	5	0
80.0	60.0	34	08.8	121	08.4	NH	98	09	25	0152	77	1	0
80.0	70.0	33	48.4	121	50.2	NH	98	09	25	0818	71	0	1
80.0	80.0	33	28.9	122	31.3	NH	98	09	25	1639	73	0	0
80.0	90.0	33	09.0	123	13.3	NH	98	09	25	2214	73	5	4
80.0	100.0	32	48.9	123	53.8	NH	98	09	26	0356	75	3	3
81.8	46.9	34	16.4	120	00.1	NH	98	09	24	1439	68	0	12
83.3	40.6	34	13.4	119	24.7	NH	98	09	24	0634	78	67	1172
83.3	42.0	34	10.7	119	30.0	NH	98	09	24	0739	78	6	111
83.3	51.0	33	52.6	120	08.1	NH	98	09	24	0007	71	98	225
83.3	55.0	33	44.7	120	24.6	NH	98	09	23	2100	75	0	0
83.3	60.0	33	34.7	120	45.3	NH	98	09	23	1721	286	0	3
83.3	70.0	33	13.9	121	25.9	NH	98	09	23	0849	82	1	26
83.3	80.0	32	54.2	122	07.3	NH	98	09	23	0415	73	5	107
83.3	90.0	32	34.6	122	48.7	NH	98	09	22	2220	79	2	111
83.3	100.0	32	14.1	123	29.4	NH	98	09	22	1627	80	1	532
83.3	110.0	31	53.9	124	09.6	NH	98	09	22	0842	79	3	0
86.7	33.0	33	53.4	118	29.4	NH	98	09	19	2003	89	48	272
86.7	35.0	33	49.4	118	37.6	NH	98	09	19	2234	81	7	365
86.7	40.0	33	39.6	118	58.1	NH	98	09	20	0245	70	2	9
86.7	45.0	33	29.4	119	19.1	NH	98	09	20	0701	71	4	0
86.7	50.0	33	19.4	119	39.7	NH	98	09	20	1136	49	2	4548
86.7	55.0	33	09.5	119	59.7	NH	98	09	20	1628	71	2	5
86.7	60.0	32	59.4	120	20.9	NH	98	09	20	2025	67	0	3
86.7	70.0	32	39.4	121	01.3	NH	98	09	21	0221	62	0	3
86.7	80.0	32	19.4	121	42.9	NH	98	09	21	0705	62	2	2
86.7	90.0	31	59.4	122	22.9	NH	98	09	21	1628	75	0	45
86.7	100.0	31	39.4	123	04.1	NH	98	09	21	2207	83	1	1
86.7	110.0	31	19.4	123	43.9	NH	98	09	22	0351	69	5	2
90.0	28.0	33	29.0	117	46.0	NH	98	09	19	1106	90	41	535
90.0	30.0	33	25.3	117	53.8	NH	98	09	19	1416	82	0	21
90.0	35.0	33	15.0	118	14.9	NH	98	09	19	0531	81	1	1
90.0	37.0	33	10.8	118	23.0	NH	98	09	19	0234	78	25	2
90.0	45.0	32	55.0	118	56.1	NH	98	09	18	2123	70	8	2
90.0	53.0	32	38.5	119	28.8	NH	98	09	18	1543	70	1	0
90.0	60.0	32	24.9	119	57.3	NH	98	09	18	0647	56	4	1
90.0	70.0	32	04.6	120	38.4	NH	98	09	18	0125	65	4	4
90.0	80.0	31	45.0	121	19.0	NH	98	09	17	1919	63	18	18
90.0	90.0	31	25.0	121	59.4	NH	98	09	17	1310	72	0	5
90.0	100.0	31	05.1	122	39.7	NH	98	09	17	0555	90	2	13
90.0	110.0	30	45.0	123	19.9	NH	98	09	17	0004	68	25	13
90.0	120.0	30	24.9	123	59.8	NH	98	09	16	1825	77	20	0
93.3	26.7	32	57.4	117	18.1	NH	98	09	13	1138	69	10	1034
93.3	28.0	32	54.9	117	23.0	NH	98	09	13	1434	78	13	485
93.3	30.0	32	50.7	117	31.9	NH	98	09	13	1806	95	24	18
93.3	35.0	32	40.7	117	52.3	NH	98	09	13	2156	85	1	6
93.3	40.0	32	31.0	118	12.3	NH	98	09	14	0151	75	4	0
93.3	45.0	32	20.7	118	33.2	NH	98	09	14	0703	86	2	2
93.3	50.0	32	10.8	118	53.4	NH	98	09	14	1238	70	0	0

TABLE 1. (cont.) CalCOFI Cruise 9809 (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	55.0	32	00.9	119	13.3	NH	98	09	14	1723	74	2	13
93.3	60.0	31	50.8	119	34.2	NH	98	09	14	2124	63	2	0
93.3	70.0	31	30.8	120	14.3	NH	98	09	15	0318	67	0	3
93.3	80.0	31	10.2	120	54.6	NH	98	09	15	0802	76	0	33
93.3	90.0	30	50.8	121	34.8	NH	98	09	15	1619	72	0	1
93.3	100.0	30	30.8	122	15.4	NH	98	09	15	2151	71	0	7
93.3	110.0	30	10.9	122	54.5	NH	98	09	16	0258	69	6	0
93.3	120.0	29	50.4	123	34.5	NH	98	09	16	0904	74	1	7

TABLE 2. Pooled occurrences of fish larvae taken in Manta tows on the 1998 CalCOFI survey.

Rank	Taxon	Occurrences
1	*Sardinops sagax*	67
2	*Engraulis mordax*	64
3	*Cololabis saira*	51
4	*Vinciguerria lucetia*	37
5	*Sebastes* spp.	29
6	*Hypsoblennius jenkinsi*	26
6	*Trachurus symmetricus*	26
8	*Ceratoscopelus townsendi*	22
9	*Scomber japonicus*	15
10	*Cheilopogon heterurus*	12
10	*Chromis punctipinnis*	12
12	*Atherinopsis californiensis*	9
13	*Sebastes diploproa*	7
13	*Stomias atriventer*	7
13	*Triphoturus mexicanus*	7
16	*Cyclothone signata*	6
16	*Cheilopogon pinnatibarbatus*	6
16	*Protomyctophum crockeri*	6
16	*Lampanyctus* spp.	6
16	*Stenobrachius leucopsarus*	6
21	*Leuresthes tenuis*	4
21	*Oxyjulis californica*	4
21	*Hypsoblennius gilberti*	4
21	*Aristostomias scintillans*	4
25	*Paralichthys californicus*	3
25	*Sebastes jordani*	3
25	*Merluccius productus*	3
25	*Macroramphosus gracilis*	3
25	*Scorpaenichthys marmoratus*	3
25	*Sphyraena argentea*	3
25	*Seriola lalandi*	3
25	*Hypsoblennius gentilis*	3
25	*Ophiodon elongatus*	3
25	*Tetragonurus cuvieri*	3
35	*Cheilopogon* spp.	2
35	*Fodiator acutus*	2
35	*Nannobrachium ritteri*	2
35	*Sebastes paucispinis*	2
35	*Oxylebius pictus*	2
35	*Lampadena urophaos*	2
35	*Semicossyphus pulcher*	2
35	*Hypsoblennius* spp.	2
43	*Notoscopelus resplendens*	1
43	*Nannobrachium regale*	1
43	*Diogenichthys laternatus*	1
43	Myctophidae	1
43	*Cyclothone acclinidens*	1
43	*Diogenichthys atlanticus*	1
43	*Bathylagus wesethi*	1

TABLE 2. (cont.)

Rank	Taxon	Occurrences
43	*Diaphus* spp.	1
43	*Leptocottus armatus*	1
43	*Citharichthys stigmaeus*	1
43	*Citharichthys sordidus*	1
43	*Citharichthys* spp.	1
43	*Chiasmodon niger*	1
43	*Rathbunella* spp.	1
43	*Medialuna californiensis*	1
43	*Girella nigricans*	1
43	*Hirundichthys* spp.	1
43	*Paralabrax* spp.	1
43	*Hygophum reinhardtii*	1
43	*Zaniolepis frenata*	1
43	*Sebastes levis*	1
43	*Sebastes aurora*	1
43	*Symphurus atricaudus*	1
43	*Hirundichthys marginatus*	1
43	*Atherinops affinis*	1
43	*Gigantactis* spp.	1
43	*Symbolophorus californiensis*	1
43	Kyphosidae	1
	Total	511

TABLE 3. Pooled raw counts of fish larvae taken in Manta tows on the 1998 CalCOFI survey.

Rank	Taxon	Count
1	*Sardinops sagax*	2545
2	*Engraulis mordax*	954
3	*Hypsoblennius jenkinsi*	293
4	*Atherinopsis californiensis*	210
5	*Cololabis saira*	156
6	*Vinciguerria lucetia*	128
7	*Trachurus symmetricus*	94
8	*Sebastes* spp.	66
9	*Scomber japonicus*	53
10	*Ceratoscopelus townsendi*	49
11	*Chromis punctipinnis*	42
12	*Hypsoblennius gilberti*	27
13	*Hypsoblennius* spp.	22
14	*Cheilopogon heterurus*	21
15	*Lampadena urophaos*	14
16	*Stomias atriventer*	11
17	*Sebastes diploproa*	10
17	*Cheilopogon pinnatibarbatus*	10
17	*Hypsoblennius gentilis*	10
20	*Fodiator acutus*	8
21	*Macroramphosus gracilis*	7
21	*Lampanyctus* spp.	7
21	*Stenobrachius leucopsarus*	7
21	*Triphoturus mexicanus*	7
25	*Ophiodon elongatus*	6
25	*Leuresthes tenuis*	6
25	*Protomyctophum crockeri*	6
25	*Cyclothone signata*	6
25	*Paralichthys californicus*	6
30	*Scorpaenichthys marmoratus*	5
31	*Aristostomias scintillans*	4
31	*Sphyraena argentea*	4
31	*Sebastes jordani*	4
31	*Oxyjulis californica*	4
35	*Tetragonurus cuvieri*	3
35	*Nannobrachium ritteri*	3
35	*Seriola lalandi*	3
35	*Semicossyphus pulcher*	3
35	*Merluccius productus*	3
40	*Rathbunella* spp.	2
40	*Cheilopogon* spp.	2
40	*Oxylebius pictus*	2
40	*Sebastes paucispinis*	2
40	*Symphurus atricaudus*	2
45	*Zaniolepis frenata*	1
45	*Leptocottus armatus*	1
45	*Chiasmodon niger*	1
45	*Sebastes aurora*	1
45	*Citharichthys sordidus*	1

TABLE 3. (cont.)

Rank	Taxon	Count
45	*Citharichthys* spp.	1
45	*Citharichthys stigmaeus*	1
45	*Cyclothone acclinidens*	1
45	*Bathylagus wesethi*	1
45	*Atherinops affinis*	1
45	*Sebastes levis*	1
45	*Gigantactis* spp.	1
45	*Girella nigricans*	1
45	*Symbolophorus californiensis*	1
45	Kyphosidae	1
45	*Medialuna californiensis*	1
45	*Hirundichthys marginatus*	1
45	*Nannobrachium regale*	1
45	*Hirundichthys* spp.	1
45	*Hygophum reinhardtii*	1
45	*Diogenichthys laternatus*	1
45	*Diogenichthys atlanticus*	1
45	*Diaphus* spp.	1
45	Myctophidae	1
45	*Paralabrax* spp.	1
45	*Notoscopelus resplendens*	1
	Total	4853

TABLE 4. Numbers of fish larvae taken in Manta net tows on the 1998 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.
66.7	49.0	-	-	-	1.5	-	-	-	-	-	-	-	-
66.7	50.0	-	-	-	4.8	-	-	-	-	-	-	-	-
66.7	55.0	-	-	-	2.8	-	-	-	-	-	-	-	-
66.7	60.0	-	-	-	14.6	-	-	-	-	-	-	-	-
66.7	65.0	-	-	-	0.7	-	-	-	-	-	-	-	-
66.7	70.0	-	-	-	5.6	-	-	-	-	-	-	-	-
66.7	80.0	-	-	-	14.8	-	-	-	-	-	-	-	-
70.0	51.0	-	-	-	0.8	-	-	0.0	-	-	-	-	-
70.0	55.0	-	-	-	7.9	-	-	0.0	-	-	-	-	-
70.0	60.0	-	-	-	16.0	-	-	0.0	-	-	-	-	-
70.0	65.0	-	-	-	179.7	-	-	0.0	-	-	-	-	-
70.0	70.0	-	-	-	49.1	-	-	-	-	-	-	-	-
70.0	80.0	-	-	-	12.5	-	-	-	-	-	-	-	-
73.3	50.4	-	-	-	4.0	-	-	-	-	-	-	-	-
73.3	55.0	-	-	-	3.9	-	-	-	-	-	-	-	-
73.3	60.0	-	-	-	144.4	-	-	-	-	-	-	-	-
73.3	65.0	-	-	-	12.9	-	-	-	-	-	-	-	-
73.3	70.0	-	-	-	3.6	-	-	-	-	-	-	-	-
76.7	49.0	-	0.0	-	4.8	-	-	0.0	-	0.0	-	-	-
76.7	51.0	-	0.6	-	284.0	-	-	0.0	-	0.0	-	-	-
76.7	55.0	-	0.0	-	236.5	-	-	0.0	-	0.0	-	-	-
76.7	60.0	-	0.0	-	102.3	-	-	0.0	-	0.0	-	-	-
76.7	70.0	-	0.0	-	5.1	-	-	0.0	-	0.0	-	-	-
80.0	51.0	-	-	-	10.1	-	-	0.0	-	0.0	-	-	-
80.0	55.0	-	0.0	-	6.6	-	-	0.0	-	0.0	-	-	-
80.0	60.0	-	0.0	-	54.8	-	-	0.0	-	0.0	-	-	-
80.0	70.0	-	0.0	-	41.3	-	-	0.0	-	0.0	-	-	-
81.8	46.9	-	0.0	-	1.6	-	-	0.0	-	0.0	-	-	-
83.3	40.6	-	5.9	-	0.0	-	-	0.0	-	0.0	-	-	-
83.3	42.0	-	4.8	-	0.8	-	-	0.0	-	0.0	-	-	-
83.3	51.0	-	0.0	-	5.5	-	-	0.0	-	0.0	-	-	-

TABLE 4. (cont.)

Sardinops sagax (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 55.0	-	0.0	-	346.0	-	-	0.0	-	0.0	-	-	-
83.3 60.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-
83.3 80.0	-	-	-	8.3	-	-	0.0	-	0.0	-	-	-
83.3 90.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-
86.7 33.0	3.0	-	-	2.9	-	-	0.0	-	0.0	-	-	-
86.7 35.0	2.1	-	-	4.9	-	-	0.0	-	0.0	-	-	-
86.7 40.0	0.7	-	-	0.0	-	-	0.0	-	0.0	-	-	-
86.7 45.0	0.0	-	-	1.6	-	-	0.0	-	0.0	-	-	-
86.7 50.0	0.0	-	-	33.8	-	-	0.0	-	0.0	-	-	-
86.7 55.0	4.0	-	-	27.2	-	-	0.0	-	0.0	-	-	-
86.7 80.0	0.0	-	-	0.8	-	-	0.0	-	0.0	-	-	-
90.0 28.0	1.7	-	-	9.7	-	-	0.0	-	0.0	-	-	-
90.0 30.0	27.4	-	-	14.2	-	-	0.0	-	0.0	-	-	-
90.0 35.0	16.2	-	-	0.8	-	-	0.0	-	0.0	-	-	-
90.0 37.0	1.7	-	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0 45.0	1.7	-	-	29.4	-	-	0.0	-	0.0	-	-	-
90.0 60.0	1.7	-	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0 100.0	0.0	-	-	0.8	-	-	0.0	-	0.0	-	-	-
93.3 28.0	0.9	-	-	26.5	-	-	0.0	-	0.0	-	-	-
93.3 30.0	0.0	-	-	14.0	-	-	0.0	-	0.0	-	-	-
93.3 35.0	0.0	-	-	224.7	-	-	0.0	-	0.0	-	-	-
93.3 40.0	5.4	-	-	2.5	-	-	0.0	-	0.0	-	-	-
93.3 45.0	4.3	-	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 50.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-
93.3 55.0	0.0	-	-	0.7	-	-	0.0	-	0.0	-	-	-

Engraulis mordax

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
66.7 49.0	-	-	-	3.0	-	-	-	-	-	-	-	-
66.7 50.0	-	-	-	1.6	-	-	-	-	-	-	-	-
66.7 55.0	-	-	-	6.2	-	-	-	-	-	-	-	-
70.0 51.0	-	-	-	0.0	-	-	3.6	-	-	-	-	-
70.0 55.0	-	-	-	18.6	-	-	0.0	-	-	-	-	-
70.0 60.0	-	-	-	1.5	-	-	0.0	-	-	-	-	-
70.0 65.0	-	-	-	3.1	-	-	0.0	-	-	-	-	-
70.0 70.0	-	-	-	1.7	-	-	-	-	-	-	-	-

TABLE 4. (cont.)

Engraulis mordax (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
73.3 50.4	-	-	-	1.6	-	-	-	-	-	-	-	-
73.3 55.0	-	-	-	44.9	-	-	-	-	-	-	-	-
73.3 60.0	-	-	-	3.0	-	-	-	-	-	-	-	-
76.7 49.0	-	0.0	-	4.0	-	-	0.0	-	5.4	-	-	-
76.7 51.0	-	1.2	-	7.9	-	-	0.0	-	0.8	-	-	-
76.7 55.0	-	0.0	-	9.1	-	-	0.8	-	0.0	-	-	-
80.0 51.0	-	-	-	5.1	-	-	11.0	-	15.4	-	-	-
80.0 55.0	-	5.6	-	5.8	-	-	0.0	-	0.0	-	-	-
81.8 46.9	-	0.8	-	1.6	-	-	4.1	-	0.0	-	-	-
83.3 40.6	-	0.0	-	0.0	-	-	13.6	-	45.4	-	-	-
83.3 42.0	-	5.6	-	1.6	-	-	1.8	-	1.6	-	-	-
83.3 51.0	-	0.0	-	8.7	-	-	0.0	-	56.6	-	-	-
83.3 60.0	-	0.0	-	0.0	-	-	1.7	-	0.0	-	-	-
86.7 33.0	13.5	-	-	4.8	-	-	1.0	-	11.6	-	-	-
86.7 35.0	3.6	-	-	32.2	-	-	2.4	-	0.0	-	-	-
86.7 40.0	13.0	-	-	12.8	-	-	0.0	-	0.0	-	-	-
86.7 45.0	0.0	-	-	5.5	-	-	0.0	-	0.0	-	-	-
86.7 55.0	5.6	-	-	0.0	-	-	0.0	-	0.0	-	-	-
86.7 90.0	0.0	-	-	0.0	-	-	0.7	-	0.0	-	-	-
90.0 28.0	4.2	-	-	1.0	-	-	1.0	-	10.7	-	-	-
90.0 30.0	0.0	-	-	0.9	-	-	0.6	-	0.0	-	-	-
90.0 35.0	0.0	-	-	0.8	-	-	0.0	-	0.0	-	-	-
90.0 45.0	0.0	-	-	0.0	-	-	0.0	-	1.4	-	-	-
93.3 28.0	0.0	-	-	287.3	-	-	0.0	-	0.8	-	-	-
93.3 30.0	0.9	-	-	15.7	-	-	0.0	-	1.0	-	-	-
93.3 35.0	0.8	-	-	57.8	-	-	0.0	-	0.0	-	-	-
93.3 40.0	0.0	-	-	1.7	-	-	0.0	-	0.0	-	-	-
93.3 55.0	0.0	-	-	0.7	-	-	0.0	-	0.0	-	-	-

Bathylagus wesethi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 90.0	-	0.0	-	0.0	-	-	0.6	-	0.0	-	-	-

Cyclothone acclinidens

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 110.0	-	0.0	-	0.0	-	-	0.6	-	0.0	-	-	-

TABLE 4. (cont.)

Cyclothone signata

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 70.0	-	0.0	-	0.0	-	-	1.0	-	0.0	-	-	-
76.7 90.0	-	0.7	-	0.0	-	-	0.0	-	0.0	-	-	-
80.0 70.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-
80.0 100.0	-	0.7	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0 120.0	0.0	-	-	0.0	-	-	0.0	-	0.8	-	-	-
93.3 60.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-

Vinciguerria lucetia

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 80.0	-	0.0	-	0.0	-	-	0.9	-	0.0	-	-	-
80.0 60.0	-	0.7	-	0.0	-	-	0.0	-	0.0	-	-	-
80.0 80.0	-	0.0	-	0.0	-	-	3.7	-	0.0	-	-	-
80.0 90.0	-	0.0	-	0.0	-	-	3.9	-	0.0	-	-	-
80.0 100.0	-	2.2	-	1.5	-	-	0.0	-	0.7	-	-	-
83.3 70.0	-	1.4	-	0.0	-	-	0.0	-	0.0	-	-	-
83.3 90.0	-	0.0	-	0.0	-	-	4.5	-	0.0	-	-	-
83.3 100.0	-	0.0	-	1.5	-	-	5.6	-	0.0	-	-	-
86.7 40.0	0.7	-	-	0.0	-	-	0.0	-	0.0	-	-	-
86.7 55.0	0.0	-	-	0.0	-	-	0.0	-	0.7	-	-	-
86.7 60.0	0.8	-	-	0.0	-	-	0.0	-	0.0	-	-	-
86.7 80.0	0.0	-	-	0.0	-	-	0.0	-	1.2	-	-	-
86.7 90.0	0.0	-	-	0.0	-	-	3.6	-	0.0	-	-	-
86.7 100.0	-	0.0	-	0.8	-	-	6.2	-	0.0	-	-	-
90.0 60.0	0.0	-	-	0.0	-	-	0.0	-	1.1	-	-	-
90.0 70.0	0.0	-	-	0.0	-	-	0.0	-	2.0	-	-	-
90.0 80.0	0.0	-	-	0.8	-	-	1.3	-	7.5	-	-	-
90.0 100.0	0.0	-	-	0.0	-	-	2.1	-	1.8	-	-	-
90.0 110.0	0.0	-	-	0.0	-	-	0.0	-	14.9	-	-	-
90.0 120.0	0.0	-	-	0.0	-	-	2.2	-	0.0	-	-	-
93.3 35.0	0.8	-	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 55.0	0.0	-	-	0.0	-	-	0.0	-	0.7	-	-	-
93.3 60.0	1.6	-	-	1.7	-	-	1.6	-	0.0	-	-	-
93.3 70.0	0.0	-	-	0.0	-	-	6.7	-	0.0	-	-	-
93.3 80.0	2.6	-	-	0.9	-	-	0.0	-	0.0	-	-	-
93.3 100.0	0.0	-	-	0.0	-	-	0.8	-	0.0	-	-	-

TABLE 4. (cont.)

Vinciguerria lucetia (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 110.0	0.0	-	-	0.0	-	-	0.0	-	1.4	-	-	-

Stomias atriventer

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 55.0	-	0.8	-	0.0	-	-	0.0	-	0.0	-	-	-
76.7 100.0	-	0.8	-	0.0	-	-	0.0	-	0.0	-	-	-
83.3 60.0	-	1.4	-	0.0	-	-	0.0	-	0.0	-	-	-
86.7 60.0	1.6	-	-	0.0	-	-	0.0	-	0.0	-	-	-
86.7 70.0	1.8	-	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0 60.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-
93.3 60.0	1.6	-	-	0.0	-	-	0.0	-	0.0	-	-	-

Aristostomias scintillans

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 70.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-
86.7 80.0	0.8	-	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0 53.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-
90.0 100.0	0.0	-	-	0.8	-	-	0.0	-	0.0	-	-	-

Myctophidae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 100.0	-	0.0	-	0.0	-	-	0.0	-	0.7	-	-	-

Ceratoscopelus townsendi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 70.0	-	0.0	-	0.7	-	-	0.0	-	0.0	-	-	-
76.7 90.0	-	0.7	-	0.0	-	-	0.0	-	0.0	-	-	-
80.0 80.0	-	1.5	-	0.0	-	-	0.0	-	0.0	-	-	-
80.0 90.0	-	0.0	-	0.0	-	-	3.9	-	0.0	-	-	-
80.0 100.0	-	0.7	-	0.0	-	-	0.0	-	0.7	-	-	-
83.3 90.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-
86.7 90.0	0.0	-	-	0.0	-	-	0.7	-	0.0	-	-	-
86.7 110.0	-	0.0	-	1.5	-	-	0.6	-	0.0	-	-	-
90.0 53.0	0.0	-	-	0.0	-	-	0.0	-	0.7	-	-	-
90.0 60.0	2.5	-	-	0.0	-	-	0.0	-	0.6	-	-	-
90.0 80.0	0.0	-	-	0.0	-	-	0.0	-	0.6	-	-	-
90.0 100.0	0.0	-	-	6.6	-	-	0.0	-	0.0	-	-	-

TABLE 4. (cont.)

Ceratoscopelus townsendi (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 120.0	0.0	-	-	0.0	-	-	1.5	-	4.6	-	-	-
93.3 90.0	0.9	-	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 100.0	0.0	-	-	3.0	-	-	1.6	-	0.0	-	-	-
93.3 110.0	0.0	-	-	0.0	-	-	2.3	-	0.0	-	-	-
93.3 120.0	0.0	-	-	1.6	-	-	0.0	-	0.0	-	-	-

***Diaphus* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 60.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-

Lampadena urophaos

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 110.0	-	0.0	-	0.0	-	-	0.7	-	0.0	-	-	-
90.0 120.0	0.0	-	-	0.0	-	-	0.0	-	9.9	-	-	-

***Lampanyctus* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 90.0	-	0.7	-	0.0	-	-	0.0	-	0.0	-	-	-
80.0 60.0	-	0.7	-	0.0	-	-	0.0	-	0.0	-	-	-
80.0 80.0	-	0.8	-	0.0	-	-	0.0	-	0.0	-	-	-
80.0 100.0	-	0.0	-	1.5	-	-	0.0	-	0.0	-	-	-
83.3 60.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-
90.0 53.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-

Nannobrachium regale

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 70.0	-	0.0	-	0.0	-	-	0.7	-	0.0	-	-	-

Nannobrachium ritteri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0 60.0	-	-	-	1.5	-	-	0.0	-	-	-	-	-
73.3 80.0	-	-	-	0.8	-	-	-	-	-	-	-	-

Notoscopelus resplendens

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
73.3 70.0	-	-	-	0.9	-	-	-	-	-	-	-	-

TABLE 4. (cont.)

Stenobrachius leucopsarus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0 60.0	-	-	-	0.8	-	-	0.0	-	-	-	-	-
73.3 50.4	-	-	-	0.8	-	-	-	-	-	-	-	-
73.3 55.0	-	-	-	0.8	-	-	-	-	-	-	-	-
81.8 46.9	-	0.0	-	1.6	-	-	0.0	-	0.0	-	-	-
83.3 42.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-
86.7 35.0	0.0	-	-	1.0	-	-	0.0	-	0.0	-	-	-

Triphoturus mexicanus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 55.0	-	0.0	-	0.0	-	-	0.9	-	0.0	-	-	-
86.7 45.0	0.0	-	-	0.0	-	-	0.0	-	0.7	-	-	-
86.7 55.0	0.0	-	-	0.0	-	-	0.7	-	0.0	-	-	-
86.7 90.0	0.0	-	-	0.0	-	-	0.7	-	0.0	-	-	-
90.0 35.0	0.0	-	-	0.0	-	-	0.0	-	0.8	-	-	-
90.0 53.0	0.0	-	-	0.0	-	-	0.7	-	0.0	-	-	-
90.0 60.0	0.0	-	-	0.0	-	-	0.0	-	0.6	-	-	-

Diogenichthys atlanticus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 100.0	-	0.8	-	0.0	-	-	0.0	-	0.0	-	-	-

Diogenichthys laternatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 45.0	0.9	-	-	0.0	-	-	0.0	-	0.0	-	-	-

Hygophum reinhardtii

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 100.0	-	0.0	-	0.0	-	-	0.8	-	0.0	-	-	-

Protomyctophum crockeri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0 65.0	-	-	-	0.8	-	-	0.0	-	-	-	-	-
76.7 70.0	-	0.0	-	0.0	-	-	1.0	-	0.0	-	-	-
76.7 100.0	-	0.8	-	0.0	-	-	0.0	-	0.0	-	-	-
80.0 60.0	-	0.0	-	0.9	-	-	0.0	-	0.0	-	-	-
90.0 53.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-
90.0 60.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-

TABLE 4. (cont.)

Symbolophorus californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 100.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-

Merluccius productus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0 55.0	-	-	-	0.7	-	-	0.0	-	-	-	-	-
73.3 50.4	-	-	-	0.8	-	-	-	-	-	-	-	-
80.0 60.0	-	0.7	-	0.0	-	-	0.0	-	0.0	-	-	-

Gigantactis spp.

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 120.0	0.9	-	-	0.0	-	-	0.0	-	0.0	-	-	-

Atherinops affinis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	-	-	-	0.0	-	-	0.8	-	0.0	-	-	-

Atherinopsis californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
66.7 50.0	-	-	-	5.6	-	-	-	-	-	-	-	-
76.7 49.0	-	2.4	-	0.0	-	-	0.0	-	0.0	-	-	-
76.7 51.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-
83.3 40.6	-	0.8	-	0.0	-	-	0.0	-	0.0	-	-	-
83.3 42.0	-	0.8	-	0.0	-	-	0.0	-	0.0	-	-	-
86.7 33.0	0.0	-	-	1.0	-	-	0.0	-	0.0	-	-	-
86.7 35.0	0.0	-	-	2.9	-	-	0.0	-	0.0	-	-	-
90.0 28.0	0.0	-	-	173.6	-	-	0.0	-	0.0	-	-	-
93.3 26.7	0.0	-	-	13.2	-	-	0.0	-	0.0	-	-	-

Leuresthes tenuis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.0	-	0.0	-	-	0.8	-	0.0	-	-	-
80.0 51.0	-	-	-	0.0	-	-	2.5	-	0.0	-	-	-
81.8 46.9	-	0.0	-	0.0	-	-	0.8	-	0.0	-	-	-
86.7 33.0	0.0	-	-	0.0	-	-	1.0	-	0.0	-	-	-

TABLE 4. (cont.)

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
						Cololabis saira							
76.7	51.0	-	0.0	-	0.0	-	-	0.7	-	0.0	-	-	-
76.7	55.0	-	0.0	-	0.0	-	-	0.8	-	0.0	-	-	-
76.7	60.0	-	2.9	-	0.0	-	-	0.0	-	0.0	-	-	-
76.7	70.0	-	1.5	-	0.0	-	-	0.0	-	1.5	-	-	-
76.7	80.0	-	0.0	-	0.0	-	-	0.0	-	1.6	-	-	-
76.7	90.0	-	0.0	-	0.0	-	-	0.0	-	0.8	-	-	-
76.7	100.0	-	1.6	-	0.0	-	-	0.0	-	2.2	-	-	-
80.0	80.0	-	0.8	-	0.0	-	-	0.0	-	0.0	-	-	-
80.0	90.0	-	3.6	-	0.0	-	-	0.8	-	3.6	-	-	-
80.0	100.0	-	0.0	-	0.0	-	-	1.4	-	0.7	-	-	-
83.3	70.0	-	0.0	-	0.0	-	-	0.0	-	0.8	-	-	-
83.3	90.0	-	0.0	-	0.0	-	-	0.0	-	1.6	-	-	-
83.3	100.0	-	0.0	-	0.0	-	-	1.6	-	0.8	-	-	-
83.3	110.0	-	0.0	-	0.0	-	-	2.9	-	1.6	-	-	-
86.7	80.0	0.0	-	-	1.6	-	-	0.0	-	0.0	-	-	-
86.7	90.0	0.8	-	-	0.0	-	-	0.0	-	0.0	-	-	-
86.7	100.0	-	0.8	-	0.0	-	-	1.8	-	0.8	-	-	-
86.7	110.0	-	0.0	-	0.0	-	-	0.0	-	2.8	-	-	-
90.0	30.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-
90.0	35.0	0.8	-	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0	37.0	2.6	-	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0	45.0	0.9	-	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0	60.0	0.8	-	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0	70.0	0.0	-	-	0.0	-	-	1.5	-	0.0	-	-	-
90.0	80.0	1.7	-	-	0.0	-	-	9.4	-	3.1	-	-	-
90.0	90.0	0.0	-	-	0.0	-	-	3.8	-	0.0	-	-	-
90.0	110.0	5.3	-	-	0.0	-	-	4.0	-	2.0	-	-	-
90.0	120.0	0.0	-	-	0.8	-	-	1.5	-	0.0	-	-	-
93.3	35.0	0.0	-	-	0.0	-	-	0.6	-	0.0	-	-	-
93.3	90.0	0.0	-	-	5.5	-	-	2.2	-	0.0	-	-	-
93.3	100.0	2.8	-	-	1.0	-	-	20.6	-	0.0	-	-	-
93.3	110.0	1.0	-	-	0.0	-	-	0.0	-	2.8	-	-	-
93.3	120.0	0.0	-	-	0.0	-	-	0.0	-	0.7	-	-	-

TABLE 4. (cont.)

***Cheilopogon* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	-	-	-	0.0	-	-	0.0	-	0.7	-	-	-
83.3 110.0	-	0.0	-	0.0	-	-	0.0	-	0.8	-	-	-

Cheilopogon heterurus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	0.0	-	0.0	-	-	0.0	-	1.5	-	-	-
83.3 40.6	-	0.0	-	0.0	-	-	0.9	-	0.0	-	-	-
86.7 33.0	0.0	-	-	0.0	-	-	0.0	-	0.9	-	-	-
86.7 45.0	0.0	-	-	0.0	-	-	0.0	-	2.1	-	-	-
86.7 55.0	0.0	-	-	0.0	-	-	0.0	-	0.7	-	-	-
90.0 37.0	0.0	-	-	0.0	-	-	0.0	-	0.8	-	-	-
93.3 30.0	0.0	-	-	0.0	-	-	0.8	-	0.0	-	-	-
93.3 40.0	0.0	-	-	0.0	-	-	3.2	-	0.8	-	-	-
93.3 45.0	0.0	-	-	0.0	-	-	0.0	-	0.9	-	-	-
93.3 55.0	0.0	-	-	0.0	-	-	0.0	-	0.7	-	-	-
93.3 60.0	0.0	-	-	0.0	-	-	0.0	-	1.3	-	-	-

Cheilopogon pinnatibarbatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	0.0	-	0.0	-	-	0.7	-	0.0	-	-	-
83.3 42.0	-	0.0	-	0.0	-	-	0.9	-	0.0	-	-	-
90.0 28.0	0.0	-	-	0.0	-	-	0.0	-	0.9	-	-	-
90.0 35.0	0.0	-	-	0.0	-	-	3.9	-	0.0	-	-	-
93.3 26.7	0.0	-	-	0.0	-	-	0.0	-	1.4	-	-	-
93.3 28.0	0.0	-	-	0.0	-	-	0.0	-	0.8	-	-	-

Fodiator acutus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 28.0	0.0	-	-	0.0	-	-	0.0	-	0.9	-	-	-
93.3 26.7	0.0	-	-	0.0	-	-	0.0	-	4.8	-	-	-

***Hirundichthys* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 110.0	-	0.0	-	0.0	-	-	0.0	-	0.7	-	-	-

TABLE 4. (cont.)

Hirundichthys marginatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 100.0	0.0	-	-	0.0	-	-	0.8	-	0.0	-	-	-

Macroramphosus gracilis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 37.0	0.9	-	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0 53.0	2.4	-	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0 60.0	2.5	-	-	0.0	-	-	0.0	-	0.0	-	-	-

Sebastes spp.

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
66.7 55.0	-	-	-	5.5	-	-	-	-	-	-	-	-
70.0 55.0	-	-	-	0.7	-	-	0.0	-	-	-	-	-
73.3 50.4	-	-	-	1.6	-	-	-	-	-	-	-	-
76.7 49.0	-	0.8	-	4.8	-	-	0.0	-	0.0	-	-	-
80.0 51.0	-	-	-	0.0	-	-	0.8	-	0.0	-	-	-
80.0 55.0	-	0.0	-	0.0	-	-	0.0	-	0.6	-	-	-
80.0 70.0	-	0.6	-	0.0	-	-	0.0	-	0.0	-	-	-
81.8 46.9	-	0.8	-	0.8	-	-	0.0	-	0.0	-	-	-
83.3 51.0	-	0.0	-	1.6	-	-	0.0	-	0.0	-	-	-
83.3 55.0	-	3.5	-	0.0	-	-	0.0	-	0.0	-	-	-
86.7 35.0	0.0	-	-	1.0	-	-	0.0	-	0.0	-	-	-
86.7 40.0	0.7	-	-	0.0	-	-	0.0	-	0.0	-	-	-
86.7 45.0	0.0	-	-	0.8	-	-	0.0	-	0.0	-	-	-
86.7 50.0	0.0	-	-	1.6	-	-	0.0	-	0.0	-	-	-
86.7 55.0	4.0	-	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0 28.0	1.7	-	-	5.8	-	-	0.0	-	0.0	-	-	-
90.0 30.0	0.0	-	-	1.8	-	-	0.0	-	0.0	-	-	-
90.0 35.0	0.0	-	-	0.8	-	-	0.0	-	0.0	-	-	-
90.0 37.0	0.0	-	-	0.0	-	-	1.0	-	0.0	-	-	-
90.0 45.0	2.6	-	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0 53.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-
90.0 60.0	1.7	-	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 26.7	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-
93.3 40.0	0.0	-	-	2.5	-	-	0.0	-	0.0	-	-	-
93.3 45.0	2.6	-	-	0.9	-	-	0.0	-	0.0	-	-	-

TABLE 4. (cont.)

Sebastes aurora

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	-	-	-

Sebastes diploproa

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0 51.0	-	-	-	0.0	-	-	0.9	-	-	-	-	-
76.7 49.0	-	0.0	-	0.0	-	-	2.4	-	0.0	-	-	-
76.7 51.0	-	0.0	-	0.0	-	-	0.7	-	0.0	-	-	-
80.0 51.0	-	-	-	0.0	-	-	0.0	-	0.7	-	-	-
80.0 55.0	-	0.0	-	0.0	-	-	0.0	-	0.6	-	-	-
86.7 50.0	0.0	-	-	0.0	-	-	0.0	-	1.0	-	-	-
86.7 60.0	0.0	-	-	0.0	-	-	0.7	-	0.0	-	-	-

Sebastes jordani

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
66.7 55.0	-	-	-	1.4	-	-	-	-	-	-	-	-
83.3 55.0	-	0.7	-	0.0	-	-	0.0	-	0.0	-	-	-
83.3 60.0	-	0.7	-	0.0	-	-	0.0	-	0.0	-	-	-

Sebastes levis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 55.0	0.8	-	-	0.0	-	-	0.0	-	0.0	-	-	-

Sebastes paucispinis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0 55.0	-	-	-	0.7	-	-	0.0	-	-	-	-	-
83.3 51.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-

Oxylebius pictus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-
83.3 60.0	-	0.0	-	0.0	-	-	0.6	-	0.0	-	-	-

Zaniolepis frenata

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	-	-	-

TABLE 4. (cont.)

Ophiodon elongatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0 51.0	-	-	-	1.6	-	-	0.0	-	-	-	-	-
80.0 51.0	-	-	-	0.8	-	-	0.0	-	0.0	-	-	-
83.3 51.0	-	2.4	-	0.0	-	-	0.0	-	0.0	-	-	-

Leptocottus armatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0 51.0	-	-	-	0.8	-	-	0.0	-	-	-	-	-

Scorpaenichthys marmoratus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
66.7 55.0	-	-	-	0.7	-	-	-	-	-	-	-	-
70.0 51.0	-	-	-	1.6	-	-	0.0	-	-	-	-	-
83.3 51.0	-	1.6	-	0.0	-	-	0.0	-	0.0	-	-	-

Paralabrax spp.

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

Seriola lalandi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 30.0	0.0	-	-	0.0	-	-	0.0	-	1.0	-	-	-
93.3 35.0	0.0	-	-	0.0	-	-	0.0	-	0.8	-	-	-
93.3 45.0	0.0	-	-	0.0	-	-	0.0	-	0.9	-	-	-

Trachurus symmetricus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
66.7 65.0	-	-	-	0.7	-	-	-	-	-	-	-	-
66.7 80.0	-	-	-	0.7	-	-	-	-	-	-	-	-
70.0 60.0	-	-	-	0.8	-	-	0.0	-	-	-	-	-
70.0 65.0	-	-	-	5.4	-	-	6.6	-	-	-	-	-
70.0 70.0	-	-	-	0.8	-	-	-	-	-	-	-	-
70.0 80.0	-	-	-	4.7	-	-	-	-	-	-	-	-
73.3 70.0	-	-	-	2.7	-	-	-	-	-	-	-	-
73.3 80.0	-	-	-	1.6	-	-	-	-	-	-	-	-
76.7 55.0	-	0.0	-	14.8	-	-	0.0	-	0.0	-	-	-
76.7 60.0	-	0.0	-	3.7	-	-	0.0	-	0.0	-	-	-
76.7 70.0	-	0.0	-	0.7	-	-	0.0	-	0.0	-	-	-

TABLE 4. (cont.)

Trachurus symmetricus (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 70.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-
80.0 80.0	-	0.0	-	10.1	-	-	0.0	-	0.0	-	-	-
80.0 90.0	-	0.0	-	5.1	-	-	0.0	-	0.0	-	-	-
83.3 42.0	-	0.0	-	0.0	-	-	0.0	-	1.6	-	-	-
83.3 55.0	-	0.0	-	1.6	-	-	0.0	-	0.0	-	-	-
83.3 80.0	-	-	-	0.0	-	-	0.0	-	3.7	-	-	-
83.3 90.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-
86.7 90.0	0.0	-	-	0.0	-	-	0.7	-	0.0	-	-	-
90.0 45.0	0.0	-	-	0.0	-	-	0.0	-	1.4	-	-	-
93.3 28.0	0.0	-	-	0.0	-	-	0.0	-	0.8	-	-	-
93.3 30.0	0.0	-	-	0.0	-	-	0.0	-	1.0	-	-	-
93.3 55.0	0.0	-	-	1.3	-	-	0.0	-	0.0	-	-	-
93.3 60.0	0.0	-	-	0.9	-	-	0.8	-	0.0	-	-	-

Kyphosidae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 90.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-

Girella nigricans

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 35.0	0.0	-	-	0.0	-	-	0.6	-	0.0	-	-	-

Medialuna californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 40.0	0.0	-	-	0.0	-	-	0.0	-	0.8	-	-	-

Chromis punctipinnis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.0	-	0.0	-	-	0.8	-	0.0	-	-	-
76.7 51.0	-	0.0	-	0.0	-	-	0.0	-	5.4	-	-	-
80.0 60.0	-	0.0	-	0.0	-	-	0.0	-	0.8	-	-	-
83.3 51.0	-	0.0	-	0.0	-	-	0.0	-	2.8	-	-	-
86.7 33.0	0.0	-	-	0.0	-	-	1.0	-	9.8	-	-	-
86.7 35.0	0.0	-	-	0.0	-	-	0.3	-	0.8	-	-	-
90.0 37.0	0.0	-	-	0.0	-	-	0.0	-	8.6	-	-	-
90.0 45.0	0.0	-	-	0.0	-	-	0.0	-	0.7	-	-	-
90.0 70.0	0.0	-	-	0.0	-	-	0.0	-	0.7	-	-	-

TABLE 4. (cont.)

Chromis punctipinnis (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 40.0	0.0	-	-	0.0	-	-	0.0	-	1.5	-	-	-

Oxyjulis californica

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 55.0	-	0.0	-	0.0	-	-	0.9	-	0.0	-	-	-
86.7 55.0	0.0	-	-	0.0	-	-	0.7	-	0.0	-	-	-
90.0 45.0	0.0	-	-	0.8	-	-	0.0	-	0.0	-	-	-
93.3 30.0	0.0	-	-	0.0	-	-	0.0	-	1.0	-	-	-

Semicossyphus pulcher

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	-	-	-	0.0	-	-	0.0	-	0.7	-	-	-
83.3 51.0	-	0.0	-	0.0	-	-	0.0	-	1.4	-	-	-

***Rathbunella* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0 51.0	-	-	-	1.6	-	-	0.0	-	-	-	-	-

Chiasmodon niger

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 110.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-

***Hypsoblennius* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	0.0	-	-	0.0	-	-	0.0	-	4.5	-	-	-
90.0 28.0	0.0	-	-	0.0	-	-	0.0	-	15.2	-	-	-

Hypsoblennius gentilis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 28.0	0.0	-	-	0.0	-	-	0.0	-	5.4	-	-	-
90.0 37.0	0.0	-	-	0.0	-	-	0.0	-	0.8	-	-	-
93.3 30.0	0.0	-	-	0.0	-	-	0.0	-	2.9	-	-	-

Hypsoblennius gilberti

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.0	-	0.0	-	-	3.3	-	0.0	-	-	-
80.0 51.0	-	-	-	0.0	-	-	17.7	-	0.0	-	-	-
86.7 33.0	0.0	-	-	0.0	-	-	0.0	-	0.9	-	-	-

TABLE 4. (cont.)

Hypsoblennius gilberti (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 30.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-

Hypsoblennius jenkinsi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0 55.0	-	-	-	0.0	-	-	0.8	-	-	-	-	-
70.0 65.0	-	-	-	0.0	-	-	2.8	-	-	-	-	-
76.7 49.0	-	0.0	-	0.0	-	-	19.6	-	0.8	-	-	-
76.7 51.0	-	0.0	-	0.0	-	-	5.4	-	3.1	-	-	-
76.7 55.0	-	0.0	-	0.0	-	-	2.4	-	0.0	-	-	-
80.0 51.0	-	-	-	0.0	-	-	91.2	-	0.7	-	-	-
80.0 55.0	-	0.0	-	0.0	-	-	0.0	-	1.8	-	-	-
81.8 46.9	-	0.0	-	0.0	-	-	28.1	-	0.0	-	-	-
83.3 40.6	-	0.0	-	0.0	-	-	0.0	-	4.7	-	-	-
83.3 42.0	-	0.0	-	0.0	-	-	0.0	-	1.6	-	-	-
86.7 33.0	0.8	-	-	0.0	-	-	35.2	-	14.2	-	-	-
86.7 35.0	0.7	-	-	0.0	-	-	2.1	-	4.1	-	-	-
86.7 40.0	0.0	-	-	0.0	-	-	0.0	-	1.4	-	-	-
90.0 28.0	0.0	-	-	1.9	-	-	0.0	-	0.0	-	-	-
90.0 30.0	0.0	-	-	3.6	-	-	0.0	-	0.0	-	-	-
90.0 37.0	0.0	-	-	0.0	-	-	0.0	-	8.6	-	-	-
90.0 45.0	0.0	-	-	0.0	-	-	0.0	-	2.1	-	-	-
93.3 28.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-
93.3 30.0	0.0	-	-	0.0	-	-	0.0	-	3.8	-	-	-

Sphyraena argentea

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	-	0.0	-	0.0	-	-	0.0	-	0.8	-	-	-
86.7 33.0	0.0	-	-	0.0	-	-	1.9	-	0.9	-	-	-

Scomber japonicus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 55.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-
76.7 70.0	-	0.0	-	0.7	-	-	0.0	-	0.0	-	-	-
80.0 51.0	-	-	-	0.0	-	-	0.0	-	3.5	-	-	-
83.3 40.6	-	0.0	-	0.0	-	-	0.0	-	1.6	-	-	-
83.3 51.0	-	0.0	-	0.0	-	-	0.0	-	7.8	-	-	-
86.7 35.0	0.0	-	-	0.0	-	-	0.3	-	0.8	-	-	-

TABLE 4. (cont.)

Scomber japonicus (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 60.0	0.0	-	-	0.8	-	-	0.0	-	0.0	-	-	-
90.0 28.0	0.0	-	-	0.0	-	-	0.0	-	2.7	-	-	-
90.0 37.0	0.0	-	-	0.0	-	-	0.0	-	0.8	-	-	-
90.0 60.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-
90.0 70.0	0.0	-	-	0.8	-	-	0.0	-	0.0	-	-	-
93.3 26.7	0.0	-	-	0.0	-	-	0.0	-	0.7	-	-	-
93.3 28.0	0.0	-	-	0.0	-	-	0.0	-	7.8	-	-	-
93.3 30.0	0.0	-	-	0.0	-	-	0.0	-	12.4	-	-	-

Tetragonurus cuvieri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 60.0	-	0.0	-	0.7	-	-	0.0	-	0.0	-	-	-
76.7 100.0	-	0.0	-	0.8	-	-	0.0	-	0.0	-	-	-
93.3 100.0	0.0	-	-	0.0	-	-	0.8	-	0.0	-	-	-

***Citharichthys* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 28.0	0.0	-	-	0.0	-	-	0.0	-	0.9	-	-	-

Citharichthys sordidus

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

Citharichthys stigmaeus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0 51.0	-	-	-	0.0	-	-	0.9	-	-	-	-	-

Paralichthys californicus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
66.7 49.0	-	-	-	2.3	-	-	-	-	-	-	-	-
86.7 33.0	0.8	-	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 28.0	0.0	-	-	1.8	-	-	0.0	-	0.0	-	-	-

Symphurus atricaudus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	-	-	-	0.0	-	-	0.0	-	1.4	-	-	-

PHYLOGENETIC INDEX TO TABLE 4

ALPHABETICAL INDEX TO TABLE 4

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