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ICHTHYOPLANKTON AND STATION DATA FOR MANTA (SURFACE) TOWS TAKEN ON CALIFORNIA COOPERATIVE OCEANIC FISHERIES INVESTIGATIONS SURVEY CRUISES IN 1992

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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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 1992. It is the 11th report in a series that presents surface tow data for all biological-oceanographic CalCOFI surveys from 1977 to the present. A total of 258 net tow stations was occupied during four quarterly cruises over the 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 255 Manta net tows was taken during 1992. 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 68 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 11th 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 1992. 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 1992 CalCOFI survey are published in Watson 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 1992 CalCOFI survey were published by the Scripps Institution of Oceanography (Univ. of Calif., SIO 1992, 1993). All available records for Manta tows on the 1992 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	1987	Sandknop et al. 2002a
1980–81	Ambrose et al. 2002a	1988	Watson et al. 2002
1984	Charter et al. 2002a	1989	Ambrose et al. 2002c
1985	Ambrose et al. 2002b	1990	Charter et al. 2002c
1986	Charter et al. 2002b	1991	Sandknop et al. 2002b

SAMPLING AREA AND PATTERN

The 1992 CalCOFI survey consisted of four quarterly cruises on which a total of 255 Manta net tows was taken at most of the 258 standard CalCOFI net tow stations occupied on the survey (Table 1; Figures 2 and 3). Two vessels were employed on the survey, the NOAA vessel RV *David Starr Jordan* and the SIO vessel *New Horizon*. Dates and numbers of stations sampled with the Manta net in 1992 (Figures 2 and 3) are summarized below:

9202, RV *David Starr Jordan*, 60 stations, January 28–February 11;

9204, RV *David Starr Jordan*, 65 stations, April 13–28;

9207, RV *David Starr Jordan*, 66 stations, July 2–15;

9210, RV *New Horizon*, 64 stations, September 26–October 9.

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. Stations on CalCOFI lines 76.7 and 80.0 extended seaward to station 100.0, stations on lines 83.3 and 86.7 extended seaward to station 110.0, and stations on lines 90.0 and 93.3 extended seaward to station 120.0 on all cruises. At its shoreward end, line 76.7 began at station 70.0 on cruise 9202, and at station 49.0 on all other cruises (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 68 larval fish categories (including the disintegrated category) was identified: 57 to species, 8 to genus, and 2 to family.

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

Disintegrated fish larvae–larvae that could not be identified because of their poor condition; separated from the "unidentified" category to monitor the general condition of the ichthyoplankton samples through the time series.

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, northern anchovy (*Engraulis mordax*) ranked first in abundance with 31.2% of the total fish larvae and first in occurrence with larvae taken in 18.4% of the total samples (Tables 2 and 3). They were more than twice as abundant as the second most abundant species, Pacific hake (*Merluccius productus*), which had 12.4% of the total larvae but ranked only 15th occurrence (3.1% of the total samples). The high abundance of Pacific hake is attributable to a single large collection (515 larvae) at station 80.0 80.0 on cruise 9202JD. California scorpionfish (*Scorpaena guttata*) was the third most abundant taxon with 10.7% of the total larvae but it ranked only 33rd in frequency of occurrence (0.8% of the samples). The high abundance of California scorpionfish is attributable to a single large catch of newly hatched larvae (458 larvae) at station 83.3 40.6 on cruise 9207NH. Pacific sardine (*Sardinops sagax*) ranked fourth in abundance (8.6% of total larvae) and third in total occurrences (16.1% of the samples). The mussel blenny *Hypsoblennius jenkensi* ranked fifth in abundance (5.5% of total larvae) and sixth in total occurrences (7.5% of the samples). The next five most abundant taxa were the rockfish genus *Sebastes* (5.0% of total larvae), shortbelly rockfish *S. jordani* and Pacific saury *Cololabis saira*, each with 3.1% of the total, California grunion *Leuresthes tenuis* (2.6%), and Panama lightfish *Vinciguerria lucetia* (2.4%). These species ranked 4th, tied for 10th, ranked 2nd, tied for 20th, and ranked 8th in frequency of occurrence, respectively. The 10 most abundant taxa comprised 84.6% of all the larvae collected in Manta net tows on CalCOFI cruises in 1992. The remaining 15.4% was distributed among 58 other taxa (including the "disintegrated" category). Of the ten most abundant taxa, half were coastal demersal taxa, three were coastal pelagic species, one was epipelagic, and one was mesopelagic.

In contrast to the Manta collections, among the 146 taxa collected in the oblique tows during the 1992 survey Pacific hake ranked first in both abundance and occurrence (33.4% of the total larvae and 19.0% positive tows), with more than twice as many larvae as the third-ranked northern anchovy (14.6% of the total larvae). Larval Panama lightfish, ranked 10th in abundance in Manta tows, was second most abundant in oblique tows (Watson et al. 1999). Although their rank orders of abundance differed between the two samplers, among the ten most abundant taxa in oblique tows all but two mesopelagic bathylagid species also were taken with the Manta net, and six of those eight ranked among the ten most abundant in the Manta collections.

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 1992 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 1992 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* and the RV *New Horizon* during the 1992 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 1992 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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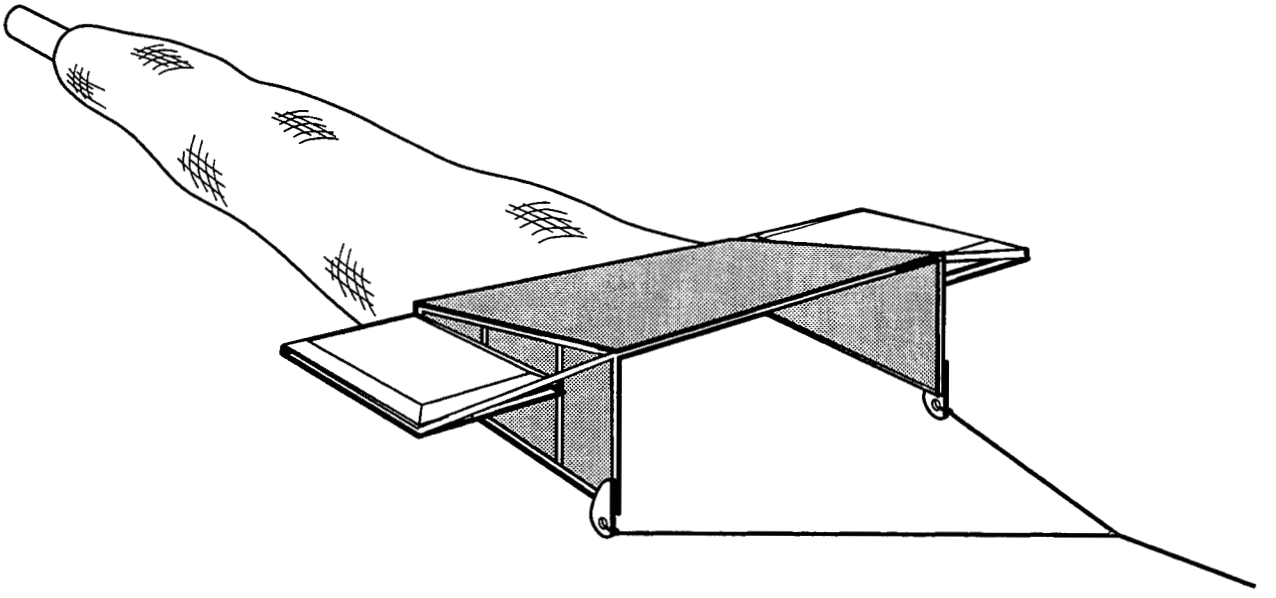

Figure 1. Diagram of the Manta net used on CalCOFI surveys.

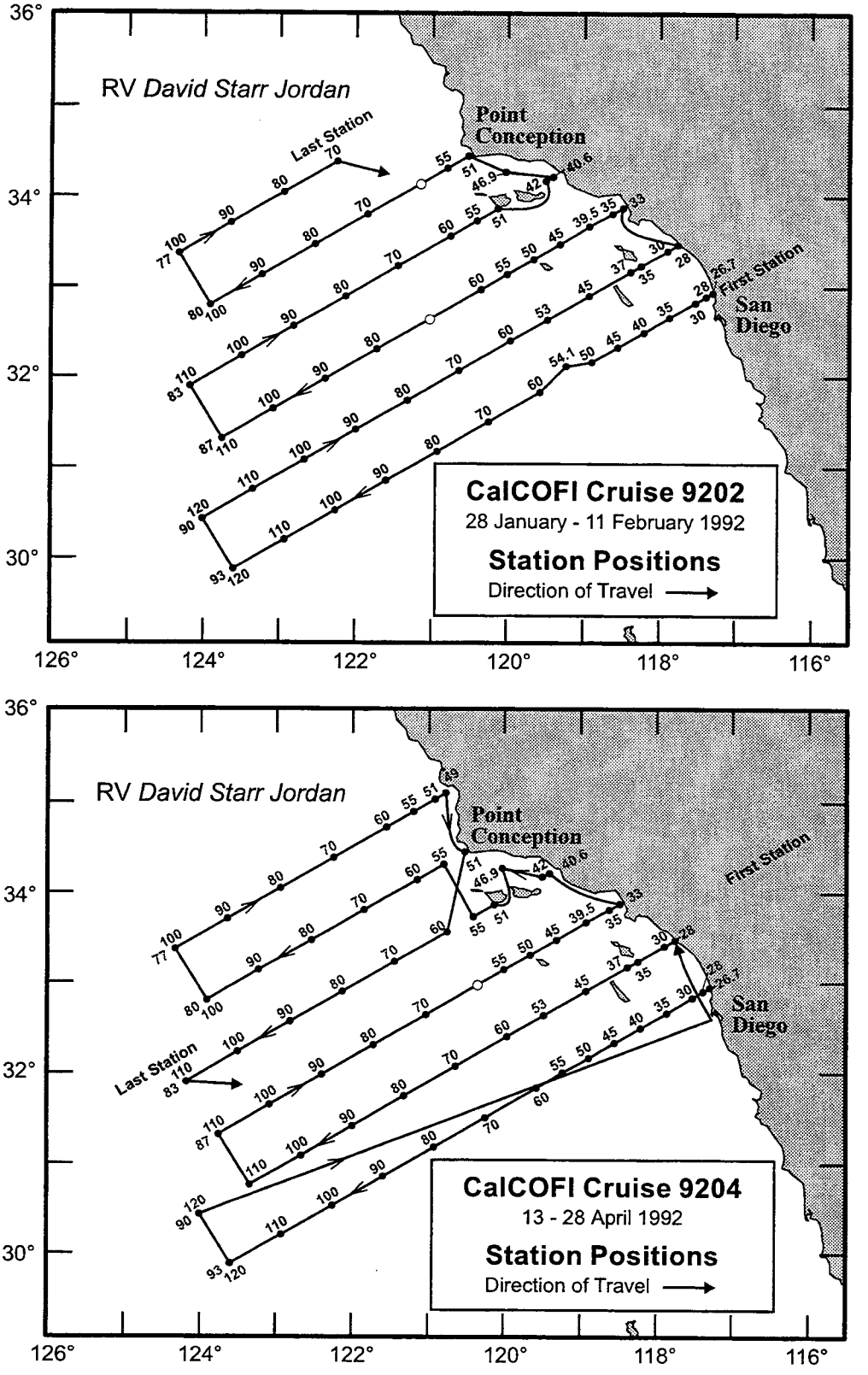

Figure 2. Stations and cruise tracks for CalCOFI cruises 9202 (above) and 9204 (below). Dots indicate stations where Manta and oblique tows were taken; open circles indicate stations where only oblique tows were taken.

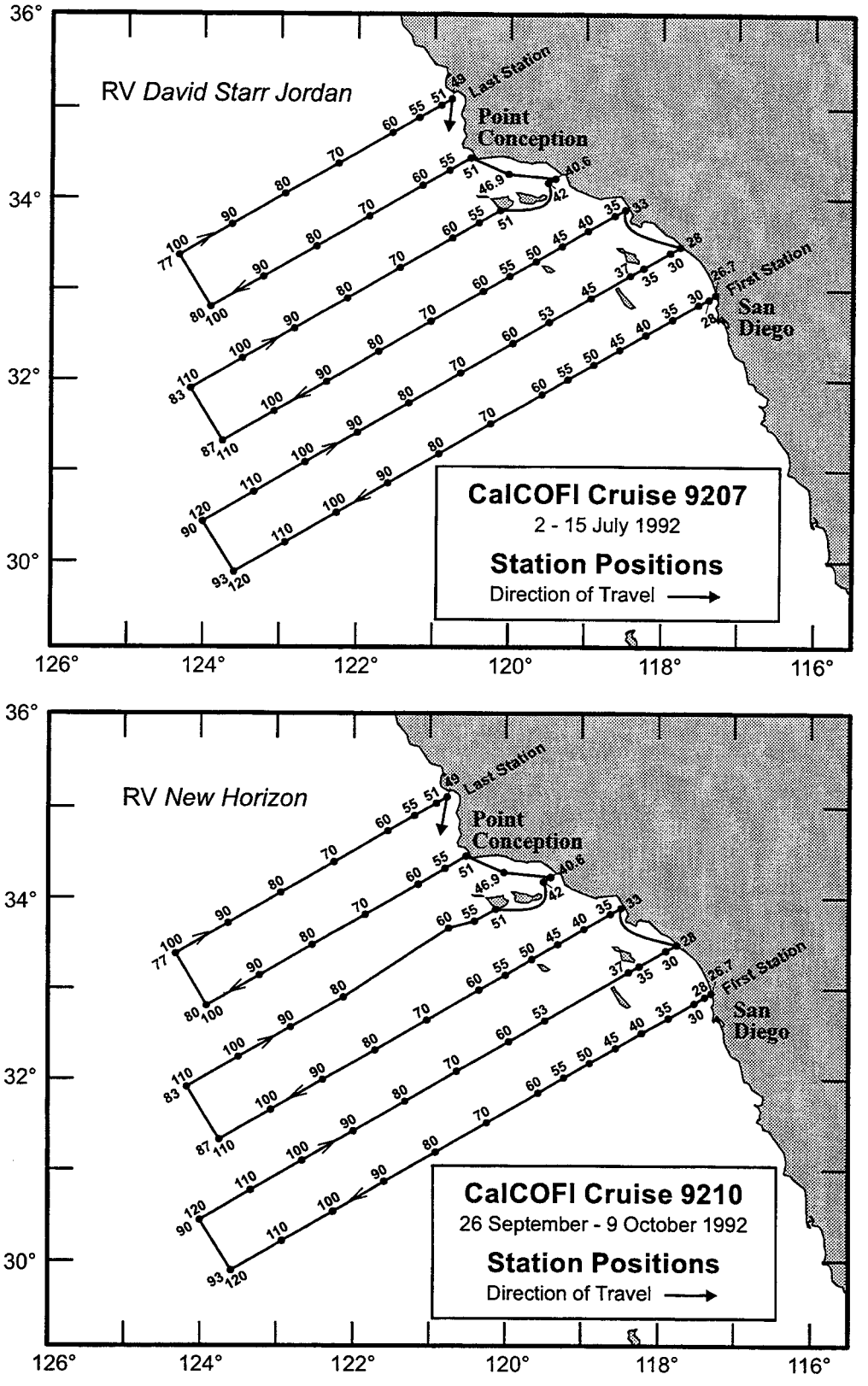

Figure 3. Stations and cruise tracks for CalCOFI cruises 9207 (above) and 9210 (below). Symbols as in Figure 2.

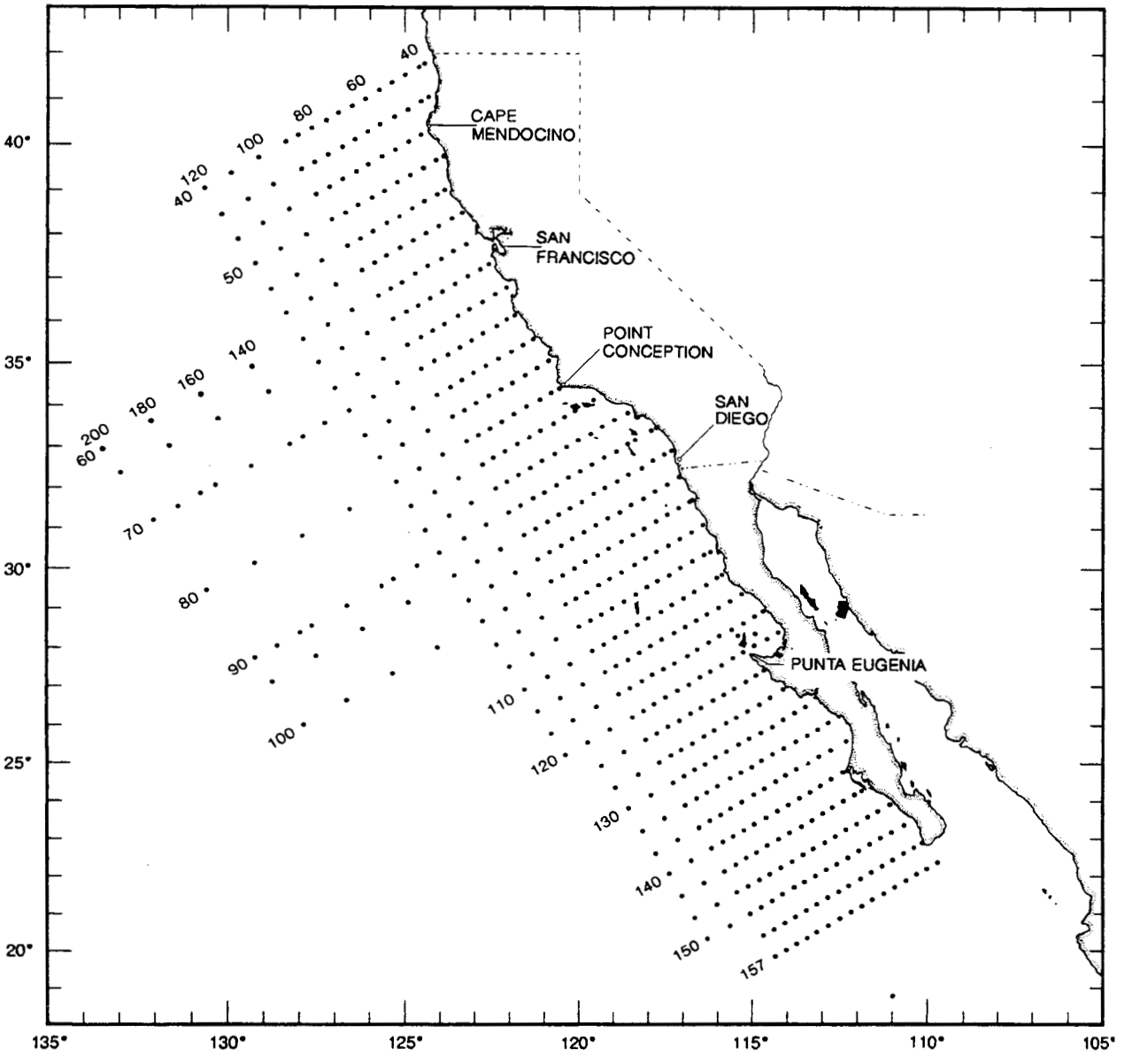

Figure 4. The basic station plan for CalCOFI cruises from 1950 - 1984.

TABLE 1. Station and plankton tow data for Manta tows taken on the 1992 CalCOFI survey. Numbers of fish eggs and larvae are raw counts, unadjusted for volume (cubic meters) of water filtered.

CalCOFI Cruise 9202

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	70.0	34	23.3	122	14.8	JD	92	02	11	1246	75	2	16
76.7	80.0	34	03.3	122	56.4	JD	92	02	11	0641	81	1	3
76.7	90.0	33	43.2	123	38.0	JD	92	02	11	0109	68	0	6
76.7	100.0	33	23.2	124	19.4	JD	92	02	10	1920	85	1	0
80.0	51.0	34	27.0	120	31.4	JD	92	02	09	0303	90	279	2493
80.0	55.0	34	19.0	120	48.1	JD	92	02	09	0620	81	31	22
80.0	70.0	33	49.0	121	50.5	JD	92	02	09	1742	85	18	17
80.0	80.0	33	29.0	122	31.9	JD	92	02	09	2357	80	518	18
80.0	90.0	33	09.0	123	13.2	JD	92	02	10	0602	77	5	9
80.0	100.0	32	49.0	123	54.3	JD	92	02	10	1310	71	0	4
81.8	46.9	34	16.5	120	01.5	JD	92	02	08	2255	92	26	639
83.3	40.6	34	13.5	119	24.6	JD	92	02	08	1810	101	38	2959
83.3	42.0	34	10.7	119	30.5	JD	92	02	08	1611	92	11	109
83.3	51.0	33	52.7	120	07.9	JD	92	02	08	0948	87	4	148
83.3	55.0	33	44.7	120	24.5	JD	92	02	08	0654	83	0	24
83.3	60.0	33	34.7	120	45.3	JD	92	02	08	0313	89	60	353
83.3	70.0	33	14.7	121	26.5	JD	92	02	07	2137	79	10	1880
83.3	80.0	32	54.7	122	07.7	JD	92	02	07	1602	92	0	21
83.3	90.0	32	34.7	122	48.7	JD	92	02	07	0953	82	0	2
83.3	100.0	32	14.7	123	29.4	JD	92	02	07	0418	84	0	4
83.3	110.0	31	54.7	124	10.2	JD	92	02	06	2232	83	2	4
86.7	33.0	33	53.4	118	29.4	JD	92	02	04	0804	89	166	5938
86.7	35.0	33	49.4	118	37.7	JD	92	02	04	1101	89	3	96
86.7	39.5	33	41.0	118	56.0	JD	92	02	04	1542	95	1	23
86.7	45.0	33	29.4	119	19.1	JD	92	02	04	2011	85	33	64
86.7	50.0	33	19.4	119	39.8	JD	92	02	04	2352	80	6	43
86.7	55.0	33	09.4	120	00.4	JD	92	02	05	0318	80	2	5
86.7	60.0	32	59.3	120	21.0	JD	92	02	05	0722	93	8	2
86.7	80.0	32	19.4	121	42.9	JD	92	02	05	2202	75	1	0
86.7	90.0	31	59.4	122	23.5	JD	92	02	06	0405	79	1	2
86.7	100.0	31	39.3	123	04.2	JD	92	02	06	0937	89	0	20
86.7	110.0	31	19.4	123	44.6	JD	92	02	06	1627	88	1	12
90.0	28.0	33	29.1	117	46.0	JD	92	02	04	0156	91	33	7
90.0	30.0	33	25.0	117	54.3	JD	92	02	03	2337	91	4	5
90.0	35.0	33	15.0	118	15.0	JD	92	02	03	2001	94	88	138
90.0	37.0	33	11.1	118	23.2	JD	92	02	03	1703	100	0	0
90.0	45.0	32	55.1	118	56.0	JD	92	02	03	1157	86	0	359
90.0	53.0	32	39.2	119	28.8	JD	92	02	03	0611	86	111	13
90.0	60.0	32	25.1	119	57.6	JD	92	02	03	0114	74	15	28
90.0	70.0	32	05.1	120	38.3	JD	92	02	01	2242	73	0	2
90.0	80.0	31	45.0	121	18.9	JD	92	02	01	1618	80	1	3
90.0	90.0	31	25.2	121	59.3	JD	92	02	01	0850	73	1	4
90.0	100.0	31	05.1	122	39.7	JD	92	02	01	0331	77	3	13
90.0	110.0	30	44.9	123	20.1	JD	92	01	31	2215	82	1	2
90.0	120.0	30	25.0	123	59.9	JD	92	01	31	1637	83	0	31
92.8	54.1	32	08.0	119	14.0	JD	92	01	29	1647	76	0	15
93.3	26.7	32	57.5	117	18.3	JD	92	01	28	1252	99	1	77

TABLE 1. (cont.) CalCOFI Cruise 9202 (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	28.0	32	54.8	117	23.6	JD	92	01	28	1538	95	136	174
93.3	30.0	32	50.8	117	31.9	JD	92	01	28	1842	93	12	52
93.3	35.0	32	40.8	117	52.6	JD	92	01	28	2307	102	3	0
93.3	40.0	32	30.8	118	12.8	JD	92	01	29	0259	84	8	5
93.3	45.0	32	20.7	118	33.3	JD	92	01	29	0652	91	0	2
93.3	50.0	32	10.8	118	53.6	JD	92	01	29	1225	87	0	20
93.3	60.0	31	50.8	119	34.3	JD	92	01	29	2115	85	5	3
93.3	70.0	31	30.8	120	14.8	JD	92	01	30	0311	73	1	2
93.3	80.0	31	10.8	120	55.2	JD	92	01	30	0852	84	0	5
93.3	90.0	30	50.8	121	35.4	JD	92	01	30	1535	90	0	13
93.3	100.0	30	30.8	122	15.5	JD	92	01	30	2104	90	1	7
93.3	110.0	30	10.8	122	55.4	JD	92	01	31	0217	94	0	54
93.3	120.0	29	50.7	123	35.2	JD	92	01	31	0734	104	0	29

CalCOFI Cruise 9204

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	46.5	JD	92	04	27	0717	91	21	153
76.7	51.0	35	01.3	120	55.0	JD	92	04	27	0457	83	5	23
76.7	55.0	34	53.3	121	11.9	JD	92	04	27	0139	88	6	14
76.7	60.0	34	43.2	121	33.1	JD	92	04	26	2130	74	0	23
76.7	70.0	34	23.3	122	14.8	JD	92	04	26	1530	84	0	2
76.7	80.0	34	03.3	122	56.4	JD	92	04	26	0815	89	0	16
76.7	90.0	33	43.3	123	38.0	JD	92	04	26	0202	88	12	4
76.7	100.0	33	23.3	124	19.5	JD	92	04	25	2038	105	46	114
80.0	51.0	34	27.1	120	31.4	JD	92	04	27	1228	87	1	11
80.0	55.0	34	19.0	120	48.1	JD	92	04	24	1108	92	2	5
80.0	60.0	34	09.0	121	09.0	JD	92	04	24	1515	77	1	27
80.0	70.0	33	49.1	121	50.6	JD	92	04	24	2118	74	2	4
80.0	80.0	33	29.0	122	32.0	JD	92	04	25	0312	91	4	1
80.0	90.0	33	09.1	123	13.3	JD	92	04	25	0844	89	0	20
80.0	100.0	32	49.0	123	54.5	JD	92	04	25	1510	90	0	199
81.8	46.9	34	16.5	120	01.5	JD	92	04	23	1843	80	0	9
83.3	40.6	34	13.4	119	24.7	JD	92	04	23	1207	91	3	8482
83.3	42.0	34	10.7	119	30.5	JD	92	04	23	1345	84	0	1505
83.3	51.0	33	52.8	120	08.0	JD	92	04	23	2320	91	28	212
83.3	55.0	33	44.7	120	24.6	JD	92	04	24	0240	81	15	3
83.3	60.0	33	34.6	120	45.3	JD	92	04	27	1905	77	14	4
83.3	70.0	33	14.7	121	26.5	JD	92	04	28	0039	73	12	25
83.3	80.0	32	54.7	122	07.7	JD	92	04	28	0622	73	0	5
83.3	90.0	32	34.8	122	48.6	JD	92	04	28	1210	86	0	13
83.3	100.0	32	14.7	123	29.5	JD	92	04	28	1728	90	0	15
83.3	110.0	31	54.7	124	10.2	JD	92	04	28	2237	80	19	4
86.7	33.0	33	53.4	118	29.4	JD	92	04	23	0551	92	5	872
86.7	35.0	33	49.4	118	37.7	JD	92	04	23	0326	98	358	1235
86.7	39.5	33	41.0	118	56.1	JD	92	04	22	2320	77	20	252
86.7	45.0	33	29.4	119	19.1	JD	92	04	22	1810	86	11	0
86.7	50.0	33	19.4	119	39.8	JD	92	04	22	1440	78	53	110

TABLE 1. (cont.) CalCOFI Cruise 9204 (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	00.5	JD	92	04	22	0954	81	2	7
86.7	70.0	32	39.4	121	02.1	JD	92	04	21	2243	84	3	0
86.7	80.0	32	19.5	121	42.9	JD	92	04	21	1628	76	0	1
86.7	90.0	31	59.4	122	23.8	JD	92	04	21	0930	69	2	129
86.7	100.0	31	39.4	123	04.3	JD	92	04	21	0324	75	5	94
86.7	110.0	31	19.4	123	44.5	JD	92	04	20	2138	71	5	16
90.0	28.0	33	29.1	117	46.1	JD	92	04	18	0539	104	9	2543
90.0	30.0	33	25.1	117	54.3	JD	92	04	18	0835	90	182	1410
90.0	35.0	33	15.1	118	15.1	JD	92	04	18	1254	86	1	1447
90.0	37.0	33	11.1	118	23.2	JD	92	04	18	1540	74	0	214
90.0	45.0	32	55.1	118	56.0	JD	92	04	18	2103	74	57	2
90.0	53.0	32	39.1	119	28.9	JD	92	04	19	0234	83	32	18
90.0	60.0	32	25.1	119	57.6	JD	92	04	19	0722	87	0	1
90.0	70.0	32	05.1	120	38.3	JD	92	04	19	1521	83	0	4
90.0	80.0	31	45.2	121	18.9	JD	92	04	19	2055	75	6	9
90.0	90.0	31	25.1	121	59.4	JD	92	04	20	0235	88	5	62
90.0	100.0	31	05.1	122	39.7	JD	92	04	20	0804	97	7	68
90.0	110.0	30	45.1	123	19.9	JD	92	04	20	1518	85	0	46
90.0	120.0	30	25.1	123	59.9	JD	92	04	16	1012	80	0	13
93.3	26.7	32	57.4	117	18.4	JD	92	04	13	1150	96	1	20
93.3	28.0	32	54.8	117	23.7	JD	92	04	13	1402	88	0	992
93.3	30.0	32	50.7	117	31.9	JD	92	04	13	1715	95	6	4
93.3	35.0	32	40.6	117	52.4	JD	92	04	13	2133	81	10	36
93.3	40.0	32	30.8	118	12.8	JD	92	04	14	0202	68	5	44
93.3	45.0	32	20.8	118	33.3	JD	92	04	14	0634	83	0	42
93.3	50.0	32	10.7	118	53.6	JD	92	04	14	1023	70	0	1
93.3	55.0	32	00.8	119	14.0	JD	92	04	14	1444	77	0	0
93.3	60.0	31	50.8	119	34.3	JD	92	04	14	1842	84	2	0
93.3	70.0	31	30.8	120	14.7	JD	92	04	15	0016	80	1	3
93.3	80.0	31	10.8	120	55.2	JD	92	04	15	0603	83	8	37
93.3	90.0	30	50.9	121	35.4	JD	92	04	15	1223	80	0	19
93.3	100.0	30	30.8	122	15.5	JD	92	04	15	1800	83	1	22
93.3	110.0	30	10.9	122	55.4	JD	92	04	15	2325	83	4	27
93.3	120.0	29	50.8	123	35.2	JD	92	04	16	0440	92	2	14

CalCOFI Cruise 9207

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	92	07	15	1655	78	0	26
76.7	51.0	35	01.3	120	55.1	JD	92	07	15	1459	84	2	1
76.7	55.0	34	53.3	121	11.9	JD	92	07	15	1157	87	0	60
76.7	60.0	34	43.3	121	32.9	JD	92	07	15	0652	79	0	38
76.7	70.0	34	23.2	122	14.9	JD	92	07	15	0036	84	0	60
76.7	80.0	34	03.5	122	56.4	JD	92	07	14	1847	84	0	16
76.7	90.0	33	43.3	123	38.0	JD	92	07	14	1325	93	0	32
76.7	100.0	33	23.3	124	19.4	JD	92	07	14	0606	87	0	16
80.0	51.0	34	27.0	120	31.4	JD	92	07	12	1830	91	5	2201
80.0	55.0	34	19.0	120	48.0	JD	92	07	12	2130	87	15	158

TABLE 1. (cont.) CalCOFI Cruise 9207 (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	60.0	34	09.1	121	09.0	JD	92	07	13	0115	103	4	82
80.0	70.0	33	49.0	121	50.6	JD	92	07	13	0632	83	0	199
80.0	80.0	33	29.2	122	31.6	JD	92	07	13	1300	83	0	16
80.0	90.0	33	09.0	123	13.3	JD	92	07	13	1902	74	2	4
80.0	100.0	32	49.1	123	54.4	JD	92	07	14	0032	91	1	242
81.8	46.9	34	16.6	120	01.5	JD	92	07	12	1430	103	0	630
83.3	40.6	34	13.5	119	24.7	JD	92	07	12	0507	91	464	1184
83.3	42.0	34	10.7	119	30.5	JD	92	07	12	0318	101	131	5648
83.3	51.0	33	52.7	120	08.0	JD	92	07	11	2205	87	1	3389
83.3	55.0	33	44.7	120	24.6	JD	92	07	11	1915	84	1	31
83.3	60.0	33	34.7	120	45.3	JD	92	07	11	1540	86	0	88
83.3	70.0	33	15.0	121	26.3	JD	92	07	11	0847	85	0	29
83.3	80.0	32	54.7	122	07.7	JD	92	07	11	0318	101	13	4852
83.3	90.0	32	34.6	122	48.7	JD	92	07	10	2150	73	1	56
83.3	100.0	32	14.7	123	29.4	JD	92	07	10	1640	83	0	501
83.3	110.0	31	54.6	124	10.1	JD	92	07	10	1028	78	1	41
86.7	33.0	33	53.4	118	29.4	JD	92	07	08	0348	106	159	4126
86.7	35.0	33	49.4	118	37.7	JD	92	07	08	0557	81	28	4101
86.7	40.0	33	39.4	118	58.6	JD	92	07	08	0945	79	3	18
86.7	45.0	33	29.5	119	19.1	JD	92	07	08	1437	102	0	6
86.7	50.0	33	19.4	119	39.8	JD	92	07	08	1745	87	1	215
86.7	55.0	33	09.4	120	00.4	JD	92	07	08	2045	85	5	70
86.7	60.0	32	59.4	120	20.9	JD	92	07	09	0004	92	3	256
86.7	70.0	32	39.3	121	02.0	JD	92	07	09	0616	87	1	13
86.7	80.0	32	19.4	121	42.9	JD	92	07	09	1223	97	0	475
86.7	90.0	31	59.1	122	23.4	JD	92	07	09	1819	82	0	150
86.7	100.0	31	39.3	123	04.2	JD	92	07	09	2338	83	0	10
86.7	110.0	31	19.4	123	44.5	JD	92	07	10	0457	83	0	243
90.0	28.0	33	29.1	117	46.2	JD	92	07	07	2200	83	168	48
90.0	30.0	33	25.2	117	54.3	JD	92	07	07	2010	80	88	37
90.0	35.0	33	15.0	118	15.0	JD	92	07	07	1626	93	1	92
90.0	37.0	33	10.0	118	25.3	JD	92	07	07	1318	109	0	177
90.0	45.0	32	55.0	118	56.0	JD	92	07	07	0804	84	4	8
90.0	53.0	32	38.9	119	28.9	JD	92	07	07	0319	87	1	6
90.0	60.0	32	25.1	119	57.7	JD	92	07	06	2250	73	1	67
90.0	70.0	32	05.1	120	38.3	JD	92	07	06	1724	74	13	19
90.0	80.0	31	45.1	121	19.1	JD	92	07	06	1142	82	1	206
90.0	90.0	31	25.0	121	59.4	JD	92	07	06	0519	68	12	93
90.0	100.0	31	05.1	122	39.9	JD	92	07	05	2334	73	5	433
90.0	110.0	30	45.0	123	19.9	JD	92	07	05	1752	81	47	490
90.0	120.0	30	25.1	123	59.9	JD	92	07	05	0910	85	4	64
93.3	26.7	32	57.5	117	18.2	JD	92	07	02	1218	92	1	5
93.3	28.0	32	54.1	117	23.5	JD	92	07	02	1618	93	9	28
93.3	30.0	32	50.8	117	31.9	JD	92	07	02	1842	87	7	35
93.3	35.0	32	40.8	117	52.5	JD	92	07	02	2222	82	30	564
93.3	40.0	32	30.8	118	12.9	JD	92	07	03	0203	75	17	88
93.3	45.0	32	20.7	118	33.3	JD	92	07	03	0620	75	2	16
93.3	50.0	32	10.9	118	53.6	JD	92	07	03	0952	80	1	0
93.3	55.0	32	00.8	119	14.0	JD	92	07	03	1433	87	0	2

TABLE 1. (cont.) CalCOFI Cruise 9207 (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	60.0	31	50.8	119	34.4	JD	92	07	03	1810	81	0	57
93.3	70.0	31	30.9	120	14.8	JD	92	07	03	2340	84	2	4
93.3	80.0	31	10.8	120	55.2	JD	92	07	04	0506	74	11	136
93.3	90.0	30	50.8	121	35.4	JD	92	07	04	1028	86	0	775
93.3	100.0	30	30.9	122	15.5	JD	92	07	04	1635	77	1	186
93.3	110.0	30	10.9	122	55.3	JD	92	07	04	2156	84	7	136
93.3	120.0	29	50.9	123	35.2	JD	92	07	05	0326	98	9	3

CalCOFI Cruise 9210

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	46.7	NH	92	10	09	1446	94	13	6134
76.7	51.0	35	01.3	120	55.0	NH	92	10	09	1246	100	0	160
76.7	55.0	34	53.2	121	11.9	NH	92	10	09	0855	96	1	64
76.7	60.0	34	43.3	121	33.0	NH	92	10	09	0505	85	5	0
76.7	70.0	34	23.3	122	14.9	NH	92	10	08	2316	96	3	0
76.7	80.0	34	03.3	122	56.5	NH	92	10	08	1628	93	0	6
76.7	90.0	33	43.2	123	38.0	NH	92	10	08	0944	103	3	6
76.7	100.0	33	23.3	124	19.3	NH	92	10	08	0405	92	4	3
80.0	51.0	34	27.0	120	31.4	NH	92	10	06	1604	92	0	209
80.0	55.0	34	19.0	120	48.1	NH	92	10	06	1914	83	21	2
80.0	60.0	34	09.0	121	08.9	NH	92	10	06	2319	87	3	5
80.0	70.0	33	49.0	121	50.6	NH	92	10	07	0445	93	1	7
80.0	80.0	33	29.0	122	31.9	NH	92	10	07	1115	111	1	9
80.0	90.0	33	09.0	123	13.3	NH	92	10	07	1656	94	1	0
80.0	100.0	32	49.1	123	54.6	NH	92	10	07	2222	96	3	1
81.8	46.9	34	16.5	120	01.5	NH	92	10	06	1224	92	0	75
83.3	40.6	34	13.5	119	24.7	NH	92	10	06	0644	90	9	561
83.3	42.0	34	10.6	119	30.5	NH	92	10	06	0452	90	77	692
83.3	51.0	33	52.6	120	08.1	NH	92	10	05	2304	89	4	390
83.3	55.0	33	44.6	120	24.6	NH	92	10	05	1952	88	1	3
83.3	60.0	33	40.0	120	45.1	NH	92	10	05	1558	91	0	6
83.3	80.0	32	54.7	122	07.7	NH	92	10	05	0440	88	7	0
83.3	90.0	32	34.6	122	48.7	NH	92	10	04	2256	92	4	7
83.3	100.0	32	14.7	123	29.5	NH	92	10	04	1706	82	2	9
83.3	110.0	31	54.6	124	10.2	NH	92	10	04	1057	92	0	8
86.7	33.0	33	53.4	118	29.4	NH	92	10	02	0105	80	86	58
86.7	35.0	33	49.4	118	37.7	NH	92	10	02	0322	84	32	70
86.7	40.0	33	39.4	118	58.4	NH	92	10	02	0705	78	0	4
86.7	45.0	33	29.4	119	19.0	NH	92	10	02	1215	67	0	0
86.7	50.0	33	19.5	119	39.8	NH	92	10	02	1552	81	4	24
86.7	55.0	33	09.3	120	00.3	NH	92	10	02	1944	87	3	0
86.7	60.0	32	59.4	120	21.0	NH	92	10	02	2334	90	1	4
86.7	70.0	32	39.4	121	02.0	NH	92	10	03	0445	93	1	7
86.7	80.0	32	19.4	121	42.8	NH	92	10	03	1053	95	1	5
86.7	90.0	31	59.4	122	23.5	NH	92	10	03	1624	95	3	25
86.7	100.0	31	39.4	123	04.2	NH	92	10	03	2202	91	1	13
86.7	110.0	31	19.4	123	44.6	NH	92	10	04	0420	95	1	11

TABLE 1. (cont.) CalCOFI Cruise 9210 (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	28.0	33	29.0	117	46.1	NH	92	10	01	1905	99	58	287
90.0	30.0	33	25.1	117	54.3	NH	92	10	01	1706	96	2	0
90.0	35.0	33	15.1	118	15.0	NH	92	10	01	1323	87	0	1
90.0	37.0	33	11.1	118	23.2	NH	92	10	01	1057	95	0	0
90.0	53.0	32	39.1	119	29.0	NH	92	10	01	0147	61	2	0
90.0	60.0	32	25.1	119	57.6	NH	92	09	30	2107	97	1	3
90.0	70.0	32	05.1	120	38.2	NH	92	09	30	1532	81	0	40
90.0	80.0	31	45.0	121	18.9	NH	92	09	30	0808	102	1	9
90.0	90.0	31	25.1	121	59.5	NH	92	09	30	0235	84	0	17
90.0	100.0	31	05.1	122	39.7	NH	92	09	29	2100	102	0	398
90.0	110.0	30	45.1	123	19.9	NH	92	09	29	1532	99	3	706
90.0	120.0	30	25.1	123	59.9	NH	92	09	29	0750	103	0	12
93.3	26.7	32	57.3	117	18.3	NH	92	09	26	1050	95	2	101
93.3	28.0	32	54.8	117	23.6	NH	92	09	26	1419	83	0	4
93.3	30.0	32	50.8	117	32.0	NH	92	09	26	1636	99	7	1
93.3	35.0	32	40.8	117	52.4	NH	92	09	26	2012	112	3	4
93.3	40.0	32	30.9	118	12.9	NH	92	09	27	0008	93	1	0
93.3	45.0	32	20.8	118	33.2	NH	92	09	27	0353	93	1	20
93.3	50.0	32	10.8	118	53.6	NH	92	09	27	0735	83	0	0
93.3	55.0	32	00.9	119	13.9	NH	92	09	27	1241	89	0	9
93.3	60.0	31	50.8	119	34.3	NH	92	09	27	1612	95	0	3
93.3	70.0	31	30.8	120	14.7	NH	92	09	27	2144	101	1	43
93.3	80.0	31	10.8	120	55.1	NH	92	09	28	0332	87	1	33
93.3	90.0	30	50.8	121	35.3	NH	92	09	28	0900	96	0	9
93.3	100.0	30	30.8	122	15.4	NH	92	09	28	1522	87	0	14
93.3	110.0	30	10.8	122	55.3	NH	92	09	28	2045	97	0	14
93.3	120.0	29	50.8	123	35.2	NH	92	09	29	0215	94	0	34

TABLE 2. Pooled occurrences of fish larvae taken in Manta tows on the 1992 CalCOFI survey.

Rank	Taxon	Occurrences
1	*Engraulis mordax*	47
2	*Cololabis saira*	43
3	*Sardinops sagax*	41
4	*Sebastes* spp.	29
5	*Scomber japonicus*	21
6	*Hypsoblennius jenkinsi*	19
7	*Trachurus symmetricus*	18
8	*Vinciguerria lucetia*	16
9	*Sebastes diploproa*	15
10	*Medialuna californiensis*	10
10	*Oxyjulis californica*	10
10	*Sphyraena argentea*	10
10	*Sebastes jordani*	10
14	*Ceratoscopelus townsendi*	9
15	*Merluccius productus*	8
16	*Triphoturus mexicanus*	6
16	*Hypsoblennius gilberti*	6
16	*Tetragonurus cuvieri*	6
16	*Chromis punctipinnis*	6
20	*Seriphus politus*	5
20	*Scorpaenichthys marmoratus*	5
20	*Leuresthes tenuis*	5
20	*Stenobrachius leucopsarus*	5
24	*Nannobrachium ritteri*	4
24	*Lampadena urophaos*	4
24	*Girella nigricans*	4
27	*Sebastes aurora*	3
27	*Atherinopsis californiensis*	3
27	*Neoclinus stephensae*	3
27	*Icichthys lockingtoni*	3
27	*Paralichthys californicus*	3
27	*Neoclinus blanchardi*	3
33	*Fodiator acutus*	2
33	*Aristostomias scintillans*	2
33	*Cyclothone signata*	2
33	*Scorpaena guttata*	2
33	*Pleuronichthys coenosus*	2
33	*Citharichthys sordidus*	2
33	*Howella* spp.	2
40	*Citharichthys* spp.	1
40	*Protomyctophum crockeri*	1
40	*Chiasmodon niger*	1
40	*Coryphopterus nicholsii*	1
40	*Diplospinus multistriatus*	1
40	*Lampanyctus* spp.	1
40	*Semicossyphus pulcher*	1
40	*Peprilus simillimus*	1
40	*Oneirodes* spp.	1
40	*Tactostoma macropus*	1

TABLE 2. (cont.)

Rank	Taxon	Occurrences
40	*Stomias atriventer*	1
40	*Pleuronichthys decurrens*	1
40	*Sarda chiliensis*	1
40	*Cheilopogon heterurus*	1
40	*Sebastes levis*	1
40	Disintegrated fish larvae	1
40	*Paralabrax* spp.	1
40	Sciaenidae	1
40	*Macroramphosus gracilis*	1
40	*Ophidion scrippsae*	1
40	*Cheilopogon pinnatibarbatus*	1
40	Cottidae	1
40	*Cheilopogon* spp.	1
40	*Menticirrhus undulatus*	1
40	*Hypsypops rubicundus*	1
40	*Halichoeres semicinctus*	1
40	*Gigantactis* spp.	1
40	*Brosmophycis marginata*	1
40	*Genyonemus lineatus*	1
	Total	423

TABLE 3. Pooled raw counts of fish larvae taken in Manta tows on the 1992 CalCOFI survey.

Rank	Taxon	Count
1	*Engraulis mordax*	1344
2	*Merluccius productus*	533
3	*Scorpaena guttata*	459
4	*Sardinops sagax*	369
5	*Hypsoblennius jenkinsi*	239
6	*Sebastes* spp.	216
7	*Sebastes jordani*	135
7	*Cololabis saira*	135
9	*Leuresthes tenuis*	110
10	*Vinciguerria lucetia*	104
11	*Scomber japonicus*	93
12	Disintegrated fish larvae	73
13	*Sphyraena argentea*	54
14	*Hypsoblennius gilberti*	53
14	*Trachurus symmetricus*	53
16	*Chromis punctipinnis*	37
17	*Scorpaenichthys marmoratus*	30
17	*Sebastes diploproa*	30
19	*Atherinopsis californiensis*	28
20	*Triphoturus mexicanus*	20
21	*Stenobrachius leucopsarus*	17
22	*Paralichthys californicus*	15
23	*Oxyjulis californica*	14
23	*Medialuna californiensis*	14
25	*Ceratoscopelus townsendi*	13
25	*Girella nigricans*	13
27	*Hypsypops rubicundus*	10
28	*Neoclinus stephensae*	6
28	*Lampadena urophaos*	6
28	*Tetragonurus cuvieri*	6
28	*Seriphus politus*	6
32	*Pleuronichthys coenosus*	5
32	*Citharichthys sordidus*	5
32	*Fodiator acutus*	5
32	*Neoclinus blanchardi*	5
36	*Icichthys lockingtoni*	4
36	*Macroramphosus gracilis*	4
36	*Nannobrachium ritteri*	4
36	*Sebastes aurora*	4
40	Cottidae	3
41	*Cheilopogon* spp.	2
41	*Menticirrhus undulatus*	2
41	*Aristostomias scintillans*	2
41	*Howella* spp.	2
41	*Paralabrax* spp.	2
41	*Cyclothone signata*	2
47	*Cheilopogon pinnatibarbatus*	1
47	*Tactostoma macropus*	1
47	*Stomias atriventer*	1

TABLE 3. (cont.)

Rank	Taxon	Count
47	*Cheilopogon heterurus*	1
47	*Semicossyphus pulcher*	1
47	*Gigantactis* spp.	1
47	*Pleuronichthys decurrens*	1
47	*Citharichthys* spp.	1
47	*Ophidion scrippsae*	1
47	*Brosmophycis marginata*	1
47	*Chiasmodon niger*	1
47	Sciaenidae	1
47	*Sebastes levis*	1
47	*Lampanyctus* spp.	1
47	*Halichoeres semicinctus*	1
47	*Oneirodes* spp.	1
47	*Genyonemus lineatus*	1
47	*Diplospinus multistriatus*	1
47	*Sarda chiliensis*	1
47	*Peprilus simillimus*	1
47	*Protomyctophum crockeri*	1
47	*Coryphopterus nicholsii*	1
	Total	4308

TABLE 4. Numbers of fish larvae taken in Manta net tows on the 1992 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 49.0	-	-	-	0.9	-	-	0.0	-	-	0.0	-	-
76.7 55.0	-	-	-	3.5	-	-	0.0	-	-	0.0	-	-
76.7 90.0	-	0.0	-	10.5	-	-	0.0	-	-	0.0	-	-
76.7 100.0	-	0.0	-	1.0	-	-	0.0	-	-	0.0	-	-
80.0 51.0	-	7.2	-	0.0	-	-	3.6	-	-	0.0	-	-
80.0 55.0	-	0.0	-	0.0	-	-	0.9	-	-	0.0	-	-
80.0 70.0	-	0.0	-	0.7	-	-	0.0	-	-	0.0	-	-
80.0 80.0	-	0.0	-	2.7	-	-	0.0	-	-	0.0	-	-
83.3 40.6	-	0.0	-	0.9	-	-	0.0	-	-	0.0	-	-
83.3 42.0	-	0.0	-	0.0	-	-	9.1	-	-	3.6	-	-
83.3 70.0	-	0.0	-	6.6	-	-	0.0	-	-	-	-	-
83.3 80.0	-	0.0	-	0.0	-	-	6.1	-	-	0.0	-	-
83.3 110.0	-	0.0	-	0.8	-	-	0.0	-	-	0.0	-	-
86.7 33.0	-	24.1	-	0.0	-	-	4.2	-	-	2.4	-	-
86.7 35.0	-	0.0	-	12.8	-	-	0.0	-	-	2.5	-	-
86.7 45.0	-	0.8	-	0.0	-	-	0.0	-	-	0.0	-	-
86.7 70.0	-	-	-	2.5	-	-	0.0	-	-	0.0	-	-
90.0 28.0	-	0.0	-	2.1	-	-	28.3	-	-	3.0	-	-
90.0 30.0	-	0.0	-	100.1	-	-	13.7	-	-	0.0	-	-
90.0 35.0	-	0.0	-	0.0	-	-	0.9	-	-	0.0	-	-
90.0 45.0	-	0.0	-	3.7	-	-	0.0	-	-	-	-	-
90.0 53.0	-	10.3	-	4.2	-	-	0.0	-	-	0.0	-	-
90.0 60.0	-	0.7	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0 80.0	-	0.0	-	1.5	-	-	0.0	-	0.0	-	-	-
90.0 90.0	-	0.0	-	2.6	-	-	0.0	-	0.0	-	-	-
93.3 28.0	1.9	-	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 30.0	0.0	-	-	0.0	-	-	5.2	-	0.0	-	-	-
93.3 35.0	0.0	-	-	0.8	-	-	21.2	-	0.0	-	-	-
93.3 40.0	0.0	-	-	1.4	-	-	11.3	-	0.0	-	-	-
93.3 60.0	0.0	-	-	1.7	-	-	0.0	-	0.0	-	-	-

TABLE 4. (cont.)

Engraulis mordax

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	-	-	0.0	-	-	0.0	-	-	1.9	-	-
76.7 51.0	-	-	-	2.5	-	-	0.0	-	-	0.0	-	-
76.7 70.0	-	0.0	-	0.0	-	-	0.0	-	-	1.0	-	-
80.0 51.0	-	238.2	-	0.0	-	-	0.0	-	-	0.0	-	-
80.0 55.0	-	21.1	-	0.0	-	-	0.0	-	-	10.8	-	-
80.0 80.0	-	1.6	-	0.0	-	-	0.0	-	-	0.0	-	-
81.8 46.9	-	24.0	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 40.6	-	38.2	-	0.0	-	-	0.0	-	-	3.6	-	-
83.3 42.0	-	1.8	-	0.0	-	-	0.0	-	-	60.0	-	-
83.3 51.0	-	1.7	-	19.0	-	-	0.0	-	-	0.0	-	-
83.3 55.0	-	0.0	-	8.1	-	-	0.0	-	-	0.0	-	-
83.3 60.0	-	40.2	-	0.8	-	-	0.0	-	-	0.0	-	-
83.3 70.0	-	1.6	-	0.0	-	-	0.0	-	-	-	-	-
83.3 100.0	-	0.0	-	0.0	-	-	0.0	-	-	0.8	-	-
86.7 33.0	-	58.9	-	1.8	-	-	10.6	-	-	57.3	-	-
86.7 35.0	-	1.8	-	215.1	-	-	1.6	-	-	15.2	-	-
86.7 39.5	-	0.0	-	13.1	-	-	-	-	-	-	-	-
86.7 45.0	-	23.8	-	6.9	-	-	0.0	-	-	0.0	-	-
86.7 50.0	-	4.0	-	5.4	-	-	0.0	-	-	0.0	-	-
86.7 60.0	-	0.0	-	-	-	-	0.0	-	-	0.9	-	-
90.0 28.0	-	0.0	-	3.1	-	-	72.4	-	-	34.7	-	-
90.0 30.0	-	1.8	-	56.8	-	-	16.1	-	-	0.0	-	-
90.0 35.0	-	82.7	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 45.0	-	0.0	-	27.5	-	-	0.0	-	-	-	-	-
90.0 53.0	-	2.6	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 100.0	-	0.0	-	0.0	-	-	0.7	-	0.0	-	-	-
93.3 28.0	0.0	-	-	0.0	-	-	2.8	-	0.0	-	-	-
93.3 30.0	8.4	-	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 40.0	3.4	-	-	0.7	-	-	0.0	-	0.0	-	-	-

Cyclothone signata

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 80.0	-	0.7	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 100.0	-	0.8	-	0.0	-	-	0.0	-	0.0	-	-	-

TABLE 4. (cont.)

Vinciguerria lucetia

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 90.0	-	0.0	-	0.0	-	-	0.0	-	-	1.0	-	-
76.7 100.0	-	0.0	-	0.0	-	-	0.0	-	-	3.7	-	-
80.0 100.0	-	0.0	-	0.0	-	-	0.0	-	-	1.0	-	-
83.3 80.0	-	0.0	-	0.0	-	-	0.0	-	-	2.7	-	-
86.7 90.0	-	0.0	-	0.0	-	-	0.0	-	-	0.9	-	-
86.7 100.0	-	0.0	-	3.0	-	-	0.0	-	-	0.9	-	-
90.0 70.0	-	0.0	-	0.0	-	-	8.2	-	0.0	-	-	-
90.0 80.0	-	0.0	-	0.0	-	-	0.8	-	0.0	-	-	-
90.0 90.0	-	0.0	-	0.0	-	-	7.5	-	0.0	-	-	-
90.0 100.0	-	0.0	-	0.0	-	-	0.7	-	0.0	-	-	-
90.0 110.0	0.0	-	-	0.0	-	-	35.6	-	0.0	-	-	-
93.3 70.0	0.0	-	-	0.0	-	-	0.8	-	0.0	-	-	-
93.3 80.0	0.0	-	-	0.0	-	-	8.1	-	0.0	-	-	-
93.3 110.0	0.0	-	-	0.0	-	-	1.7	-	0.0	-	-	-
93.3 120.0	0.0	-	-	0.0	-	-	6.8	-	0.0	-	-	-

Stomias atriventer

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

Tactostoma macropus

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

Aristostomias scintillans

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 90.0	-	0.0	-	0.0	-	-	0.0	-	-	1.0	-	-
93.3 100.0	0.0	-	-	0.8	-	-	0.0	-	0.0	-	-	-

Ceratoscopelus townsendi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 90.0	-	0.0	-	0.0	-	-	0.0	-	-	0.9	-	-
83.3 100.0	-	0.0	-	0.0	-	-	0.0	-	-	0.8	-	-
90.0 70.0	-	0.0	-	0.0	-	-	0.7	-	0.0	-	-	-
90.0 80.0	-	0.8	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0 90.0	-	0.0	-	0.0	-	-	0.7	-	0.0	-	-	-

TABLE 4. (cont.)

Ceratoscopelus townsendi (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 100.0	-	0.8	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0 110.0	0.8	-	-	0.0	-	-	2.4	-	0.0	-	-	-
93.3 110.0	0.0	-	-	0.0	-	-	2.5	-	0.0	-	-	-

Lampadena urophaos

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 110.0	0.0	-	-	0.0	-	-	0.0	-	3.0	-	-	-
90.0 120.0	0.0	-	-	0.0	-	-	0.9	-	0.0	-	-	-
93.3 110.0	0.0	-	-	0.0	-	-	0.8	-	0.0	-	-	-
93.3 120.0	0.0	-	-	0.0	-	-	1.0	-	0.0	-	-	-

Lampanyctus spp.

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 90.0	-	0.8	-	0.0	-	-	0.0	-	-	0.0	-	-

Nannobrachium ritteri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	-	-	0.0	-	-	0.8	-	-	0.0	-	-
80.0 80.0	-	0.0	-	0.9	-	-	0.0	-	-	0.0	-	-
83.3 40.6	-	0.0	-	0.9	-	-	0.0	-	-	0.0	-	-
93.3 40.0	0.0	-	-	0.0	-	-	0.8	-	0.0	-	-	-

Stenobrachius leucopsarus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	-	-	10.9	-	-	0.0	-	-	0.0	-	-
80.0 100.0	-	0.0	-	0.0	-	-	0.9	-	-	0.0	-	-
86.7 50.0	-	0.0	-	1.6	-	-	0.0	-	-	0.0	-	-
86.7 55.0	-	0.0	-	0.0	-	-	0.8	-	-	0.0	-	-
93.3 28.0	0.9	-	-	0.0	-	-	0.0	-	0.0	-	-	-

Triphoturus mexicanus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 35.0	-	0.0	-	0.0	-	-	1.6	-	-	0.0	-	-
86.7 90.0	-	0.0	-	0.0	-	-	0.0	-	-	0.9	-	-
93.3 30.0	0.0	-	-	5.7	-	-	0.0	-	6.9	-	-	-
93.3 35.0	0.0	-	-	2.4	-	-	0.0	-	0.0	-	-	-
93.3 45.0	0.0	-	-	0.0	-	-	0.8	-	0.0	-	-	-

TABLE 4. (cont.)

Protomyctophum crockeri

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

Merluccius productus

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	-	-
80.0 70.0	-	1.7	-	0.0	-	-	0.0	-	-	0.0	-	-
80.0 80.0	-	411.5	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 60.0	-	1.8	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 70.0	-	2.4	-	0.0	-	-	0.0	-	-	-	-	-
90.0 30.0	-	0.9	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 53.0	-	1.7	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 60.0	-	5.2	-	0.0	-	-	0.0	-	0.0	-	-	-

Ophidion scrippsae

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

Brosmophycis marginata

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

***Oneirodes* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 90.0	-	0.0	-	0.0	-	-	0.0	-	-	0.9	-	-

***Gigantactis* spp.**

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

Atherinopsis californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	-	2.7	-	0.0	-	-	0.0	-	-	0.0	-	-
86.7 35.0	-	0.0	-	12.8	-	-	0.0	-	-	0.0	-	-
90.0 28.0	-	10.9	-	0.0	-	-	0.0	-	-	0.0	-	-

Leuresthes tenuis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	0.0	-	-	10.1	-	-	0.0	-	-

TABLE 4. (cont.)

Leuresthes tenuis (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	-	0.0	-	0.0	-	-	11.6	-	-	0.0	-	-
86.7 35.0	-	0.0	-	85.4	-	-	0.0	-	-	0.8	-	-
90.0 60.0	-	0.0	-	0.0	-	-	0.7	-	0.0	-	-	-

Cololabis saira

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	-	-	0.0	-	-	0.0	-	-	1.9	-	-
76.7 60.0	-	-	-	0.0	-	-	0.0	-	-	2.5	-	-
76.7 70.0	-	0.0	-	0.0	-	-	0.0	-	-	1.0	-	-
76.7 90.0	-	0.0	-	0.0	-	-	0.0	-	-	1.0	-	-
76.7 100.0	-	0.0	-	13.6	-	-	0.0	-	-	0.0	-	-
80.0 55.0	-	0.0	-	0.0	-	-	3.5	-	-	0.0	-	-
80.0 60.0	-	-	-	0.0	-	-	4.1	-	-	0.9	-	-
80.0 70.0	-	0.0	-	0.7	-	-	0.0	-	-	0.0	-	-
80.0 80.0	-	0.0	-	0.0	-	-	0.0	-	-	1.1	-	-
80.0 90.0	-	3.8	-	0.0	-	-	0.0	-	-	0.0	-	-
80.0 100.0	-	0.0	-	0.0	-	-	0.0	-	-	1.9	-	-
83.3 51.0	-	0.0	-	0.0	-	-	0.0	-	-	0.9	-	-
83.3 60.0	-	7.1	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 70.0	-	3.2	-	0.0	-	-	0.0	-	-	-	-	-
83.3 80.0	-	0.0	-	0.0	-	-	3.0	-	-	3.5	-	-
83.3 90.0	-	0.0	-	0.0	-	-	0.0	-	-	3.7	-	-
83.3 110.0	-	1.7	-	14.4	-	-	0.0	-	-	0.0	-	-
86.7 35.0	-	0.0	-	3.9	-	-	0.0	-	-	0.0	-	-
86.7 45.0	-	0.8	-	0.0	-	-	0.0	-	-	0.0	-	-
86.7 55.0	-	0.0	-	0.0	-	-	3.4	-	-	0.0	-	-
86.7 60.0	-	7.5	-	-	-	-	2.7	-	-	0.0	-	-
86.7 70.0	-	-	-	0.0	-	-	0.0	-	-	0.9	-	-
86.7 80.0	-	0.0	-	0.0	-	-	0.0	-	-	1.0	-	-
86.7 110.0	-	0.9	-	0.7	-	-	0.0	-	-	1.0	-	-
90.0 53.0	-	0.0	-	1.7	-	-	0.0	-	-	0.0	-	-
90.0 80.0	-	0.0	-	0.0	-	-	0.0	-	1.0	-	-	-
90.0 100.0	-	0.0	-	3.9	-	-	0.0	-	0.0	-	-	-
93.3 30.0	1.9	-	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 35.0	3.1	-	-	1.6	-	-	0.8	-	0.0	-	-	-

TABLE 4. (cont.)

Cololabis saira (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 40.0	0.8	-	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 60.0	4.3	-	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 70.0	0.7	-	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 100.0	0.9	-	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 110.0	0.0	-	-	3.3	-	-	0.0	-	0.0	-	-	-
93.3 120.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-

***Cheilopogon* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 30.0	-	0.0	-	0.0	-	-	0.0	-	-	1.9	-	-

Cheilopogon heterurus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 35.0	0.0	-	-	0.0	-	-	0.0	-	1.1	-	-	-

Cheilopogon pinnatibarbatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 53.0	-	0.0	-	0.0	-	-	0.0	-	-	0.6	-	-

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	-	-	3.0	-	-
93.3 26.7	0.0	-	-	0.0	-	-	0.0	-	1.9	-	-	-

Macroramphosus gracilis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 50.0	-	0.0	-	0.0	-	-	0.0	-	-	3.3	-	-

***Sebastes* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	-	-	1.8	-	-	0.0	-	-	0.0	-	-
76.7 51.0	-	-	-	0.8	-	-	0.8	-	-	0.0	-	-
76.7 55.0	-	-	-	0.0	-	-	0.0	-	-	1.0	-	-
80.0 51.0	-	0.0	-	0.9	-	-	0.0	-	-	0.0	-	-
80.0 55.0	-	1.6	-	1.8	-	-	0.0	-	-	0.0	-	-
80.0 70.0	-	13.6	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 40.6	-	0.0	-	0.9	-	-	0.0	-	-	0.0	-	-
83.3 42.0	-	2.8	-	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.
83.3 55.0	-	0.0	-	3.3	-	-	0.0	-	-	0.0	-	-
83.3 60.0	-	0.0	-	8.5	-	-	0.0	-	-	0.0	-	-
86.7 33.0	-	0.0	-	0.9	-	-	0.0	-	-	0.0	-	-
86.7 35.0	-	0.9	-	0.0	-	-	0.0	-	-	0.0	-	-
86.7 39.5	-	0.9	-	0.8	-	-	-	-	-	-	-	-
86.7 45.0	-	0.8	-	1.7	-	-	0.0	-	-	0.0	-	-
86.7 50.0	-	0.8	-	27.2	-	-	0.0	-	-	0.0	-	-
86.7 55.0	-	1.6	-	1.6	-	-	0.0	-	-	0.0	-	-
90.0 45.0	-	0.0	-	7.4	-	-	0.0	-	-	-	-	-
90.0 53.0	-	74.6	-	1.7	-	-	0.0	-	-	0.0	-	-
90.0 60.0	-	2.9	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 28.0	17.0	-	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 40.0	1.7	-	-	0.7	-	-	0.0	-	0.0	-	-	-

Sebastes aurora

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 70.0	-	0.8	-	0.0	-	-	0.0	-	-	-	-	-
86.7 50.0	-	0.0	-	0.8	-	-	0.0	-	-	0.0	-	-
90.0 53.0	-	0.0	-	1.7	-	-	0.0	-	-	0.0	-	-

Sebastes diploproa

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	-	-	1.8	-	-	0.0	-	-	7.6	-	-
76.7 70.0	-	0.0	-	0.0	-	-	0.0	-	-	1.0	-	-
80.0 60.0	-	-	-	0.0	-	-	0.0	-	-	0.9	-	-
83.3 40.6	-	0.0	-	0.0	-	-	0.9	-	-	0.0	-	-
83.3 42.0	-	0.0	-	0.0	-	-	1.0	-	-	0.0	-	-
83.3 60.0	-	0.9	-	0.0	-	-	0.0	-	-	0.0	-	-
86.7 33.0	-	0.0	-	0.0	-	-	0.0	-	-	0.8	-	-
86.7 35.0	-	0.0	-	1.0	-	-	1.6	-	-	0.8	-	-
86.7 50.0	-	0.0	-	5.4	-	-	0.0	-	-	0.0	-	-
90.0 30.0	-	0.9	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 60.0	-	0.7	-	0.0	-	-	0.0	-	0.0	-	-	-
93.3 40.0	0.8	-	-	0.0	-	-	0.0	-	0.0	-	-	-

TABLE 4. (cont.)

Sebastes jordani

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	-	-	3.6	-	-	0.0	-	-	0.0	-	-
80.0 51.0	-	0.9	-	0.0	-	-	0.0	-	-	0.0	-	-
80.0 55.0	-	0.8	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 42.0	-	5.5	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 51.0	-	1.7	-	0.0	-	-	0.0	-	-	0.0	-	-
86.7 50.0	-	0.0	-	0.8	-	-	0.0	-	-	0.0	-	-
90.0 53.0	-	2.6	-	0.0	-	-	0.0	-	-	0.0	-	-
93.3 26.7	1.0	-	-	1.0	-	-	0.0	-	0.0	-	-	-
93.3 28.0	108.9	-	-	0.0	-	-	0.0	-	0.0	-	-	-

Sebastes levis

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

Scorpaena guttata

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	-	0.0	-	0.0	-	-	417.7	-	-	0.0	-	-
90.0 28.0	-	0.0	-	0.0	-	-	0.8	-	-	0.0	-	-

Cottidae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 51.0	-	0.0	-	2.7	-	-	0.0	-	-	0.0	-	-

Scorpaenichthys marmoratus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 60.0	-	3.6	-	0.0	-	-	0.0	-	-	0.0	-	-
86.7 33.0	-	0.0	-	0.0	-	-	0.0	-	-	2.4	-	-
86.7 45.0	-	0.8	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 28.0	-	19.1	-	0.0	-	-	0.0	-	-	1.0	-	-

***Howella* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 110.0	0.0	-	-	0.0	-	-	0.8	-	0.0	-	-	-
93.3 120.0	0.0	-	-	0.0	-	-	1.0	-	0.0	-	-	-

TABLE 4. (cont.)

***Paralabrax* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 28.0	-	0.0	-	0.0	-	-	1.7	-	-	0.0	-	-

Trachurus symmetricus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 55.0	-	-	-	0.9	-	-	0.0	-	-	0.0	-	-
76.7 100.0	-	0.0	-	9.4	-	-	0.0	-	-	0.0	-	-
80.0 55.0	-	0.0	-	0.0	-	-	8.7	-	-	0.0	-	-
80.0 60.0	-	-	-	0.8	-	-	0.0	-	-	0.0	-	-
80.0 90.0	-	0.0	-	0.0	-	-	1.5	-	-	0.0	-	-
83.3 80.0	-	0.0	-	0.0	-	-	1.0	-	-	0.0	-	-
86.7 90.0	-	0.0	-	1.4	-	-	0.0	-	-	0.0	-	-
86.7 110.0	-	0.0	-	2.8	-	-	0.0	-	-	0.0	-	-
90.0 45.0	-	0.0	-	0.7	-	-	0.0	-	-	-	-	-
90.0 53.0	-	0.0	-	0.0	-	-	0.9	-	-	0.0	-	-
90.0 70.0	-	0.0	-	0.0	-	-	0.7	-	0.0	-	-	-
90.0 80.0	-	0.0	-	3.0	-	-	0.0	-	0.0	-	-	-
90.0 100.0	-	0.0	-	2.9	-	-	1.5	-	0.0	-	-	-
93.3 40.0	0.0	-	-	0.7	-	-	0.0	-	0.0	-	-	-
93.3 50.0	0.0	-	-	0.0	-	-	0.8	-	0.0	-	-	-
93.3 80.0	0.0	-	-	6.7	-	-	0.0	-	0.0	-	-	-
93.3 120.0	0.0	-	-	0.9	-	-	0.0	-	0.0	-	-	-

Sciaenidae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	-	0.0	-	0.0	-	-	1.1	-	-	0.0	-	-

Genyonemus lineatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	-	0.9	-	0.0	-	-	0.0	-	-	0.0	-	-

Menticirrhus undulatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	0.0	-	-	2.0	-	-	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	-	-	1.0	-	-	0.0	-	-

TABLE 4. (cont.)

Seriphus politus (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	-	0.0	-	0.0	-	-	1.1	-	-	0.0	-	-
86.7 35.0	-	0.0	-	0.0	-	-	1.6	-	-	0.0	-	-
90.0 30.0	-	0.0	-	0.9	-	-	0.8	-	-	0.0	-	-

Girella nigricans

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	-	0.0	-	0.0	-	-	1.8	-	-	0.0	-	-
83.3 42.0	-	0.0	-	0.0	-	-	2.0	-	-	0.0	-	-
86.7 33.0	-	0.0	-	0.0	-	-	3.2	-	-	0.0	-	-
93.3 28.0	0.0	-	-	0.0	-	-	5.6	-	0.0	-	-	-

Medialuna californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	0.0	-	-	3.0	-	-	0.0	-	-
83.3 55.0	-	0.0	-	0.0	-	-	0.0	-	-	0.9	-	-
83.3 80.0	-	0.0	-	0.0	-	-	2.0	-	-	0.0	-	-
83.3 90.0	-	0.0	-	0.0	-	-	0.7	-	-	0.0	-	-
86.7 50.0	-	0.0	-	0.0	-	-	0.9	-	-	0.0	-	-
86.7 70.0	-	-	-	0.0	-	-	0.9	-	-	0.0	-	-
90.0 53.0	-	0.0	-	1.7	-	-	0.0	-	-	0.6	-	-
93.3 40.0	0.0	-	-	0.0	-	-	0.0	-	0.9	-	-	-
93.3 45.0	0.0	-	-	0.0	-	-	0.0	-	0.9	-	-	-

Chromis punctipinnis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	0.0	-	-	31.2	-	-	0.0	-	-
86.7 35.0	-	0.0	-	0.0	-	-	0.0	-	-	0.8	-	-
90.0 60.0	-	0.0	-	0.0	-	-	0.0	-	1.0	-	-	-
93.3 35.0	0.0	-	-	0.0	-	-	0.8	-	2.2	-	-	-
93.3 45.0	0.0	-	-	0.0	-	-	0.8	-	0.0	-	-	-

Hypsypops rubicundus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	0.0	-	-	10.1	-	-	0.0	-	-

TABLE 4. (cont.)

Halichoeres semicinctus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 45.0	-	0.0	-	0.7	-	-	0.0	-	-	-	-	-

Oxyjulis californica

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 55.0	-	0.0	-	0.0	-	-	0.0	-	-	0.8	-	-
83.3 51.0	-	0.0	-	0.0	-	-	0.9	-	-	0.0	-	-
83.3 55.0	-	0.0	-	0.0	-	-	0.8	-	-	0.0	-	-
86.7 39.5	-	0.0	-	1.5	-	-	-	-	-	-	-	-
86.7 40.0	-	-	-	-	-	-	1.6	-	-	0.0	-	-
86.7 45.0	-	0.0	-	0.9	-	-	0.0	-	-	0.0	-	-
90.0 45.0	-	0.0	-	1.5	-	-	0.0	-	-	-	-	-
90.0 53.0	-	0.0	-	1.7	-	-	0.0	-	-	0.0	-	-
93.3 30.0	0.0	-	-	0.0	-	-	0.9	-	0.0	-	-	-
93.3 70.0	0.0	-	-	0.0	-	-	0.8	-	0.0	-	-	-

Semicossyphus pulcher

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

Chiasmodon niger

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

Neoclinus blanchardi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	0.0	-	-	3.0	-	-	0.9	-	-
86.7 35.0	-	0.0	-	1.0	-	-	0.0	-	-	0.0	-	-

Neoclinus stephensae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 55.0	-	0.8	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 51.0	-	0.0	-	3.6	-	-	0.0	-	-	0.0	-	-
86.7 45.0	-	0.8	-	0.0	-	-	0.0	-	-	0.0	-	-

Hypsoblennius gilberti

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 55.0	-	0.0	-	0.0	-	-	0.0	-	-	0.8	-	-

TABLE 4. (cont.)

Hypsoblennius gilberti (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	0.0	-	-	41.3	-	-	0.0	-	-
86.7 33.0	-	0.0	-	0.0	-	-	1.1	-	-	0.0	-	-
86.7 35.0	-	0.0	-	2.9	-	-	0.0	-	-	0.0	-	-
90.0 28.0	-	0.0	-	0.0	-	-	4.2	-	-	0.0	-	-
90.0 30.0	-	0.0	-	0.0	-	-	1.6	-	-	0.0	-	-

Hypsoblennius jenkinsi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 60.0	-	-	-	0.0	-	-	0.0	-	-	1.7	-	-
80.0 55.0	-	0.0	-	0.0	-	-	0.0	-	-	5.0	-	-
80.0 60.0	-	-	-	0.0	-	-	0.0	-	-	0.9	-	-
80.0 70.0	-	0.0	-	0.0	-	-	0.0	-	-	0.9	-	-
83.3 40.6	-	0.0	-	0.0	-	-	0.0	-	-	4.5	-	-
83.3 42.0	-	0.0	-	0.0	-	-	6.0	-	-	4.5	-	-
83.3 51.0	-	0.0	-	0.0	-	-	0.0	-	-	2.7	-	-
86.7 33.0	-	0.0	-	0.0	-	-	133.1	-	-	3.2	-	-
86.7 35.0	-	0.0	-	11.8	-	-	11.3	-	-	1.7	-	-
86.7 55.0	-	0.0	-	0.0	-	-	0.0	-	-	2.6	-	-
90.0 28.0	-	0.0	-	0.0	-	-	19.1	-	-	15.9	-	-
90.0 30.0	-	0.0	-	0.0	-	-	5.6	-	-	0.0	-	-
93.3 35.0	0.0	-	-	0.0	-	-	1.6	-	0.0	-	-	-
93.3 40.0	0.0	-	-	0.0	-	-	0.8	-	0.0	-	-	-

Coryphopterus nicholsii

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

Sphyraena argentea

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	-	-	0.0	-	-	0.0	-	-	0.9	-	-
80.0 51.0	-	0.0	-	0.0	-	-	0.9	-	-	0.0	-	-
83.3 42.0	-	0.0	-	0.0	-	-	10.1	-	-	0.0	-	-
86.7 35.0	-	0.0	-	0.0	-	-	4.9	-	-	0.0	-	-
86.7 40.0	-	-	-	-	-	-	0.8	-	-	0.0	-	-
90.0 28.0	-	0.0	-	0.0	-	-	2.5	-	-	0.0	-	-
90.0 30.0	-	0.0	-	2.7	-	-	21.7	-	-	0.0	-	-

TABLE 4. (cont.)

Sphyraena argentea (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 35.0	-	0.0	-	0.9	-	-	0.0	-	-	0.0	-	-
93.3 26.7	0.0	-	-	0.0	-	-	0.9	-	0.0	-	-	-

Diplospinus multistriatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 100.0	-	0.8	-	0.0	-	-	0.0	-	0.0	-	-	-

Sarda chiliensis

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

Scomber japonicus

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 55.0	-	-	-	0.9	-	-	0.0	-	-	0.0	-	-
76.7 100.0	-	0.0	-	24.1	-	-	0.0	-	-	0.0	-	-
83.3 40.6	-	0.0	-	0.0	-	-	2.7	-	-	0.0	-	-
83.3 42.0	-	0.0	-	0.0	-	-	1.0	-	-	0.0	-	-
83.3 70.0	-	0.0	-	2.2	-	-	0.0	-	-	-	-	-
83.3 80.0	-	0.0	-	0.0	-	-	1.0	-	-	0.0	-	-
86.7 33.0	-	0.0	-	1.8	-	-	2.1	-	-	2.4	-	-
86.7 35.0	-	0.0	-	0.0	-	-	0.0	-	-	5.1	-	-
90.0 28.0	-	0.0	-	4.2	-	-	0.8	-	-	0.0	-	-
90.0 30.0	-	0.0	-	2.7	-	-	9.6	-	-	0.0	-	-
90.0 45.0	-	0.0	-	0.7	-	-	3.3	-	-	-	-	-
90.0 53.0	-	0.0	-	13.3	-	-	0.0	-	-	0.0	-	-
90.0 90.0	-	0.0	-	1.8	-	-	0.0	-	0.0	-	-	-
93.3 35.0	0.0	-	-	2.4	-	-	0.0	-	0.0	-	-	-
93.3 70.0	0.0	-	-	0.8	-	-	0.0	-	0.0	-	-	-

Icichthys lockingtoni

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 70.0	-	1.5	-	0.0	-	-	0.0	-	-	0.0	-	-
76.7 80.0	-	0.8	-	0.0	-	-	0.0	-	-	0.0	-	-
80.0 80.0	-	0.8	-	0.0	-	-	0.0	-	-	0.0	-	-

TABLE 4. (cont.)

Tetragonurus cuvieri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 100.0	-	0.0	-	0.7	-	-	0.0	-	-	0.0	-	-
90.0 90.0	-	0.7	-	0.0	-	-	0.0	-	0.0	-	-	-
90.0 100.0	-	0.0	-	0.0	-	-	0.7	-	0.0	-	-	-
93.3 70.0	0.0	-	-	0.0	-	-	0.0	-	1.0	-	-	-
93.3 80.0	0.0	-	-	0.0	-	-	0.0	-	0.9	-	-	-
93.3 100.0	0.0	-	-	0.0	-	-	0.8	-	0.0	-	-	-

Peprilus simillimus

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	-	-

***Citharichthys* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 55.0	-	0.8	-	0.0	-	-	0.0	-	-	0.0	-	-

Citharichthys sordidus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 53.0	-	2.6	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 60.0	-	1.5	-	0.0	-	-	0.0	-	0.0	-	-	-

Paralichthys californicus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	-	0.9	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 28.0	-	0.0	-	0.0	-	-	10.0	-	-	0.0	-	-
90.0 30.0	-	0.0	-	0.0	-	-	1.6	-	-	0.0	-	-

Pleuronichthys coenosus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 35.0	-	0.0	-	3.9	-	-	0.0	-	-	0.0	-	-
93.3 30.0	0.9	-	-	0.0	-	-	0.0	-	0.0	-	-	-

Pleuronichthys decurrens

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 35.0	-	0.0	-	1.0	-	-	0.0	-	-	0.0	-	-

Disintegrated fish larvae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	-	65.1	-	0.0	-	-	0.0	-	-	0.0	-	-

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ALPHABETICAL INDEX TO TABLE 4

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(March 2002)

319 Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations Survey Cruises in 1980-81.
D.A. AMBROSE, R.L. CHARTER, H.G. MOSER
(May 2002)

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S.R. CHARTER, R.L. CHARTER, H.G. MOSER
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(May 2002)

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S.R. CHARTER, R.L. CHARTER, H.G. MOSER
(May 2002)

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E.M. SANDKNOP, R.L. CHARTER, H.G. MOSER
(May 2002)

324 Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations Survey Cruises in 1988.
W. WATSON, R.L. CHARTER, H.G. MOSER
(May 2002)

325 Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations Survey Cruises in 1989.
D.A. AMBROSE, R.L. CHARTER, H.G. MOSER
(May 2002)

326 Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations Survey Cruises in 1990.
S.R. CHARTER, R.L. CHARTER, H.G. MOSER
(May 2002)

327 Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations Survey Cruises in 1991.
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