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ICHTHYOPLANKTON AND STATION DATA FOR MANTA (SURFACE) TOWS TAKEN ON CALIFORNIA COOPERATIVE OCEANIC FISHERIES INVESTIGATIONS SURVEY CRUISES IN 1977 AND 1978

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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 1977-78. It is the first report in a series that presents surface tow data for all biological-oceanographic CalCOFI surveys from 1977 to the present. A total of 1241 stations was occupied during seven monthly multi-vessel cruises over the survey area which extended from Pt. Reyes, California to Punta San Juanico, Baja California Sur, Mexico, and seaward to several hundred miles. A total of 490 Manta net tows was taken during 1977-78. 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 89 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 first 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 1977-78. 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, 2001 for summaries of historical CalCOFI sampling effort). Neuston[1] sampling was initiated in 1977-78, with Manta net (Figure 1) tows taken on ~ 40 % of the survey stations. Station and ichthyoplankton data for oblique tows taken on the 1977-78 CalCOFI survey are published in Sandknop et al. (1988). 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

[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).

northeastern Pacific. Hydrographic and biological data from the 1977-78 CalCOFI survey were published by Scripps Institution of Oceanography (Univ. of Calif., SIO 1982, 1986).

All available records for Manta tows on the 1977-78 CalCOFI survey 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.

SAMPLING AREA AND PATTERN

The 1977-78 CalCOFI survey consisted of a cruise (7712) in November–December 1977 and six cruises in 1978. A total of 490 Manta net tows was taken on the 1241 CalCOFI net tow stations occupied on the survey (Table 1; Figures 2–10). Manta net tows were not taken on every survey station because this was the first year that Manta nets were employed on CalCOFI cruises and surface tows were not yet part of the standard station protocol. Two vessels were employed on the survey, the NOAA vessel RV *David Starr Jordan* and the RV *Alejandro de Humboldt* from Instituto Nacional de Pesca, the Mexican National Fisheries Agency. Dates and numbers of stations sampled with the Manta net in 1977-78 (Figures 2–9) are summarized below:

7712, RV *David Starr Jordan*, 4 stations, 9–16 December 1977 and
RV *Alejandro de Humboldt*, 2 stations, 29–30 November 1977;

7801, RV *David Starr Jordan*, 5 stations, 17–27 January 1978 and
RV *Alejandro de Humboldt*, 16 stations, 8–28 January 1978;

7803, RV *David Starr Jordan*, 6 stations, 25 February–6 March 1978 and
RV *Alejandro de Humboldt*, 14 stations, 18 February–11 March 1978;

7804, RV *David Starr Jordan*, 93 stations, 29 March–25 April 1978 and
RV *Alejandro de Humboldt*, 9 stations, 4–6 April 1978;

7805, RV *David Starr Jordan*, 93 stations, 14 May–10 June 1978;

7807, RV *David Starr Jordan*, 59 stations, 21 June–14 July 1978 and
RV *Alejandro de Humboldt*, 41 stations, 22 June–17 July 1978;

7808, RV *David Starr Jordan*, 80 stations, 31 July–25 August 1978 and
RV *Alejandro de Humboldt*, 68 stations, 1–25 August 1978.

Coverage of the CalCOFI survey area varied among cruises and the entire survey area was not covered on any single cruise (Figures 2–9). Stations off central California (lines 60.0–76.7) were occupied on all cruises except cruise 7712. The area between Point Conception, California and Punta San Juanico, Baja California Sur, Mexico (lines 80.0–136.7) was surveyed on 7801, 7803, 7807, and 7808. On cruises 7712, 7804, and 7805 coverage did not extend south of line 113.3, off Punta Canoa, Baja California. Coverage extended seaward to station 200 (approximately 700 n. mi. offshore) on lines 90.0 and 93.3 (cruises 7804, 7807) and to station 180.0 on these lines on cruise 7808 but typically did not extend beyond station 90.0 (approximately 160–260 n. mi. offshore).

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. In 1977-78 tow duration was 3 minutes; in subsequent survey years the towing time for each tow was 15 min. 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 following ichthyoplankton experts: David Ambrose, Morgan Busby, Susan D'Vincent, Barbara MacCall, Elaine Sandknop, and Elizabeth Stevens. 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 89 larval fish categories (including the unidentified category) was identified: 69 to species, 14 to genus, and 5 to family.

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

Ceratoscopelus townsendi – *Ceratoscopelus* larvae in the CalCOFI sampling region are *C. townsendi*, a species associated with the California Current; at the western margin of the California Current (approx. westward of station 200), *C. townsendi* is replaced by the tropical-subtropical cosmopolite, *C. warmingii* (Wisner 1976; Butler et al. 1997); larvae of the two species are not distinguishable.

Citharichthys spp . – if specimen condition permitted, all larvae of this genus from Manta tows in 1977-78 were identified to species; *Citharichthys* larvae taken in oblique tows during the 1977-78 survey (Sandknop et al. 1988) were not identified to species, except for specimens of *C. stigmaeus* > ~ 4.5 mm length.

Cyclothone spp. - small or damaged larvae, almost entirely *C. acclinidens* and/or *C. pseudopallida* lacking diagnostic characters.

Diaphus spp. - *Diaphus theta* is the dominant *Diaphus* species in the survey area and most larvae taken seaward to the California Current are this species; the generic category is used because a small proportion of the *Diaphus* larvae captured at the outer margin of the California Current may represent other species whose larvae are not separable from those of *D. theta*; the proportion of *Diaphus* larvae representing species other than *D. theta* becomes larger with increasing distance westward from the core of the California Current (see Berry and Perkins 1966, Wisner 1976, and Butler et al. 1997 for distributional information on *Diaphus* species in the CalCOFI region).

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).

Nannobrachium – see comment for *Lampanyctus*.

Unidentified fish larvae - larvae that were generally in good condition but could not be identified because of their small size or early stage of development.

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; *Vinciguerria* larvae from stations seaward (e.g., station 93.140 on cruise 7807) of the present sampling pattern probably are *V. poweriae*.

SPECIES SUMMARY

Of the five most abundant larvae, northern anchovy (*Engraulis mordax*) ranked first in abundance with 36.6% of the total fish larvae and ranked second in occurrence with larvae collected in 16.7% of the

total samples (Tables 2 and 3). They were almost twice as abundant as the second most abundant species, California grunion (*Leuresthes tenuis*), which had 19.3% of the total larvae and ranked seventh in occurrence (3.9% of the total samples). Pacific saury (*Cololabis saira*) was the third most abundant taxon with 13.7% of the total larvae and ranked first in frequency of occurrence (23.9% of the samples). Pacific mackerel *Scomber japonicus* ranked fourth in abundance (4.9% of total larvae) and fifth in total occurrences (6.3% of the samples). The mussel blenny *Hypsoblennius jenkinsi* ranked fifth in abundance (3.8% of total larvae) and sixth in total occurrences (4.9% of the samples). The next five most abundant taxa were the rockfish genus *Sebastes* (3.5% of total larvae), jack mackerel *Trachurus symmetricus* (2.6%), unidentified specimens of the blenny genus *Hypsoblennius* (2.3%), rockpool blenny *Hypsoblennius gilberti* (1.1%), and cabezon *Scorpaenichthys marmoratus* (1.1%). These species ranked 4th, 3rd, tied for 8th, tied for 12th, and tied for 17th in frequency of occurrence, respectively. The ten most abundant taxa comprised 88.9% of all the larvae collected in Manta net tows on CalCOFI cruises in 1977-78. The remaining 11.1% was distributed among 79 other taxa (including the unidentified category). Of the ten most abundant taxa, half were coastal demersal species, four were coastal pelagic taxa, and one was epipelagic.

In comparison with the surface samples, about twice as many taxa were collected in the oblique tows but, like the former, larval northern anchovy also dominated the oblique tows, accounting for nearly half of the total larvae (Sandknop et al. 1988). Other than northern anchovy, of the ten most abundant taxa in oblique samples, only the rockfish genus *Sebastes* (4th in oblique and 6th in Manta tows) ranked among the ten most abundant taxa in Manta tows. The 2nd, 3rd, 5th, 7th, and 8th ranked taxa (*Vinciguerria lucetia*, *Merluccius productus*, Sciaenidae, *Triphoturus mexicanus*, and *Stenobrachius leucopsarus*) ranked 16th, 26th, 18th, and tied for 32nd in Manta tows, respectively. Three species of bathylagid smelts (*Leuroglossus stilbius*, *Bathylagus ochotensis*, and *B. wesethi*) ranked 6th, 9th, and 10th in oblique tows but were not present in Manta tows. Other than northern anchovy and *Sebastes*, most high ranking taxa in the Manta tow collections were rare in oblique tows. California grunion and Pacific saury ranked 2nd and 3rd in Manta tows but ranked about 102nd in oblique tows. Likewise, Pacific and jack mackerel ranked 4th and 7th in Manta tows but only 20th and 16th in oblique tows. The cabezon *Scorpaenichthys marmoratus* ranked 10th in Manta tows but 124th in oblique tows. Three blenny taxa ranked 5th, 8th, and 9th in Manta tows but ranked only 44th, in aggregate, in oblique tows.

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 1977-78 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 VA (*Alejandro de Humboldt*). 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 3–9). 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 *Alejandro de Humboldt* during the 1977-78 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 *Alejandro de Humboldt* during the 1977-78 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 *Alejandro de Humboldt* during the 1977-78 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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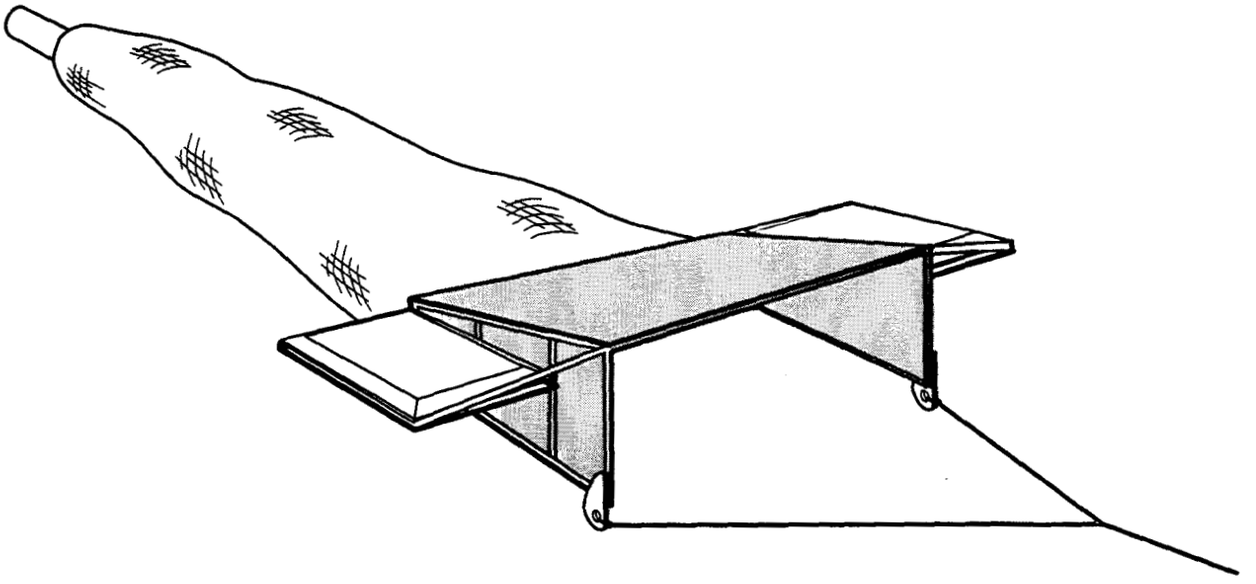

Figure 1. Diagram of the Manta net used on CalCOFI surveys.

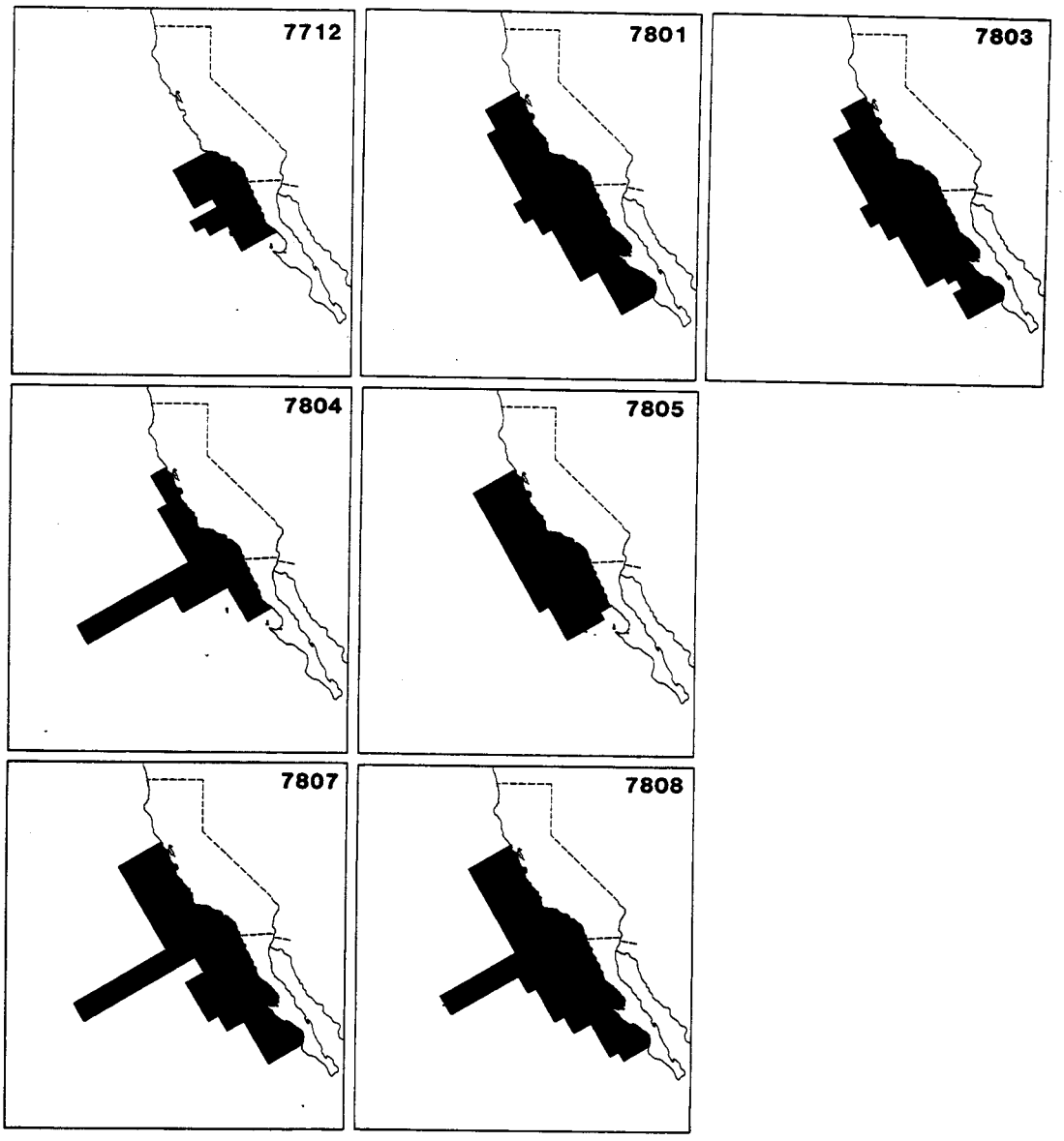

Figure 2. Composite arrangement of diagrammatic charts showing areas sampled on each CalCOFI cruise during 1977-78.

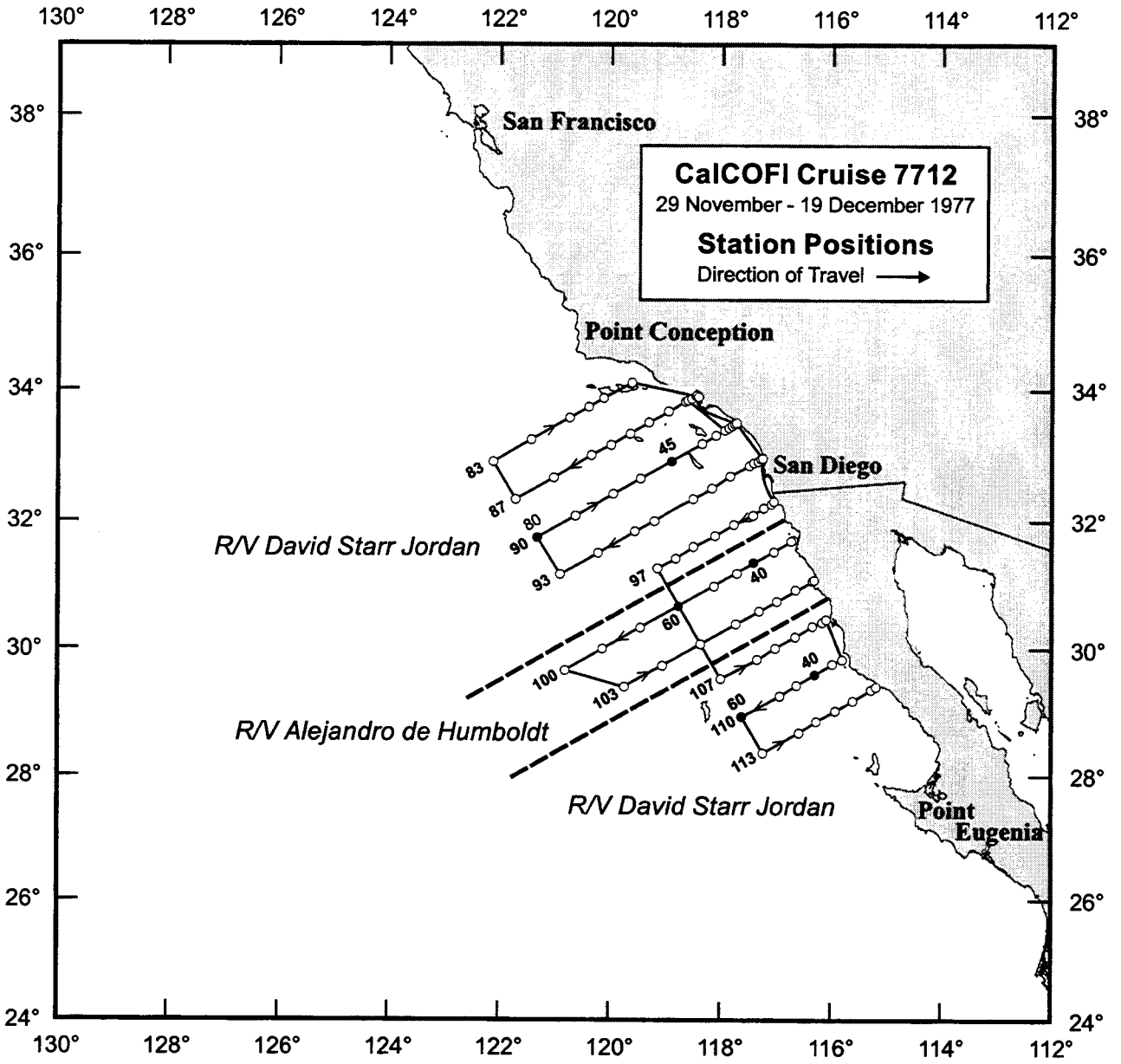

Figure 3. Station pattern and cruise tracks for CalCOFI Cruise 7712. Dots indicate stations where Manta and oblique tows were taken; open circles indicate stations where only oblique tows were taken.

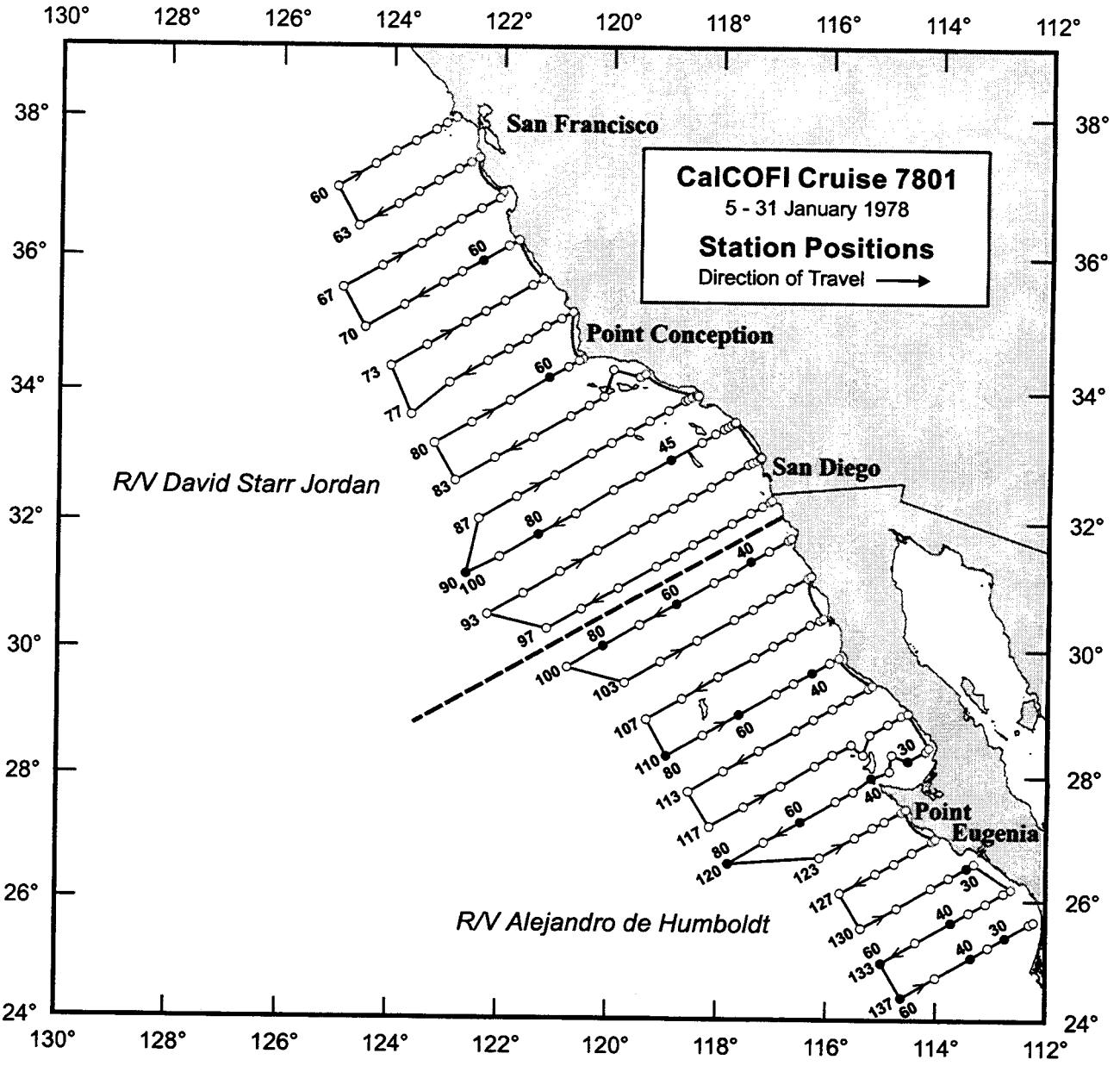

Figure 4. Station pattern and cruise tracks for CalCOFI Cruise 7801. Symbols as in Figure 3.

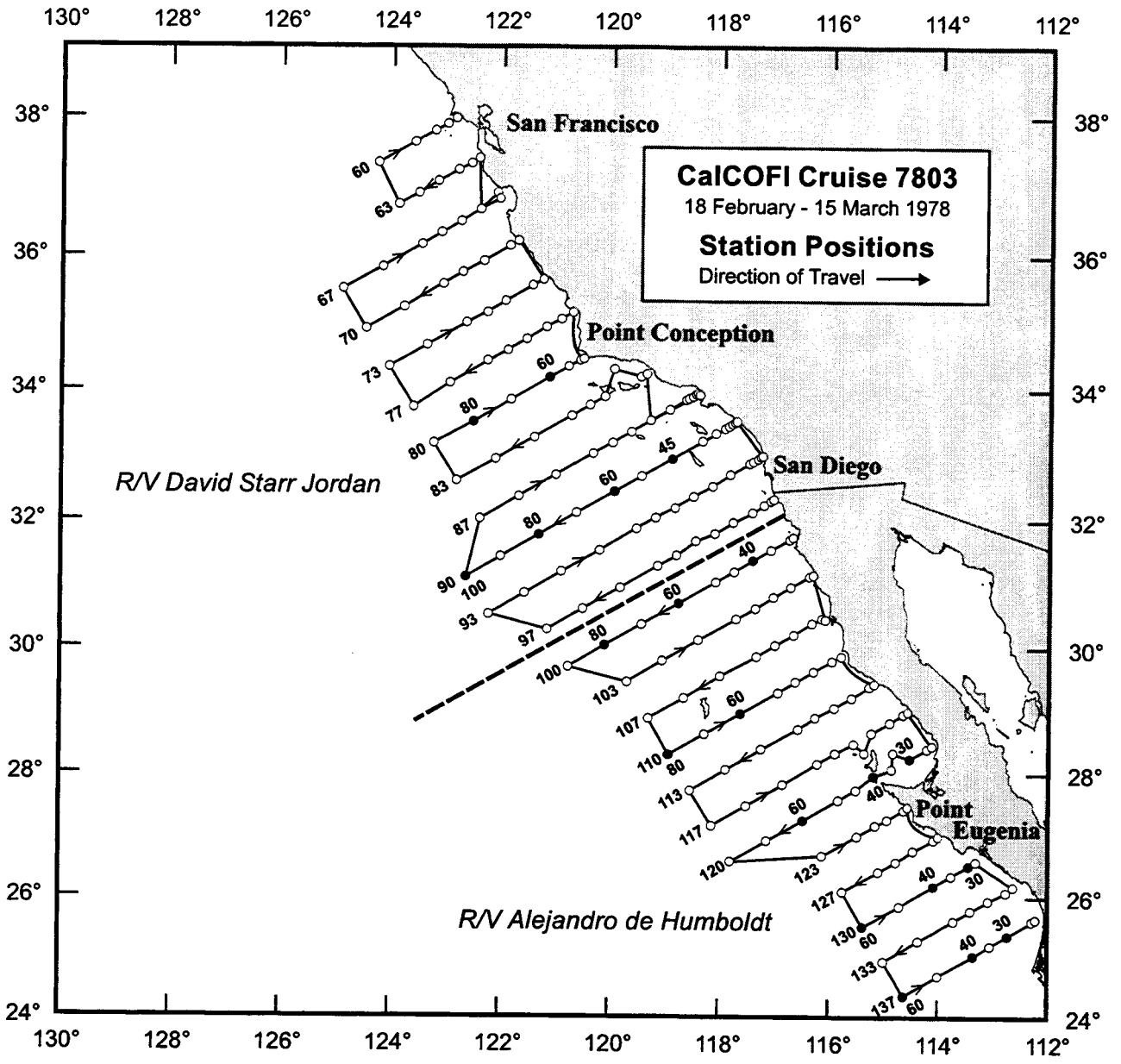

Figure 5. Station pattern and cruise tracks for CalCOFI Cruise 7803. Symbols as in Figure 3.

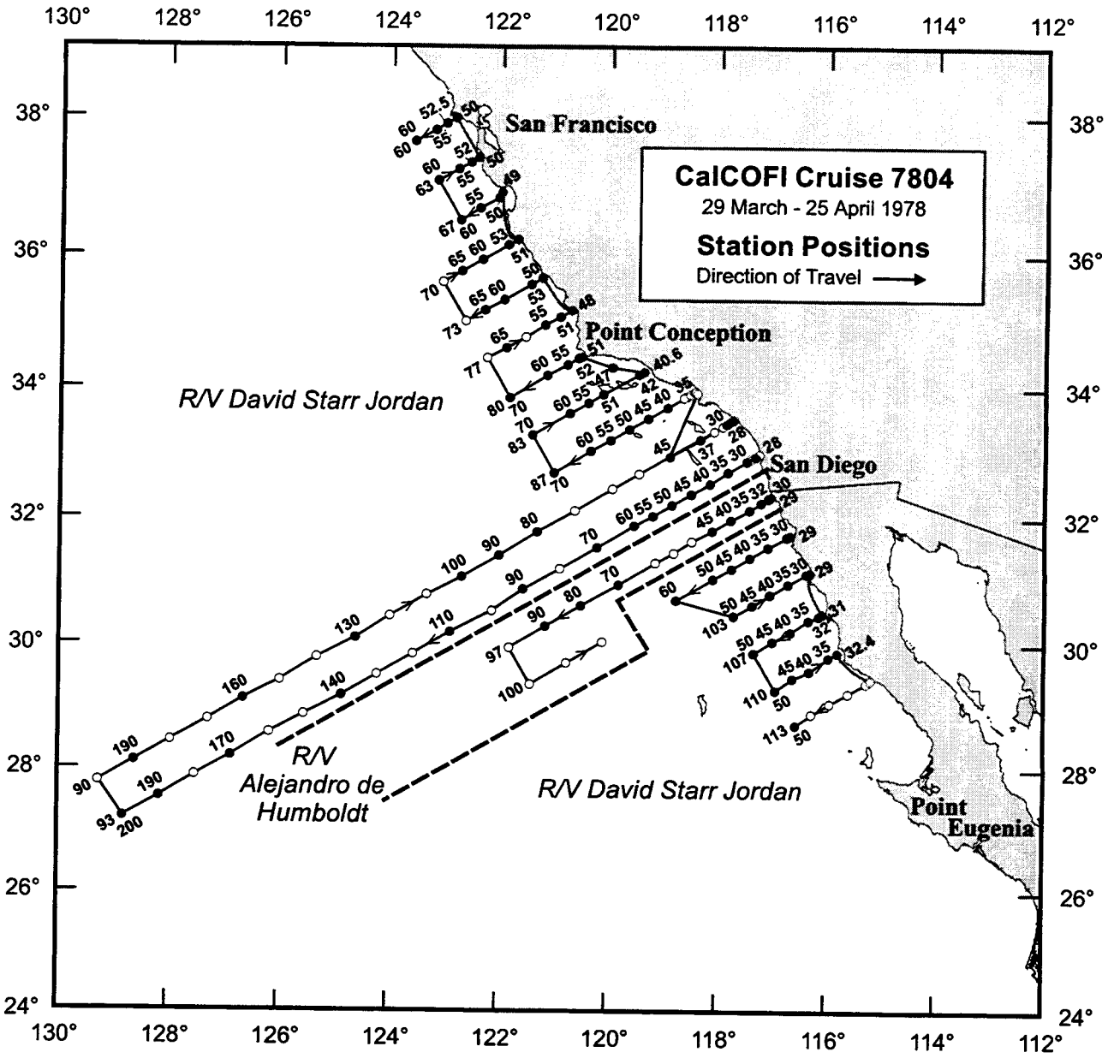

Figure 6. Station pattern and cruise tracks for CalCOFI Cruise 7804. Symbols as in Figure 3.

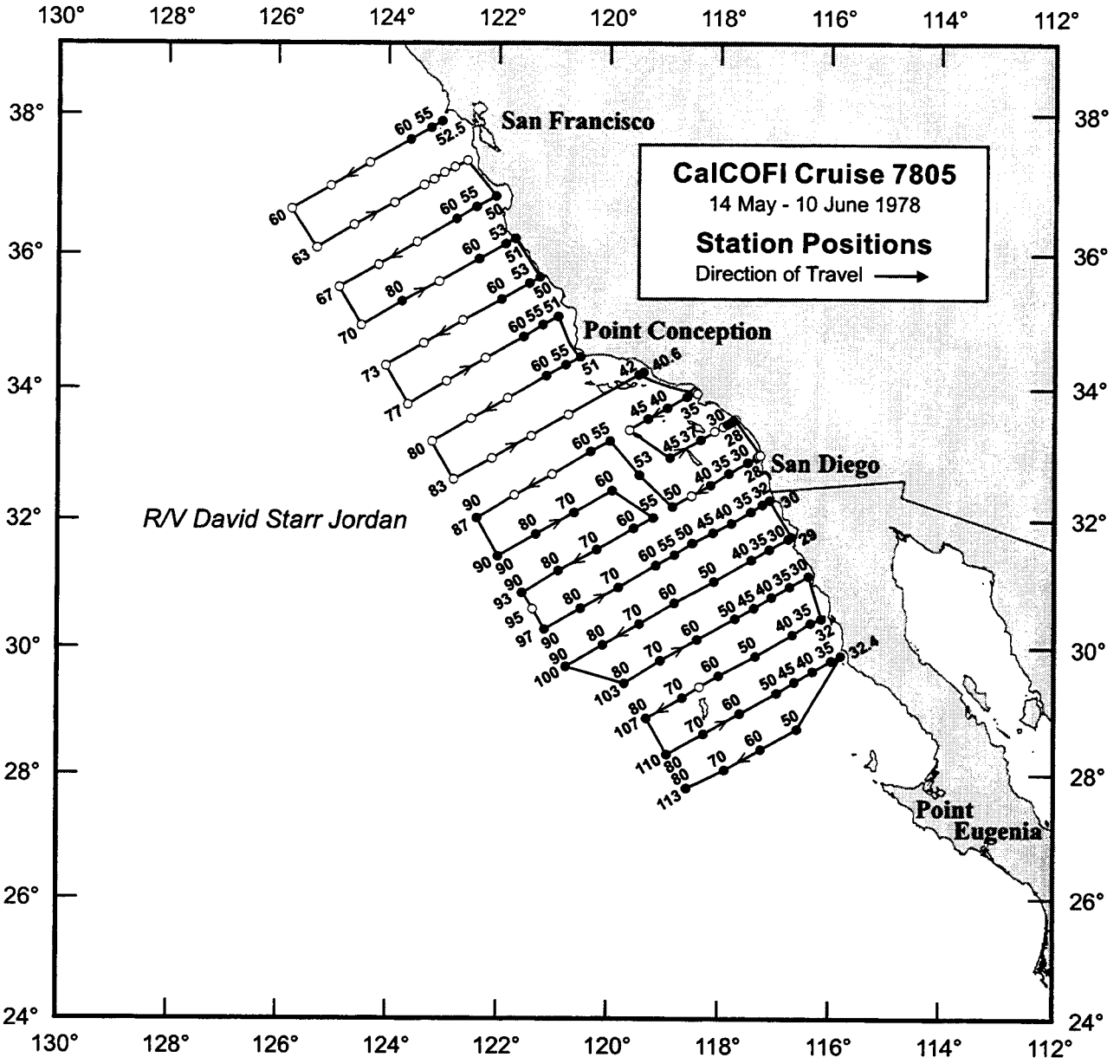

Figure 7. Station pattern and cruise tracks for CalCOFI Cruise 7805. Symbols as in Figure 3.

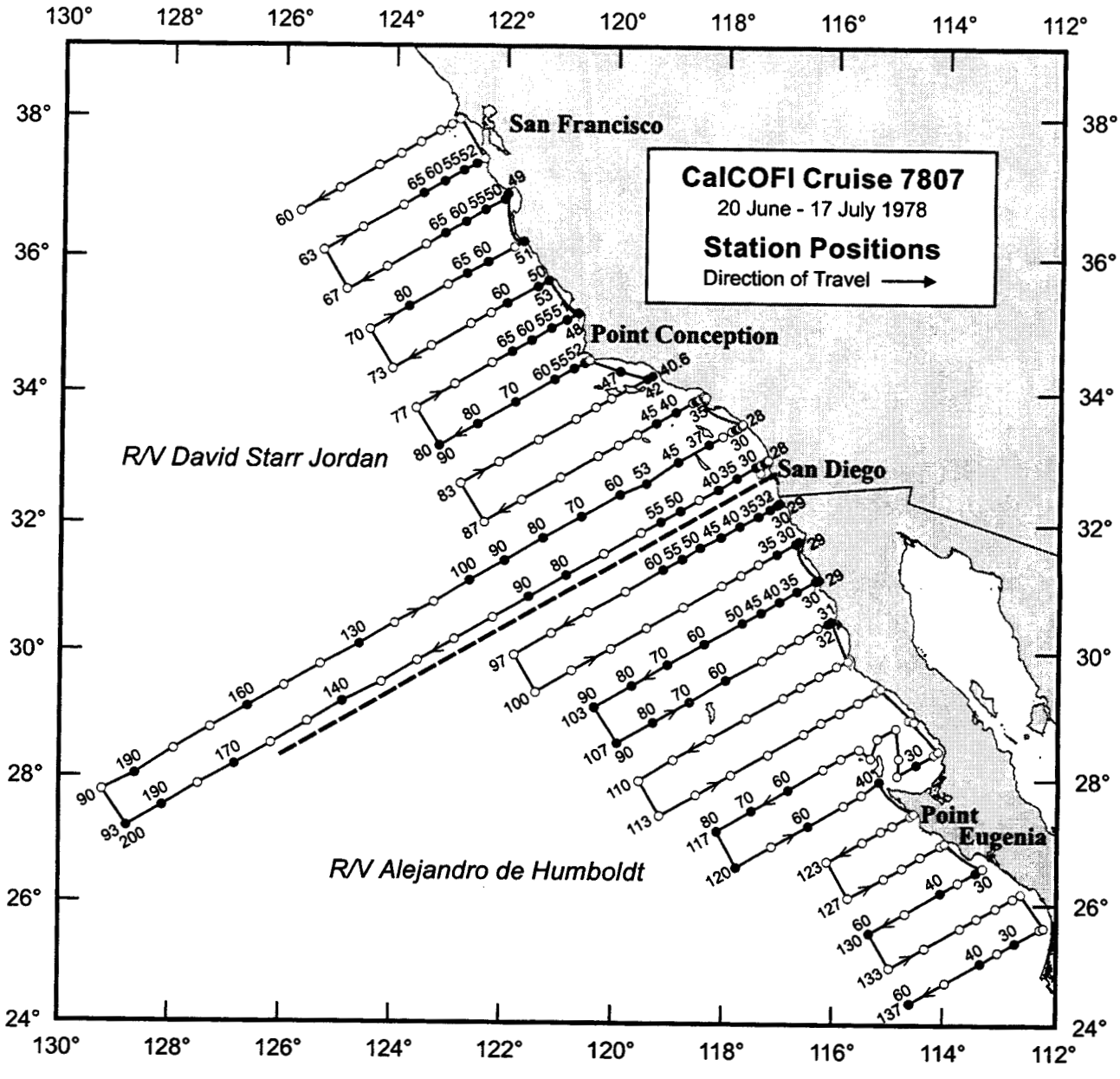

Figure 8. Station pattern and cruise tracks for CalCOFI Cruise 7807. Symbols as in Figure 3.

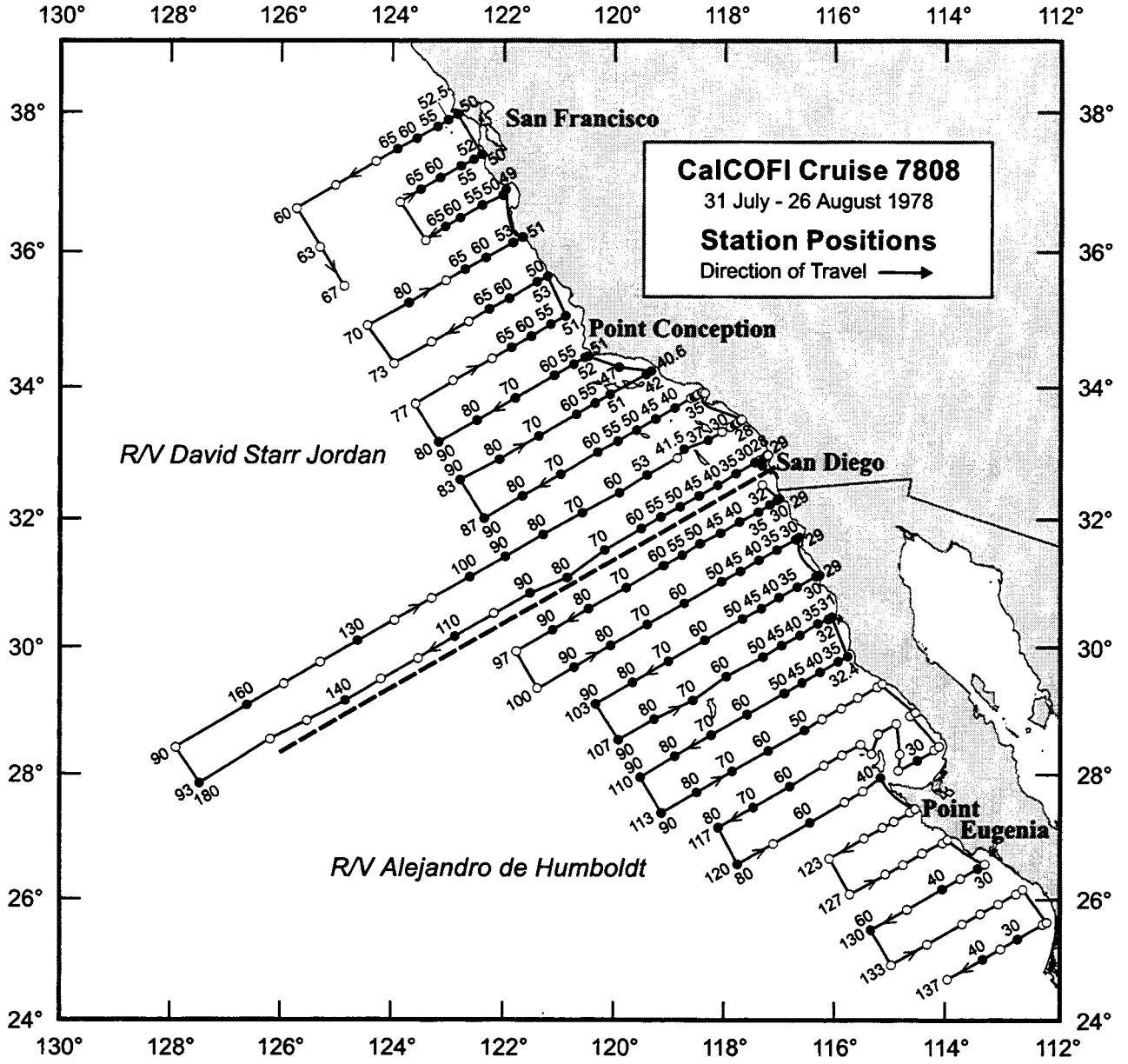

Figure 9. Station pattern and cruise tracks for CalCOFI Cruise 7808. Symbols as in Figure 3.

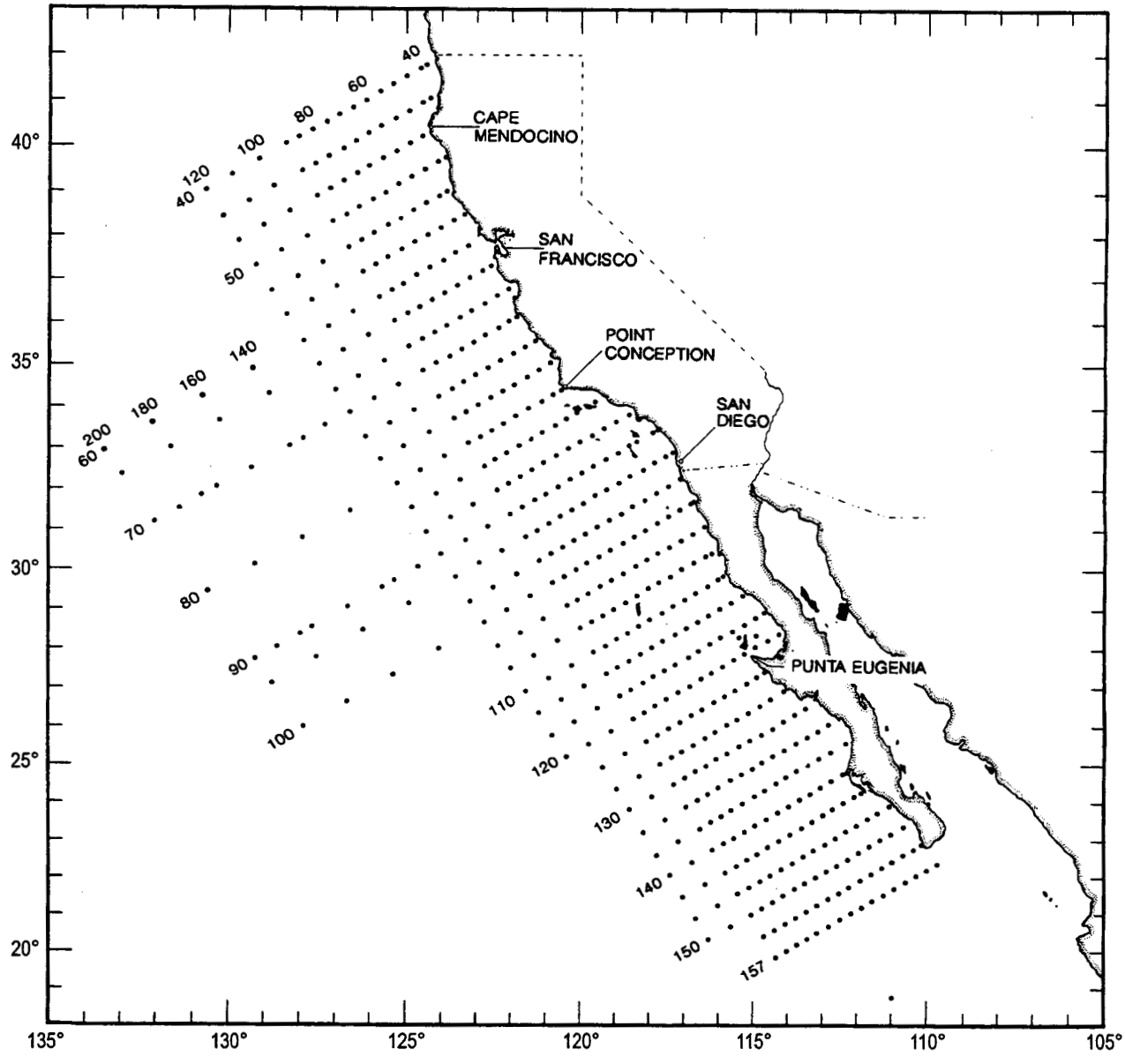

Figure 10. The basic station pattern for CalCOFI cruises from 1950 to 1984.

TABLE 1. Station and plankton tow data for Manta tows taken on the 1977-78 CalCOFI survey. Numbers of fish eggs and larvae are raw counts, unadjusted for volume (cubic meters) of water filtered.

CalCOFI Cruise 7712

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	45.0	32	54.5	118	55.5	JD	77	12	16	0725	23	41	77
90.0	80.0	31	44.5	121	19.5	JD	77	12	15	0940	22	1	0
100.0	40.0	31	21.1	117	26.9	VA	77	11	29	1430	32	2	5
100.0	60.0	30	40.5	118	47.5	VA	77	11	30	0319	29	0	15
110.0	40.0	29	36.5	116	19.6	JD	77	12	10	0340	14	0	0
110.0	60.0	28	56.4	117	39.0	JD	77	12	09	1600	10	0	6

CalCOFI Cruise 7801

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
70.0	60.0	35	53.0	122	22.5	JD	78	01	27	1500	14	0	9
80.0	60.0	34	08.9	121	08.8	JD	78	01	24	0625	9	0	0
90.0	45.0	32	54.5	118	55.0	JD	78	01	17	1150	21	4	156
90.0	80.0	31	45.0	121	19.0	JD	78	01	18	1010	25	0	3
90.0	100.0	31	08.5	122	37.0	JD	78	01	18	2245	30	1	4
100.0	40.0	31	21.0	117	26.9	VA	78	01	08	0500	10	1	0
100.0	60.0	30	40.4	118	47.5	VA	78	01	08	1715	17	0	3
100.0	80.0	30	01.0	120	07.0	VA	78	01	09	0605	13	0	11
110.0	40.0	29	36.5	116	19.4	VA	78	01	14	0805	32	2	3
110.0	60.0	28	56.4	117	38.9	VA	78	01	13	1930	25	0	2
110.0	80.0	28	16.5	118	57.5	VA	78	01	13	0730	13	3	9
120.0	30.0	28	13.0	114	34.0	VA	78	01	21	2115	38	5	10
120.0	40.0	27	56.5	115	14.0	VA	78	01	22	0605	30	54	216
120.0	60.0	27	13.0	116	30.5	VA	78	01	22	1810	21	0	2
120.0	80.0	26	32.4	117	49.0	VA	78	01	23	0545	30	2	0
130.0	30.0	26	29.0	113	29.0	VA	78	01	26	0930	43	103	889
133.0	40.0	25	34.5	113	45.5	VA	78	01	27	0255	36	1	7
133.0	60.0	24	54.5	115	02.0	VA	78	01	27	1445	37	0	4
137.0	30.0	25	20.0	112	46.0	VA	78	01	28	1615	32	0	655
137.0	40.0	25	00.0	113	23.6	VA	78	01	28	0820	41	0	3
137.0	60.0	24	20.0	114	39.5	VA	78	01	27	2045	42	0	409

CalCOFI Cruise 7803

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	09.0	121	09.0	JD	78	03	06	0239	17	8	4
80.0	80.0	33	28.7	122	32.0	JD	78	03	05	1440	17	0	10
90.0	45.0	32	54.5	118	55.5	JD	78	02	25	1630	21	0	141
90.0	60.0	32	25.0	119	57.5	JD	78	02	26	0413	25	62	3
90.0	80.0	31	44.5	121	19.5	JD	78	02	26	1615	16	0	0
90.0	100.0	31	05.0	122	39.0	JD	78	02	27	0410	19	0	0
100.0	40.0	31	21.0	117	27.0	VA	78	02	18	1730	34	1	5
100.0	60.0	30	40.5	118	47.5	VA	78	02	19	0535	28	0	4
100.0	80.0	30	01.0	120	07.0	VA	78	02	19	1805	35	7	0
110.0	60.0	28	56.5	117	39.0	VA	78	02	23	1625	29	1	0

TABLE 1. (cont.) CalCOFI Cruise 7803 (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
110.0	80.0	28	16.5	118	57.5	VA	78	02	23	0535	37	1	3
120.0	30.0	28	13.0	114	34.0	VA	78	03	04	1840	39	0	471
120.0	40.0	27	56.5	115	14.0	VA	78	03	05	0320	57	28	1388
120.0	60.0	27	13.0	116	30.5	VA	78	03	05	1700	35	3	18
130.0	30.0	26	29.0	113	29.0	VA	78	03	09	1010	53	0	4297
130.0	40.0	26	09.0	114	07.0	VA	78	03	09	0415	37	0	355
130.0	60.0	25	29.0	115	24.5	VA	78	03	08	1520	42	0	21
137.0	30.0	25	20.0	112	46.0	VA	78	03	11	1605	36	0	3
137.0	40.0	25	00.0	113	23.5	VA	78	03	11	1000	40	1	19
137.0	60.0	24	20.0	114	39.5	VA	78	03	10	2140	39	2	25

CalCOFI Cruise 7804

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
60.0	50.0	37	57.5	122	53.1	JD	78	04	19	0700	28	13	338
60.0	52.5	37	52.5	123	03.5	JD	78	04	19	0850	20	21	511
60.0	55.0	37	47.0	123	15.0	JD	78	04	19	1115	21	1	2
60.0	60.0	37	37.0	123	37.0	JD	78	04	19	1450	20	0	2
63.0	50.0	37	23.3	122	27.8	JD	78	04	19	0255	27	174	110
63.0	52.0	37	19.0	122	36.0	JD	78	04	19	0135	26	27	1583
63.0	55.0	37	13.0	122	50.0	JD	78	04	18	2255	26	10	3
63.0	60.0	37	03.0	123	12.0	JD	78	04	18	1810	24	0	9
66.0	49.0	36	53.0	122	01.7	JD	78	04	18	0130	23	14	13
67.0	50.0	36	48.0	122	05.0	JD	78	04	18	0325	21	16	6
67.0	55.0	36	39.0	122	26.0	JD	78	04	18	0715	24	0	5
67.0	60.0	36	28.0	122	47.0	JD	78	04	18	1130	19	1	15
70.0	51.0	36	11.3	121	43.9	JD	78	04	17	2000	24	5	2
70.0	53.0	36	06.5	121	54.0	JD	78	04	17	1805	23	2	2
70.0	60.0	35	53.0	122	22.5	JD	78	04	17	1215	17	0	3
70.0	65.0	35	43.0	122	45.0	JD	78	04	17	0810	28	3	48
73.0	50.0	35	37.0	121	17.0	JD	78	04	16	0745	25	0	31
73.0	53.0	35	31.4	121	28.6	JD	78	04	16	1053	25	5	6
73.0	60.0	35	17.5	121	57.9	JD	78	04	16	1545	15	0	22
73.0	65.0	35	08.0	122	19.0	JD	78	04	16	1845	29	9	4
77.0	48.0	35	08.3	120	43.7	JD	78	04	16	0315	14	6	104
77.0	51.0	35	02.0	120	56.5	JD	78	04	16	0110	24	71	2
77.0	55.0	34	54.5	121	13.0	JD	78	04	15	2105	22	4	1
77.0	65.0	34	34.0	121	55.0	JD	78	04	15	1135	19	0	6
80.0	51.0	34	26.0	120	32.6	JD	78	04	14	0930	25	0	1
80.0	52.0	34	24.8	120	36.0	JD	78	04	14	1110	29	4	1
80.0	55.0	34	19.0	120	48.0	JD	78	04	14	1455	18	4	6
80.0	60.0	34	09.0	121	10.0	JD	78	04	14	1940	26	22	87
80.0	70.0	33	48.5	121	51.0	JD	78	04	15	0225	18	1	21
82.0	47.0	34	16.5	119	59.0	JD	78	04	14	0555	34	4	0
83.0	40.6	34	12.5	119	24.2	JD	78	04	13	1105	22	0	203
83.0	42.0	34	10.0	119	29.5	JD	78	04	13	0929	23	1	452
83.0	51.0	33	52.0	120	08.5	JD	78	04	13	0350	21	15	0
83.0	55.0	33	44.0	120	24.5	JD	78	04	13	0040	22	31	64

TABLE 1. (cont.) CalCOFI Cruise 7804 (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
83.0	60.0	33	34.3	120	45.0	JD	78	04	12	2035	27	1	19
83.0	70.0	33	14.5	121	26.0	JD	78	04	12	1330	19	1	6
87.0	35.0	33	50.0	118	37.8	JD	78	04	10	0515	28	0	0
87.0	40.0	33	40.0	118	58.0	JD	78	04	11	0045	19	0	51
87.0	45.0	33	30.0	119	19.0	JD	78	04	11	0535	27	0	6
87.0	50.0	33	20.0	119	39.5	JD	78	04	11	0905	22	7	58
87.0	55.0	33	10.0	120	00.0	JD	78	04	11	1305	19	0	22
87.0	60.0	33	00.0	120	21.5	JD	78	04	11	2325	38	2	63
87.0	70.0	32	39.6	121	02.0	JD	78	04	12	0640	32	3	61
90.0	28.0	33	28.5	117	46.7	JD	78	04	08	2026	26	114	83
90.0	30.0	33	25.0	117	53.5	JD	78	04	08	2355	28	249	1961
90.0	37.0	33	11.0	118	22.5	JD	78	04	09	1035	23	1	14
90.0	45.0	32	54.5	118	55.5	JD	78	04	09	1645	25	1	6
90.0	80.0	31	44.5	121	19.5	JD	78	04	07	1210	17	0	8
90.0	90.0	31	22.3	122	01.4	JD	78	04	07	0500	26	1	3
90.0	100.0	31	02.0	122	42.2	JD	78	04	06	2220	19	1	0
90.0	130.0	30	04.1	124	37.8	JD	78	04	06	0410	25	0	1
90.0	160.0	29	05.1	126	38.8	JD	78	04	05	0905	26	1	0
90.0	190.0	28	05.1	128	36.5	JD	78	04	04	1450	15	0	0
93.0	28.0	32	54.7	117	21.8	JD	78	03	29	2230	21	41	523
93.0	30.0	32	50.5	117	31.0	JD	78	03	30	0355	30	5	201
93.0	35.0	32	40.5	117	51.5	JD	78	03	30	0730	27	0	5
93.0	40.0	32	30.0	118	11.5	JD	78	03	30	1325	19	0	1
93.0	45.0	32	20.0	118	32.0	JD	78	03	30	1720	17	2	2
93.0	50.0	32	10.0	118	53.0	JD	78	03	30	2345	19	5	1
93.0	55.0	32	00.0	119	13.5	JD	78	03	31	0325	21	4	1
93.0	60.0	31	50.4	119	33.7	JD	78	03	31	0925	22	0	2
93.0	70.0	31	30.0	120	14.0	JD	78	03	31	1815	22	0	6
93.0	90.0	30	51.0	121	34.5	JD	78	04	01	0810	29	0	1
93.0	110.0	30	09.6	122	54.7	JD	78	04	01	2055	25	0	9
93.0	140.0	29	09.0	124	53.0	JD	78	04	02	1535	16	0	2
93.0	170.0	28	10.4	126	52.0	JD	78	04	03	0905	27	3	0
93.0	190.0	27	30.5	128	09.8	JD	78	04	03	2050	27	1	0
93.0	200.0	27	10.4	128	48.9	JD	78	04	04	0305	27	0	0
97.0	29.0	32	17.5	117	04.7	VA	78	04	04	1450	37	1	117
97.0	30.0	32	15.9	117	07.0	VA	78	04	04	1605	37	1	43
97.0	32.0	32	12.0	117	15.2	VA	78	04	04	1810	26	1	86
97.0	35.0	32	05.5	117	27.5	VA	78	04	04	2120	73	0	11
97.0	40.0	31	56.0	117	48.0	VA	78	04	05	0200	35	12	27
97.0	45.0	31	46.0	118	08.5	VA	78	04	05	0550	27	2	4
97.0	70.0	30	55.0	119	50.5	VA	78	04	05	2254	39	3	14
97.0	80.0	30	35.0	120	31.0	VA	78	04	06	0505	23	2	0
97.0	90.0	30	15.5	121	10.5	VA	78	04	06	1045	40	0	10
100.0	29.0	31	42.0	116	43.4	JD	78	04	21	1825	24	74	9
100.0	30.0	31	40.5	116	46.5	JD	78	04	21	2000	23	9	532
100.0	35.0	31	30.5	117	07.0	JD	78	04	21	2350	19	1	17
100.0	40.0	31	20.9	117	27.1	JD	78	04	22	0310	19	1	3
100.0	45.0	31	10.5	117	46.5	JD	78	04	22	0540	21	2	3
100.0	50.0	31	00.5	118	07.0	JD	78	04	22	0915	24	1	1

TABLE 1. (cont.) CalCOFI Cruise 7804 (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
100.0	60.0	30	40.5	118	47.5	JD	78	04	22	1445	18	1	1
103.0	29.0	31	07.0	116	21.0	JD	78	04	23	1215	23	6	48
103.0	30.0	31	06.0	116	24.5	JD	78	04	23	1120	22	5	10
103.0	35.0	30	56.0	116	45.0	JD	78	04	23	0820	19	5	27
103.0	40.0	30	46.0	117	04.5	JD	78	04	23	0450	34	2	59
103.0	45.0	30	36.0	117	24.0	JD	78	04	23	0105	21	0	65
103.0	50.0	30	26.0	117	44.5	JD	78	04	22	2200	25	6	0
107.0	31.0	30	27.8	116	07.0	JD	78	04	23	1630	20	4	354
107.0	32.0	30	25.8	116	11.0	JD	78	04	23	1755	25	297	1168
107.0	35.0	30	21.5	116	22.5	JD	78	04	23	2035	28	1	0
107.0	40.0	30	11.0	116	42.0	JD	78	04	23	2355	23	0	3
107.0	45.0	30	01.5	117	02.0	JD	78	04	24	0233	20	5	6
107.0	50.0	29	50.7	117	22.0	JD	78	04	24	0600	15	0	0
110.0	32.4	29	51.2	115	49.7	JD	78	04	24	2248	24	9	5
110.0	35.0	29	46.0	116	00.0	JD	78	04	24	2055	25	103	0
110.0	40.0	29	33.0	116	21.0	JD	78	04	24	1705	28	0	2
110.0	45.0	29	26.5	116	39.5	JD	78	04	24	1340	22	0	0
110.0	50.0	29	14.9	116	58.2	JD	78	04	24	1055	20	1	0
113.0	50.0	28	41.5	116	36.0	JD	78	04	25	1650	21	0	2

CalCOFI Cruise 7805

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
60.0	52.5	37	52.5	123	03.5	JD	78	05	14	1550	26	1	1
60.0	55.0	37	47.0	123	15.0	JD	78	05	14	1825	26	9	10
60.0	60.0	37	37.0	123	37.0	JD	78	05	14	2145	29	6	18
67.0	50.0	36	48.0	122	05.0	JD	78	05	17	0826	27	0	0
67.0	55.0	36	39.0	122	26.0	JD	78	05	17	1224	21	1	15
67.0	60.0	36	28.0	122	47.5	JD	78	05	17	1555	22	3	79
70.0	51.0	36	11.3	121	43.9	JD	78	05	19	1225	19	0	47
70.0	53.0	36	06.5	121	54.0	JD	78	05	19	1036	26	1	64
70.0	60.0	35	53.0	122	22.6	JD	78	05	19	0605	31	11	126
70.0	80.0	35	15.7	123	46.0	JD	78	05	18	1945	26	0	41
73.0	50.0	35	37.0	121	17.0	JD	78	05	19	1640	23	13	0
73.0	53.0	35	31.7	121	28.3	JD	78	05	19	1910	53	14	6
73.0	60.0	35	17.5	121	58.0	JD	78	05	19	2240	26	0	13
77.0	51.0	35	02.0	120	56.5	JD	78	05	21	2020	19	2	5
77.0	55.0	34	54.5	121	13.0	JD	78	05	21	1740	30	6	434
77.0	60.0	34	44.0	121	34.0	JD	78	05	21	1339	21	0	34
80.0	51.0	34	26.0	120	32.5	JD	78	05	22	0107	20	4	3
80.0	55.0	34	19.0	120	48.0	JD	78	05	22	0405	21	3	0
80.0	60.0	34	09.0	121	09.0	JD	78	05	22	0724	24	2	20
83.0	40.6	34	12.5	119	24.2	JD	78	05	25	0115	22	10	107
83.0	42.0	34	10.0	119	29.5	JD	78	05	25	0250	22	9	12
87.0	35.0	33	50.0	118	37.5	JD	78	05	25	1212	25	1	302
87.0	40.0	33	40.0	118	58.0	JD	78	05	25	1600	16	5	551
87.0	45.0	33	30.0	119	19.0	JD	78	05	25	1925	18	3	6
87.0	55.0	33	10.0	120	00.0	JD	78	05	28	1337	24	0	0

TABLE 1. (cont.) CalCOFI Cruise 7805 (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
87.0	60.0	33	00.5	120	21.0	JD	78	05	28	1705	25	6	1
87.0	90.0	31	59.0	122	24.0	JD	78	05	29	1140	19	0	0
90.0	28.0	33	28.5	117	46.7	JD	78	05	27	0400	25	60	445
90.0	30.0	33	25.0	117	53.5	JD	78	05	27	0025	16	58	274
90.0	37.0	33	11.0	118	22.5	JD	78	05	26	1720	22	1	148
90.0	45.0	32	54.5	118	55.5	JD	78	05	26	1128	17	0	102
90.0	53.0	32	39.0	119	28.5	JD	78	05	28	0814	25	3	5
90.0	60.0	32	24.9	119	57.5	JD	78	05	30	1019	27	1	2
90.0	70.0	32	04.5	120	38.5	JD	78	05	30	0420	20	0	2
90.0	80.0	31	44.5	121	19.5	JD	78	05	29	2235	22	0	0
90.0	90.0	31	24.0	122	01.0	JD	78	05	29	1700	17	0	5
93.0	28.0	32	54.7	117	21.8	JD	78	05	27	1122	20	0	115
93.0	30.0	32	50.5	117	31.0	JD	78	05	27	1351	25	2	401
93.0	35.0	32	40.5	117	51.5	JD	78	05	27	1705	31	7	10
93.0	40.0	32	30.0	118	11.5	JD	78	05	27	2015	29	10	7
93.0	50.0	32	10.0	118	52.5	JD	78	05	28	0220	19	0	3
93.0	55.0	32	00.0	119	13.5	JD	78	05	30	1600	19	0	2
93.0	60.0	31	50.0	119	34.0	JD	78	05	30	1915	31	6	5
93.0	70.0	31	30.0	120	14.0	JD	78	05	31	0100	21	0	0
93.0	80.0	31	10.5	120	55.0	JD	78	05	31	0530	17	0	0
93.0	90.0	30	50.0	121	34.5	JD	78	05	31	1135	21	0	21
97.0	30.0	32	16.0	117	07.0	JD	78	06	02	0628	18	5	490
97.0	32.0	32	12.0	117	15.2	JD	78	06	02	0435	33	3	18
97.0	35.0	32	05.5	117	27.5	JD	78	06	02	0225	29	9	58
97.0	40.0	31	54.4	117	48.6	JD	78	06	01	2240	31	15	28
97.0	45.0	31	46.0	118	08.5	JD	78	06	01	1910	32	4	12
97.0	50.0	31	36.0	118	30.5	JD	78	06	01	1620	28	4	78
97.0	55.0	31	25.5	118	49.5	JD	78	06	01	1310	27	2	10
97.0	60.0	31	15.5	119	10.0	JD	78	06	01	1010	23	0	9
97.0	70.0	30	55.0	119	50.6	JD	78	06	01	0500	27	0	1
97.0	80.0	30	35.0	120	31.0	JD	78	05	31	2325	23	1	1
97.0	90.0	30	15.7	121	10.0	JD	78	05	31	1805	30	1	79
100.0	29.0	31	42.2	116	43.4	JD	78	06	03	1417	36	37	9
100.0	30.0	31	40.5	116	46.5	JD	78	06	03	1555	18	7	8
100.0	35.0	31	30.5	117	07.0	JD	78	06	03	2015	26	3	0
100.0	40.0	31	21.0	117	27.0	JD	78	06	03	2350	21	3	2
100.0	50.0	31	00.5	118	07.0	JD	78	06	04	0450	20	3	1
100.0	60.0	30	40.6	118	50.0	JD	78	06	04	1013	32	0	2
100.0	70.0	30	20.5	119	27.5	JD	78	06	04	1515	25	0	3
100.0	80.0	30	01.0	120	07.0	JD	78	06	04	2045	29	1	6
100.0	90.0	29	40.5	120	47.0	JD	78	06	05	0205	14	0	176
103.0	30.0	31	06.0	116	24.5	JD	78	06	06	1505	27	2	41
103.0	35.0	30	56.0	116	45.0	JD	78	06	06	1224	27	0	6
103.0	40.0	30	46.0	117	04.5	JD	78	06	06	0911	30	4	25
103.0	45.0	30	36.0	117	24.0	JD	78	06	06	0545	25	4	15
103.0	50.0	30	26.0	117	44.5	JD	78	06	06	0240	30	163	63
103.0	60.0	30	06.0	118	25.0	JD	78	06	05	2055	34	5	5
103.0	70.0	29	46.2	119	04.8	JD	78	06	05	1452	23	0	6
103.0	80.0	29	25.0	119	43.9	JD	78	06	05	0926	31	0	55

TABLE 1. (cont.) CalCOFI Cruise 7805 (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
107.0	32.0	30	25.8	116	11.0	JD	78	06	06	1925	36	0	19
107.0	35.0	30	21.5	116	22.5	JD	78	06	06	2155	36	10	3
107.0	40.0	30	11.0	116	42.0	JD	78	06	07	0110	18	5	4
107.0	50.0	29	50.5	117	22.0	JD	78	06	07	0645	30	3	2
107.0	60.0	29	32.0	118	01.5	JD	78	06	07	1203	27	5	11
107.0	70.0	29	11.0	118	41.0	JD	78	06	07	1835	26	2	18
107.0	80.0	28	51.5	119	20.0	JD	78	06	07	2330	22	0	116
110.0	32.4	29	51.2	115	49.7	JD	78	06	09	0903	25	0	17
110.0	35.0	29	46.0	116	00.0	JD	78	06	09	0703	30	0	5
110.0	40.0	29	36.5	116	19.5	JD	78	06	09	0355	24	2	3
110.0	45.0	29	26.5	116	39.5	JD	78	06	09	0010	28	45	1
110.0	50.0	29	15.8	116	58.8	JD	78	06	08	2120	48	23	2
110.0	60.0	28	56.5	117	39.0	JD	78	06	08	1550	23	1	71
110.0	70.0	28	36.5	118	18.0	JD	78	06	08	1024	30	0	28
110.0	80.0	28	17.0	118	57.5	JD	78	06	08	0505	30	2	598
113.0	50.0	28	41.5	116	36.5	JD	78	06	09	1730	33	0	8
113.0	60.0	28	22.0	117	16.0	JD	78	06	09	2315	23	0	35
113.0	70.0	28	02.0	117	55.0	JD	78	06	10	0445	23	0	1
113.0	80.0	27	44.5	118	36.0	JD	78	06	10	0928	33	0	8

CalCOFI Cruise 7807

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
63.0	52.0	37	19.0	122	36.0	JD	78	07	14	2130	26	2	153
63.0	55.0	37	13.0	122	50.0	JD	78	07	14	1850	13	4	16
63.0	60.0	37	03.4	123	10.5	JD	78	07	14	1425	21	0	0
63.0	65.0	36	53.0	123	33.0	JD	78	07	14	1000	27	1	30
66.0	49.0	36	53.0	122	01.7	JD	78	07	12	0720	22	1	1208
67.0	50.0	36	48.0	122	05.0	JD	78	07	12	0930	25	69	6
67.0	55.0	36	39.0	122	26.0	JD	78	07	12	1353	14	4	1
67.0	60.0	36	28.0	122	47.0	JD	78	07	12	1810	20	0	3
67.0	65.0	36	18.0	123	09.0	JD	78	07	12	2130	27	2	6
70.0	51.0	36	11.3	121	43.9	JD	78	07	12	0140	27	6	139
70.0	60.0	35	53.0	122	22.5	JD	78	07	11	1835	17	1	5
70.0	65.0	35	43.0	122	45.0	JD	78	07	11	1415	16	1	10
70.0	80.0	35	13.5	123	47.5	JD	78	07	11	0608	5	3	0
73.0	50.0	35	37.0	121	17.0	JD	78	07	09	1305	9	0	35
73.0	53.0	35	31.5	121	28.5	JD	78	07	09	1559	4	0	28
73.0	60.0	35	16.7	122	01.0	JD	78	07	09	2100	12	2	0
77.0	48.0	35	08.3	120	43.7	JD	78	07	09	0810	27	0	154
77.0	51.0	35	02.0	120	56.5	JD	78	07	09	0545	16	1	163
77.0	55.0	34	54.5	121	13.0	JD	78	07	09	0220	25	14	40
77.0	60.0	34	44.0	121	34.0	JD	78	07	08	2106	18	0	29
77.0	65.0	34	34.0	121	55.0	JD	78	07	08	1555	14	0	0
80.0	52.0	34	24.0	120	36.7	JD	78	07	06	1403	9	0	1
80.0	55.0	34	19.0	120	48.0	JD	78	07	06	1730	9	1	0
80.0	60.0	34	09.0	121	09.0	JD	78	07	06	2210	23	3	2
80.0	70.0	33	48.5	121	51.0	JD	78	07	07	0450	13	8	8

TABLE 1. (cont.) CalCOFI Cruise 7807 (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	80.0	33	28.7	122	32.0	JD	78	07	07	1035	23	0	18
80.0	90.0	33	09.0	123	13.0	JD	78	07	07	1705	10	0	0
82.0	47.0	34	16.5	119	59.0	JD	78	07	06	0840	34	14	278
83.0	40.6	34	12.5	119	24.2	JD	78	07	06	0145	28	6	220
83.0	42.0	34	10.0	119	29.5	JD	78	07	06	0335	26	78	216
87.0	35.0	33	50.0	118	37.5	JD	78	07	02	0305	23	33	218
87.0	40.0	33	40.0	118	58.0	JD	78	07	02	1030	25	0	5855
87.0	45.0	33	30.0	119	19.0	JD	78	07	02	1425	20	2	181
90.0	28.0	33	28.5	117	46.7	JD	78	07	01	1459	18	4	200
90.0	30.0	33	25.0	117	53.5	JD	78	07	01	1100	32	2	874
90.0	37.0	33	11.0	118	22.5	JD	78	07	01	0045	18	16	36
90.0	45.0	32	54.5	118	55.5	JD	78	06	30	1917	14	11	30
90.0	53.0	32	34.8	119	29.5	JD	78	06	30	1320	19	0	4
90.0	60.0	32	25.0	119	57.5	JD	78	06	30	0730	10	0	18
90.0	70.0	32	04.5	120	38.5	JD	78	06	30	0021	18	0	3
90.0	80.0	31	44.5	121	19.5	JD	78	06	29	1817	18	2	5
90.0	90.0	31	23.2	122	01.2	JD	78	06	29	1115	24	0	1
90.0	100.0	31	05.0	122	39.0	JD	78	06	29	0600	10	0	16
90.0	130.0	30	04.3	124	38.7	JD	78	06	28	1148	30	0	4657
90.0	160.0	29	05.1	126	38.7	JD	78	06	27	1827	6	0	3
90.0	190.0	28	00.5	128	39.8	JD	78	06	26	2205	17	3	0
93.0	28.0	32	54.7	117	21.8	JD	78	06	21	0105	22	42	978
93.0	30.0	32	50.5	117	31.0	JD	78	06	21	0740	12	0	779
93.0	35.0	32	40.5	117	51.5	JD	78	06	21	1210	17	0	136
93.0	40.0	32	30.0	118	11.5	JD	78	06	22	0005	20	3	17
93.0	50.0	32	10.0	118	52.5	JD	78	06	22	0930	23	6	483
93.0	55.0	32	00.0	119	13.5	JD	78	06	22	1325	22	1	5
93.0	80.0	31	10.0	120	54.5	JD	78	06	23	0755	20	0	1
93.0	90.0	30	50.0	121	34.5	JD	78	06	23	1440	19	0	46
93.0	140.0	29	10.6	124	56.3	JD	78	06	24	2150	16	3	2
93.0	170.0	28	10.4	126	52.0	JD	78	06	25	1710	11	1	0
93.0	190.0	27	30.4	128	09.9	JD	78	06	26	0542	7	1	0
93.0	200.0	27	10.4	128	48.7	JD	78	06	26	1125	25	0	3
97.0	29.0	32	17.5	117	04.7	VA	78	06	22	1540	11	767	485
97.0	30.0	32	16.0	117	07.0	VA	78	06	22	1710	32	26	162
97.0	32.0	32	12.0	117	15.2	VA	78	06	22	1850	26	10	18
97.0	35.0	32	05.5	117	27.5	VA	78	06	22	2205	29	30	8
97.0	40.0	31	56.0	117	48.0	VA	78	06	23	0210	22	8	40
97.0	45.0	31	46.0	118	08.5	VA	78	06	23	0545	26	16	2
97.0	50.0	31	36.0	118	30.5	VA	78	06	23	0945	35	10	17
97.0	55.0	31	25.5	118	49.5	VA	78	06	23	1300	31	3	1
97.0	60.0	31	15.5	119	10.0	VA	78	06	23	1717	32	2	2
100.0	29.0	31	42.2	116	43.4	VA	78	06	27	1352	18	0	7
100.0	30.0	31	40.5	116	46.5	VA	78	06	27	1225	18	0	49
100.0	35.0	31	30.5	117	07.0	VA	78	06	27	0640	28	2	2
103.0	29.0	31	07.0	116	21.0	VA	78	06	27	1900	25	5	140
103.0	30.0	31	06.0	116	24.5	VA	78	06	27	2015	18	2	2
103.0	35.0	30	56.0	116	45.0	VA	78	06	27	2345	15	0	12
103.0	40.0	30	46.0	117	04.4	VA	78	06	28	0440	25	10	13

TABLE 1. (cont.)

CalCOFI Cruise 7807 (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
103.0	45.0	30	36.0	117	24.0	VA	78	06	28	0750	24	6	2
103.0	50.0	30	26.0	117	44.5	VA	78	06	28	1240	31	0	88
103.0	60.0	30	06.0	118	25.0	VA	78	06	28	1830	22	0	0
103.0	70.0	29	46.4	119	04.8	VA	78	06	29	0055	22	2	4
103.0	80.0	29	26.2	119	43.0	VA	78	06	29	0640	29	0	5
103.0	90.0	29	06.0	120	23.5	VA	78	06	29	1230	34	2	125
107.0	31.0	30	27.8	116	07.0	VA	78	07	01	1130	30	0	142
107.0	32.0	30	25.8	116	11.0	VA	78	07	01	0925	24	1	109
107.0	60.0	29	32.0	118	01.5	VA	78	06	30	1115	31	0	4
107.0	70.0	29	11.0	118	41.0	VA	78	06	30	0525	40	6	786
107.0	80.0	28	51.5	119	20.0	VA	78	06	29	2307	29	3	100
107.0	90.0	28	32.0	119	59.0	VA	78	06	29	1725	34	0	67
117.0	60.0	27	48.0	116	53.0	VA	78	07	10	1440	36	1	2
117.0	70.0	27	27.5	117	32.5	VA	78	07	10	2030	28	2	214
117.0	80.0	27	07.9	118	10.5	VA	78	07	11	0200	26	4	5
120.0	30.0	28	13.0	114	34.0	VA	78	07	09	0730	32	8	16
120.0	40.0	27	56.5	115	14.0	VA	78	07	12	0925	19	8	25
120.0	60.0	27	13.0	116	30.5	VA	78	07	11	1905	32	20	1
120.0	80.0	26	32.5	117	49.0	VA	78	07	11	0755	28	0	131
130.0	30.0	26	29.0	113	29.0	VA	78	07	14	1115	31	18	303
130.0	40.0	26	09.0	114	07.0	VA	78	07	14	1740	31	2	41
130.0	60.0	25	29.0	115	24.0	VA	78	07	15	0435	29	5	0
137.0	30.0	25	20.0	112	46.0	VA	78	07	16	1835	27	3	0
137.0	40.0	25	00.0	113	23.5	VA	78	07	17	0110	29	0	35
137.0	60.0	24	20.0	114	39.5	VA	78	07	17	1145	27	1	12

CalCOFI Cruise 7808

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
60.0	50.0	37	57.5	122	53.1	JD	78	08	25	0505	19	0	5385
60.0	52.5	37	52.5	123	03.5	JD	78	08	25	0635	24	0	1079
60.0	55.0	37	47.0	123	15.0	JD	78	08	25	0915	21	1	96
60.0	60.0	37	37.0	123	37.0	JD	78	08	25	1350	30	0	26
60.0	65.0	37	28.0	123	58.5	JD	78	08	25	1700	26	0	3
63.0	50.0	37	23.3	122	27.8	JD	78	08	25	0045	27	4	1378
63.0	52.0	37	19.0	122	36.0	JD	78	08	24	2315	24	9	1333
63.0	55.0	37	13.0	122	50.0	JD	78	08	24	2025	32	6	6084
63.0	60.0	37	03.1	123	11.8	JD	78	08	24	1625	33	1	743
63.0	65.0	36	53.0	123	33.0	JD	78	08	24	1130	29	3	12
66.0	49.0	36	53.0	122	01.7	JD	78	08	23	0800	28	2	1672
67.0	50.0	36	48.0	122	05.0	JD	78	08	23	1000	30	0	331
67.0	55.0	36	39.5	122	27.0	JD	78	08	23	1345	21	0	5
67.0	60.0	36	28.0	122	50.2	JD	78	08	23	1730	18	0	0
67.0	65.0	36	20.3	123	06.5	JD	78	08	23	2020	36	25	116
70.0	51.0	36	11.3	121	43.9	JD	78	08	21	1420	23	0	129
70.0	53.0	36	06.5	121	54.1	JD	78	08	21	1220	19	0	1
70.0	60.0	35	53.3	122	22.6	JD	78	08	21	0705	29	1	1
70.0	65.0	35	43.0	122	45.0	JD	78	08	21	0220	15	2	0

TABLE 1. (cont.) CalCOFI Cruise 7808 (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
70.0	80.0	35	13.5	123	45.4	JD	78	08	20	1820	25	0	2
73.0	50.0	35	37.0	121	17.0	JD	78	08	19	0227	17	2	355
73.0	53.0	35	32.0	121	28.3	JD	78	08	19	0534	20	0	7
73.0	60.0	35	17.6	121	57.8	JD	78	08	19	1100	18	0	0
73.0	65.0	35	08.0	122	19.0	JD	78	08	19	1340	15	0	2
77.0	51.0	35	02.0	120	56.8	JD	78	08	18	2120	24	5	0
77.0	55.0	34	54.5	121	13.0	JD	78	08	18	1710	22	0	3
77.0	60.0	34	44.0	121	34.0	JD	78	08	18	1255	15	2	3
77.0	65.0	34	34.0	121	55.5	JD	78	08	18	0725	23	0	5
80.0	51.0	34	26.0	120	32.5	JD	78	08	16	0115	20	1	52
80.0	52.0	34	24.8	120	35.8	JD	78	08	16	0315	26	3	2
80.0	55.0	34	19.0	120	48.0	JD	78	08	16	0705	23	0	1
80.0	60.0	34	09.0	121	09.0	JD	78	08	16	1110	20	0	0
80.0	70.0	33	48.5	121	51.0	JD	78	08	16	1810	19	0	0
80.0	80.0	33	28.7	122	32.0	JD	78	08	16	2355	16	1	3
80.0	90.0	33	09.0	123	13.0	JD	78	08	17	0559	23	0	1
82.0	47.0	34	16.5	119	59.0	JD	78	08	15	0920	22	0	11
83.0	40.6	34	13.0	119	24.0	JD	78	08	15	0425	23	57	4978
83.0	42.0	34	10.0	119	29.5	JD	78	08	15	0215	17	22	1471
83.0	51.0	33	52.0	120	08.5	JD	78	08	14	1915	21	11	2
83.0	55.0	33	44.0	120	24.5	JD	78	08	14	1530	17	0	1
83.0	60.0	33	34.0	120	45.0	JD	78	08	14	1125	20	0	3
83.0	70.0	33	14.5	121	26.0	JD	78	08	14	0405	18	0	2
83.0	80.0	32	53.3	122	07.8	JD	78	08	13	2110	19	1	6
83.0	90.0	32	34.5	122	50.0	JD	78	08	13	1425	21	0	110
87.0	35.0	33	50.0	118	37.5	JD	78	08	11	1425	32	1	268
87.0	40.0	33	40.0	118	58.0	JD	78	08	11	2135	24	8	24
87.0	45.0	33	30.0	119	19.0	JD	78	08	12	0200	33	1	44
87.0	50.0	33	20.0	119	39.5	JD	78	08	12	0610	25	0	631
87.0	55.0	33	10.0	120	00.0	JD	78	08	12	0935	30	3	4
87.0	60.0	33	00.0	120	21.5	JD	78	08	12	1400	24	1	23
87.0	70.0	32	39.6	121	02.0	JD	78	08	12	2020	19	0	2
87.0	80.0	32	19.5	121	43.0	JD	78	08	13	0200	21	0	0
87.0	90.0	31	59.0	122	24.0	JD	78	08	13	0820	20	0	9
89.7	41.5	33	03.0	118	48.0	JD	78	08	09	1040	27	0	1
90.0	28.0	33	28.5	117	47.0	JD	78	08	10	0600	20	41	966
90.0	30.0	33	25.0	117	53.5	JD	78	08	10	0105	25	35	38
90.0	37.0	33	11.0	118	22.5	JD	78	08	09	1520	29	2	126
90.0	53.0	32	39.0	119	28.5	JD	78	08	09	0300	29	0	0
90.0	60.0	32	22.5	119	58.0	JD	78	08	08	2050	23	7	6
90.0	70.0	32	04.5	120	38.5	JD	78	08	08	1400	19	1	1
90.0	80.0	31	44.4	121	20.8	JD	78	08	08	0800	24	0	2
90.0	90.0	31	24.0	122	01.0	JD	78	08	08	0100	19	0	6
90.0	100.0	31	05.0	122	39.0	JD	78	08	07	1915	27	1	26
90.0	130.0	30	05.1	124	39.8	JD	78	08	07	0130	29	1	15
90.0	160.0	29	05.0	126	39.6	JD	78	08	06	0720	19	0	0
93.0	28.0	32	54.7	117	21.8	JD	78	08	01	0125	26	70	965
93.0	30.0	32	50.5	117	31.0	JD	78	08	01	0840	26	0	1
93.0	35.0	32	40.5	117	51.5	JD	78	08	01	1220	31	3	1

TABLE 1. (cont.) CalCOFI Cruise 7808 (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
93.0	40.0	32	30.0	118	11.5	JD	78	08	01	1815	22	1	53
93.0	45.0	32	20.0	118	32.0	JD	78	08	01	2210	25	27	3
93.0	50.0	32	10.0	118	52.5	JD	78	08	02	0425	28	6	14
93.0	55.0	32	00.8	119	13.2	JD	78	08	02	0810	23	1	11
93.0	60.0	31	50.0	119	34.0	JD	78	08	02	1335	29	1	36
93.0	70.0	31	30.0	120	14.0	JD	78	08	02	2330	19	1	2
93.0	80.0	31	04.0	120	54.5	JD	78	08	03	0608	23	1	10
93.0	90.0	30	50.0	121	34.5	JD	78	08	03	1230	31	0	25
93.0	110.0	30	09.5	122	55.0	JD	78	08	04	0120	27	1	2
93.0	140.0	29	08.2	124	53.4	JD	78	08	04	2044	19	0	0
93.0	180.0	27	50.4	127	31.0	JD	78	08	05	1620	26	5	1
93.5	29.0	32	47.5	117	23.5	JD	78	07	31	1755	16	2	185
97.0	29.0	32	17.5	117	04.7	VA	78	08	01	2240	35	14	4040
97.0	30.0	32	16.0	117	07.0	VA	78	08	02	0010	43	14	2176
97.0	32.0	32	12.0	117	15.2	VA	78	08	02	0155	40	3	1612
97.0	35.0	32	05.5	117	27.5	VA	78	08	02	0540	32	0	153
97.0	40.0	31	56.0	117	48.0	VA	78	08	02	0935	32	0	10
97.0	45.0	31	46.0	118	08.5	VA	78	08	02	1240	32	2	4
97.0	50.0	31	36.0	118	30.5	VA	78	08	02	1640	30	2	2
97.0	55.0	31	25.5	118	49.5	VA	78	08	02	1935	32	0	2
97.0	60.0	31	15.5	119	10.0	VA	78	08	03	0030	38	0	0
97.0	70.0	30	55.0	119	50.5	VA	78	08	03	0715	29	0	2
97.0	80.0	30	35.0	120	31.0	VA	78	08	03	1325	36	0	90
97.0	90.0	30	15.5	121	10.5	VA	78	08	03	1910	28	1	56
100.0	29.0	31	42.2	116	43.4	VA	78	08	06	0510	30	2	577
100.0	30.0	31	40.5	116	46.5	VA	78	08	06	0315	41	6	53
100.0	35.0	31	30.5	117	07.0	VA	78	08	05	2330	33	1	35
100.0	40.0	31	21.0	117	27.0	VA	78	08	05	1950	29	1	9
100.0	45.0	31	10.5	117	46.5	VA	78	08	05	1555	30	2	12
100.0	50.0	31	00.5	118	07.0	VA	78	08	05	1255	37	2	11
100.0	60.0	30	40.5	118	47.5	VA	78	08	05	0608	39	0	3
100.0	70.0	30	20.5	119	27.5	VA	78	08	04	2345	30	0	5
100.0	80.0	30	01.0	120	07.0	VA	78	08	04	1820	41	0	50
100.0	90.0	29	40.5	120	47.0	VA	78	08	04	1205	36	2	193
103.0	29.0	31	07.0	116	21.0	VA	78	08	06	1125	29	8	3710
103.0	30.0	31	06.0	116	24.5	VA	78	08	06	1330	35	0	806
103.0	35.0	30	56.0	116	45.0	VA	78	08	06	1700	36	7	18
103.0	40.0	30	46.0	117	04.5	VA	78	08	06	2050	25	2	2
103.0	45.0	30	36.0	117	24.0	VA	78	08	06	2345	26	4	9
103.0	50.0	30	26.0	117	44.5	VA	78	08	07	0325	29	1	4
103.0	60.0	30	06.0	118	25.0	VA	78	08	07	0910	26	0	2
103.0	70.0	29	46.2	119	04.8	VA	78	08	07	1510	31	0	14
103.0	80.0	29	26.5	119	43.0	VA	78	08	07	2045	32	0	8
103.0	90.0	29	06.0	120	23.5	VA	78	08	08	0235	28	1	1
107.0	31.0	30	27.8	116	07.0	VA	78	08	09	2105	27	69	2625
107.0	32.0	30	25.8	116	11.0	VA	78	08	09	1945	23	112	42
107.0	35.0	30	21.5	116	22.5	VA	78	08	09	1725	32	3	3
107.0	40.0	30	11.0	116	42.0	VA	78	08	09	1400	32	0	9
107.0	45.0	30	01.5	117	02.0	VA	78	08	09	1040	28	1	70

TABLE 1. (cont.) CalCOFI Cruise 7808 (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
107.0	50.0	29	50.5	117	22.0	VA	78	08	09	0755	31	0	45
107.0	60.0	29	32.0	118	01.5	VA	78	08	09	0145	30	1	9
107.0	70.0	29	09.6	118	37.7	VA	78	08	08	2020	23	0	3
107.0	80.0	28	51.5	119	20.0	VA	78	08	08	1335	34	0	16
107.0	90.0	28	32.0	119	59.0	VA	78	08	08	0815	24	0	0
110.0	32.4	29	51.2	115	49.7	VA	78	08	10	0140	29	65	516
110.0	35.0	29	46.0	116	00.0	VA	78	08	10	0430	28	12	13
110.0	40.0	29	36.5	116	19.5	VA	78	08	10	0840	30	1	10
110.0	45.0	29	26.5	116	39.5	VA	78	08	10	1140	34	0	17
110.0	50.0	29	16.5	116	59.0	VA	78	08	10	1520	27	0	6
110.0	60.0	28	56.5	117	39.0	VA	78	08	10	2140	26	0	28
110.0	70.0	28	36.5	118	18.0	VA	78	08	11	0430	32	0	145
110.0	80.0	28	16.5	118	57.5	VA	78	08	11	0950	30	1	27
110.0	90.0	27	56.5	119	35.0	VA	78	08	11	1510	39	0	568
113.0	50.0	28	41.5	116	36.5	VA	78	08	12	1950	28	4	0
113.0	60.0	28	22.0	117	16.0	VA	78	08	12	1345	31	2	29
113.0	70.0	28	02.0	117	55.0	VA	78	08	12	0800	27	1	10
113.0	80.0	27	42.0	118	33.5	VA	78	08	12	0212	37	0	605
113.0	90.0	27	22.0	119	12.0	VA	78	08	11	2040	30	0	230
117.0	60.0	27	48.0	116	53.0	VA	78	08	18	2100	27	5	3
117.0	70.0	27	27.5	117	32.5	VA	78	08	19	0300	30	12	5
117.0	80.0	27	08.0	118	10.5	VA	78	08	19	0820	22	0	12
120.0	30.0	28	13.0	114	34.0	VA	78	08	17	1300	31	15	998
120.0	40.0	27	56.5	115	14.0	VA	78	08	20	1520	30	8	57
120.0	60.0	27	13.0	116	30.5	VA	78	08	20	0155	32	5	9
120.0	80.0	26	32.5	117	49.0	VA	78	08	19	1415	36	0	7
130.0	30.0	26	29.0	113	29.0	VA	78	08	22	1915	26	12	6
130.0	40.0	26	09.0	114	07.0	VA	78	08	23	0155	39	45	2
130.0	60.0	25	29.0	115	24.0	VA	78	08	23	1330	32	1	23
137.0	30.0	25	20.0	112	46.0	VA	78	08	25	0405	32	15	14
137.0	40.0	25	00.0	113	23.5	VA	78	08	25	1035	26	2	4

TABLE 2. Pooled occurrences of fish larvae taken in Manta tows on the 1977-78 CalCOFI survey.

Rank	Taxon	Occurrences
1	*Cololabis saira*	117
2	*Engraulis mordax*	82
3	*Trachurus symmetricus*	41
4	*Sebastes* spp.	37
5	*Scomber japonicus*	31
6	*Hypsoblennius jenkinsi*	24
7	*Leuresthes tenuis*	19
8	*Hypsoblennius* spp.	14
8	*Oxyjulis californica*	14
10	*Sebastes diploproa*	12
10	Unidentified fish larvae	12
12	*Cheilopogon* spp.	11
12	*Vinciguerria lucetia*	11
12	*Hypsoblennius gilberti*	11
15	*Ceratoscopelus townsendi*	10
15	*Sardinops sagax*	10
17	*Scorpaenichthys marmoratus*	9
17	*Girella nigricans*	9
17	*Hypsoblennius gentilis*	9
20	*Medialuna californiensis*	7
20	*Peprilus simillimus*	7
22	*Chromis punctipinnis*	6
23	*Seriphus politus*	5
24	*Icichthys lockingtoni*	4
24	*Citharichthys stigmaeus*	4
24	*Sebastes aurora*	4
24	*Hirundichthys marginatus*	4
24	*Stenobrachius leucopsarus*	4
24	*Triphoturus mexicanus*	4
30	*Pleuronichthys coenosus*	3
30	*Sphyraena argentea*	3
30	*Lampadena urophaos*	3
30	*Coryphopterus nicholsii*	3
30	*Merluccius productus*	3
30	*Sebastes jordani*	3
30	*Cyclothone* spp.	3
30	*Semicossyphus pulcher*	3
30	*Diaphus* spp.	3
30	*Paralabrax* spp.	3
30	*Aristostomias scintillans*	3
30	*Nannobrachium ritteri*	3
42	*Macroramphosus gracilis*	2
42	*Lampanyctus* spp.	2
42	*Nannobrachium regale*	2
42	*Paralichthys californicus*	2
42	*Tetragonurus cuvieri*	2
42	*Labrisomus multiporosus*	2
42	*Citharichthys sordidus*	2
42	*Halichoeres semicinctus*	2

TABLE 2. (cont.)

Rank	Taxon	Occurrences
42	*Hermosilla azurea*	2
42	*Genyonemus lineatus*	2
42	Myctophidae	2
42	*Xenistius californiensis*	2
42	*Bolinichthys longipes*	2
42	*Cyclothone signata*	2
42	*Seriola lalandi*	2
57	*Lampanyctus steinbecki*	1
57	*Argyropelecus sladeni*	1
57	*Tactostoma macropus*	1
57	*Bathylagus* spp.	1
57	*Bathophilus flemingi*	1
57	*Nansenia candida*	1
57	*Stomias atriventer*	1
57	*Chilara taylori*	1
57	*Anisotremus davidsoni*	1
57	*Pleuronichthys verticalis*	1
57	*Pleuronichthys ritteri*	1
57	*Pleuronichthys* spp.	1
57	*Hippoglossina stomata*	1
57	*Citharichthys* spp.	1
57	*Euthynnus lineatus*	1
57	*Lepidogobius lepidus*	1
57	Chaenopsidae	1
57	*Labrisomus xanti*	1
57	*Cryptotrema corallinum*	1
57	*Ophiodon elongatus*	1
57	Sciaenidae	1
57	*Atherinops affinis*	1
57	*Eucinostomus* spp.	1
57	*Leptocottus armatus*	1
57	*Hexagrammos* spp.	1
57	*Zaniolepis frenata*	1
57	*Sebastes levis*	1
57	*Hirundichthys* spp.	1
57	*Fodiator acutus*	1
57	*Exocoetus* spp.	1
57	Exocoetidae	1
57	*Atherinopsis californiensis*	1
57	Labrisomidae	1
	Total	631

TABLE 3. Pooled raw counts of fish larvae taken in Manta tows on the 1977-78 CalCOFI survey.

Rank	Taxon	Count
1	*Engraulis mordax*	1688
2	*Leuresthes tenuis*	890
3	*Cololabis saira*	630
4	*Scomber japonicus*	226
5	*Hypsoblennius jenkinsi*	176
6	*Sebastes* spp.	160
7	*Trachurus symmetricus*	121
8	*Hypsoblennius* spp.	107
9	*Hypsoblennius gilberti*	52
10	*Scorpaenichthys marmoratus*	49
11	*Hypsoblennius gentilis*	41
12	*Chromis punctipinnis*	40
12	*Sebastes diploproa*	40
14	*Oxyjulis californica*	36
15	*Sardinops sagax*	27
16	*Vinciguerria lucetia*	24
16	*Girella nigricans*	24
18	Unidentified fish larvae	19
19	*Seriphus politus*	18
20	*Cheilopogon* spp.	17
20	*Labrisomus multiporosus*	17
22	*Peprilus simillimus*	16
23	*Medialuna californiensis*	14
24	*Ceratoscopelus townsendi*	10
24	*Semicossyphus pulcher*	10
26	*Merluccius productus*	8
27	*Paralabrax* spp.	7
28	*Fodiator acutus*	5
28	*Lampadena urophaos*	5
28	*Aristostomias scintillans*	5
28	*Citharichthys stigmaeus*	5
32	*Diaphus* spp.	4
32	Exocoetidae	4
32	*Sebastes aurora*	4
32	*Hermosilla azurea*	4
32	*Hirundichthys marginatus*	4
32	*Sebastes jordani*	4
32	*Triphoturus mexicanus*	4
32	*Icichthys lockingtoni*	4
32	*Genyonemus lineatus*	4
32	*Stenobrachius leucopsarus*	4
42	*Paralichthys californicus*	3
42	*Xenistius californiensis*	3
42	*Macroramphosus gracilis*	3
42	*Sphyraena argentea*	3
42	*Coryphopterus nicholsii*	3
42	*Pleuronichthys coenosus*	3
42	*Nannobrachium ritteri*	3
42	*Cyclothone* spp.	3

TABLE 3. (cont.)

Rank	Taxon	Count
50	*Hexagrammos* spp.	2
50	*Pleuronichthys ritteri*	2
50	Labrisomidae	2
50	*Lepidogobius lepidus*	2
50	*Citharichthys sordidus*	2
50	*Nansenia candida*	2
50	Myctophidae	2
50	*Atherinopsis californiensis*	2
50	*Halichoeres semicinctus*	2
50	*Bolinichthys longipes*	2
50	*Eucinostomus* spp.	2
50	*Nannobrachium regale*	2
50	*Lampanyctus* spp.	2
50	*Leptocottus armatus*	2
50	*Tetragonurus cuvieri*	2
50	*Cyclothone signata*	2
50	*Ophiodon elongatus*	2
50	*Seriola lalandi*	2
68	*Exocoetus* spp.	1
68	*Bathophilus flemingi*	1
68	*Tactostoma macropus*	1
68	*Argyropelecus sladeni*	1
68	*Stomias atriventer*	1
68	*Bathylagus* spp.	1
68	*Zaniolepis frenata*	1
68	*Pleuronichthys* spp.	1
68	*Hippoglossina stomata*	1
68	*Citharichthys* spp.	1
68	*Chilara taylori*	1
68	*Labrisomus xanti*	1
68	*Euthynnus lineatus*	1
68	Chaenopsidae	1
68	*Atherinops affinis*	1
68	*Sebastes levis*	1
68	Sciaenidae	1
68	*Pleuronichthys verticalis*	1
68	*Anisotremus davidsoni*	1
68	*Lampanyctus steinbecki*	1
68	*Hirundichthys* spp.	1
68	*Cryptotrema corallinum*	1
	Total	4609

TABLE 4. Numbers of fish larvae taken in Manta net tows on the 1977-78 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.
97.0 35.0	-	-	-	0.0	-	0.6	-	0.0	-	-	-	-
103.0 29.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
103.0 30.0	-	-	-	0.0	-	0.3	-	0.0	-	-	-	-
107.0 31.0	-	-	-	0.2	-	-	0.0	0.0	-	-	-	-
107.0 32.0	-	-	-	0.0	-	0.0	0.0	0.5	-	-	-	-
120.0 30.0	0.0	-	0.0	-	-	-	0.0	3.7	-	-	-	-
120.0 40.0	0.9	-	0.0	-	-	-	0.6	0.3	-	-	-	-
130.0 40.0	-	-	0.0	-	-	-	0.3	0.0	-	-	-	-

Engraulis mordax

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
60.0 50.0	-	-	-	3.6	-	-	-	0.0	-	-	-	-
60.0 52.5	-	-	-	4.3	0.0	-	-	0.0	-	-	-	-
63.0 50.0	-	-	-	42.9	-	-	-	0.3	-	-	-	-
63.0 52.0	-	-	-	0.5	-	-	0.3	0.0	-	-	-	-
66.0 49.0	-	-	-	3.2	-	-	0.2	0.0	-	-	-	-
67.0 50.0	-	-	-	2.5	0.0	-	0.0	0.0	-	-	-	-
70.0 51.0	-	-	-	0.2	0.0	-	1.6	0.0	-	-	-	-
70.0 60.0	0.0	-	-	0.0	0.3	-	0.0	0.0	-	-	-	-
77.0 48.0	-	-	-	0.8	-	-	0.0	-	-	-	-	-
77.0 51.0	-	-	-	0.0	0.2	-	0.0	0.0	-	-	-	-
77.0 55.0	-	-	-	0.0	0.0	-	2.5	0.0	-	-	-	-
80.0 51.0	-	-	-	0.0	0.2	-	-	0.0	-	-	-	-
80.0 55.0	-	-	-	0.0	0.4	-	0.1	0.0	-	-	-	-
80.0 60.0	0.0	-	0.0	2.1	0.0	-	0.0	0.0	-	-	-	-
80.0 70.0	-	-	-	0.0	-	-	0.4	0.0	-	-	-	-
82.0 47.0	-	-	-	0.0	-	-	3.7	0.0	-	-	-	-
83.0 40.6	-	-	-	0.0	0.0	-	1.4	3.0	-	-	-	-
83.0 42.0	-	-	-	0.0	1.1	-	8.0	3.6	-	-	-	-
83.0 51.0	-	-	-	2.5	-	-	-	0.2	-	-	-	-
83.0 55.0	-	-	-	5.8	-	-	-	0.0	-	-	-	-

TABLE 4. (cont.)

Engraulis mordax (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
87.0 35.0	-	-	-	0.0	0.0	-	0.9	0.3	-	-	-	-
87.0 40.0	-	-	-	0.0	0.2	-	0.0	0.0	-	-	-	-
87.0 45.0	-	-	-	0.0	0.4	-	0.0	0.0	-	-	-	-
87.0 50.0	-	-	-	1.3	-	-	-	0.0	-	-	-	-
90.0 28.0	-	-	-	27.4	0.8	-	0.0	0.0	-	-	-	-
90.0 30.0	-	-	-	68.2	8.0	-	0.0	2.0	-	-	-	-
90.0 37.0	-	-	-	0.2	0.0	-	0.7	0.0	-	-	-	-
90.0 45.0	0.8	0.0	-	0.0	0.0	0.0	-	-	-	-	-	9.4
90.0 60.0	-	12.2	-	-	0.0	0.0	-	0.5	-	-	-	-
93.0 28.0	-	-	8.3	-	0.0	0.2	-	1.5	-	-	-	-
93.0 30.0	-	-	1.5	-	0.0	0.0	-	0.0	-	-	-	-
93.0 40.0	-	-	0.0	-	0.3	0.0	-	0.0	-	-	-	-
97.0 29.0	-	-	-	0.0	-	0.0	-	1.4	-	-	-	-
97.0 30.0	-	-	-	0.4	-	0.6	-	0.0	-	-	-	-
97.0 32.0	-	-	-	0.0	-	2.1	-	0.0	-	-	-	-
97.0 35.0	-	-	-	0.0	-	1.0	-	0.0	-	-	-	-
97.0 40.0	-	-	-	0.0	-	0.3	-	0.0	-	-	-	-
100.0 29.0	-	-	-	17.4	-	0.4	-	0.0	-	-	-	-
100.0 30.0	-	-	-	1.6	-	0.0	-	0.0	-	-	-	-
100.0 40.0	0.0	0.0	-	0.0	-	0.2	-	0.0	-	-	0.0	-
103.0 29.0	-	-	-	0.0	-	1.0	-	0.0	-	-	-	-
103.0 30.0	-	-	-	0.4	-	0.4	-	0.0	-	-	-	-
107.0 31.0	-	-	-	0.4	-	-	0.0	1.9	-	-	-	-
107.0 32.0	-	-	-	72.6	-	0.0	0.0	0.0	-	-	-	-
107.0 35.0	-	-	-	0.3	-	0.0	-	0.0	-	-	-	-
110.0 32.4	-	-	-	2.2	-	0.0	-	2.3	-	-	-	-
110.0 35.0	-	-	-	25.4	-	0.0	-	0.3	-	-	-	-
110.0 40.0	0.0	-	-	0.0	-	0.2	-	0.0	-	-	-	0.0
120.0 30.0	1.1	-	0.0	-	-	-	0.0	0.6	-	-	-	-
120.0 40.0	12.8	-	14.7	-	-	-	0.2	0.0	-	-	-	-
120.0 60.0	0.0	-	0.0	-	-	-	0.0	0.6	-	-	-	-
130.0 30.0	43.9	-	0.0	-	-	-	0.0	0.5	-	-	-	-
130.0 40.0	-	-	0.0	-	-	-	0.0	2.3	-	-	-	-

Nansenia candida

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
100.0 40.0	0.0	0.0	-	0.0	-	0.0	-	0.0	-	-	0.6	-

TABLE 4. (cont.)

***Bathylagus* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
100.0 60.0	0.0	0.0	-	0.2	-	0.0	-	0.0	-	-	0.0	-

***Cyclothone* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.0 80.0	-	-	-	-	-	-	-	0.2	-	-	-	-
117.0 70.0	-	-	-	-	-	-	0.0	0.3	-	-	-	-
137.0 60.0	0.0	-	0.4	-	-	-	0.0	-	-	-	-	-

Cyclothone signata

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 100.0	0.0	0.0	-	0.0	-	0.0	-	0.3	-	-	-	-
90.0 190.0	-	-	-	0.0	-	0.2	-	-	-	-	-	-

Argyropelecus sladeni

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 28.0	-	-	-	0.0	0.0	-	0.2	0.0	-	-	-	-

Vinciguerria lucetia

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.0 55.0	-	-	0.2	-	0.0	0.0	-	0.0	-	-	-	-
93.0 140.0	-	-	-	0.0	-	0.2	-	0.0	-	-	-	-
93.5 29.0	-	-	-	-	-	-	0.2	-	-	-	-	-
100.0 80.0	0.0	0.0	-	-	-	0.3	-	0.0	-	-	-	-
103.0 90.0	-	-	-	-	-	0.0	-	0.3	-	-	-	-
107.0 70.0	-	-	-	-	-	0.3	-	0.0	-	-	-	-
110.0 80.0	0.0	0.0	-	-	-	0.3	-	0.0	-	-	-	-
117.0 60.0	-	-	-	-	-	-	0.0	1.3	-	-	-	-
117.0 70.0	-	-	-	-	-	-	0.0	3.0	-	-	-	-
120.0 80.0	0.3	-	-	-	-	-	0.0	0.0	-	-	-	-

Stomias atriventer

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
120.0 80.0	0.3	-	-	-	-	-	0.0	0.0	-	-	-	-

Bathophilus flemingi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 90.0	-	-	-	0.3	0.0	0.0	-	0.0	-	-	-	-

TABLE 4. (cont.)

Tactostoma macropus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
67.0 65.0	-	-	-	-	-	-	0.3	0.0	-	-	-	-

Aristostomias scintillans

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 80.0	0.0	0.0	-	0.0	0.0	0.2	-	0.0	-	-	-	0.0
90.0 160.0	-	-	-	0.3	-	0.0	-	0.0	-	-	-	-
93.0 170.0	-	-	-	0.8	-	0.0	-	-	-	-	-	-

Myctophidae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
107.0 40.0	-	-	-	0.0	-	0.2	-	0.0	-	-	-	-
133.0 40.0	0.4	-	-	-	-	-	-	-	-	-	-	-

Bolinichthys longipes

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.0 180.0	-	-	-	-	-	-	-	0.3	-	-	-	-
130.0 60.0	-	-	0.0	-	-	-	0.3	0.0	-	-	-	-

Ceratoscopelus townsendi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
73.0 60.0	-	-	-	0.0	0.0	-	0.1	0.0	-	-	-	-
90.0 100.0	0.0	0.0	-	0.2	-	0.0	-	0.0	-	-	-	-
90.0 190.0	-	-	-	0.0	-	0.2	-	-	-	-	-	-
93.0 140.0	-	-	-	0.0	-	0.2	-	0.0	-	-	-	-
93.0 170.0	-	-	-	0.0	-	0.1	-	-	-	-	-	-
93.0 180.0	-	-	-	-	-	-	-	0.3	-	-	-	-
93.0 190.0	-	-	-	0.0	-	0.1	-	-	-	-	-	-
97.0 90.0	-	-	-	0.0	0.0	-	-	0.3	-	-	-	-
110.0 80.0	0.0	0.0	-	-	-	0.3	-	0.0	-	-	-	-
120.0 60.0	0.0	-	0.0	-	-	-	0.3	0.0	-	-	-	-

***Diaphus* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 70.0	-	-	-	0.0	-	-	0.1	0.0	-	-	-	-
87.0 60.0	-	-	-	0.0	0.3	-	-	0.0	-	-	-	-
93.0 180.0	-	-	-	-	-	-	-	0.5	-	-	-	-

TABLE 4. (cont.)

Lampadena urophaos

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
117.0 70.0	-	-	-	-	-	-	0.0	0.3	-	-	-	-
120.0 60.0	0.0	-	0.0	-	-	-	0.0	0.3	-	-	-	-
130.0 60.0	-	-	0.0	-	-	-	0.9	0.0	-	-	-	-

***Lampanyctus* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
63.0 55.0	-	-	-	0.0	-	-	0.1	0.0	-	-	-	-
73.0 60.0	-	-	-	0.0	0.0	-	0.1	0.0	-	-	-	-

Lampanyctus steinbecki

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 190.0	-	-	-	0.0	-	0.2	-	-	-	-	-	-

Nannobrachium regale

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 80.0	-	-	0.0	-	-	-	0.0	0.2	-	-	-	-
87.0 60.0	-	-	-	0.0	0.3	-	-	0.0	-	-	-	-

Nannobrachium ritteri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 70.0	-	-	-	0.0	-	-	0.1	0.0	-	-	-	-
82.0 47.0	-	-	-	0.0	-	-	0.3	0.0	-	-	-	-
90.0 28.0	-	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-

Stenobrachius leucopsarus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
73.0 50.0	-	-	-	0.0	0.2	-	0.0	0.0	-	-	-	-
80.0 55.0	-	-	-	0.2	0.0	-	0.0	0.0	-	-	-	-
97.0 32.0	-	-	-	0.3	-	0.0	-	0.0	-	-	-	-
103.0 30.0	-	-	-	0.0	-	0.3	-	0.0	-	-	-	-

Triphoturus mexicanus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.0 80.0	-	-	-	-	0.0	0.0	-	0.2	-	-	-	-
97.0 45.0	-	-	-	0.0	-	0.3	-	0.0	-	-	-	-
97.0 60.0	-	-	-	-	-	0.3	-	0.0	-	-	-	-
107.0 70.0	-	-	-	-	-	0.3	-	0.0	-	-	-	-

TABLE 4. (cont.)

Merluccius productus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0 65.0	-	-	-	0.3	-	-	0.0	0.0	-	-	-	-
80.0 60.0	0.0	-	1.0	0.0	0.0	-	0.0	0.0	-	-	-	-
83.0 60.0	-	-	-	0.3	-	-	-	0.0	-	-	-	-

Chilara taylori

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
110.0 35.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-

Atherinops affinis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
120.0 40.0	0.0	-	0.0	-	-	-	0.2	0.0	-	-	-	-

Atherinopsis californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
120.0 40.0	0.6	-	0.0	-	-	-	0.0	0.0	-	-	-	-

Leuresthes tenuis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
66.0 49.0	-	-	-	0.0	-	-	0.0	0.3	-	-	-	-
83.0 40.6	-	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-
87.0 35.0	-	-	-	0.0	0.2	-	0.0	0.0	-	-	-	-
90.0 28.0	-	-	-	0.3	8.9	-	0.0	0.0	-	-	-	-
97.0 29.0	-	-	-	0.0	-	84.4	-	0.3	-	-	-	-
97.0 30.0	-	-	-	0.0	-	7.6	-	0.0	-	-	-	-
97.0 32.0	-	-	-	0.0	-	0.5	-	0.0	-	-	-	-
100.0 29.0	-	-	-	0.0	-	12.5	-	0.6	-	-	-	-
100.0 30.0	-	-	-	0.0	-	1.3	-	0.0	-	-	-	-
100.0 35.0	-	-	-	0.0	-	0.3	-	0.0	-	-	-	-
100.0 40.0	0.0	0.0	-	0.0	-	0.2	-	0.0	-	-	0.0	-
100.0 50.0	-	-	-	0.0	-	0.2	-	0.0	-	-	-	-
103.0 29.0	-	-	-	1.4	-	0.0	-	0.6	-	-	-	-
107.0 32.0	-	-	-	0.0	-	0.0	0.2	0.0	-	-	-	-
110.0 35.0	-	-	-	0.2	-	0.0	-	0.0	-	-	-	-

Cololabis saira

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

TABLE 4. (cont.)

Station		*Cololabis saira* (cont.)											
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
63.0	50.0	-	-	-	0.0	-	-	-	0.3	-	-	-	-
63.0	52.0	-	-	-	2.6	-	-	0.0	0.0	-	-	-	-
63.0	65.0	-	-	-	-	-	-	0.3	0.6	-	-	-	-
67.0	50.0	-	-	-	0.4	0.0	-	0.0	0.0	-	-	-	-
67.0	55.0	-	-	-	0.0	0.2	-	0.0	0.0	-	-	-	-
67.0	60.0	-	-	-	0.2	0.0	-	0.0	0.0	-	-	-	-
67.0	65.0	-	-	-	-	-	-	0.0	3.2	-	-	-	-
70.0	60.0	0.0	-	-	0.0	2.5	-	0.0	0.0	-	-	-	-
70.0	65.0	-	-	-	0.6	-	-	0.0	0.2	-	-	-	-
70.0	80.0	-	-	-	-	0.0	-	0.1	0.0	-	-	-	-
73.0	53.0	-	-	-	1.3	0.0	-	0.0	0.0	-	-	-	-
73.0	65.0	-	-	-	2.6	-	-	-	0.0	-	-	-	-
77.0	51.0	-	-	-	10.3	0.0	-	0.0	0.0	-	-	-	-
77.0	55.0	-	-	-	0.2	0.0	-	0.0	0.0	-	-	-	-
80.0	52.0	-	-	-	1.2	-	-	0.0	0.0	-	-	-	-
80.0	55.0	-	-	-	0.2	0.0	-	0.0	0.0	-	-	-	-
80.0	60.0	0.0	-	0.0	0.5	0.0	-	0.0	0.0	-	-	-	-
80.0	70.0	-	-	-	0.2	-	-	0.0	0.0	-	-	-	-
82.0	47.0	-	-	-	1.3	-	-	0.0	0.0	-	-	-	-
83.0	42.0	-	-	-	0.2	0.0	-	0.0	0.0	-	-	-	-
83.0	55.0	-	-	-	0.9	-	-	-	0.0	-	-	-	-
87.0	40.0	-	-	-	0.0	0.0	-	0.0	0.5	-	-	-	-
87.0	60.0	-	-	-	0.0	0.0	-	-	0.2	-	-	-	-
90.0	28.0	-	-	-	0.3	0.3	-	0.0	0.0	-	-	-	-
90.0	30.0	-	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-
90.0	37.0	-	-	-	0.0	0.0	-	0.0	0.3	-	-	-	-
90.0	53.0	-	-	-	-	0.7	0.0	-	0.0	-	-	-	-
90.0	60.0	-	1.0	-	-	0.0	0.0	-	0.7	-	-	-	-
90.0	80.0	0.0	0.0	-	0.0	0.0	0.2	-	0.0	-	-	-	0.2
90.0	100.0	0.3	0.0	-	0.0	-	0.0	-	0.0	-	-	-	-
90.0	130.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
93.0	30.0	-	-	0.0	-	0.5	0.0	-	0.0	-	-	-	-
93.0	35.0	-	-	0.0	-	2.1	0.0	-	0.6	-	-	-	-
93.0	40.0	-	-	0.0	-	0.0	0.0	-	0.2	-	-	-	-
93.0	45.0	-	-	0.0	-	-	-	-	5.9	-	-	-	-

TABLE 4. (cont.)

Station		*Cololabis saira* (cont.)											
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.0	50.0	-	-	0.2	-	0.0	0.0	-	0.0	-	-	-	-
93.0	55.0	-	-	0.0	-	0.0	0.0	-	0.2	-	-	-	-
93.0	60.0	-	-	0.0	-	1.9	-	-	0.0	-	-	-	-
93.0	70.0	-	-	0.0	-	0.0	-	-	0.2	-	-	-	-
93.0	140.0	-	-	-	0.0	-	0.2	-	0.0	-	-	-	-
93.0	190.0	-	-	-	0.3	-	0.0	-	-	-	-	-	-
97.0	29.0	-	-	-	0.4	-	0.0	-	0.0	-	-	-	-
97.0	30.0	-	-	-	0.0	-	0.4	-	0.0	-	-	-	-
97.0	32.0	-	-	-	0.0	-	0.7	-	0.0	-	-	-	-
97.0	35.0	-	-	-	0.0	-	1.1	-	0.0	-	-	-	-
97.0	40.0	-	-	-	0.0	-	2.8	-	0.0	-	-	-	-
97.0	45.0	-	-	-	0.0	-	2.2	-	0.3	-	-	-	-
97.0	50.0	-	-	-	-	-	0.8	-	0.0	-	-	-	-
97.0	55.0	-	-	-	-	-	0.4	-	0.0	-	-	-	-
97.0	60.0	-	-	-	-	-	0.3	-	0.0	-	-	-	-
97.0	70.0	-	-	-	1.2	-	0.0	-	0.0	-	-	-	-
97.0	80.0	-	-	-	0.5	0.2	-	-	0.0	-	-	-	-
97.0	90.0	-	-	-	0.0	0.3	-	-	0.0	-	-	-	-
100.0	30.0	-	-	-	0.0	-	0.0	-	1.2	-	-	-	-
100.0	35.0	-	-	-	0.0	-	0.3	-	0.3	-	-	-	-
100.0	40.0	0.1	0.3	-	0.0	-	0.0	-	0.0	-	-	0.0	-
100.0	45.0	-	-	-	0.0	-	-	-	0.3	-	-	-	-
100.0	50.0	-	-	-	0.0	-	0.4	-	0.7	-	-	-	-
100.0	80.0	0.0	2.4	-	-	-	0.0	-	0.0	-	-	-	-
103.0	29.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
103.0	35.0	-	-	-	0.0	-	0.0	-	2.5	-	-	-	-
103.0	40.0	-	-	-	0.7	-	1.7	-	0.5	-	-	-	-
103.0	45.0	-	-	-	0.0	-	1.2	-	0.3	-	-	-	-
103.0	50.0	-	-	-	1.0	-	48.2	-	0.3	-	-	-	-
103.0	60.0	-	-	-	-	-	1.7	-	0.0	-	-	-	-
103.0	70.0	-	-	-	-	-	0.4	-	0.0	-	-	-	-
103.0	90.0	-	-	-	-	-	0.7	-	0.0	-	-	-	-
107.0	31.0	-	-	-	0.0	-	-	0.0	0.3	-	-	-	-
107.0	32.0	-	-	-	0.0	-	0.0	0.0	1.2	-	-	-	-
107.0	35.0	-	-	-	0.0	-	3.6	-	0.6	-	-	-	-
107.0	40.0	-	-	-	0.0	-	0.7	-	0.0	-	-	-	-

TABLE 4. (cont.)

Cololabis saira (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
107.0 45.0	-	-	-	0.0	-	-	-	0.3	-	-	-	-
107.0 50.0	-	-	-	0.0	-	0.9	-	0.0	-	-	-	-
107.0 60.0	-	-	-	-	-	1.4	-	0.3	-	-	-	-
107.0 70.0	-	-	-	-	-	2.0	-	0.0	-	-	-	-
107.0 80.0	-	-	-	-	-	0.6	-	0.0	-	-	-	-
110.0 35.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
110.0 40.0	0.0	-	-	0.0	-	0.0	-	0.3	-	-	-	0.0
110.0 45.0	-	-	-	0.0	-	12.6	-	0.0	-	-	-	-
110.0 50.0	-	-	-	0.0	-	11.0	-	0.0	-	-	-	-
110.0 60.0	0.0	0.0	-	-	-	0.2	-	0.0	-	-	-	0.0
110.0 80.0	0.4	0.4	-	-	-	0.0	-	0.3	-	-	-	-
117.0 60.0	-	-	-	-	-	-	0.4	0.0	-	-	-	-
117.0 70.0	-	-	-	-	-	-	0.3	0.0	-	-	-	-
117.0 80.0	-	-	-	-	-	-	0.8	0.0	-	-	-	-
120.0 60.0	0.0	-	1.1	-	-	-	5.4	0.0	-	-	-	-
130.0 60.0	-	-	0.0	-	-	-	0.3	0.0	-	-	-	-
137.0 60.0	0.0	-	0.4	-	-	-	0.0	-	-	-	-	-

Exocoetidae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
97.0 35.0	-	-	-	0.0	-	1.1	-	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	1.5	-	-	-	-
90.0 37.0	-	-	-	0.0	0.0	-	0.0	0.3	-	-	-	-
93.0 35.0	-	-	0.0	-	0.0	0.0	-	0.3	-	-	-	-
97.0 45.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
103.0 40.0	-	-	-	0.0	-	0.2	-	0.0	-	-	-	-
113.0 50.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
113.0 60.0	-	-	-	-	-	0.0	-	0.6	-	-	-	-
113.0 70.0	-	-	-	-	-	0.0	-	0.3	-	-	-	-
117.0 80.0	-	-	-	-	-	-	0.3	0.0	-	-	-	-
120.0 60.0	0.0	-	0.0	-	-	-	0.3	0.0	-	-	-	-
137.0 40.0	0.0	-	0.4	-	-	-	0.0	0.0	-	-	-	-

TABLE 4. (cont.)

***Exocoetus* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
137.0 40.0	0.0	-	0.0	-	-	-	0.0	0.3	-	-	-	-

Fodiator acutus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
120.0 40.0	0.0	-	0.0	-	-	-	0.0	1.5	-	-	-	-

***Hirundichthys* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
137.0 40.0	0.0	-	0.0	-	-	-	0.0	0.3	-	-	-	-

Hirundichthys marginatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.0 110.0	-	-	-	0.0	-	-	-	0.3	-	-	-	-
93.0 180.0	-	-	-	-	-	-	-	0.3	-	-	-	-
100.0 40.0	0.0	0.0	-	0.0	-	0.0	-	0.3	-	-	0.0	-
107.0 35.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-

Macroramphosus gracilis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
110.0 40.0	0.6	-	-	0.0	-	0.0	-	0.0	-	-	-	0.0
110.0 60.0	0.0	0.3	-	-	-	0.0	-	0.0	-	-	-	0.0

***Sebastes* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
60.0 55.0	-	-	-	0.2	2.3	-	-	0.0	-	-	-	-
60.0 60.0	-	-	-	0.0	0.3	-	-	0.0	-	-	-	-
63.0 50.0	-	-	-	0.3	-	-	-	0.3	-	-	-	-
63.0 52.0	-	-	-	0.3	-	-	0.3	0.0	-	-	-	-
63.0 55.0	-	-	-	1.1	-	-	0.0	0.0	-	-	-	-
63.0 65.0	-	-	-	-	-	-	0.0	0.3	-	-	-	-
67.0 50.0	-	-	-	0.0	0.0	-	17.2	0.0	-	-	-	-
67.0 65.0	-	-	-	-	-	-	0.3	0.0	-	-	-	-
70.0 53.0	-	-	-	0.5	0.0	-	-	0.0	-	-	-	-
70.0 60.0	0.0	-	-	0.0	0.6	-	0.0	0.0	-	-	-	-
73.0 50.0	-	-	-	0.0	2.5	-	0.0	0.0	-	-	-	-
77.0 51.0	-	-	-	1.2	0.2	-	0.0	0.0	-	-	-	-
77.0 55.0	-	-	-	0.6	0.3	-	1.0	0.0	-	-	-	-

TABLE 4. (cont.)

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

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
77.0	60.0	-	-	-	-	0.0	-	0.0	0.3	-	-	-	-
80.0	51.0	-	-	-	0.0	0.2	-	-	0.2	-	-	-	-
80.0	52.0	-	-	-	0.0	-	-	0.0	0.3	-	-	-	-
80.0	60.0	0.0	-	0.0	2.6	0.5	-	0.2	0.0	-	-	-	-
83.0	40.6	-	-	-	0.0	0.2	-	0.0	0.0	-	-	-	-
83.0	55.0	-	-	-	0.2	-	-	-	0.0	-	-	-	-
93.0	28.0	-	-	0.0	-	0.0	0.0	-	0.3	-	-	-	-
93.0	50.0	-	-	0.4	-	0.0	0.0	-	1.4	-	-	-	-
97.0	40.0	-	-	-	0.3	-	0.3	-	0.0	-	-	-	-
100.0	29.0	-	-	-	0.0	-	0.4	-	0.0	-	-	-	-
100.0	35.0	-	-	-	0.0	-	0.3	-	0.0	-	-	-	-
103.0	30.0	-	-	-	0.2	-	0.0	-	0.0	-	-	-	-
107.0	32.0	-	-	-	2.0	-	0.0	0.0	0.0	-	-	-	-

Sebastes aurora

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0	60.0	0.0	-	-	0.0	0.0	-	0.2	0.0	-	-	-	-
77.0	51.0	-	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-
80.0	70.0	-	-	-	0.0	-	-	0.1	0.0	-	-	-	-
87.0	60.0	-	-	-	0.0	0.3	-	-	0.0	-	-	-	-

Sebastes diploproa

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
63.0	52.0	-	-	-	0.0	-	-	0.0	2.1	-	-	-	-
63.0	55.0	-	-	-	0.0	-	-	0.0	1.9	-	-	-	-
66.0	49.0	-	-	-	0.0	-	-	0.0	0.3	-	-	-	-
67.0	55.0	-	-	-	0.0	0.0	-	0.5	0.0	-	-	-	-
67.0	65.0	-	-	-	-	-	-	0.0	4.3	-	-	-	-
70.0	60.0	0.0	-	-	0.0	0.0	-	0.0	0.3	-	-	-	-
70.0	65.0	-	-	-	0.0	-	-	0.0	0.2	-	-	-	-
73.0	50.0	-	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-
77.0	51.0	-	-	-	0.0	0.0	-	0.2	0.2	-	-	-	-
80.0	60.0	0.0	-	0.0	0.0	0.0	-	0.5	0.0	-	-	-	-
97.0	29.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-

TABLE 4. (cont.)

Sebastes jordani

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
60.0 52.5	-	-	-	0.0	0.3	-	-	0.0	-	-	-	-
63.0 55.0	-	-	-	0.5	-	-	0.0	0.0	-	-	-	-
73.0 50.0	-	-	-	0.0	0.2	-	0.0	0.0	-	-	-	-

Sebastes levis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
87.0 60.0	-	-	-	0.0	0.3	-	-	0.0	-	-	-	-

Zaniolepis frenata

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
100.0 30.0	-	-	-	0.2	-	0.0	-	0.0	-	-	-	-

***Hexagrammos* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0 51.0	-	-	-	0.5	0.0	-	0.0	0.0	-	-	-	-

Ophiodon elongatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
107.0 32.0	-	-	-	0.5	-	0.0	0.0	0.0	-	-	-	-

Leptocottus armatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
70.0 51.0	-	-	-	0.5	0.0	-	0.0	0.0	-	-	-	-

Scorpaenichthys marmoratus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
63.0 50.0	-	-	-	0.3	-	-	-	0.0	-	-	-	-
63.0 52.0	-	-	-	3.6	-	-	0.0	0.0	-	-	-	-
63.0 55.0	-	-	-	0.8	-	-	0.0	0.0	-	-	-	-
67.0 50.0	-	-	-	0.4	0.0	-	0.0	0.0	-	-	-	-
77.0 51.0	-	-	-	5.2	0.0	-	0.0	0.0	-	-	-	-
80.0 60.0	0.0	-	0.0	0.5	0.0	-	0.0	0.0	-	-	-	-
83.0 40.6	-	-	-	0.0	0.7	-	0.0	0.0	-	-	-	-
90.0 45.0	0.0	0.0	-	0.3	0.0	0.0	-	-	-	-	-	0.0
90.0 60.0	-	0.2	-	-	0.0	0.0	-	0.0	-	-	-	-

***Paralabrax* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
97.0 30.0	-	-	-	0.0	-	0.0	-	1.7	-	-	-	-

TABLE 4. (cont.)

***Paralabrax* spp.** (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
110.0 32.4	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
137.0 30.0	0.0	-	0.0	-	-	-	0.0	0.6	-	-	-	-

Seriola lalandi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
107.0 80.0	-	-	-	-	-	0.3	-	0.0	-	-	-	-
117.0 70.0	-	-	-	-	-	-	0.3	0.0	-	-	-	-

Trachurus symmetricus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
63.0 55.0	-	-	-	0.0	-	-	0.4	0.0	-	-	-	-
67.0 60.0	-	-	-	0.0	0.7	-	0.0	0.0	-	-	-	-
70.0 53.0	-	-	-	0.0	0.3	-	-	0.0	-	-	-	-
70.0 65.0	-	-	-	0.0	-	-	0.2	0.0	-	-	-	-
73.0 53.0	-	-	-	0.0	7.4	-	0.0	0.0	-	-	-	-
77.0 55.0	-	-	-	0.0	1.5	-	0.0	0.0	-	-	-	-
80.0 55.0	-	-	-	0.2	0.0	-	0.0	0.0	-	-	-	-
80.0 60.0	0.0	-	0.3	0.0	0.0	-	0.0	0.0	-	-	-	-
83.0 51.0	-	-	-	0.2	-	-	-	0.0	-	-	-	-
83.0 70.0	-	-	-	0.2	-	-	-	0.0	-	-	-	-
87.0 40.0	-	-	-	0.0	0.5	-	0.0	0.0	-	-	-	-
87.0 45.0	-	-	-	0.0	0.0	-	0.2	0.0	-	-	-	-
87.0 50.0	-	-	-	0.2	-	-	-	0.0	-	-	-	-
87.0 60.0	-	-	-	0.8	0.0	-	-	0.0	-	-	-	-
87.0 70.0	-	-	-	0.9	-	-	-	0.0	-	-	-	-
90.0 28.0	-	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-
90.0 30.0	-	-	-	0.0	0.3	-	0.0	0.0	-	-	-	-
90.0 37.0	-	-	-	0.0	0.0	-	0.7	0.0	-	-	-	-
90.0 45.0	0.0	0.0	-	0.0	0.0	0.8	-	-	-	-	-	0.0
90.0 60.0	-	1.7	-	-	0.0	0.0	-	0.0	-	-	-	-
93.0 40.0	-	-	0.0	-	0.3	0.6	-	0.0	-	-	-	-
93.0 45.0	-	-	0.3	-	-	-	-	0.0	-	-	-	-
93.0 50.0	-	-	0.4	-	0.0	1.1	-	0.0	-	-	-	-
93.0 55.0	-	-	0.6	-	0.0	0.0	-	0.0	-	-	-	-
97.0 30.0	-	-	-	0.0	-	0.4	-	0.0	-	-	-	-
97.0 40.0	-	-	-	3.8	-	0.2	-	0.0	-	-	-	-
97.0 45.0	-	-	-	0.5	-	0.5	-	0.0	-	-	-	-

TABLE 4. (cont.)

Trachurus symmetricus (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
97.0 50.0	-	-	-	-	-	2.1	-	0.0	-	-	-	-
100.0 35.0	-	-	-	0.2	-	0.0	-	0.0	-	-	-	-
100.0 45.0	-	-	-	0.4	-	-	-	0.0	-	-	-	-
100.0 50.0	-	-	-	0.2	-	0.0	-	0.0	-	-	-	-
103.0 35.0	-	-	-	1.0	-	0.0	-	0.0	-	-	-	-
103.0 45.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
103.0 50.0	-	-	-	0.5	-	0.0	-	0.0	-	-	-	-
107.0 32.0	-	-	-	0.0	-	0.0	0.0	0.2	-	-	-	-
107.0 45.0	-	-	-	1.0	-	-	-	0.0	-	-	-	-
110.0 50.0	-	-	-	0.2	-	0.0	-	0.0	-	-	-	-

***Eucinostomus* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
120.0 40.0	0.0	-	0.0	-	-	-	0.0	0.6	-	-	-	-

Anisotremus davidsoni

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
110.0 32.4	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-

Xenistius californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
97.0 29.0	-	-	-	0.0	-	0.0	-	0.7	-	-	-	-
120.0 40.0	0.0	-	0.0	-	-	-	0.2	0.0	-	-	-	-

Sciaenidae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
107.0 32.0	-	-	-	0.0	-	0.0	0.0	0.2	-	-	-	-

Genyonemus lineatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
63.0 50.0	-	-	-	0.8	-	-	-	0.0	-	-	-	-
97.0 32.0	-	-	-	0.0	-	0.3	-	0.0	-	-	-	-

Seriphus politus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 28.0	-	-	-	1.1	0.0	-	0.0	2.0	-	-	-	-
90.0 30.0	-	-	-	0.3	0.0	-	0.0	0.0	-	-	-	-

TABLE 4. (cont.)

Seriphus politus (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
103.0 30.0	-	-	-	0.4	-	0.0	-	0.0	-	-	-	-
107.0 31.0	-	-	-	0.2	-	-	0.0	0.0	-	-	-	-

Girella nigricans

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.0 40.6	-	-	-	0.0	0.2	-	0.0	0.0	-	-	-	-
90.0 28.0	-	-	-	0.0	3.5	-	0.0	0.0	-	-	-	-
90.0 30.0	-	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-
90.0 60.0	-	0.0	-	-	0.0	0.0	-	0.2	-	-	-	-
93.0 40.0	-	-	0.0	-	0.6	0.0	-	0.0	-	-	-	-
93.0 55.0	-	-	0.0	-	0.0	0.2	-	0.0	-	-	-	-
97.0 50.0	-	-	-	-	-	0.3	-	0.0	-	-	-	-
100.0 90.0	-	-	-	-	-	0.0	-	0.7	-	-	-	-
120.0 30.0	0.4	-	0.0	-	-	-	0.0	0.0	-	-	-	-

Hermosilla azurea

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 28.0	-	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-
130.0 30.0	0.0	-	0.0	-	-	-	0.9	0.0	-	-	-	-

Medialuna californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
67.0 65.0	-	-	-	-	-	-	0.0	1.4	-	-	-	-
87.0 55.0	-	-	-	0.0	0.0	-	-	0.9	-	-	-	-
93.0 45.0	-	-	0.0	-	-	-	-	0.5	-	-	-	-
93.0 50.0	-	-	0.0	-	0.0	0.0	-	0.3	-	-	-	-
97.0 50.0	-	-	-	-	-	0.0	-	0.6	-	-	-	-
97.0 55.0	-	-	-	-	-	0.3	-	0.0	-	-	-	-
100.0 45.0	-	-	-	0.0	-	-	-	0.3	-	-	-	-

Chromis punctipinnis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.0 51.0	-	-	-	0.0	-	-	-	0.2	-	-	-	-
90.0 37.0	-	-	-	0.0	0.0	-	0.2	0.0	-	-	-	-
93.0 28.0	-	-	0.0	-	0.0	0.0	-	0.3	-	-	-	-
97.0 55.0	-	-	-	-	-	0.3	-	0.0	-	-	-	-
110.0 32.4	-	-	-	0.0	-	0.0	-	9.2	-	-	-	-

TABLE 4. (cont.)

Chromis punctipinnis (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
110.0 35.0	-	-	-	0.0	-	0.0	-	1.1	-	-	-	-

Halichoeres semicinctus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
113.0 50.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
120.0 60.0	0.0	-	0.0	-	-	-	0.0	0.3	-	-	-	-

Oxyjulis californica

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
82.0 47.0	-	-	-	0.0	-	-	0.3	0.0	-	-	-	-
83.0 42.0	-	-	-	0.0	0.0	-	0.5	0.0	-	-	-	-
83.0 51.0	-	-	-	0.2	-	-	-	1.7	-	-	-	-
87.0 40.0	-	-	-	0.0	0.0	-	0.0	0.9	-	-	-	-
87.0 45.0	-	-	-	0.0	0.2	-	0.2	0.0	-	-	-	-
87.0 60.0	-	-	-	0.0	0.5	-	-	0.0	-	-	-	-
90.0 45.0	0.0	0.0	-	0.0	0.0	0.1	-	-	-	-	-	0.0
93.0 50.0	-	-	0.0	-	0.0	0.2	-	0.0	-	-	-	-
97.0 45.0	-	-	-	0.0	-	0.3	-	0.0	-	-	-	-
100.0 35.0	-	-	-	0.0	-	0.5	-	0.0	-	-	-	-
107.0 31.0	-	-	-	0.0	-	-	0.0	2.2	-	-	-	-
107.0 32.0	-	-	-	0.0	-	0.0	0.0	0.7	-	-	-	-

Semicossyphus pulcher

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
107.0 32.0	-	-	-	0.0	-	0.0	0.0	1.6	-	-	-	-
110.0 32.4	-	-	-	0.0	-	0.0	-	0.6	-	-	-	-
113.0 50.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-

Labrisomidae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.0 42.0	-	-	-	0.0	0.0	-	0.5	0.0	-	-	-	-

Cryptotrema corallinum

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
110.0 32.4	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-

TABLE 4. (cont.)

Labrisomus multiporosus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
130.0 30.0	0.0	-	0.0	-	-	-	4.7	0.5	-	-	-	-

Labrisomus xanti

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
120.0 30.0	0.0	-	0.0	-	-	-	0.3	0.0	-	-	-	-

Chaenopsidae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
120.0 40.0	0.0	-	0.0	-	-	-	0.2	0.0	-	-	-	-

***Hypsoblennius* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.0 40.6	-	-	-	0.0	0.0	-	0.0	0.9	-	-	-	-
87.0 40.0	-	-	-	0.0	0.0	-	0.0	0.5	-	-	-	-
90.0 28.0	-	-	-	0.0	0.0	-	0.5	4.5	-	-	-	-
90.0 30.0	-	-	-	0.0	0.3	-	0.0	0.7	-	-	-	-
93.0 28.0	-	-	0.0	-	0.0	7.1	-	3.6	-	-	-	-
97.0 29.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
97.0 30.0	-	-	-	0.0	-	0.0	-	2.6	-	-	-	-
100.0 29.0	-	-	-	0.2	-	0.0	-	0.0	-	-	-	-
110.0 32.4	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
130.0 30.0	0.0	-	0.0	-	-	-	0.0	1.3	-	-	-	-
137.0 30.0	0.0	-	0.0	-	-	-	0.0	3.2	-	-	-	-

Hypsoblennius gentilis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.0 28.0	-	-	0.0	-	0.0	0.0	-	0.3	-	-	-	-
103.0 29.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
107.0 31.0	-	-	-	0.0	-	-	0.0	8.7	-	-	-	-
110.0 32.4	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
120.0 30.0	0.0	-	0.0	-	-	-	0.0	0.3	-	-	-	-
120.0 40.0	0.6	-	0.6	-	-	-	0.0	0.0	-	-	-	-
130.0 30.0	0.4	-	0.0	-	-	-	0.0	0.3	-	-	-	-

Hypsoblennius gilberti

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.0 40.6	-	-	-	0.0	0.2	-	0.0	6.7	-	-	-	-

TABLE 4. (cont.)

Hypsoblennius gilberti (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.0 42.0	-	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-
87.0 35.0	-	-	-	0.0	0.0	-	0.2	0.0	-	-	-	-
90.0 30.0	-	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-
93.0 40.0	-	-	0.0	-	1.4	0.0	-	0.0	-	-	-	-
97.0 29.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
97.0 30.0	-	-	-	0.0	-	0.0	-	0.9	-	-	-	-
110.0 32.4	-	-	-	0.0	-	0.0	-	1.4	-	-	-	-
110.0 35.0	-	-	-	0.0	-	0.0	-	1.4	-	-	-	-
120.0 30.0	0.4	-	0.0	-	-	-	0.0	0.0	-	-	-	-

Hypsoblennius jenkinsi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.0 40.6	-	-	-	0.0	0.0	-	0.0	0.7	-	-	-	-
87.0 35.0	-	-	-	0.0	0.0	-	4.6	0.0	-	-	-	-
90.0 28.0	-	-	-	0.8	1.8	-	0.0	0.0	-	-	-	-
90.0 30.0	-	-	-	0.0	0.0	-	0.0	3.5	-	-	-	-
93.0 28.0	-	-	0.2	-	0.0	0.0	-	11.9	-	-	-	-
93.0 45.0	-	-	0.0	-	-	-	-	0.2	-	-	-	-
97.0 29.0	-	-	-	0.0	-	0.0	-	1.0	-	-	-	-
97.0 32.0	-	-	-	0.0	-	0.0	-	0.4	-	-	-	-
97.0 35.0	-	-	-	0.0	-	2.3	-	0.0	-	-	-	-
100.0 30.0	-	-	-	0.0	-	0.0	-	1.2	-	-	-	-
100.0 40.0	0.0	0.0	-	0.0	-	0.2	-	0.0	-	-	0.0	-
103.0 29.0	-	-	-	0.0	-	0.2	-	0.6	-	-	-	-
107.0 31.0	-	-	-	0.0	-	-	0.0	3.0	-	-	-	-
110.0 40.0	0.0	-	-	0.0	-	0.2	-	0.0	-	-	-	0.0
113.0 50.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
120.0 30.0	0.0	-	0.0	-	-	-	0.3	0.0	-	-	-	-
120.0 40.0	1.2	-	0.0	-	-	-	0.0	0.0	-	-	-	-
130.0 30.0	0.0	-	0.0	-	-	-	0.0	0.3	-	-	-	-
130.0 40.0	-	-	0.0	-	-	-	0.3	15.2	-	-	-	-
137.0 30.0	0.0	-	0.0	-	-	-	0.8	0.0	-	-	-	-

Coryphopterus nicholsii

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
63.0 55.0	-	-	-	0.3	-	-	0.0	0.0	-	-	-	-

TABLE 4. (cont.)

Coryphopterus nicholsii (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 52.0	-	-	-	0.0	-	-	0.0	0.3	-	-	-	-
80.0 55.0	-	-	-	0.0	0.2	-	0.0	0.0	-	-	-	-

Lepidogobius lepidus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
63.0 50.0	-	-	-	0.5	-	-	-	0.0	-	-	-	-

Sphyraena argentea

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 28.0	-	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-
93.0 28.0	-	-	0.0	-	0.0	0.0	-	0.3	-	-	-	-
97.0 29.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-

Euthynnus lineatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
120.0 60.0	0.0	-	0.0	-	-	-	0.3	0.0	-	-	-	-

Scomber japonicus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
82.0 47.0	-	-	-	0.0	-	-	0.3	0.0	-	-	-	-
83.0 40.6	-	-	-	0.0	0.2	-	0.3	1.2	-	-	-	-
83.0 42.0	-	-	-	0.0	0.2	-	10.8	0.0	-	-	-	-
87.0 35.0	-	-	-	0.0	0.0	-	1.8	0.0	-	-	-	-
87.0 40.0	-	-	-	0.0	0.2	-	0.0	0.0	-	-	-	-
87.0 45.0	-	-	-	0.0	0.0	-	0.0	0.3	-	-	-	-
90.0 28.0	-	-	-	0.3	0.0	-	0.0	1.2	-	-	-	-
90.0 30.0	-	-	-	0.0	0.6	-	0.0	0.0	-	-	-	-
90.0 37.0	-	-	-	0.0	0.2	-	1.3	0.0	-	-	-	-
90.0 45.0	0.0	0.0	-	0.0	0.0	0.5	-	-	-	-	-	0.0
93.0 28.0	-	-	0.0	-	0.0	1.7	-	0.0	-	-	-	-
93.0 40.0	-	-	0.0	-	0.3	0.0	-	0.0	-	-	-	-
93.0 60.0	-	-	0.0	-	0.0	-	-	0.3	-	-	-	-
93.5 29.0	-	-	-	-	-	-	0.2	-	-	-	-	-
97.0 30.0	-	-	-	0.0	-	0.2	-	0.0	-	-	-	-
97.0 32.0	-	-	-	0.0	-	0.0	-	0.8	-	-	-	-
97.0 35.0	-	-	-	0.0	-	2.9	-	0.0	-	-	-	-
97.0 50.0	-	-	-	-	-	0.6	-	0.0	-	-	-	-

TABLE 4. (cont.)

Scomber japonicus (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
103.0 29.0	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
107.0 31.0	-	-	-	0.0	-	-	0.0	0.8	-	-	-	-
107.0 32.0	-	-	-	0.0	-	0.0	0.0	21.3	-	-	-	-
110.0 32.4	-	-	-	0.0	-	0.0	-	3.2	-	-	-	-
120.0 30.0	0.0	-	0.0	-	-	-	1.9	0.0	-	-	-	-
120.0 40.0	0.0	-	0.0	-	-	-	0.2	0.0	-	-	-	-
120.0 60.0	0.0	-	0.0	-	-	-	0.0	0.3	-	-	-	-
130.0 30.0	0.0	-	0.0	-	-	-	0.0	0.3	-	-	-	-

Icichthys lockingtoni

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
73.0 50.0	-	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-
80.0 70.0	-	-	-	0.0	-	-	0.1	0.0	-	-	-	-
90.0 60.0	-	0.2	-	-	0.3	0.0	-	0.0	-	-	-	-

Tetragonurus cuvieri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 70.0	-	-	-	-	0.0	0.0	-	0.2	-	-	-	-
137.0 60.0	0.0	-	0.0	-	-	-	0.3	-	-	-	-	-

Peprilus simillimus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
63.0 50.0	-	-	-	1.3	-	-	-	0.3	-	-	-	-
80.0 70.0	-	-	-	0.0	-	-	0.1	0.0	-	-	-	-
83.0 40.6	-	-	-	0.0	0.2	-	0.0	0.0	-	-	-	-
83.0 42.0	-	-	-	0.0	0.2	-	0.0	0.0	-	-	-	-
90.0 30.0	-	-	-	0.3	0.0	-	0.0	0.0	-	-	-	-
107.0 31.0	-	-	-	0.0	-	-	0.0	1.6	-	-	-	-

***Citharichthys* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.0 51.0	-	-	-	0.0	-	-	-	0.2	-	-	-	-

Citharichthys sordidus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 55.0	-	-	-	0.2	0.0	-	0.0	0.0	-	-	-	-
83.0 51.0	-	-	-	0.2	-	-	-	0.0	-	-	-	-

TABLE 4. (cont.)

Citharichthys stigmaeus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
77.0 51.0	-	-	-	0.0	0.0	-	0.0	0.5	-	-	-	-
80.0 52.0	-	-	-	0.0	-	-	0.0	0.3	-	-	-	-
100.0 40.0	0.0	0.0	-	0.2	-	0.0	-	0.0	-	-	0.0	-
107.0 31.0	-	-	-	0.0	-	-	0.0	0.3	-	-	-	-

Hippoglossina stomata

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.0 42.0	-	-	-	0.0	0.2	-	0.0	0.0	-	-	-	-

Paralichthys californicus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
63.0 50.0	-	-	-	0.5	-	-	-	0.0	-	-	-	-
110.0 32.4	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-

***Pleuronichthys* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
120.0 40.0	0.0	-	0.6	-	-	-	0.0	0.0	-	-	-	-

Pleuronichthys coenosus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
77.0 51.0	-	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-
83.0 42.0	-	-	-	0.0	0.0	-	0.3	0.0	-	-	-	-
90.0 60.0	-	0.0	-	-	0.0	0.0	-	0.2	-	-	-	-

Pleuronichthys ritteri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.0 40.6	-	-	-	0.0	0.4	-	0.0	0.0	-	-	-	-

Pleuronichthys verticalis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.0 42.0	-	-	-	0.0	0.2	-	0.0	0.0	-	-	-	-

Unidentified fish larvae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
60.0 55.0	-	-	-	0.0	0.0	-	-	0.2	-	-	-	-
80.0 51.0	-	-	-	0.0	0.4	-	-	0.0	-	-	-	-
83.0 40.6	-	-	-	0.0	0.0	-	0.0	0.5	-	-	-	-
90.0 30.0	-	-	-	0.0	0.0	-	0.6	0.2	-	-	-	-

TABLE 4. (cont.)

Station		Unidentified fish larvae (cont.)											
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
97.0	30.0	-	-	-	0.0	-	0.0	-	0.9	-	-	-	-
100.0	30.0	-	-	-	0.2	-	0.0	-	0.0	-	-	-	-
103.0	45.0	-	-	-	0.0	-	0.0	-	0.5	-	-	-	-
107.0	32.0	-	-	-	0.0	-	0.0	0.0	0.2	-	-	-	-
110.0	32.4	-	-	-	0.0	-	0.0	-	0.3	-	-	-	-
130.0	60.0	-	-	0.0	-	-	-	0.0	0.3	-	-	-	-
137.0	30.0	0.0	-	0.0	-	-	-	0.0	1.0	-	-	-	-

PHYLOGENETIC INDEX TO TABLE 4

ALPHABETICAL INDEX TO TABLE 4

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