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ICHTHYOPLANKTON AND STATION DATA FOR MANTA (SURFACE) TOWS TAKEN ON CALIFORNIA COOPERATIVE OCEANIC FISHERIES INVESTIGATIONS SURVEY CRUISES IN 2000

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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Southwest Fisheries Science Center

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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 2000. It is the 19th report in a series that presents surface tow data for all biological-oceanographic CalCOFI surveys from 1977 to the present. A total of 263 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 263 Manta net tows was taken during 2000. 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 65 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 19th 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 2000. 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 2000 CalCOFI survey are published in Watson 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).

(2001). 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 2000 CalCOFI cruises were published by the Scripps Institution of Oceanography (Univ. of Calif., SIO 2000, 2001). All available records for Manta tows on the 2000 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	1991	Sandknop et al. 2002b
1980-81	Ambrose et al. 2002a	1992	Watson et al. 2002b
1984	Charter et al. 2002a	1993	Ambrose et al. 2002d
1985	Ambrose et al. 2002b	1994	Charter et al. 2002d
1986	Charter et al. 2002b	1995	Sandknop et al. 2002c
1987	Sandknop et al. 2002a	1996	Watson et al. 2002c
1988	Watson et al. 2002a	1997	Ambrose et al. 2002e
1989	Ambrose et al. 2002c	1998	Ambrose et al. 2002f
1990	Charter et al. 2002c	1999	Ambrose et al. 2002g

SAMPLING AREA AND PATTERN

The 2000 CalCOFI survey consisted of four quarterly cruises on which a total of 263 Manta net tows was taken at the 263 standard CalCOFI net tow stations occupied during the survey (Table 1; Figures 2–3). Three 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 2000 (Figures 2–3) are summarized below:

0001, RV *New Horizon*, 66 stations, 7–23 January;

0004, RV *David Starr Jordan*, 66 stations, 7–22 April;

0007, RV *New Horizon*, 66 stations, 29 June–13 July;

0010, RV *New Horizon*, 65 stations, 12–29 October.

The core survey area extended from Avila Beach to San Diego, California and seaward on six survey lines to approximately 120–330 n. mi (Cruise 0001 occupied nine lines extending northward to Monterey Bay and cruise 0004 occupied eleven lines extending northward to Cape Mendocino; however, Manta tows were made only in the core area) (Figures 2 and 3). The most seaward plankton tow station, 90.0 120.0, was approximately 400 n. mi. west of Punta Baja, Baja California, Mexico. 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 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 65 larval fish categories was identified: 62 to species and 3 to genus.

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

Lampanyctus spp. – most of the larvae in this category are small (< 5 mm), often poorly preserved, 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 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; in previous data reports these were referred to as *Lampanyctus* "niger" and *Lampanyctus* "no pectorals", respectively (see Moser 1996).

Parophrys vetulus– Sakamoto (1984) changed pleuronectid generic designations for some of the species in the CalCOFI area, including *Parophrys vetulus*, which was transferred into *Pleuronectes*; although these changes were incorporated in the lists of Robins et al. (1991) and Eschmeyer (1998) we follow Nelson (1994) in retaining the older nomenclature because Sakamoto's (1984) changes were based on a phenetic study; also, the older names are used in the major identification guides to fishes of our region (Miller and Lea 1972, Eschmeyer et al. 1983, Matarese et al. 1989, and 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 55.6% of the total fish larvae and third in occurrence with larvae collected in 14.8% of the total samples (Tables 2 and 3). They were over four times more abundant as the second most abundant species, northern anchovy (*Engraulis mordax*), which accounted for 12.4% of the total larvae and ranked second in occurrence (19.0% of the total samples). Pacific saury (*Cololabis saira*) was the third most abundant taxon with 12.1% of the total larvae; it ranked first in frequency of occurrence (44.1% of the samples). California grunion (*Leuresthes tenuis*) ranked fourth in abundance (6.1% of total larvae) and tied with three other species for 12th in total occurrences (1.9% of the samples). The high abundance of California grunion was attributable to a single large collection (247 larvae) at station 90.0 28.0 on Cruise 0007NH. The rockfish genus *Sebastes* ranked fifth in abundance (3.8% of total larvae) and fourth in total occurrences (14.1% of the samples). The next five most abundant taxa were cabezon *Scorpaenichthys marmoratus* (3.5% of total larvae), jack mackerel *Trachurus symmetricus* (0.9%), mussel blenny *Hypsoblennius jenkinsi* (0.8%), jacksmelt *Atherinopsis californiensis* (0.5%), and splitnose rockfish *Sebastes diploproa* (0.5%). The first two of these species tied for fifth, and the next three ranked 7th, 10th, and 8th, in frequency of occurrence, respectively. The ten most abundant taxa comprised 96.1% of all the larvae collected in Manta net tows on CalCOFI cruises in 2000. The remaining 3.9% was distributed among 55 other taxa. Of the ten most abundant taxa, four were coastal demersal taxa, five were coastal pelagic species, and one was epipelagic.

In comparison with the surface collections, among the 128 taxa collected in the oblique tows during the 2000 survey, Pacific sardine also was the most abundant (21.3% of the larvae) but was not substantially more abundant than the second-ranked northern anchovy, which accounted for 18.6% of the total (Watson et al. 2001). The third and fourth-ranked species in the Manta collections, Pacific saury and California grunion, were not taken in oblique tows. Among the ten most abundant taxa in the oblique tows in 2000, only three also were among the ten most abundant in the Manta tows (Pacific sardine, northern anchovy, and *Sebastes* spp.) although another five occurred in the Manta samples (only two mesopelagic blacksmelt

species among the top ten in oblique tows were absent from the Manta samples).

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 2000 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 2000 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 2000 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 2000 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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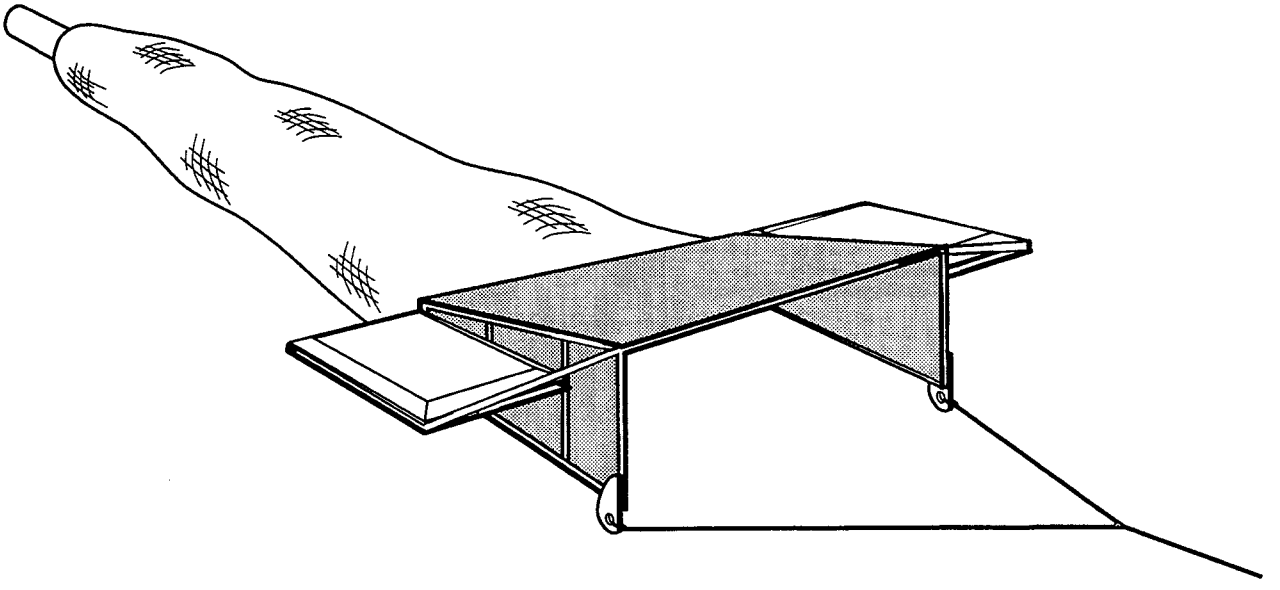

Figure 1. Diagram of the Manta net used on CalCOFI surveys.

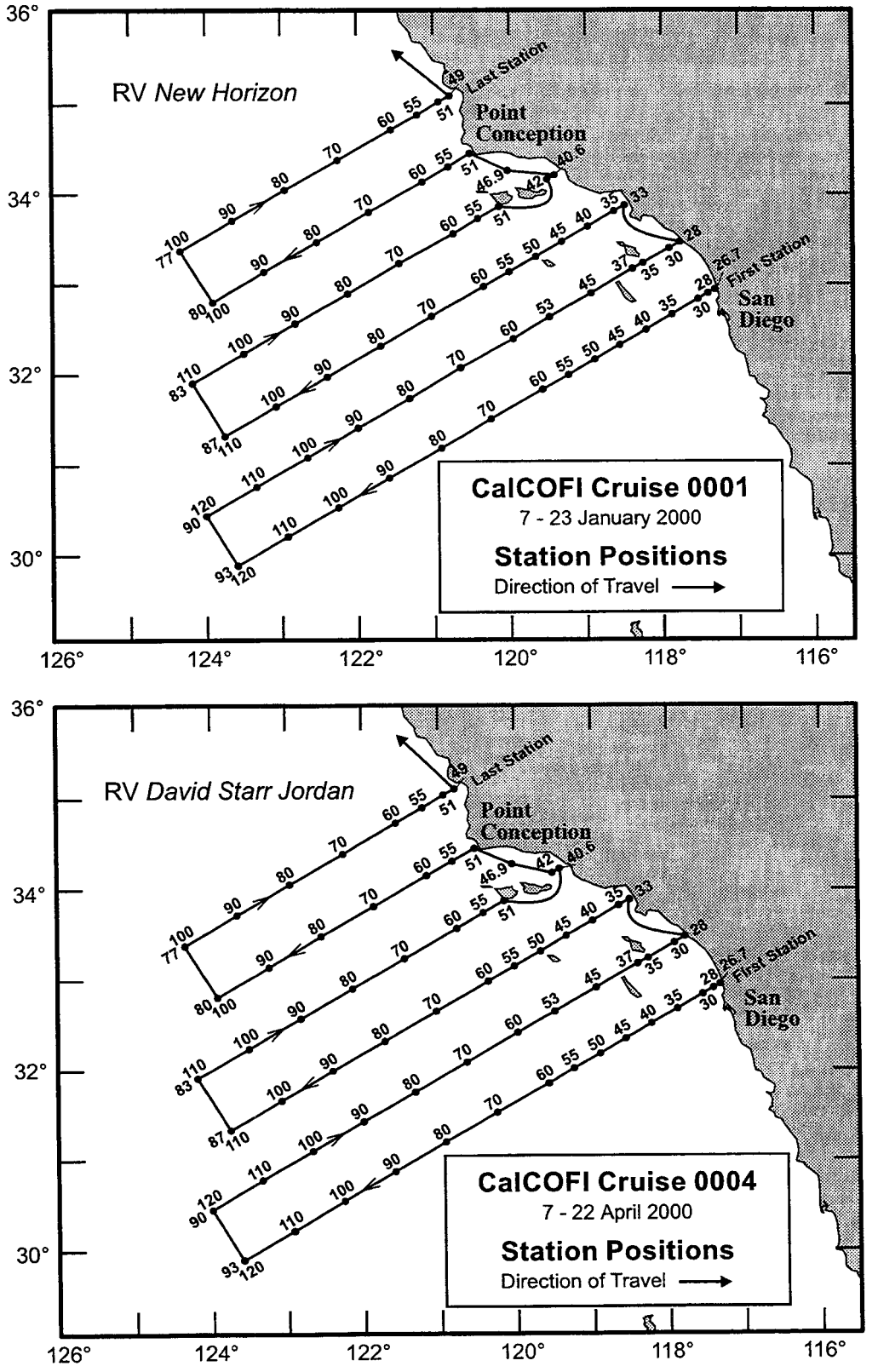

Figure 2. Stations and cruise tracks for CalCOFI cruises 0001 (above) and 0004 (below). Dots indicate stations where Manta and oblique tows were taken; open circles indicate stations where only oblique tows were taken.

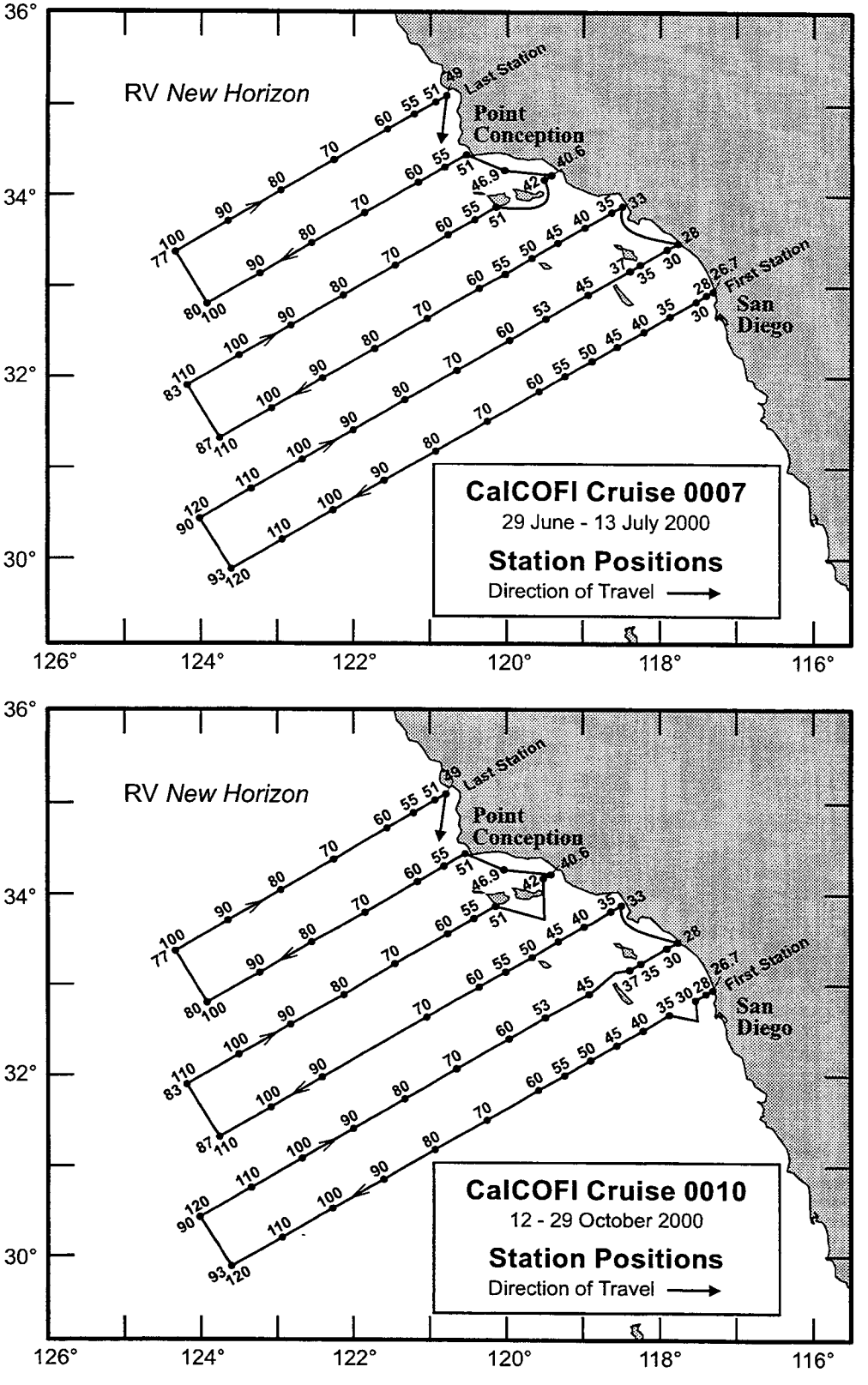

Figure 3. Stations and cruise tracks for CalCOFI cruises 0007 (above) and 0010 (below). Symbols as in figure 2.

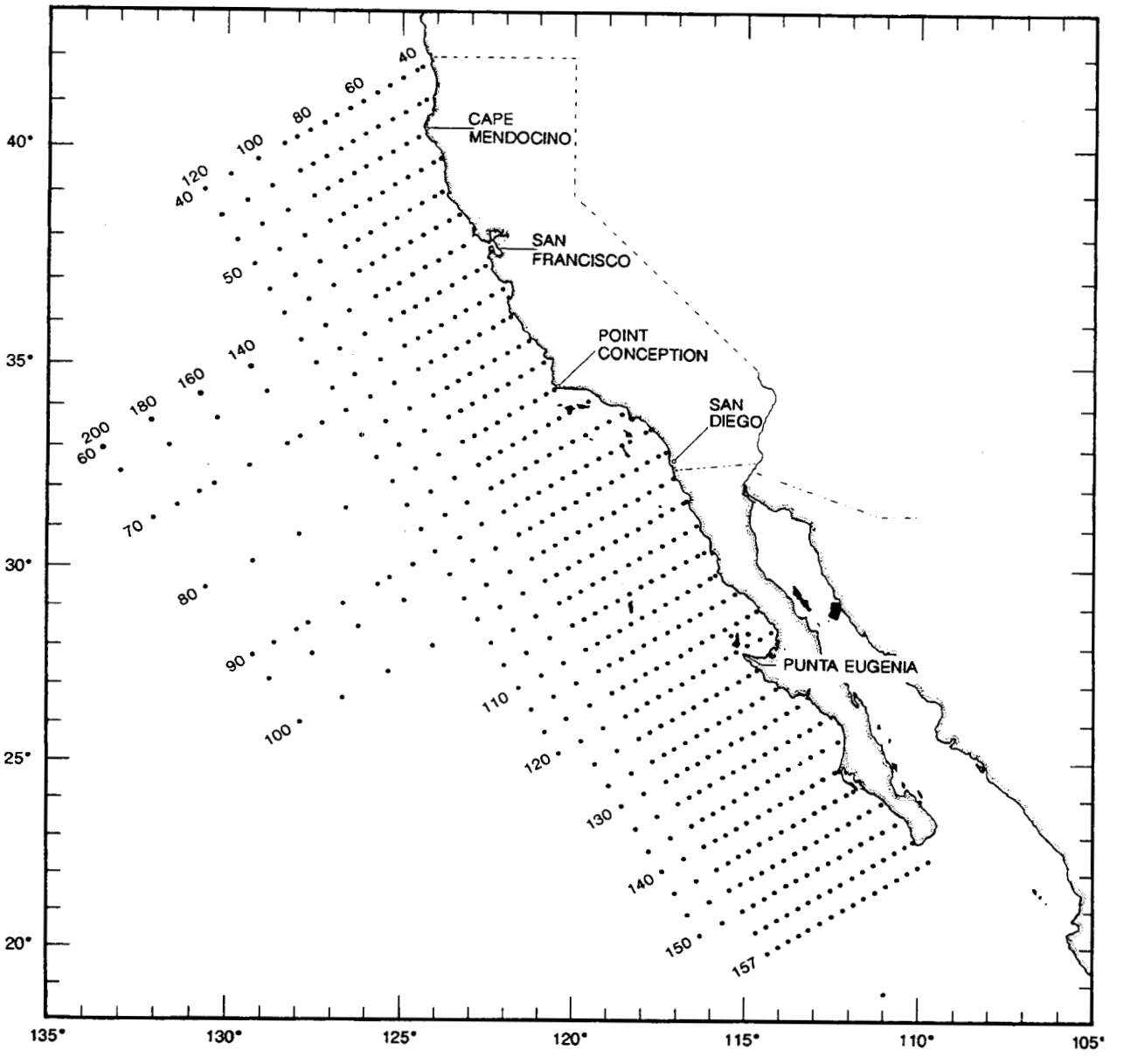

Figure 4. The basic station plan for CalCOFI cruises from 1950 - 1984.

TABLE 1. Station and plankton tow data for Manta tows taken on the 2000 CalCOFI survey. Numbers of fish eggs and larvae are raw counts, unadjusted for volume (cubic meters) of water filtered.

CalCOFI Cruise 0001

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	00	01	23	0803	72	2	8
76.7	51.0	35	01.4	120	55.4	NH	00	01	23	0559	80	10	1
76.7	55.0	34	53.1	121	12.2	NH	00	01	23	0237	90	4	8
76.7	60.0	34	43.3	121	33.0	NH	00	01	22	2232	92	78	395
76.7	70.0	34	23.2	122	15.1	NH	00	01	22	1618	89	6	266
76.7	80.0	34	03.5	122	56.5	NH	00	01	22	0800	76	0	69
76.7	90.0	33	43.3	123	38.3	NH	00	01	22	0324	80	0	0
76.7	100.0	33	23.1	124	19.4	NH	00	01	21	2148	79	3	4
80.0	51.0	34	27.6	120	31.4	NH	00	01	20	0536	71	19	78
80.0	55.0	34	18.9	120	48.0	NH	00	01	20	0844	84	0	5
80.0	60.0	34	09.0	121	08.6	NH	00	01	20	1446	75	10	26
80.0	70.0	33	49.0	121	50.7	NH	00	01	20	2037	81	5	5
80.0	80.0	33	29.1	122	31.6	NH	00	01	21	0225	71	33	2
80.0	90.0	33	09.2	123	13.5	NH	00	01	21	0800	89	0	4
80.0	100.0	32	49.1	123	54.1	NH	00	01	21	1604	85	0	10
81.8	46.9	34	16.4	120	01.4	NH	00	01	19	2145	75	10	11
83.3	40.6	34	13.4	119	24.8	NH	00	01	19	1313	89	5	495
83.3	42.0	34	10.6	119	30.4	NH	00	01	19	1126	85	4	46
83.3	51.0	33	52.6	120	08.2	NH	00	01	19	0425	88	25	427
83.3	55.0	33	44.7	120	25.1	NH	00	01	19	0110	90	2	11
83.3	60.0	33	34.7	120	44.4	NH	00	01	18	2122	93	50	363
83.3	70.0	33	14.7	121	27.0	NH	00	01	18	1536	90	1	75
83.3	80.0	32	54.7	122	07.4	NH	00	01	18	0800	81	3	16
83.3	90.0	32	34.8	122	49.0	NH	00	01	18	0325	78	1	6
83.3	100.0	32	14.7	123	29.6	NH	00	01	17	2151	77	2	5
83.3	110.0	31	55.0	124	09.9	NH	00	01	17	1622	77	0	3
86.7	33.0	33	53.3	118	29.4	NH	00	01	15	0053	69	12	961
86.7	35.0	33	49.4	118	37.7	NH	00	01	15	0321	92	4	451
86.7	40.0	33	39.5	118	58.6	NH	00	01	15	0713	87	1	8
86.7	45.0	33	29.4	119	19.1	NH	00	01	15	1212	82	0	3
86.7	50.0	33	19.4	119	39.5	NH	00	01	15	1557	82	1	17
86.7	55.0	33	09.3	120	00.4	NH	00	01	15	2006	96	2	30
86.7	60.0	32	59.4	120	20.8	NH	00	01	16	0008	94	0	47
86.7	70.0	32	39.6	121	01.6	NH	00	01	16	0614	77	3	0
86.7	80.0	32	19.9	121	41.7	NH	00	01	16	1302	72	1	1
86.7	90.0	31	59.3	122	23.5	NH	00	01	16	1858	79	0	2
86.7	100.0	31	39.4	123	03.9	NH	00	01	17	0110	73	9	1
86.7	110.0	31	19.7	123	44.5	NH	00	01	17	0800	85	0	4
90.0	28.0	33	29.0	117	46.1	NH	00	01	14	1828	105	6	116
90.0	30.0	33	24.9	117	54.4	NH	00	01	14	1554	99	15	100
90.0	35.0	33	15.0	118	15.1	NH	00	01	14	1120	103	0	31
90.0	37.0	33	11.2	118	23.3	NH	00	01	14	0728	100	0	2
90.0	45.0	32	54.9	118	55.9	NH	00	01	14	0158	94	1	1
90.0	53.0	32	39.0	119	28.9	NH	00	01	12	2134	84	5	238
90.0	60.0	32	24.7	119	57.5	NH	00	01	12	1629	94	1	6
90.0	70.0	32	05.3	120	38.9	NH	00	01	12	0821	55	1	2
90.0	80.0	31	44.7	121	19.0	NH	00	01	12	0155	59	3	2

TABLE 1. (cont.) CalCOFI Cruise 0001 (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	90.0	31	24.9	121	59.3	NH	00	01	11	1908	47	0	3
90.0	100.0	31	05.0	122	39.7	NH	00	01	11	1239	94	0	0
90.0	110.0	30	44.9	123	20.0	NH	00	01	11	0521	76	6	0
90.0	120.0	30	25.0	123	59.7	NH	00	01	10	2303	64	1	1
93.3	26.7	32	57.3	117	18.3	NH	00	01	07	1404	74	2	0
93.3	28.0	32	54.8	117	23.6	NH	00	01	07	1641	93	0	0
93.3	30.0	32	50.9	117	31.7	NH	00	01	07	1950	83	0	0
93.3	35.0	32	40.8	117	52.4	NH	00	01	08	0002	71	2	20
93.3	40.0	32	30.8	118	12.6	NH	00	01	08	0415	62	1	0
93.3	45.0	32	20.5	118	33.3	NH	00	01	08	0809	80	0	3
93.3	50.0	32	10.8	118	53.4	NH	00	01	08	1437	69	0	0
93.3	55.0	32	00.4	119	14.1	NH	00	01	08	1900	64	0	3
93.3	60.0	31	50.8	119	34.2	NH	00	01	08	2307	74	0	1
93.3	70.0	31	31.0	120	14.9	NH	00	01	09	0535	65	2	0
93.3	80.0	31	11.2	120	54.1	NH	00	01	09	1301	63	1	8
93.3	90.0	30	50.8	121	35.2	NH	00	01	09	1954	67	0	3
93.3	100.0	30	30.8	122	15.3	NH	00	01	10	0226	70	6	1
93.3	110.0	30	10.7	122	55.5	NH	00	01	10	0817	72	0	2
93.3	120.0	29	50.8	123	34.9	NH	00	01	10	1637	73	5	0

CalCOFI Cruise 0004

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	JD	00	04	22	1302	68	0	0
76.7	51.0	35	01.4	120	55.2	JD	00	04	22	0801	58	4	10
76.7	55.0	34	53.2	121	11.9	JD	00	04	22	0504	63	14	8
76.7	60.0	34	43.3	121	32.9	JD	00	04	22	0047	65	89	946
76.7	70.0	34	23.3	122	14.8	JD	00	04	21	1834	55	33	2317
76.7	80.0	34	03.2	122	56.5	JD	00	04	21	1210	67	2	238
76.7	90.0	33	43.2	123	38.2	JD	00	04	21	0431	62	19	4
76.7	100.0	33	23.3	124	19.6	JD	00	04	20	2201	69	117	45
80.0	51.0	34	26.9	120	31.4	JD	00	04	19	0508	66	6	72
80.0	55.0	34	18.6	120	48.6	JD	00	04	19	0737	69	7	20
80.0	60.0	34	09.1	120	08.9	JD	00	04	19	1304	66	1	80
80.0	70.0	33	49.0	121	50.6	JD	00	04	19	1955	68	47	394
80.0	80.0	33	29.3	122	31.9	JD	00	04	20	0141	66	777	527
80.0	90.0	33	09.0	123	13.3	JD	00	04	20	0803	66	5	71
80.0	100.0	32	49.1	123	54.3	JD	00	04	20	1606	62	0	116
81.8	46.9	34	16.5	120	01.5	JD	00	04	19	0054	69	5	0
83.3	40.6	34	13.5	119	24.7	JD	00	04	18	1812	65	10	715
83.3	42.0	34	10.7	119	30.5	JD	00	04	18	2006	63	26	37
83.3	51.0	33	52.6	120	08.1	JD	00	04	18	1150	75	9	2125
83.3	55.0	33	44.7	120	24.6	JD	00	04	18	0753	56	0	806
83.3	60.0	33	34.5	120	45.4	JD	00	04	18	0338	64	253	919
83.3	70.0	33	14.6	121	26.5	JD	00	04	17	2159	59	201	432
83.3	80.0	32	54.6	122	07.8	JD	00	04	17	1600	61	0	31
83.3	90.0	32	34.7	122	48.7	JD	00	04	17	0801	60	0	87
83.3	100.0	32	14.6	123	29.6	JD	00	04	17	0055	71	69	33

TABLE 1. (cont.) CalCOFI Cruise 0004 (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
83.3	110.0	31	54.7	124	10.2	JD	00	04	16	1918	61	58	6
86.7	33.0	33	53.4	118	29.4	JD	00	04	14	0312	74	42	2027
86.7	35.0	33	49.5	118	38.0	JD	00	04	14	0537	69	25	307
86.7	40.0	33	39.4	118	58.6	JD	00	04	14	0844	68	2	0
86.7	45.0	33	29.6	119	19.3	JD	00	04	14	1508	69	2	2
86.7	50.0	33	19.4	119	39.8	JD	00	04	14	1845	63	61	11
86.7	55.0	33	09.5	120	00.4	JD	00	04	14	2227	58	3	15
86.7	60.0	32	59.5	120	20.9	JD	00	04	15	0225	70	24	4012
86.7	70.0	32	39.4	121	02.0	JD	00	04	15	0752	68	169	2424
86.7	80.0	32	19.4	121	42.8	JD	00	04	15	1604	69	17	722
86.7	90.0	31	59.4	122	23.6	JD	00	04	15	2332	78	21	22
86.7	100.0	31	39.4	123	04.1	JD	00	04	16	0541	73	1	22
86.7	110.0	31	19.4	123	44.5	JD	00	04	16	1247	68	0	1
90.0	28.0	33	29.1	117	46.1	JD	00	04	13	1959	68	156	4149
90.0	30.0	33	25.0	117	54.5	JD	00	04	13	1512	68	7	10
90.0	35.0	33	14.9	118	15.1	JD	00	04	13	1122	73	0	217
90.0	37.0	33	11.1	118	23.2	JD	00	04	13	0744	82	1	3491
90.0	45.0	32	55.1	118	56.3	JD	00	04	13	0221	75	17	9660
90.0	53.0	32	39.1	119	28.9	JD	00	04	12	2057	72	65	636
90.0	60.0	32	25.1	119	57.9	JD	00	04	12	1558	71	1	46
90.0	70.0	32	05.1	120	38.2	JD	00	04	12	0811	72	5	55
90.0	80.0	31	45.1	121	18.9	JD	00	04	11	2342	76	197	917
90.0	90.0	31	25.1	121	59.5	JD	00	04	11	1725	72	8	171
90.0	100.0	31	05.1	122	39.9	JD	00	04	11	0902	71	0	82
90.0	110.0	30	45.1	123	20.0	JD	00	04	11	0350	69	3	1
90.0	120.0	30	25.0	123	59.7	JD	00	04	10	2148	67	3	8
93.3	26.7	32	57.4	117	18.3	JD	00	04	07	1515	78	2	1372
93.3	28.0	32	54.8	117	23.7	JD	00	04	07	1746	71	1	712
93.3	30.0	32	50.8	117	31.9	JD	00	04	07	2042	68	28	160
93.3	35.0	32	40.9	117	52.4	JD	00	04	08	0049	71	14	1591
93.3	40.0	32	30.9	118	12.6	JD	00	04	08	0509	68	5	720
93.3	45.0	32	20.9	118	33.1	JD	00	04	08	0831	66	2	1654
93.3	50.0	32	10.9	118	53.3	JD	00	04	08	1442	74	8	107
93.3	55.0	32	00.8	119	14.0	JD	00	04	08	1856	58	78	1615
93.3	60.0	31	50.8	119	34.0	JD	00	04	08	2303	65	1	68
93.3	70.0	31	30.9	120	14.8	JD	00	04	09	0519	62	3	135
93.3	80.0	31	11.1	120	55.2	JD	00	04	09	1232	67	0	27
93.3	90.0	30	50.8	121	35.4	JD	00	04	09	1853	57	4	5
93.3	100.0	30	30.9	122	15.4	JD	00	04	10	0105	73	4	97
93.3	110.0	30	10.6	122	54.9	JD	00	04	10	0802	67	2	7
93.3	120.0	29	50.9	123	35.1	JD	00	04	10	1545	73	0	3

CalCOFI Cruise 0007

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	NH	00	07	13	0920	91	0	2408
76.7	51.0	35	01.3	120	55.2	NH	00	07	13	0652	90	1	471
76.7	55.0	34	53.4	121	11.9	NH	00	07	13	0325	80	10	13

TABLE 1. (cont.) CalCOFI Cruise 0007 (cont.)

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
76.7	60.0	34	43.3	121	32.9	NH	00	07	12	2300	81	2	788
76.7	70.0	34	23.3	122	14.9	NH	00	07	12	1654	89	2	190
76.7	80.0	34	03.3	122	56.5	NH	00	07	12	1006	85	1	1296
76.7	90.0	33	43.4	123	38.1	NH	00	07	12	0405	82	224	74
76.7	100.0	33	23.2	124	19.4	NH	00	07	11	2204	76	11	23
80.0	51.0	34	26.9	120	31.4	NH	00	07	10	0739	79	0	529
80.0	55.0	34	18.9	120	48.0	NH	00	07	10	1115	82	0	25
80.0	60.0	34	09.0	121	09.0	NH	00	07	10	1538	77	2	157
80.0	70.0	33	49.0	121	50.5	NH	00	07	10	2217	70	5	1
80.0	80.0	33	29.0	122	32.2	NH	00	07	11	0411	74	10	3
80.0	90.0	33	08.9	123	13.3	NH	00	07	11	1016	73	2	48
80.0	100.0	32	49.0	123	54.4	NH	00	07	11	1558	75	3	4
81.8	46.9	34	16.5	120	01.5	NH	00	07	10	0339	76	1	2
83.3	40.6	34	13.5	119	24.7	NH	00	07	09	2237	73	2	2024
83.3	42.0	34	10.6	119	30.5	NH	00	07	09	2021	91	20	465
83.3	51.0	33	52.7	120	08.0	NH	00	07	09	1319	67	0	332
83.3	55.0	33	44.7	120	24.6	NH	00	07	09	0901	79	0	17
83.3	60.0	33	34.7	120	45.4	NH	00	07	09	0539	71	0	66
83.3	70.0	33	14.6	121	26.6	NH	00	07	08	2325	75	1	0
83.3	80.0	32	54.7	122	07.7	NH	00	07	08	1703	77	6	5
83.3	90.0	32	34.6	122	48.7	NH	00	07	08	1104	81	2	14
83.3	100.0	32	14.8	123	29.4	NH	00	07	08	0515	82	6	181
83.3	110.0	31	54.7	124	10.1	NH	00	07	07	2323	74	6	234
86.7	33.0	33	53.4	118	29.4	NH	00	07	05	1530	77	15	89
86.7	35.0	33	49.4	118	37.7	NH	00	07	05	1750	84	40	346
86.7	40.0	33	39.4	118	58.4	NH	00	07	05	2147	70	15	2005
86.7	45.0	33	29.3	119	19.6	NH	00	07	06	0148	58	2	15
86.7	50.0	33	19.2	119	39.9	NH	00	07	06	0525	78	1	36
86.7	55.0	33	08.6	120	01.1	NH	00	07	06	0811	75	0	0
86.7	60.0	32	59.4	120	21.0	NH	00	07	06	1344	76	3	4
86.7	70.0	32	39.4	121	01.9	NH	00	07	06	1859	83	3	5
86.7	80.0	32	19.4	121	42.8	NH	00	07	07	0032	75	116	3
86.7	90.0	31	59.4	122	23.6	NH	00	07	07	0609	83	5	20
86.7	100.0	31	39.3	123	04.1	NH	00	07	07	1151	70	9	4
86.7	110.0	31	19.4	123	44.5	NH	00	07	07	1723	78	4	77
90.0	28.0	33	29.0	117	46.1	NH	00	07	05	0830	74	256	1277
90.0	30.0	33	25.2	117	54.4	NH	00	07	05	0544	85	4	0
90.0	35.0	33	15.2	118	15.2	NH	00	07	05	0128	73	2	0
90.0	37.0	33	11.0	118	23.2	NH	00	07	04	2226	70	0	0
90.0	45.0	32	55.1	118	56.1	NH	00	07	04	1703	66	1	0
90.0	53.0	32	39.0	119	28.9	NH	00	07	04	1138	65	0	0
90.0	60.0	32	24.9	119	57.7	NH	00	07	04	0622	61	3	19
90.0	70.0	32	05.0	120	38.3	NH	00	07	03	2219	64	24	20
90.0	80.0	31	45.1	121	18.9	NH	00	07	03	1528	67	4	16
90.0	90.0	31	24.7	121	59.6	NH	00	07	03	0800	67	0	18
90.0	100.0	31	05.1	122	39.7	NH	00	07	03	0114	61	25	166
90.0	110.0	30	45.1	123	20.0	NH	00	07	02	1828	72	3	20
90.0	120.0	30	25.0	123	59.9	NH	00	07	02	1156	65	1	41
93.3	26.7	32	57.3	117	18.3	NH	00	06	29	1111	87	18	1836

TABLE 1. (cont.) CalCOFI Cruise 0007 (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	23.7	NH	00	06	29	1348	81	6	190
93.3	30.0	32	50.8	117	31.8	NH	00	06	29	1623	86	1	0
93.3	35.0	32	40.8	117	52.4	NH	00	06	29	2012	58	0	5
93.3	40.0	32	30.8	118	12.7	NH	00	06	30	0009	70	26	134
93.3	45.0	32	20.8	118	33.2	NH	00	06	30	0410	71	1	31
93.3	50.0	32	11.1	118	53.0	NH	00	06	30	0807	75	3	21
93.3	55.0	32	00.8	119	14.0	NH	00	06	30	1347	72	1	196
93.3	60.0	31	50.7	119	34.2	NH	00	06	30	1747	77	7	155
93.3	70.0	31	30.8	120	14.8	NH	00	06	30	2349	73	16	235
93.3	80.0	31	10.8	120	55.1	NH	00	07	01	0543	78	20	74
93.3	90.0	30	50.8	121	35.3	NH	00	07	01	1157	74	1	7
93.3	100.0	30	30.8	122	15.5	NH	00	07	01	1800	78	16	86
93.3	110.0	30	10.8	122	55.4	NH	00	07	01	2356	68	8	10
93.3	120.0	29	50.9	123	35.2	NH	00	07	02	0559	72	4	162

CalCOFI Cruise 0010

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	05.4	120	46.6	NH	00	10	29	2032	71	2	121
76.7	51.0	35	01.4	120	55.2	NH	00	10	29	1820	74	4	0
76.7	55.0	34	53.3	121	11.9	NH	00	10	29	1453	64	0	1
76.7	60.0	34	43.4	121	32.9	NH	00	10	29	1046	67	2	157
76.7	70.0	34	23.2	122	14.7	NH	00	10	29	0400	50	3	13
76.7	80.0	34	03.2	122	56.3	NH	00	10	28	2145	67	20	3
76.7	90.0	33	43.4	123	38.0	NH	00	10	28	1608	52	4	12
76.7	100.0	33	23.3	124	19.4	NH	00	10	28	1041	65	2	6
80.0	51.0	34	27.1	120	31.5	NH	00	10	26	1031	52	1	113
80.0	55.0	34	19.1	120	48.0	NH	00	10	26	1425	64	1	10
80.0	60.0	34	08.8	121	09.1	NH	00	10	26	1829	83	7	2
80.0	70.0	33	48.7	121	49.9	NH	00	10	27	0814	68	1	4
80.0	80.0	33	29.0	122	32.0	NH	00	10	27	1611	65	3	1
80.0	90.0	33	09.0	123	13.3	NH	00	10	27	2209	64	4	13
80.0	100.0	32	49.0	123	54.3	NH	00	10	28	0428	63	7	7
81.8	46.9	34	16.5	120	01.6	NH	00	10	26	0328	68	10	5
83.3	40.6	34	13.5	119	24.8	NH	00	10	25	2219	69	1	940
83.3	42.0	34	10.7	119	30.7	NH	00	10	25	2025	71	15	69
83.3	51.0	33	52.7	120	08.1	NH	00	10	25	0846	70	0	864
83.3	55.0	33	44.7	120	24.9	NH	00	10	25	0523	86	0	2
83.3	60.0	33	34.7	120	45.3	NH	00	10	24	2110	79	9	37
83.3	70.0	33	14.7	121	26.5	NH	00	10	24	1532	75	3	33
83.3	80.0	32	54.1	122	07.1	NH	00	10	24	0825	83	16	8
83.3	90.0	32	34.7	122	48.6	NH	00	10	24	0339	86	17	4
83.3	100.0	32	14.6	123	29.4	NH	00	10	23	2151	70	6	7
83.3	110.0	31	54.6	124	10.2	NH	00	10	23	1605	89	3	48
86.7	33.0	33	53.3	118	29.6	NH	00	10	19	1615	84	48	137
86.7	35.0	33	49.5	118	37.9	NH	00	10	19	1840	76	24	99
86.7	40.0	33	39.3	118	58.6	NH	00	10	20	0203	76	2	12
86.7	45.0	33	29.6	119	19.0	NH	00	10	20	0607	85	0	254

TABLE 1. (cont.) CalCOFI Cruise 0010 (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	50.0	33	18.9	119	39.7	NH	00	10	20	0926	78	1	169
86.7	55.0	33	09.5	120	00.4	NH	00	10	20	1416	64	0	1
86.7	60.0	32	59.4	120	21.0	NH	00	10	20	1818	69	0	0
86.7	70.0	32	39.3	121	02.1	NH	00	10	20	2359	57	0	0
86.7	90.0	31	59.6	122	23.6	NH	00	10	22	1917	75	14	1
86.7	100.0	31	39.4	123	04.3	NH	00	10	23	0130	62	10	2
86.7	110.0	31	19.4	123	44.7	NH	00	10	23	0810	66	1	3
90.0	28.0	33	29.0	117	46.1	NH	00	10	19	0913	81	1	1566
90.0	30.0	33	25.1	117	54.3	NH	00	10	19	0144	78	3	688
90.0	35.0	33	15.1	118	15.0	NH	00	10	18	2126	74	2	1
90.0	37.0	33	10.9	118	23.3	NH	00	10	18	1843	72	1	5
90.0	45.0	32	54.6	118	55.0	NH	00	10	18	0815	73	1	0
90.0	53.0	32	39.2	119	29.0	NH	00	10	18	0231	70	2	1
90.0	60.0	32	25.1	119	57.6	NH	00	10	17	2119	65	3	4
90.0	70.0	32	05.1	120	38.3	NH	00	10	17	0846	66	0	9
90.0	80.0	31	45.1	121	18.8	NH	00	10	17	0356	86	4	14
90.0	90.0	31	25.0	121	59.3	NH	00	10	16	2201	67	11	12
90.0	100.0	31	05.0	122	39.7	NH	00	10	16	1624	76	6	13
90.0	110.0	30	45.1	123	19.9	NH	00	10	16	1034	57	2	1
90.0	120.0	30	25.1	123	59.9	NH	00	10	16	0428	67	2	0
93.3	26.7	32	57.4	117	18.3	NH	00	10	12	1248	84	14	132
93.3	28.0	32	54.8	117	23.7	NH	00	10	12	1612	75	1	2
93.3	30.0	32	50.8	117	31.9	NH	00	10	12	1916	81	2	1
93.3	35.0	32	41.2	117	52.5	NH	00	10	13	0705	84	1	1
93.3	40.0	32	30.8	118	12.9	NH	00	10	13	1418	77	0	0
93.3	45.0	32	20.7	118	33.3	NH	00	10	13	1808	81	2	0
93.3	50.0	32	10.8	118	53.6	NH	00	10	13	2155	52	1	0
93.3	55.0	32	00.6	119	14.0	NH	00	10	14	0208	64	4	1
93.3	60.0	31	51.0	119	34.4	NH	00	10	14	0859	54	0	4
93.3	70.0	31	30.8	120	14.7	NH	00	10	14	1643	61	0	0
93.3	80.0	31	10.9	120	55.2	NH	00	10	14	2236	61	3	2
93.3	90.0	30	50.8	121	35.5	NH	00	10	15	0435	73	1	1
93.3	100.0	30	30.9	122	15.6	NH	00	10	15	1036	74	0	2
93.3	110.0	30	10.7	122	55.5	NH	00	10	15	1632	85	0	0
93.3	120.0	29	50.9	123	35.2	NH	00	10	15	2208	71	10	2

TABLE 2. Pooled occurrences of fish larvae taken in Manta tows on the 2000 CalCOFI survey.

Rank	Taxon	Occurrences
1	*Cololabis saira*	116
2	*Engraulis mordax*	50
3	*Sardinops sagax*	39
4	*Sebastes* spp.	37
5	*Scorpaenichthys marmoratus*	18
5	*Trachurus symmetricus*	18
7	*Hypsoblennius jenkinsi*	14
8	*Sebastes diploproa*	12
9	*Hypsoblennius gilberti*	10
10	*Atherinopsis californiensis*	8
11	*Oxyjulis californica*	6
12	*Ceratoscopelus townsendi*	5
12	*Leuresthes tenuis*	5
12	*Tetragonurus cuvieri*	5
12	*Nannobrachium ritteri*	5
16	*Vinciguerria lucetia*	4
16	*Sebastes aurora*	4
16	*Stenobrachius leucopsarus*	4
16	*Medialuna californiensis*	4
16	*Citharichthys stigmaeus*	4
21	*Cheilopogon heterurus*	3
21	*Sebastes jordani*	3
21	*Oxylebius pictus*	3
21	*Scomber japonicus*	3
21	*Cyclothone signata*	3
21	*Chromis punctipinnis*	3
27	*Stomias atriventer*	2
27	*Protomyctophum crockeri*	2
27	*Pleuronichthys coenosus*	2
27	*Triphoturus mexicanus*	2
27	*Hexagrammos decagrammus*	2
27	*Icichthys lockingtoni*	2
27	*Neoclinus blanchardi*	2
27	*Nannobrachium regale*	2
27	*Lampanyctus* spp.	2
27	*Symbolophorus californiensis*	2
27	*Citharichthys sordidus*	2
38	*Aristostomias scintillans*	1
38	*Lampadena urophaos*	1
38	*Vinciguerria poweriae*	1
38	*Hygophum reinhardtii*	1
38	*Pleuronichthys decurrens*	1
38	*Melamphaes lugubris*	1
38	*Bathophilus flemingi*	1
38	*Notoscopelus resplendens*	1
38	*Sebastes goodei*	1
38	*Sphyraena argentea*	1
38	*Lepidogobius lepidus*	1
38	*Coryphopterus nicholsii*	1

TABLE 2. (cont.)

Rank	Taxon	Occurrences
38	*Icosteus aenigmaticus*	1
38	*Hypsoblennius gentilis*	1
38	*Seriola lalandi*	1
38	*Paralabrax* spp.	1
38	*Fodiator acutus*	1
38	*Anoplopoma fimbria*	1
38	*Tarletonbeania crenularis*	1
38	*Pleuronichthys verticalis*	1
38	*Paralichthys californicus*	1
38	*Parophrys vetulus*	1
38	*Macroramphosus gracilis*	1
38	*Hirundichthys marginatus*	1
38	*Cheilopogon pinnatibarbatus*	1
38	*Merluccius productus*	1
38	*Trachipterus altivelis*	1
38	*Ophiodon elongatus*	1
	Total	436

TABLE 3. Pooled raw counts of fish larvae taken in Manta tows on the 2000 CalCOFI survey.

Rank	Taxon	Count
1	*Sardinops sagax*	2443
2	*Engraulis mordax*	546
3	*Cololabis saira*	531
4	*Leuresthes tenuis*	270
5	*Sebastes* spp.	167
6	*Scorpaenichthys marmoratus*	155
7	*Trachurus symmetricus*	38
8	*Hypsoblennius jenkinsi*	33
9	*Atherinopsis californiensis*	24
10	*Sebastes diploproa*	20
11	*Hypsoblennius gilberti*	15
12	*Medialuna californiensis*	10
12	*Chromis punctipinnis*	10
14	*Ceratoscopelus townsendi*	7
14	*Vinciguerria lucetia*	7
14	*Stenobrachius leucopsarus*	7
14	*Oxyjulis californica*	7
18	*Tetragonurus cuvieri*	6
19	*Nannobrachium ritteri*	5
19	*Scomber japonicus*	5
19	*Sebastes aurora*	5
22	*Sebastes jordani*	4
22	*Oxylebius pictus*	4
22	*Cheilopogon heterurus*	4
22	*Citharichthys stigmaeus*	4
22	*Pleuronichthys coenosus*	4
22	*Lampanyctus* spp.	4
28	*Sphyraena argentea*	3
28	*Triphoturus mexicanus*	3
28	*Icichthys lockingtoni*	3
28	*Cheilopogon pinnatibarbatus*	3
28	*Cyclothone signata*	3
28	*Hexagrammos decagrammus*	3
34	*Neoclinus blanchardi*	2
34	*Nannobrachium regale*	2
34	*Citharichthys sordidus*	2
34	*Aristostomias scintillans*	2
34	*Symbolophorus californiensis*	2
34	*Lampadena urophaos*	2
34	*Tarletonbeania crenularis*	2
34	*Stomias atriventer*	2
34	*Vinciguerria poweriae*	2
34	*Paralichthys californicus*	2
34	*Paralabrax* spp.	2
34	*Protomyctophum crockeri*	2
46	*Lepidogobius lepidus*	1
46	*Bathophilus flemingi*	1
46	*Parophrys vetulus*	1
46	*Merluccius productus*	1

TABLE 3. (cont.)

Rank	Taxon	Count
46	*Hypsoblennius gentilis*	1
46	*Pleuronichthys decurrens*	1
46	*Fodiator acutus*	1
46	*Hirundichthys marginatus*	1
46	*Seriola lalandi*	1
46	*Hygophum reinhardtii*	1
46	*Pleuronichthys verticalis*	1
46	*Macroramphosus gracilis*	1
46	*Ophiodon elongatus*	1
46	*Notoscopelus resplendens*	1
46	*Anoplopoma fimbria*	1
46	*Trachipterus altivelis*	1
46	*Melamphaes lugubris*	1
46	*Sebastes goodei*	1
46	*Icosteus aenigmaticus*	1
46	*Coryphopterus nicholsii*	1
	Total	4397

TABLE 4. Numbers of fish larvae taken in Manta net tows on the 2000 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 55.0	0.0	-	-	8.8	-	-	1.6	-	-	0.0	-	-
76.7 60.0	0.0	-	-	56.6	-	-	0.0	-	-	0.0	-	-
76.7 70.0	0.0	-	-	16.0	-	-	0.0	-	-	0.0	-	-
76.7 80.0	0.0	-	-	1.3	-	-	0.0	-	-	0.0	-	-
76.7 90.0	0.0	-	-	11.7	-	-	170.1	-	-	0.0	-	-
76.7 100.0	0.0	-	-	79.8	-	-	0.0	-	-	0.0	-	-
80.0 55.0	0.0	-	-	3.5	-	-	0.0	-	-	0.0	-	-
80.0 60.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-
80.0 70.0	0.0	-	-	32.1	-	-	1.4	-	-	0.0	-	-
80.0 80.0	0.0	-	-	513.6	-	-	5.9	-	-	0.0	-	-
80.0 100.0	0.0	-	-	0.0	-	-	0.8	-	-	0.0	-	-
83.3 51.0	0.0	-	-	3.0	-	-	0.0	-	-	0.0	-	-
83.3 60.0	0.0	-	-	160.9	-	-	0.0	-	-	0.0	-	-
83.3 70.0	0.0	-	-	116.6	-	-	0.0	-	-	0.0	-	-
83.3 100.0	0.0	-	-	1.4	-	-	0.0	-	-	0.0	-	-
83.3 110.0	0.0	-	-	33.9	-	-	0.0	-	-	0.0	-	-
86.7 33.0	0.0	-	-	0.0	-	-	0.0	-	-	0.8	-	-
86.7 60.0	0.0	-	-	16.8	-	-	0.0	-	-	0.0	-	-
86.7 70.0	0.0	-	-	113.4	-	-	0.8	-	-	0.0	-	-
86.7 80.0	0.0	-	-	0.0	-	-	81.3	-	-	-	-	-
86.7 90.0	0.0	-	-	13.3	-	-	0.8	-	-	0.0	-	-
90.0 45.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-
90.0 53.0	0.0	-	-	43.9	-	-	0.0	-	-	0.0	-	-
90.0 70.0	0.0	-	-	0.0	-	-	3.2	-	-	0.0	-	-
90.0 80.0	0.0	-	-	126.8	-	-	0.0	-	-	0.0	-	-
90.0 90.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-
90.0 100.0	0.0	-	-	0.0	-	-	1.2	-	-	0.0	-	-
93.3 40.0	0.0	-	-	0.7	-	11.8	-	-	-	0.0	-	-
93.3 45.0	0.0	-	-	0.7	-	0.0	-	-	-	0.0	-	-
93.3 50.0	0.0	-	-	2.2	-	0.0	-	-	-	0.0	-	-
93.3 55.0	0.0	-	-	20.4	-	0.0	-	-	-	0.0	-	-

TABLE 4. (cont.)

Sardinops sagax (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 70.0	0.0	-	-	1.2	-	0.0	-	-	-	0.0	-	-

Engraulis mordax

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	0.0	-	-	0.0	-	-	0.0	-	-	1.4	-	-
76.7 51.0	0.8	-	-	0.6	-	-	0.0	-	-	0.7	-	-
76.7 55.0	0.9	-	-	0.0	-	-	4.8	-	-	0.0	-	-
76.7 60.0	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-
76.7 90.0	0.0	-	-	0.0	-	-	9.0	-	-	0.0	-	-
80.0 51.0	0.0	-	-	3.3	-	-	0.0	-	-	0.0	-	-
81.8 46.9	0.0	-	-	0.0	-	-	0.8	-	-	5.4	-	-
83.3 40.6	0.0	-	-	4.5	-	-	0.0	-	-	0.0	-	-
83.3 42.0	0.0	-	-	5.1	-	-	3.6	-	-	8.5	-	-
83.3 51.0	0.9	-	-	0.7	-	-	0.0	-	-	0.0	-	-
83.3 60.0	1.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 80.0	0.0	-	-	0.0	-	-	0.8	-	-	0.0	-	-
86.7 33.0	2.1	-	-	26.7	-	-	1.5	-	-	33.6	-	-
86.7 35.0	0.0	-	-	6.2	-	-	31.8	-	-	15.9	-	-
86.7 40.0	0.0	-	-	1.4	-	-	4.9	-	-	0.8	-	-
86.7 45.0	0.0	-	-	0.7	-	-	0.6	-	-	0.0	-	-
86.7 50.0	0.0	-	-	24.7	-	-	0.0	-	-	0.0	-	-
86.7 55.0	1.0	-	-	0.6	-	-	0.0	-	-	0.0	-	-
90.0 28.0	0.0	-	-	97.9	-	-	0.0	-	-	0.0	-	-
90.0 30.0	1.0	-	-	4.1	-	-	0.0	-	-	0.0	-	-
90.0 45.0	0.0	-	-	11.2	-	-	0.0	-	-	0.0	-	-
90.0 70.0	0.0	-	-	0.0	-	-	12.2	-	-	0.0	-	-
93.3 26.7	0.0	-	-	0.0	-	0.0	-	-	-	1.7	-	-
93.3 30.0	0.0	-	-	13.5	-	0.0	-	-	-	0.0	-	-
93.3 35.0	0.7	-	-	5.7	-	0.0	-	-	-	0.0	-	-
93.3 40.0	0.0	-	-	0.7	-	3.5	-	-	-	0.0	-	-
93.3 45.0	0.0	-	-	0.0	-	0.0	-	-	-	0.8	-	-
93.3 50.0	0.0	-	-	3.0	-	0.8	-	-	-	0.0	-	-
93.3 55.0	0.0	-	-	23.9	-	0.0	-	-	-	0.0	-	-
93.3 60.0	0.0	-	-	0.0	-	0.8	-	-	-	0.0	-	-

TABLE 4. (cont.)

Cyclothone signata

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 100.0	0.7	-	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 110.0	0.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-
93.3 70.0	0.0	-	-	0.0	-	0.7	-	-	-	0.0	-	-

Vinciguerria lucetia

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 70.0	0.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-
93.3 100.0	0.7	-	-	0.0	-	-	0.8	-	-	0.0	-	-
93.3 120.0	0.0	-	-	0.0	-	-	2.9	-	-	0.0	-	-

Vinciguerria poweriae

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

Stomias atriventer

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 55.0	0.0	-	-	0.0	-	0.0	-	-	-	0.6	-	-
93.3 70.0	0.0	-	-	0.6	-	0.0	-	-	-	0.0	-	-

Bathophilus flemingi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 120.0	0.7	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Aristostomias scintillans

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 110.0	0.0	-	-	1.3	-	-	0.0	-	-	0.0	-	-

Ceratoscopelus townsendi

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	-	-
93.3 90.0	0.0	-	-	0.6	-	-	0.0	-	-	0.0	-	-
93.3 100.0	0.0	-	-	1.5	-	-	1.6	-	-	0.0	-	-
93.3 120.0	0.7	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Lampadena urophaos

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

TABLE 4. (cont.)

***Lampanyctus* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 100.0	2.2	-	-	0.0	-	-	0.0	-	-	0.6	-	-

Nannobrachium regale

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 110.0	0.0	-	-	0.6	-	-	0.0	-	-	0.0	-	-
93.3 100.0	0.0	-	-	0.0	-	-	0.8	-	-	0.0	-	-

Nannobrachium ritteri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 100.0	0.0	-	-	0.0	-	-	0.0	-	-	0.6	-	-
86.7 100.0	0.0	-	-	0.0	-	-	0.0	-	-	0.6	-	-
90.0 80.0	0.6	-	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 120.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-
93.3 100.0	0.7	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Notoscopelus resplendens

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	-	-

Stenobrachius leucopsarus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 51.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-
83.3 70.0	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-
86.7 35.0	0.0	-	-	2.1	-	-	0.0	-	-	0.0	-	-
90.0 53.0	1.7	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Triphoturus mexicanus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 110.0	0.0	-	-	0.0	-	-	0.8	-	-	0.0	-	-
90.0 100.0	0.0	-	-	0.0	-	-	0.0	-	-	1.5	-	-

Hygophum reinhardtii

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

Protomyctophum crockeri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 55.0	1.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-

TABLE 4. (cont.)

Protomyctophum crockeri (cont.)

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

Symbolophorus californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 100.0	0.7	-	-	0.0	-	-	0.0	-	-	0.0	-	-
93.3 100.0	0.7	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Tarletonbeania crenularis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 53.0	1.7	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Trachipterus altivelis

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

Merluccius productus

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

Atherinopsis californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	4.4	-	-	0.0	-	-	0.0	-	-	0.0	-	-
86.7 33.0	2.1	-	-	0.0	-	-	0.0	-	-	0.8	-	-
90.0 28.0	6.3	-	-	0.7	-	-	0.0	-	-	0.0	-	-
90.0 30.0	4.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-
93.3 26.7	0.7	-	-	1.6	-	0.0	-	-	-	0.0	-	-

Leuresthes tenuis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	0.0	-	-	0.0	-	-	4.6	-	-	0.0	-	-
86.7 35.0	0.0	-	-	0.0	-	-	0.8	-	-	0.0	-	-
90.0 28.0	0.0	-	-	4.1	-	-	183.8	-	-	0.0	-	-
93.3 26.7	0.0	-	-	0.0	-	8.7	-	-	-	0.0	-	-

Cololabis saira

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	0.0	-	-	0.0	-	-	0.0	-	-	0.7	-	-

TABLE 4. (cont.)

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
						Cololabis saira (cont.)							
76.7	55.0	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-
76.7	60.0	0.0	-	-	0.0	-	-	0.8	-	-	0.0	-	-
76.7	70.0	2.7	-	-	0.0	-	-	0.9	-	-	1.0	-	-
76.7	80.0	0.0	-	-	0.0	-	-	0.0	-	-	13.3	-	-
76.7	90.0	0.0	-	-	0.0	-	-	4.1	-	-	2.1	-	-
76.7	100.0	2.4	-	-	0.0	-	-	8.3	-	-	1.3	-	-
80.0	60.0	0.0	-	-	0.0	-	-	1.5	-	-	5.0	-	-
80.0	70.0	0.8	-	-	0.0	-	-	2.1	-	-	0.7	-	-
80.0	80.0	0.7	-	-	0.0	-	-	1.5	-	-	1.9	-	-
80.0	90.0	0.0	-	-	0.0	-	-	1.5	-	-	1.9	-	-
80.0	100.0	0.0	-	-	0.0	-	-	1.5	-	-	2.5	-	-
83.3	40.6	0.0	-	-	0.0	-	-	1.5	-	-	0.0	-	-
83.3	42.0	0.0	-	-	0.0	-	-	0.9	-	-	0.0	-	-
83.3	51.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-
83.3	60.0	0.0	-	-	0.0	-	-	0.0	-	-	6.3	-	-
83.3	70.0	0.0	-	-	0.6	-	-	0.8	-	-	2.3	-	-
83.3	80.0	0.0	-	-	0.0	-	-	3.9	-	-	13.2	-	-
83.3	90.0	0.0	-	-	0.0	-	-	1.6	-	-	14.6	-	-
83.3	100.0	1.5	-	-	47.3	-	-	4.1	-	-	4.2	-	-
83.3	110.0	0.0	-	-	0.0	-	-	4.4	-	-	2.7	-	-
86.7	33.0	1.4	-	-	0.0	-	-	0.8	-	-	0.0	-	-
86.7	35.0	1.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-
86.7	40.0	0.9	-	-	0.0	-	-	0.7	-	-	0.0	-	-
86.7	50.0	0.0	-	-	0.0	-	-	0.8	-	-	0.0	-	-
86.7	60.0	0.0	-	-	0.0	-	-	2.3	-	-	0.0	-	-
86.7	70.0	0.8	-	-	0.0	-	-	1.7	-	-	0.0	-	-
86.7	80.0	0.7	-	-	11.8	-	-	4.5	-	-	-	-	-
86.7	90.0	0.0	-	-	0.0	-	-	2.5	-	-	9.7	-	-
86.7	100.0	2.2	-	-	0.0	-	-	6.3	-	-	4.9	-	-
86.7	110.0	0.0	-	-	0.0	-	-	2.4	-	-	0.0	-	-
90.0	30.0	0.0	-	-	0.0	-	-	2.5	-	-	0.0	-	-
90.0	35.0	0.0	-	-	0.0	-	-	1.5	-	-	0.0	-	-
90.0	37.0	0.0	-	-	0.8	-	-	0.0	-	-	0.7	-	-
90.0	45.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-
90.0	53.0	0.0	-	-	0.7	-	-	0.0	-	-	1.4	-	-

TABLE 4. (cont.)

Cololabis saira (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 60.0	0.0	-	-	0.7	-	-	1.8	-	-	1.3	-	-
90.0 70.0	0.6	-	-	3.6	-	-	0.0	-	-	0.0	-	-
90.0 80.0	1.2	-	-	10.7	-	-	2.7	-	-	3.4	-	-
90.0 90.0	0.0	-	-	5.0	-	-	0.0	-	-	7.4	-	-
90.0 100.0	0.0	-	-	0.0	-	-	14.0	-	-	3.0	-	-
90.0 110.0	2.3	-	-	0.7	-	-	1.4	-	-	1.1	-	-
90.0 120.0	0.6	-	-	1.3	-	-	0.6	-	-	1.3	-	-
93.3 26.7	0.0	-	-	0.0	-	0.9	-	-	-	0.0	-	-
93.3 28.0	0.0	-	-	0.7	-	4.8	-	-	-	0.0	-	-
93.3 30.0	0.0	-	-	5.4	-	0.0	-	-	-	0.8	-	-
93.3 35.0	0.7	-	-	4.3	-	0.0	-	-	-	0.0	-	-
93.3 40.0	0.0	-	-	0.7	-	1.4	-	-	-	0.0	-	-
93.3 45.0	0.0	-	-	0.0	-	0.7	-	-	-	0.8	-	-
93.3 50.0	0.0	-	-	0.0	-	0.8	-	-	-	0.5	-	-
93.3 55.0	0.0	-	-	0.0	-	0.7	-	-	-	1.9	-	-
93.3 60.0	0.0	-	-	0.0	-	4.6	-	-	-	0.0	-	-
93.3 70.0	1.3	-	-	0.0	-	11.0	-	-	-	0.0	-	-
93.3 80.0	0.6	-	-	0.0	-	-	15.6	-	-	1.8	-	-
93.3 90.0	0.0	-	-	0.0	-	-	0.7	-	-	0.7	-	-
93.3 100.0	1.4	-	-	1.5	-	-	7.0	-	-	0.0	-	-
93.3 110.0	0.0	-	-	0.0	-	-	5.4	-	-	0.0	-	-
93.3 120.0	2.2	-	-	0.0	-	-	0.0	-	-	7.1	-	-

Cheilopogon heterurus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 45.0	0.0	-	-	0.0	-	-	0.7	-	-	0.0	-	-
93.3 40.0	0.0	-	-	0.0	-	1.4	-	-	-	0.0	-	-
93.3 50.0	0.0	-	-	0.0	-	0.8	-	-	-	0.0	-	-

Cheilopogon pinnatibarbatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 28.0	0.0	-	-	0.0	-	-	2.2	-	-	0.0	-	-

Fodiator acutus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 26.7	0.0	-	-	0.0	-	0.0	-	-	-	0.8	-	-

TABLE 4. (cont.)

Hirundichthys marginatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 30.0	0.0	-	-	0.0	-	-	0.0	-	-	0.8	-	-

Melamphaes lugubris

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 110.0	0.0	-	-	0.6	-	-	0.0	-	-	0.0	-	-

Macroramphosus gracilis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 28.0	0.0	-	-	0.0	-	0.0	-	-	-	0.7	-	-

***Sebastes* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	1.4	-	-	0.0	-	-	0.0	-	-	0.0	-	-
76.7 51.0	6.4	-	-	1.2	-	-	0.0	-	-	0.0	-	-
76.7 55.0	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-
76.7 60.0	8.3	-	-	0.0	-	-	0.0	-	-	0.0	-	-
76.7 70.0	0.9	-	-	1.7	-	-	0.0	-	-	0.0	-	-
80.0 51.0	1.4	-	-	0.0	-	-	0.0	-	-	0.0	-	-
80.0 55.0	0.0	-	-	1.4	-	-	0.0	-	-	0.0	-	-
80.0 60.0	5.3	-	-	0.0	-	-	0.0	-	-	0.0	-	-
80.0 70.0	0.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-
80.0 80.0	21.4	-	-	0.0	-	-	0.0	-	-	0.0	-	-
81.8 46.9	2.3	-	-	1.4	-	-	0.0	-	-	0.0	-	-
83.3 40.6	0.0	-	-	0.6	-	-	0.0	-	-	0.0	-	-
83.3 42.0	1.7	-	-	8.2	-	-	0.0	-	-	0.0	-	-
83.3 51.0	4.4	-	-	1.5	-	-	0.0	-	-	0.0	-	-
83.3 55.0	1.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 60.0	2.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-
86.7 33.0	0.0	-	-	3.7	-	-	0.0	-	-	0.0	-	-
86.7 35.0	0.9	-	-	8.3	-	-	0.0	-	-	0.0	-	-
86.7 45.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-
86.7 50.0	0.8	-	-	12.0	-	-	0.0	-	-	0.8	-	-
86.7 55.0	0.0	-	-	1.2	-	-	0.0	-	-	0.0	-	-
86.7 70.0	0.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 30.0	7.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 80.0	0.0	-	-	6.9	-	-	0.0	-	-	0.0	-	-

TABLE 4. (cont.)

***Sebastes* spp.** (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 26.7	0.0	-	-	0.0	-	0.0	-	-	-	0.8	-	-
93.3 40.0	0.0	-	-	0.7	-	0.0	-	-	-	0.0	-	-
93.3 45.0	0.0	-	-	0.7	-	0.0	-	-	-	0.0	-	-
93.3 50.0	0.0	-	-	0.7	-	0.0	-	-	-	0.0	-	-
93.3 55.0	0.0	-	-	1.2	-	0.0	-	-	-	0.0	-	-

Sebastes aurora

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 60.0	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-
76.7 70.0	0.0	-	-	0.6	-	-	0.0	-	-	0.0	-	-
83.3 60.0	1.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 53.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-

Sebastes diploproa

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	0.0	-	-	0.0	-	-	0.9	-	-	0.7	-	-
76.7 55.0	0.0	-	-	0.0	-	-	1.6	-	-	0.0	-	-
76.7 60.0	6.5	-	-	0.0	-	-	0.0	-	-	0.7	-	-
76.7 70.0	0.0	-	-	0.0	-	-	0.9	-	-	0.0	-	-
80.0 80.0	1.4	-	-	0.0	-	-	0.0	-	-	0.0	-	-
86.7 33.0	0.7	-	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 45.0	0.0	-	-	0.0	-	-	0.0	-	-	0.7	-	-
93.3 26.7	0.7	-	-	0.0	-	0.0	-	-	-	0.8	-	-
93.3 40.0	0.6	-	-	0.0	-	0.0	-	-	-	0.0	-	-

Sebastes goodei

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

Sebastes jordani

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 60.0	1.5	-	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 51.0	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 30.0	1.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Anoplopoma fimbria

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

TABLE 4. (cont.)

Oxylebius pictus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 70.0	1.6	-	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 42.0	0.0	-	-	0.6	-	-	0.0	-	-	0.0	-	-
83.3 90.0	0.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Hexagrammos decagrammus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 60.0	1.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-
81.8 46.9	0.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Ophiodon elongatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
81.8 46.9	0.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Scorpaenichthys marmoratus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	0.8	-	-	0.6	-	-	0.0	-	-	0.7	-	-
76.7 55.0	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-
76.7 60.0	51.7	-	-	0.0	-	-	0.0	-	-	0.0	-	-
76.7 70.0	1.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-
80.0 51.0	12.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
80.0 70.0	0.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-
81.8 46.9	3.0	-	-	2.1	-	-	0.0	-	-	0.0	-	-
83.3 42.0	1.7	-	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 51.0	15.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 60.0	39.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-
86.7 33.0	0.7	-	-	0.0	-	-	0.0	-	-	0.0	-	-
86.7 35.0	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 28.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-
90.0 45.0	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-
90.0 60.0	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-

***Paralabrax* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	0.0	-	-	0.0	-	-	1.8	-	-	0.0	-	-

TABLE 4. (cont.)

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	-	-	-	0.8	-	-

Trachurus symmetricus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 60.0	0.0	-	-	1.3	-	-	0.0	-	-	0.0	-	-
76.7 80.0	0.0	-	-	0.0	-	-	0.9	-	-	0.0	-	-
80.0 90.0	0.0	-	-	3.3	-	-	0.0	-	-	0.0	-	-
83.3 60.0	0.0	-	-	1.3	-	-	0.0	-	-	0.0	-	-
83.3 70.0	0.0	-	-	1.2	-	-	0.0	-	-	0.0	-	-
83.3 100.0	0.0	-	-	0.0	-	-	0.8	-	-	0.0	-	-
86.7 70.0	0.0	-	-	2.0	-	-	0.0	-	-	0.0	-	-
86.7 90.0	0.0	-	-	3.1	-	-	0.8	-	-	0.0	-	-
86.7 100.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-
90.0 53.0	0.0	-	-	1.4	-	-	0.0	-	-	0.0	-	-
90.0 60.0	0.0	-	-	0.0	-	-	0.0	-	-	0.7	-	-
90.0 80.0	0.0	-	-	5.3	-	-	0.0	-	-	0.0	-	-
90.0 110.0	0.0	-	-	0.7	-	-	0.7	-	-	0.0	-	-
93.3 35.0	0.0	-	-	0.0	-	0.0	-	-	-	0.8	-	-
93.3 60.0	0.0	-	-	0.7	-	0.0	-	-	-	0.0	-	-
93.3 90.0	0.0	-	-	1.1	-	-	0.0	-	-	0.0	-	-

Medialuna californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 80.0	0.0	-	-	0.0	-	-	0.7	-	-	-	-	-
90.0 28.0	0.0	-	-	0.0	-	-	2.2	-	-	0.0	-	-
90.0 35.0	0.0	-	-	0.0	-	-	0.0	-	-	0.7	-	-
93.3 26.7	0.0	-	-	0.0	-	0.0	-	-	-	4.2	-	-

Chromis punctipinnis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	0.0	-	-	0.0	-	-	5.4	-	-	0.0	-	-
86.7 33.0	0.0	-	-	0.0	-	-	1.5	-	-	0.0	-	-
86.7 40.0	0.0	-	-	0.0	-	-	1.4	-	-	0.0	-	-

TABLE 4. (cont.)

Oxyjulis californica

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	0.0	-	-	0.0	-	-	0.0	-	-	0.5	-	-
80.0 60.0	0.0	-	-	0.0	-	-	0.0	-	-	0.8	-	-
83.3 40.6	0.0	-	-	1.3	-	-	0.0	-	-	0.0	-	-
83.3 42.0	0.0	-	-	0.6	-	-	0.0	-	-	0.0	-	-
86.7 50.0	0.0	-	-	0.6	-	-	0.0	-	-	0.0	-	-
90.0 30.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-

Neoclinus blanchardi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-
86.7 50.0	0.0	-	-	0.6	-	-	0.0	-	-	0.0	-	-

Hypsoblennius gentilis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	0.7	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Hypsoblennius gilberti

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 60.0	0.0	-	-	0.0	-	-	0.8	-	-	0.0	-	-
81.8 46.9	0.0	-	-	0.0	-	-	0.0	-	-	1.4	-	-
83.3 40.6	0.0	-	-	0.0	-	-	0.0	-	-	0.7	-	-
83.3 42.0	0.0	-	-	0.0	-	-	0.0	-	-	0.7	-	-
86.7 33.0	0.7	-	-	0.0	-	-	0.8	-	-	0.0	-	-
86.7 35.0	0.0	-	-	0.0	-	-	0.0	-	-	0.8	-	-
86.7 40.0	0.0	-	-	0.0	-	-	3.5	-	-	0.8	-	-
90.0 30.0	0.0	-	-	0.0	-	-	0.0	-	-	0.8	-	-

Hypsoblennius jenkinsi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
81.8 46.9	0.8	-	-	0.0	-	-	0.0	-	-	0.0	-	-
83.3 42.0	0.0	-	-	0.0	-	-	6.4	-	-	0.0	-	-
86.7 33.0	0.0	-	-	0.0	-	-	1.5	-	-	5.0	-	-
86.7 35.0	0.0	-	-	0.0	-	-	0.0	-	-	1.5	-	-
86.7 45.0	0.0	-	-	0.0	-	-	0.6	-	-	0.0	-	-
90.0 28.0	0.0	-	-	1.4	-	-	2.2	-	-	0.0	-	-
90.0 30.0	0.0	-	-	0.0	-	-	0.8	-	-	0.8	-	-

TABLE 4. (cont.)

Hypsoblennius jenkinsi (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 35.0	0.0	-	-	0.0	-	-	0.0	-	-	0.7	-	-
93.3 26.7	0.0	-	-	0.0	-	3.5	-	-	-	0.8	-	-
93.3 30.0	0.0	-	-	0.0	-	0.9	-	-	-	0.0	-	-

Icosteus aenigmaticus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 60.0	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Coryphopterus nicholsii

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 50.0	0.0	-	-	0.6	-	-	0.0	-	-	0.0	-	-

Lepidogobius lepidus

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

Sphyraena argentea

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 26.7	0.0	-	-	0.0	-	0.0	-	-	-	2.5	-	-

Scomber japonicus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	0.0	-	-	0.0	-	-	0.8	-	-	0.0	-	-
86.7 35.0	0.0	-	-	0.0	-	-	0.8	-	-	0.0	-	-
93.3 26.7	0.0	-	-	0.0	-	2.6	-	-	-	0.0	-	-

Icichthys lockingtoni

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 100.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-
83.3 80.0	1.6	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Tetragonurus cuvieri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 90.0	0.0	-	-	0.0	-	-	0.0	-	-	0.6	-	-
80.0 100.0	0.0	-	-	0.0	-	-	0.0	-	-	1.3	-	-
86.7 90.0	0.0	-	-	0.0	-	-	0.0	-	-	0.7	-	-

TABLE 4. (cont.)

Tetragonurus cuvieri (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 110.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-
93.3 90.0	0.0	-	-	0.6	-	-	0.0	-	-	0.0	-	-

Citharichthys sordidus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 55.0	0.0	-	-	0.0	-	-	0.0	-	-	0.6	-	-
83.3 42.0	0.0	-	-	0.0	-	-	0.0	-	-	0.7	-	-

Citharichthys stigmaeus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 60.0	0.0	-	-	0.0	-	-	0.0	-	-	0.7	-	-
76.7 70.0	0.0	-	-	0.0	-	-	0.0	-	-	0.5	-	-
83.3 60.0	0.0	-	-	0.0	-	-	0.0	-	-	0.8	-	-
93.3 40.0	0.0	-	-	0.7	-	0.0	-	-	-	0.0	-	-

Paralichthys californicus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 28.0	0.0	-	-	1.4	-	-	0.0	-	-	0.0	-	-

Parophrys vetulus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 35.0	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-

Pleuronichthys coenosus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	0.0	-	-	1.9	-	-	0.0	-	-	0.7	-	-

Pleuronichthys decurrens

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 60.0	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-	-

Pleuronichthys verticalis

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

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