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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 1989. It is the eighth report in a series that presents surface tow data for all biological-oceanographic CalCOFI surveys from 1977 to the present. A total of 270 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 261 Manta net tows was taken during 1989. 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 87 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 eighth 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 1989. 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 1989 CalCOFI survey are published in Ambrose et al. (1999). Ahlstrom and Stevens (1976), Gruber et al. (1982) and Doyle (1992a, b) provided initial information

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

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

Hydrographic and biological data from the 1989 CalCOFI survey were published by the Scripps Institution of Oceanography (Univ. of Calif., SIO 1989, 1990). All available records for Manta tows on the 1989 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	1986	Charter et al. 2002b
1980-81	Ambrose et al. 2002a	1987	Sandknop et al. 2002a
1984	Charter et al. 2002a	1988	Watson et al. 2002
1985	Ambrose et al. 2002b		

SAMPLING AREA AND PATTERN

The 1989 CalCOFI survey consisted of four quarterly cruises on which a total of 261 Manta net tows was taken at the 270 standard CalCOFI net tow stations occupied on the survey (Table 1; Figures 2 and 3). Two vessels were employed on the survey, the NOAA vessel RV *David Starr Jordan* and the SIO vessel RV *New Horizon*. Dates and numbers of stations sampled with the Manta net in 1989 (Figures 2 and 3) are summarized below:

8901, RV *David Starr Jordan*, 61 stations, January 20–February 3;

8904, RV *David Starr Jordan*, 76 stations, April 16–30;

8907, RV *New Horizon*, 58 stations, July 18–August 1;

8911, RV *New Horizon*, 66 stations, November 6–19.

The survey area extended from Avila Beach to San Diego, California and seaward on six survey lines to approximately 120–330 n. mi. (Figures 2 and 3). The most seaward station, 90.0 120.0, was approximately 400 n. mi. west of Punta Baja, Baja California, Mexico. Stations on CalCOFI lines 76.7 and 80.0 extended seaward to station 100.0, stations on lines 83.3 and 86.7 extended seaward to station 110.0, and stations on lines 90.0 and 93.3 extended seaward to station 120.0 on all cruises except 8907, when a Manta tow was not taken at station 120.0 on line 90.0 and station 70.0 was the most seaward Manta tow station on line 93.3 (Figures 2 and 3). On line 76.7, Cruise 8904, five non-standard CalCOFI stations had Manta tows without accompanying oblique tows: stations 51.6, 55.6, 59.1 (7 tows), 59.8, and 61.6 (Table 1, Figure 2).

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 87 larval fish categories (including the disintegrated and unidentified categories) was identified: 72 to species, 12 to genus, and 1 to family.

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

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

Nannobrachium – Zahuranec (2000) moved the subgroup of *Lampanyctus* characterized by small or absent pectoral fins in adults to the genus *Nannobrachium*; two *Nannobrachium* species, *N. ritteri* (formerly *L. ritteri*) and *N. regale* (formerly *L. regalis*), occur commonly in the present CalCOFI survey pattern; larvae of these species > ~ 5 mm have been identified in oblique tow samples since

1954; beginning in 1985, larvae of two other species, *N. bristori* and *N. hawaiiensis*, have been identified and included in the CalCOFI data base for oblique tows; in previous oblique tow data reports these were referred to as *Lampanyctus* "niger" and *Lampanyctus* "no pectorals", respectively (see Moser 1996).

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

SPECIES SUMMARY

Of the five most abundant larvae, northern anchovy (*Engraulis mordax*) ranked first in abundance with 42.8% of the total fish larvae and first in occurrence with larvae collected in 36.4% of the total samples. (Tables 2 and 3). They were approximately one and one-half times more abundant than the second most abundant species, Pacific sardine (*Sardinops sagax*), which had 22.4% of the total larvae and ranked fourth in occurrence (18.4% of the total samples). Kelp greenling (*Hexagrammos decagrammus*) was the third most abundant taxon with 9.8% of the total larvae and ranked tied for 24th in frequency of occurrence (1.9% of the samples). Mussel blenny (*Hypsoblennius jenkinsi*) ranked fourth in abundance (9.5% of total larvae) and tied for ninth in total occurrences (6.1% of the samples). The rockfish genus *Sebastes* ranked fifth in abundance (2.5% of total larvae) and third in total occurrences (24.5% of the samples). The next five most abundant taxa were Pacific mackerel *Scomber japonicus* (2.0% of total larvae), Pacific saury *Cololabis saira* (2.0%), cabezon *Scorpaenichthys marmoratus* (1.1%), jack mackerel *Trachurus symmetricus* (1.1%), and salema *Xenistius californiensis* (1.1%). These species ranked tied for 7th, 2nd, 5th, tied for 7th, and tied for 31st in frequency of occurrence, respectively. The 10 most abundant taxa comprised 94.3% of all the larvae collected in Manta net tows on CalCOFI cruises in 1989. The remaining 5.7% was distributed among 77 other taxa. Of the ten most abundant taxa, half were coastal demersal taxa, four were coastal pelagic species, and one was epipelagic.

In contrast to the surface collections, among the 147 taxa collected in the oblique tows during the 1989 survey, Pacific hake *Merluccius productus* ranked first in abundance (30.4% of the total), followed by northern anchovy (24.3%), the rockfish genus Sebastes (8.8%), and Pacific sardine (6.1%). Pacific saury were not collected in the oblique samples and none of the mesopelagic blacksmelt species occurred in the Manta collections (Ambrose et al. 1999).

EXPLANATION OF TABLES

Table 1. This table lists for each tow the pertinent station and tow data, the volume of water filtered, and the total number of fish eggs and larvae for ichthyoplankton stations occupied during the 1989 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 RV *New Horizon* during the 1989 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 RV *New Horizon* during the 1989 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 RV *New Horizon* during the 1989 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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LITERATURE CITED

Ahlstrom, E. H. and E. G. Stevens. 1976. Report of neuston (surface) collections made on an extended CalCOFI cruise during May 1972. Calif. Coop. Oceanic Fish. Invest. Rep. 18:167–180.

Ambrose, D. A., R. L. Charter, and H. G. Moser. 1999. Ichthyoplankton and station data for California Cooperative Oceanic Fisheries Investigations survey cruises in 1989. U.S. Dep. Commer., NOAA Tech. Memo., NOAA-TM-NMFS-SWFSC-270. 87 pp.

Ambrose, D. A., R. L. Charter, and H. G. Moser. 2002a. Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations survey cruises in 1980-81. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-319. 100 pp.

Ambrose, D. A., R. L. Charter, and H. G. Moser. 2002b. Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations survey cruises in 1985. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-321. 36 pp.

Banse, K. 1975. Pleuston and neuston: on the categories of organisms in the uppermost pelagial. Int. Rev. ges. Hydrobiol. 60(4):439–447.

Brown, D. M. and L. Cheng. 1981. New net for sampling the ocean surface. Mar. Ecol. Prog. Ser. 5:224–227.

Charter, S. R, R. L. Charter, and H. G. Moser. 2002a. Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations survey cruises in 1984. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-320. 84 pp.

Charter, S. R, R. L. Charter, and H. G. Moser. 2002b. Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations survey cruises in 1986. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-322. 40 pp.

Doyle, M. J. 1992a. Patterns in distribution and abundance of ichthyoplankton off Washington, Oregon, and northern California (1980–1987). U.S. Dep. Commer., Nat. Mar. Fish. Serv., Alaska Fish. Sci. Ctr. Proc. Rep. 92-14. 344 pp.

Doyle, M. J. 1992b. Neustonic ichthyoplankton in the northern region of the California Current ecosystem. Calif. Coop. Oceanic Fish. Invest. Rep. 33:141–161.

Eschmeyer, W. N. (ed.). 1998. Catalog of fishes. Center for Biodiversity Research and Information. Calif. Acad. Sci. Spec. Publ. 1. Vols. I–III. 2905 pp.

Eschmeyer, W. N., E. S. Herald, and H. Hammann. 1983. A field guide to Pacific coast fishes of North America. Houghton Mifflin Co. Boston. 336 pp.

Gruber, D., E. H. Ahlstrom, and M. M. Mullin. 1982. Distribution of ichthyoplankton in the Southern California Bight. Calif. Coop. Oceanic Fish. Invest. Rep. 23:172–179.

Hempel, G. and H. Weikert. 1972. The neuston of the subtropical and boreal northeastern Atlantic Ocean. A review. Mar. Biol. 13:70–88.

Hewitt, R. P. 1988. Historical review of the oceanographic approach to fishery research. Calif. Coop. Oceanic Fish. Invest. Rep. 29:27–41.

Kramer, D., M. Kalin, E. G. Stevens, J. R. Thrailkill, and J. R. Zweifel. 1972. Collecting and processing data on fish eggs and larvae in the California Current Region. NOAA Tech. Rep. NMFS Circ. 370. 38 pp.

Matarese, A. C., A. W. Kendall, Jr., D. M. Blood, and B. M. Vinter. 1989. Laboratory guide to early life history stages of northeast Pacific fishes. U.S. Dep. Commer., NOAA Tech. Rep. NMFS 80. 652 pp.

Miller, D. J. and R. N. Lea. 1972. Guide to the coastal marine fishes of California. Calif. Dep. Fish Game. Fish Bull. 157. 235 pp.

Moser, H. G. (ed.). 1996. The early stages of fishes in the California Current region. CalCOFI Atlas 33. 1505 pp.

Moser, H. G., R. L. Charter, P. E. Smith, D. A. Ambrose, S. R. Charter, C. A. Meyer, E. M. Sandknop, and W. Watson. 1993. Distributional atlas of fish larvae and eggs in the California Current region: taxa with 1000 or more total larvae, 1951 through 1984. CalCOFI Atlas 31. 233 pp.

Moser, H. G., R. L. Charter, P. E. Smith, D. A. Ambrose, S. R. Charter, C. A. Meyer, E. M. Sandknop, and W. Watson. 1994. Distributional atlas of fish larvae in the California Current region: taxa with less than 1000 total larvae, 1951 through 1984. CalCOFI Atlas 32. 181 pp.

Moser, H. G., R. L. Charter, P. E. Smith, D. A. Ambrose, W. Watson, S. R. Charter, and E. M. Sandknop. 2001a. Distributional atlas of fish larvae and eggs in the Southern California Bight region: 1951–1998. CalCOFI Atlas 34. 166 pp.

Moser, H. G., R. L. Charter, D. A. Ambrose, and E. M. Sandknop. 2001b. Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations survey cruises in 1977-78. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-313. 58 pp.

Naumann, E. 1917. Beiträge zur Kenntnis des Teichnannoplanktons. II. Über das Neuston das Süsswassers. Biol. Zentralbl. 37:98–106.

Peres, J. M. 1982. Specific pelagic assemblages: 1. Assemblages at the air-ocean interface *In* Marine Ecology. O. Kinne (ed.). 5 (1):313–372.

Powles, H. and D. F. Markle. 1984. Identification of larvae. Pages 31-33 *in* H. G. Moser, W. J. Richards, D. M. Cohen, M. P. Fahay, A. W. Kendall, Jr., and S. L. Richardson (eds.). Ontogeny and Systematics of Fishes. Am. Soc. Ichthyol. Herpetol. Spec. Publ. 1. 760 pp.

Sandknop, E. M., R. L. Charter, and H. G. Moser. 2002. Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations survey cruises in 1987. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-323. 40 pp.

Smith, P. E. and S. L. Richardson. 1977. Standard techniques for pelagic fish egg and larva surveys. FAO Fish. Tech. Pap. 175. 100 pp.

University of California, Scripps Institution of Oceanography. 1989. Data Report. Physical, chemical, and biological data. CalCOFI Cruise 8901, 20 January–3 February 1989 and CalCOFI Cruise 8904, 17–30 April 1989. SIO Ref. 89-26. 88 pp.

University of California, Scripps Institution of Oceanography. 1990. Data Report. Physical, chemical, and biological data. CalCOFI Cruise 8907, 18 July–1 August 1989, CalCOFI Cruise 8908, 2–8 August 1989, and CalCOFI Cruise 8911, 6–20 November 1989. SIO Ref. 90-19. 116 pp.

Watson, W, R. L. Charter, and H. G. Moser. 2002. Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations survey cruises in 1988. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-324. 44 pp.

Zahuranec, B. J. 2000. Zoogeography and systematics of the lanternfishes of the genus *Nannobrachium* (Lampanyctini: Myctophidae). Smiths. Contrib. Zool. 607. 69 pp.

Zaitsev, Y. P. 1970. Marine neustonology. Naukova Dumka. Kiev. 264 pp.[In Russian]. [English transl.: 1971. Israel Progr. Sci. Transl. No. 5976. 207 pp.]

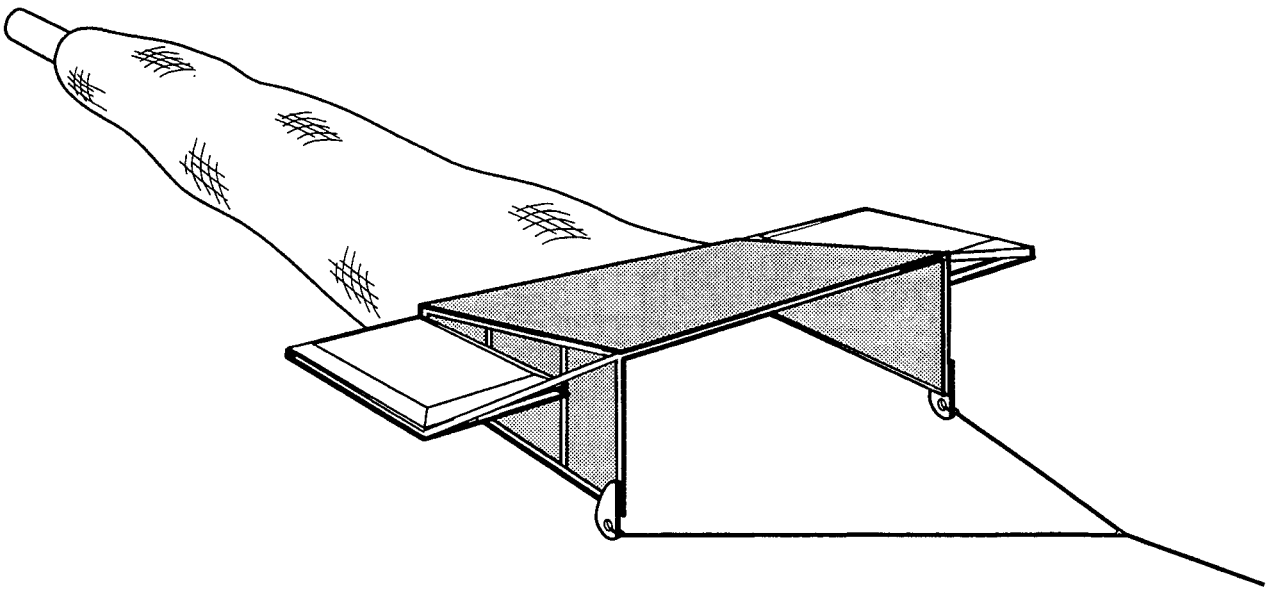

Figure 1. Diagram of the Manta net used on CalCOFI surveys.

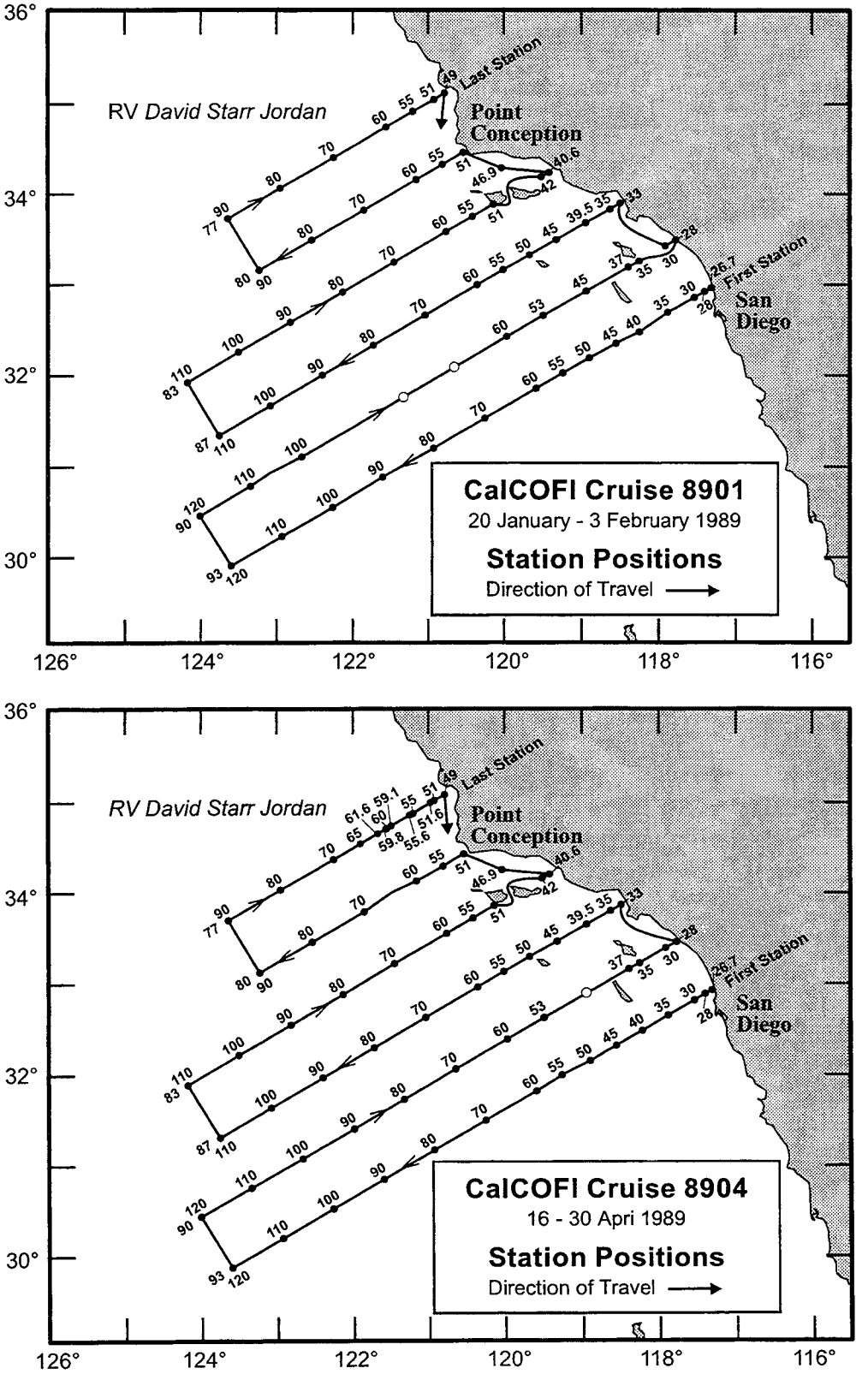

Figure 2. Stations and cruise tracks for CalCOFI cruises 8901 (above) and 8904 (below). Dots indicate stations where Manta and oblique tows were taken; open circles indicate stations where only oblique tows were taken. On Cruise 8904, Manta tows without an accompanying oblique tows were taken on Cruise 8904 on line 76.7, at stations 51.6, 55.6, 59.1 (7 tows), 59.8, 61.6, and 65.0.

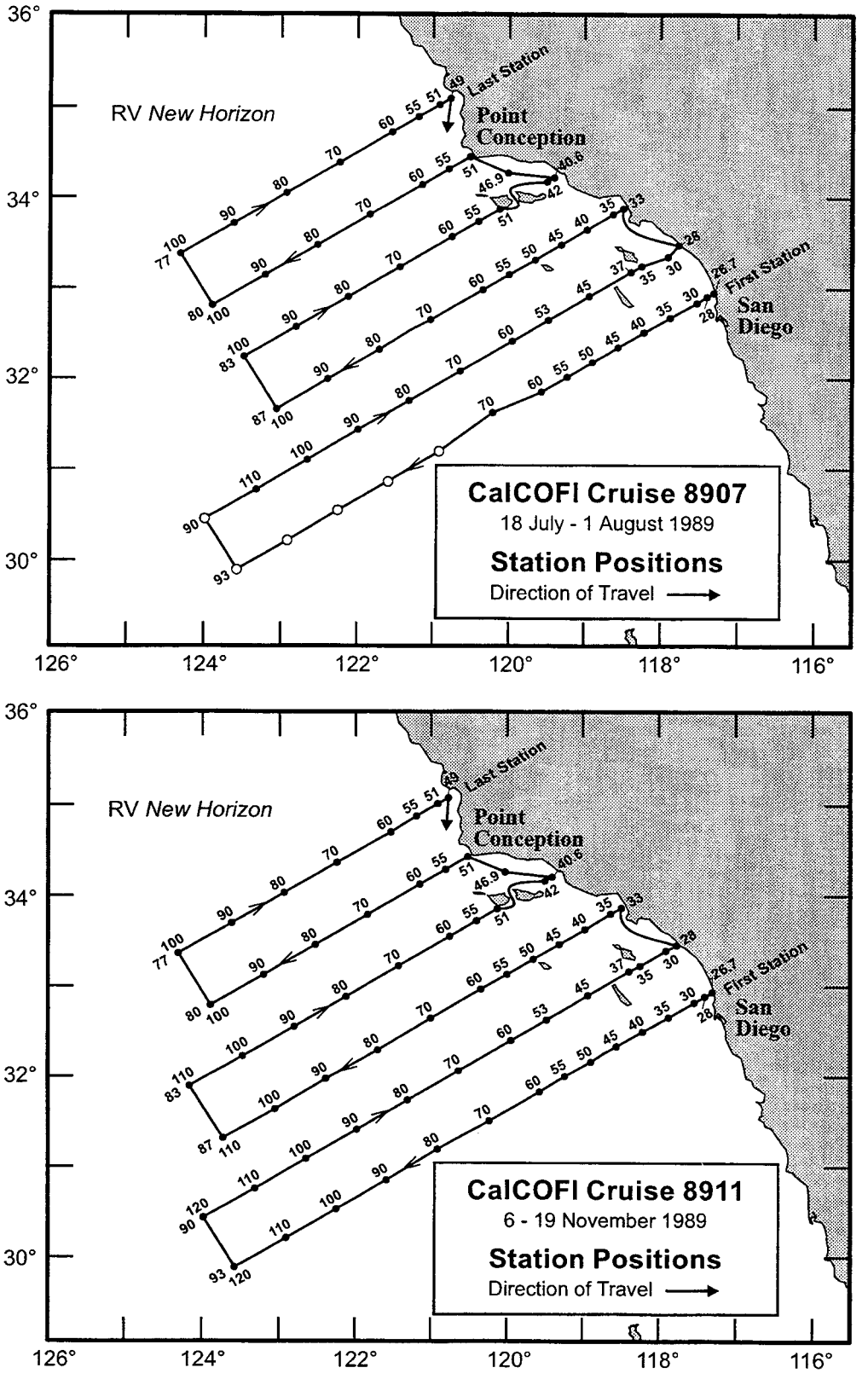

Figure 3. Stations and cruise tracks for CalCOFI cruises 8907 (above) and 8911 (below). Symbols as in Figure 2.

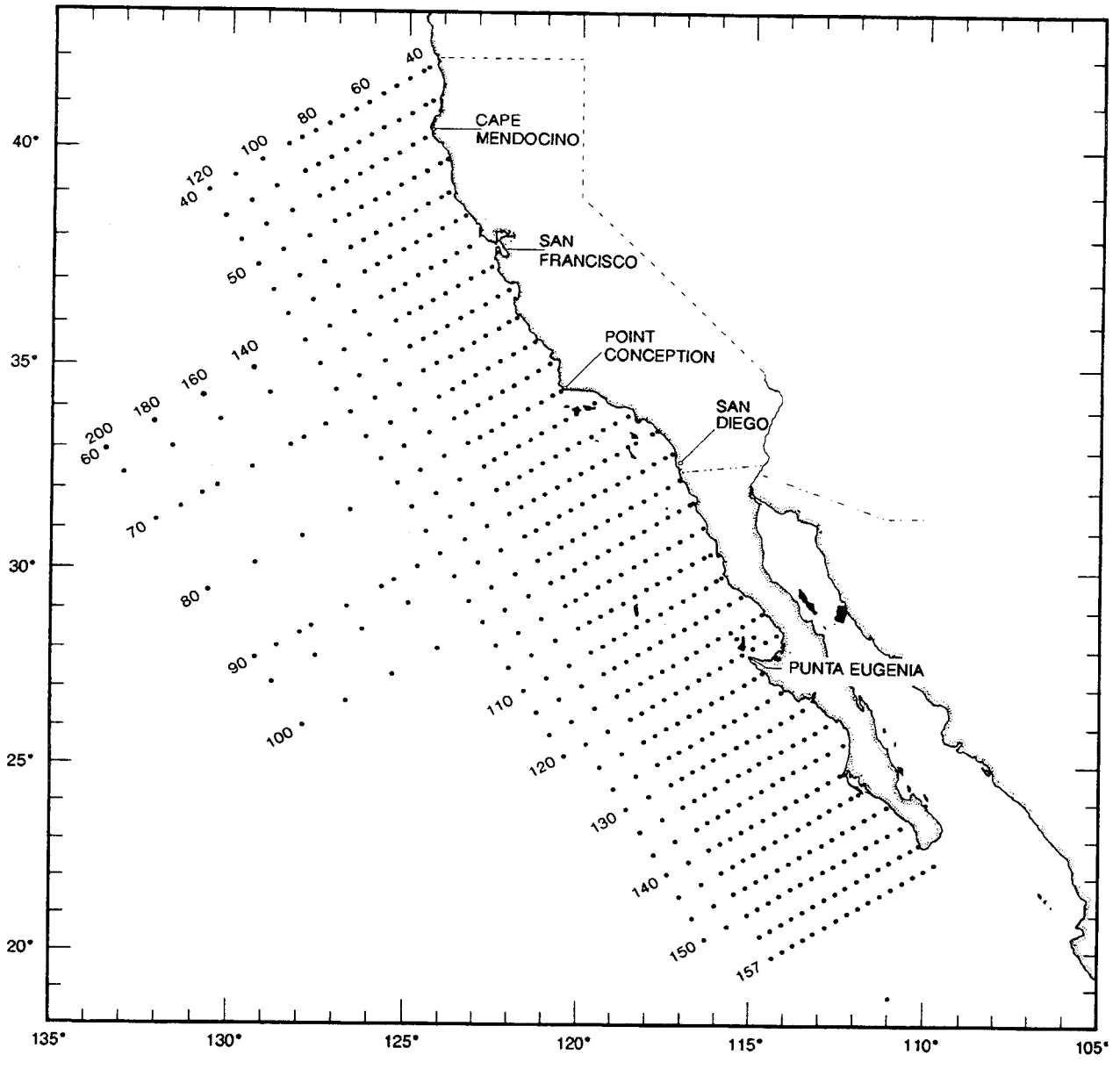

Figure 4. The basic station plan for CalCOFI cruises from 1950 - 1984.

TABLE 1. Station and plankton tow data for Manta tows taken on the 1989 CalCOFI survey. Numbers of fish eggs and larvae are raw counts, unadjusted for volume (cubic meters) of water filtered.

CalCOFI Cruise 8901

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
76.7	49.0	35	05.3	120	46.6	JD	89	02	03	0045	96	2774	75
76.7	51.0	35	01.3	120	55.1	JD	89	02	02	2225	100	271	30
76.7	55.0	34	53.5	121	11.8	JD	89	02	02	1925	84	33	15
76.7	60.0	34	43.3	121	32.9	JD	89	02	02	1512	93	3	38
76.7	70.0	34	23.3	122	14.6	JD	89	02	02	0845	94	20	60
76.7	80.0	34	03.3	122	56.5	JD	89	02	02	0310	89	18	8
76.7	90.0	33	43.2	123	38.1	JD	89	02	01	2050	100	5	13
80.0	51.0	34	26.9	120	31.5	JD	89	01	31	1544	90	30	221
80.0	55.0	34	18.9	120	48.2	JD	89	01	31	1905	93	191	26
80.0	60.0	34	09.0	121	09.0	JD	89	01	31	2255	109	47	16
80.0	70.0	33	48.9	121	50.7	JD	89	02	01	0410	89	148	66
80.0	80.0	33	29.0	122	32.0	JD	89	02	01	0930	97	60	21
80.0	90.0	33	09.1	123	13.3	JD	89	02	01	1505	92	0	3
81.8	46.9	34	16.5	120	01.5	JD	89	01	31	1153	102	40	206
83.3	40.6	34	13.6	119	24.5	JD	89	01	31	0610	100	114	4786
83.3	42.0	34	10.7	119	30.4	JD	89	01	31	0425	103	250	1568
83.3	51.0	33	52.7	120	08.0	JD	89	01	30	2230	103	1052	122
83.3	55.0	33	44.7	120	24.6	JD	89	01	30	1926	91	1146	4
83.3	60.0	33	34.7	120	45.3	JD	89	01	30	1531	98	0	56
83.3	70.0	33	14.6	121	26.6	JD	89	01	30	0930	93	4	42
83.3	80.0	32	54.7	122	07.6	JD	89	01	30	0325	91	4	5
83.3	90.0	32	34.7	122	48.7	JD	89	01	29	2137	96	1	5
83.3	100.0	32	14.7	123	29.5	JD	89	01	29	1550	91	3	4
83.3	110.0	31	54.7	124	10.1	JD	89	01	29	0955	98	0	4
86.7	33.0	33	53.4	118	29.6	JD	89	01	26	1617	97	59	2116
86.7	35.0	33	49.5	118	37.7	JD	89	01	26	1840	102	408	7560
86.7	39.5	33	40.5	118	56.4	JD	89	01	26	2253	98	243	4
86.7	45.0	33	29.4	119	19.1	JD	89	01	27	1005	95	4	47
86.7	50.0	33	19.4	119	39.8	JD	89	01	27	1359	98	6	48
86.7	55.0	33	09.4	120	00.4	JD	89	01	27	1830	88	211	28
86.7	60.0	32	59.4	120	20.9	JD	89	01	27	2218	95	6	7
86.7	70.0	32	39.4	121	02.1	JD	89	01	28	0405	90	3	8
86.7	80.0	32	19.4	121	42.9	JD	89	01	28	1035	89	14	5
86.7	90.0	31	59.4	122	23.7	JD	89	01	28	1608	92	0	5
86.7	100.0	31	39.4	123	04.2	JD	89	01	28	2150	100	0	2
86.7	110.0	31	19.4	123	44.6	JD	89	01	29	0335	93	0	2
90.0	28.0	33	29.0	117	46.1	JD	89	01	26	0705	97	22	121
90.0	30.0	33	25.1	117	54.3	JD	89	01	26	0455	98	34	1841
90.0	35.0	33	15.1	118	15.0	JD	89	01	26	0045	92	7	151
90.0	37.0	33	11.1	118	23.2	JD	89	01	25	2200	96	470	372
90.0	45.0	32	55.1	118	56.0	JD	89	01	25	1632	95	0	8
90.0	53.0	32	39.1	119	29.0	JD	89	01	25	1050	90	7	28
90.0	60.0	32	25.0	119	57.6	JD	89	01	25	0600	78	99	9
90.0	100.0	31	05.0	122	39.6	JD	89	01	23	1710	84	0	3
90.0	110.0	30	45.1	123	19.9	JD	89	01	23	0800	82	3	3
90.0	120.0	30	25.1	123	59.9	JD	89	01	23	0205	98	8	1
93.3	26.7	32	57.4	117	18.2	JD	89	01	19	2350	114	31	6998

TABLE 1. (cont.) CalCOFI Cruise 8901 (cont.)

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
93.3	28.0	32	54.8	117	23.6	JD	89	01	20	0300	90	3	555
93.3	30.0	32	51.0	117	31.8	JD	89	01	20	0620	92	1	221
93.3	35.0	32	41.0	117	52.5	JD	89	01	20	1120	91	4	282
93.3	40.0	32	28.2	118	14.6	JD	89	01	20	1619	79	2	415
93.3	45.0	32	20.6	118	33.0	JD	89	01	20	2053	88	6	1708
93.3	50.0	32	10.9	118	53.5	JD	89	01	21	0050	83	15	148
93.3	55.0	32	00.8	119	14.0	JD	89	01	21	0450	87	23	17
93.3	60.0	31	50.8	119	34.3	JD	89	01	21	0920	91	0	50
93.3	70.0	31	30.8	120	14.8	JD	89	01	21	1539	90	2	13
93.3	80.0	31	10.8	120	55.2	JD	89	01	21	2111	74	1	0
93.3	90.0	30	51.3	121	35.8	JD	89	01	22	0255	78	1	5
93.3	100.0	30	30.8	122	15.5	JD	89	01	22	0855	90	0	3
93.3	110.0	30	10.8	122	55.5	JD	89	01	22	1456	98	0	9
93.3	120.0	29	50.8	123	35.2	JD	89	01	22	2032	96	0	0

CalCOFI Cruise 8904

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
76.7	49.0	35	05.3	120	46.6	JD	89	04	30	0803	112	3	12
76.7	51.0	35	01.4	120	55.1	JD	89	04	30	0615	98	0	1
76.7	51.6	35	00.1	120	58.0	JD	89	05	01	1410	88	0	1
76.7	55.0	34	53.2	121	11.8	JD	89	04	30	0331	94	11	1
76.7	55.6	34	52.3	121	14.3	JD	89	05	01	1940	88	5	0
76.7	59.1	34	45.3	121	29.0	JD	89	05	04	1525	86	0	4
76.7	59.1	34	45.3	121	29.0	JD	89	05	04	1145	98	0	5
76.7	59.1	34	45.3	121	29.0	JD	89	05	04	0922	100	0	5
76.7	59.1	34	45.3	121	29.0	JD	89	05	04	0706	80	1	1
76.7	59.1	34	45.3	121	29.0	JD	89	05	04	0410	91	2	3
76.7	59.1	34	45.3	121	29.0	JD	89	05	02	0031	79	3	0
76.7	59.1	34	45.3	121	29.0	JD	89	05	04	2200	95	1	4
76.7	59.8	34	43.7	121	32.3	JD	89	05	02	0355	89	4	8
76.7	60.0	34	43.3	121	32.9	JD	89	04	29	2353	100	47	256
76.7	61.6	34	40.2	121	39.6	JD	89	05	02	2245	99	0	8
76.7	65.0	34	33.5	121	53.8	JD	89	05	03	0945	93	4	16
76.7	70.0	34	23.3	122	14.7	JD	89	05	03	2010	98	15	29
76.7	70.0	34	23.3	122	14.9	JD	89	04	29	1840	100	23	200
76.7	80.0	34	03.3	122	56.5	JD	89	04	29	1322	99	1	125
76.7	90.0	33	43.3	123	38.0	JD	89	04	29	0726	102	6	3361
80.0	51.0	34	26.9	120	31.5	JD	89	04	27	2050	91	2	3
80.0	55.0	34	18.9	120	48.0	JD	89	04	28	0159	94	8	45
80.0	60.0	34	09.1	121	09.0	JD	89	04	28	0643	87	3	20
80.0	70.0	33	49.0	121	50.7	JD	89	04	28	1505	90	0	125
80.0	80.0	33	29.0	122	32.0	JD	89	04	28	2025	100	2	13
80.0	90.0	33	09.0	123	13.4	JD	89	04	29	0156	93	3	290
81.8	46.9	34	16.4	120	01.5	JD	89	04	27	1600	91	2	1
83.3	40.6	34	13.5	119	24.7	JD	89	04	27	0929	107	86	4267
83.3	42.0	34	10.7	119	30.5	JD	89	04	27	0733	103	40	91
83.3	51.0	33	52.7	120	08.0	JD	89	04	27	0113	88	54	70

TABLE 1. (cont.) CalCOFI Cruise 8904 (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	55.0	33	44.7	120	24.6	JD	89	04	26	2150	103	865	3
83.3	60.0	33	34.7	120	45.4	JD	89	04	26	1755	92	1	26
83.3	70.0	33	14.7	121	26.6	JD	89	04	26	1218	84	0	16
83.3	80.0	32	54.7	122	07.7	JD	89	04	26	0518	92	0	329
83.3	90.0	32	34.7	122	48.7	JD	89	04	25	2337	100	61	169
83.3	100.0	32	14.6	123	29.5	JD	89	04	25	1745	86	1	17
83.3	110.0	31	54.6	124	10.2	JD	89	04	25	1205	83	0	7
86.7	33.0	33	53.4	118	29.4	JD	89	04	22	2245	90	547	226
86.7	35.0	33	49.4	118	37.7	JD	89	04	23	0135	79	134	107
86.7	39.5	33	40.4	118	56.4	JD	89	04	23	0631	81	25	135
86.7	45.0	33	29.4	119	19.0	JD	89	04	23	1129	93	0	0
86.7	50.0	33	19.4	119	39.9	JD	89	04	23	1455	78	2	331
86.7	55.0	33	09.4	120	00.4	JD	89	04	23	1915	86	0	0
86.7	60.0	32	59.5	120	21.0	JD	89	04	23	2245	89	6	41
86.7	70.0	32	39.4	121	02.0	JD	89	04	24	0456	81	80	134
86.7	80.0	32	19.4	121	42.9	JD	89	04	24	1144	87	0	25
86.7	90.0	31	59.5	122	23.6	JD	89	04	24	1725	84	5	224
86.7	100.0	31	39.4	123	04.2	JD	89	04	24	2300	92	4	232
86.7	110.0	31	19.4	123	44.7	JD	89	04	25	0524	88	9	36
90.0	28.0	33	29.1	117	46.1	JD	89	04	22	1335	84	23	7209
90.0	30.0	33	25.2	117	54.2	JD	89	04	22	1125	93	4	6585
90.0	35.0	33	15.1	118	15.1	JD	89	04	22	0705	86	19	4895
90.0	37.0	33	11.1	118	23.3	JD	89	04	22	0421	86	13	2488
90.0	53.0	32	39.0	119	28.9	JD	89	04	21	1755	79	5	75
90.0	60.0	32	25.1	119	57.6	JD	89	04	21	1255	71	0	19
90.0	70.0	32	05.1	120	38.2	JD	89	04	21	0540	89	0	36
90.0	80.0	31	45.0	121	19.1	JD	89	04	20	2310	89	22	223
90.0	90.0	31	25.0	121	59.1	JD	89	04	20	1655	84	1	42
90.0	100.0	31	05.1	122	39.7	JD	89	04	20	0957	90	0	302
90.0	110.0	30	45.2	123	19.9	JD	89	04	20	0345	91	32	652
90.0	120.0	30	25.5	123	59.9	JD	89	04	19	2215	96	6	13
93.3	26.7	32	57.3	117	18.3	JD	89	04	16	2040	97	21	510
93.3	28.0	32	54.8	117	23.8	JD	89	04	17	0028	97	19	785
93.3	30.0	32	50.8	117	32.0	JD	89	04	17	0341	88	228	339
93.3	35.0	32	40.9	117	52.4	JD	89	04	17	0800	98	8	31
93.3	40.0	32	30.6	118	13.0	JD	89	04	17	1340	87	1	784
93.3	45.0	32	20.9	118	33.2	JD	89	04	17	1720	90	2	4240
93.3	50.0	32	10.7	118	53.5	JD	89	04	17	2130	97	11	266
93.3	55.0	32	01.3	119	15.3	JD	89	04	18	0101	82	8	65
93.3	60.0	31	50.4	119	34.6	JD	89	04	18	0452	84	55	78
93.3	70.0	31	30.8	120	14.7	JD	89	04	18	1035	92	0	76
93.3	80.0	31	10.8	120	55.3	JD	89	04	18	1645	87	76	139
93.3	90.0	30	50.9	121	35.4	JD	89	04	18	2218	94	6	48
93.3	100.0	30	30.8	122	15.6	JD	89	04	19	0413	84	3	338
93.3	110.0	30	10.8	122	55.2	JD	89	04	19	1006	98	6	513
93.3	120.0	29	50.9	123	35.3	JD	89	04	19	1625	96	1	38

TABLE 1. (cont.) CalCOFI Cruise 8907

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	89	08	01	2156	82	14	217
76.7	51.0	35	01.2	120	55.2	NH	89	08	01	1951	70	76	1364
76.7	55.0	34	53.3	121	11.9	NH	89	08	01	1602	78	1	1
76.7	60.0	34	43.3	121	33.0	NH	89	08	01	1207	79	2	0
76.7	70.0	34	23.2	122	14.8	NH	89	08	01	0518	78	1	86
76.7	80.0	34	03.2	122	56.6	NH	89	07	31	2322	80	7	1
76.7	90.0	33	43.2	123	38.0	NH	89	07	31	1734	70	1	19
76.7	100.0	33	23.3	124	19.3	NH	89	07	31	1128	80	4	9
80.0	51.0	34	27.0	120	31.4	NH	89	07	29	1940	79	2586	1209
80.0	55.0	34	19.1	120	48.1	NH	89	07	29	2250	107	173	113
80.0	60.0	34	09.0	121	08.9	NH	89	07	30	0252	73	88	3
80.0	70.0	33	49.1	121	50.5	NH	89	07	30	0901	72	1	36
80.0	80.0	33	29.0	122	31.9	NH	89	07	30	1619	84	1	5
80.0	90.0	33	09.1	123	13.3	NH	89	07	30	2209	75	1	7
80.0	100.0	32	49.0	123	54.3	NH	89	07	31	0415	90	14	13
81.8	46.9	34	16.5	120	01.4	NH	89	07	29	1403	86	418	60
83.3	40.6	34	13.5	119	24.7	NH	89	07	29	0919	87	465	3047
83.3	42.0	34	10.7	119	30.5	NH	89	07	29	0726	94	79	8347
83.3	51.0	33	52.7	120	07.9	NH	89	07	29	0035	75	107	1649
83.3	55.0	33	44.7	120	24.7	NH	89	07	28	2045	75	18	0
83.3	60.0	33	34.7	120	45.3	NH	89	07	28	1652	79	2	1
83.3	70.0	33	14.6	121	26.7	NH	89	07	28	0900	77	1	21
83.3	80.0	32	54.6	122	07.6	NH	89	07	28	0234	79	7	3
83.3	90.0	32	34.6	122	48.6	NH	89	07	27	1933	76	7	0
83.3	100.0	32	14.5	123	29.5	NH	89	07	27	1138	74	1	1
86.7	33.0	33	53.4	118	29.4	NH	89	07	25	0044	94	1226	2140
86.7	35.0	33	49.5	118	37.6	NH	89	07	25	0326	92	1774	74
86.7	40.0	33	39.5	118	58.4	NH	89	07	25	0728	77	3	529
86.7	45.0	33	29.5	119	19.0	NH	89	07	25	1210	85	4	36
86.7	50.0	33	19.4	119	39.8	NH	89	07	25	1532	80	0	13
86.7	55.0	33	09.4	120	00.3	NH	89	07	25	2014	80	453	0
86.7	60.0	32	59.4	120	21.0	NH	89	07	26	0036	83	10	19
86.7	70.0	32	39.4	121	02.1	NH	89	07	26	0800	80	12	106
86.7	80.0	32	19.4	121	42.8	NH	89	07	26	1618	80	19	65
86.7	90.0	31	59.4	122	23.6	NH	89	07	26	2218	83	4	7
86.7	100.0	31	39.4	123	04.1	NH	89	07	27	0443	78	30	33
90.0	28.0	33	29.0	117	46.1	NH	89	07	24	1843	83	280	91
90.0	30.0	33	21.2	117	54.2	NH	89	07	24	1627	91	820	200
90.0	35.0	33	15.0	118	15.1	NH	89	07	24	1253	90	1	134
90.0	37.0	33	11.1	118	23.3	NH	89	07	24	0830	81	4	104
90.0	45.0	32	55.1	118	56.2	NH	89	07	24	0324	95	60	199
90.0	53.0	32	39.0	119	29.0	NH	89	07	23	2224	79	37	33
90.0	60.0	32	25.1	119	57.7	NH	89	07	23	1737	89	2	15
90.0	70.0	32	05.0	120	38.3	NH	89	07	23	1053	78	20	593
90.0	80.0	31	45.0	121	18.9	NH	89	07	23	0418	96	7	281
90.0	90.0	31	25.4	121	59.6	NH	89	07	22	2216	80	8	7
90.0	100.0	31	05.1	122	39.8	NH	89	07	22	1631	89	1	77
90.0	110.0	30	44.9	123	19.9	NH	89	07	22	0905	66	0	14
93.3	26.7	32	57.3	117	18.4	NH	89	07	18	1305	80	0	958
93.3	28.0	32	54.8	117	23.6	NH	89	07	18	1526	98	11	20

TABLE 1. (cont.) CalCOFI Cruise 8907 (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	30.0	32	50.8	117	31.8	NH	89	07	18	1825	99	56	13
93.3	35.0	32	40.8	117	52.3	NH	89	07	18	2245	84	245	748
93.3	40.0	32	30.9	118	12.9	NH	89	07	19	0314	105	15	224
93.3	45.0	32	20.8	118	33.4	NH	89	07	19	0723	92	9	161
93.3	50.0	32	10.8	118	53.5	NH	89	07	19	1243	78	2	101
93.3	55.0	32	00.8	119	13.9	NH	89	07	19	1634	79	7	9
93.3	60.0	31	50.9	119	34.3	NH	89	07	19	2109	83	48	76
93.3	70.0	31	36.9	120	12.9	NH	89	07	20	0400	78	21	113

CalCOFI Cruise 8911

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	05.1	120	46.6	NH	89	11	19	1629	104	126	318
76.7	51.0	35	01.3	120	55.1	NH	89	11	19	1446	103	155	0
76.7	55.0	34	53.3	121	12.1	NH	89	11	19	1201	103	0	3
76.7	60.0	34	42.9	121	32.3	NH	89	11	19	0738	88	0	0
76.7	70.0	34	23.1	122	14.9	NH	89	11	19	0215	97	4	22
76.7	80.0	34	03.3	122	56.5	NH	89	11	18	2052	116	10	6
76.7	90.0	33	43.3	123	37.9	NH	89	11	18	1557	83	1	16
76.7	100.0	33	23.4	124	19.3	NH	89	11	18	0849	87	3	2
80.0	51.0	34	26.9	120	31.4	NH	89	11	16	2129	85	0	0
80.0	55.0	34	18.7	120	48.7	NH	89	11	17	0055	80	0	0
80.0	60.0	34	09.0	121	08.9	NH	89	11	17	0444	84	25	3
80.0	70.0	33	48.9	121	50.8	NH	89	11	17	1047	88	0	3
80.0	80.0	33	29.1	122	32.1	NH	89	11	17	1642	91	1	2
80.0	90.0	33	09.1	123	13.0	NH	89	11	17	2153	88	0	4
80.0	100.0	32	49.0	123	54.3	NH	89	11	18	0355	85	19	4
81.8	46.9	34	16.9	120	01.9	NH	89	11	16	1756	89	9	77
83.3	40.6	34	13.7	119	24.6	NH	89	11	16	1317	93	14	274
83.3	42.0	34	10.7	119	30.5	NH	89	11	16	1002	101	1	0
83.3	51.0	33	52.9	120	08.1	NH	89	11	16	0439	80	3	34
83.3	55.0	33	44.9	120	24.4	NH	89	11	16	0143	82	1	0
83.3	60.0	33	34.6	120	45.4	NH	89	11	15	2203	95	6	1
83.3	70.0	33	15.0	121	26.0	NH	89	11	15	1649	89	1	5
83.3	80.0	32	54.7	122	07.8	NH	89	11	15	1137	99	1	5
83.3	90.0	32	34.7	122	48.6	NH	89	11	15	0428	89	2	1
83.3	100.0	32	14.7	123	29.3	NH	89	11	14	2308	93	6	1
83.3	110.0	31	54.7	124	10.6	NH	89	11	14	1738	78	43	0
86.7	33.0	33	53.4	118	29.4	NH	89	11	12	1123	100	13	262
86.7	35.0	33	49.4	118	38.1	NH	89	11	12	1402	90	0	892
86.7	40.0	33	39.1	118	58.3	NH	89	11	12	1740	93	29	691
86.7	45.0	33	29.5	119	19.1	NH	89	11	12	2104	98	13	14
86.7	50.0	33	19.5	119	39.7	NH	89	11	12	2352	83	0	4
86.7	55.0	33	09.4	120	00.5	NH	89	11	13	0317	84	0	1
86.7	60.0	32	59.8	120	21.0	NH	89	11	13	0653	87	0	3
86.7	70.0	32	40.2	121	00.4	NH	89	11	13	1212	81	0	2
86.7	80.0	32	18.9	121	42.7	NH	89	11	13	1850	87	11	1
86.7	90.0	31	59.5	122	23.6	NH	89	11	14	0001	91	14	5

TABLE 1. (cont.) CalCOFI Cruise 8911 (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	100.0	31	39.1	123	04.0	NH	89	11	14	0517	89	18	2
86.7	110.0	31	19.4	123	44.5	NH	89	11	14	1134	93	11	1
90.0	28.0	33	28.8	117	46.1	NH	89	11	12	0540	95	25	44
90.0	30.0	33	25.3	117	54.2	NH	89	11	12	0335	91	5	66
90.0	35.0	33	15.1	118	14.8	NH	89	11	11	2320	96	1	514
90.0	37.0	33	11.4	118	23.3	NH	89	11	11	2043	99	7	293
90.0	45.0	32	55.5	118	55.9	NH	89	11	11	1553	94	1	40
90.0	53.0	32	39.2	119	29.0	NH	89	11	11	0850	90	1	4
90.0	60.0	32	25.2	119	57.4	NH	89	11	11	0359	94	0	0
90.0	70.0	32	05.0	120	38.2	NH	89	11	10	2217	94	2	1
90.0	80.0	31	44.9	121	18.9	NH	89	11	10	1704	85	14	0
90.0	90.0	31	25.1	121	59.4	NH	89	11	10	1127	91	3	12
90.0	100.0	31	05.3	122	39.5	NH	89	11	10	0450	97	25	4
90.0	110.0	30	45.0	123	19.8	NH	89	11	09	2248	97	36	3
90.0	120.0	30	25.1	123	59.8	NH	89	11	09	1710	97	30	0
93.3	26.7	32	57.6	117	18.0	NH	89	11	06	1346	106	30	139
93.3	28.0	32	54.5	117	24.1	NH	89	11	06	1645	101	0	0
93.3	30.0	32	50.8	117	32.4	NH	89	11	06	1940	99	7	0
93.3	35.0	32	40.7	117	52.5	NH	89	11	06	2340	96	0	5
93.3	40.0	32	31.3	118	12.6	NH	89	11	07	0335	93	0	0
93.3	45.0	32	21.3	118	33.2	NH	89	11	07	0805	95	0	0
93.3	50.0	32	10.9	118	53.7	NH	89	11	07	1332	93	3	4
93.3	55.0	32	01.1	119	14.5	NH	89	11	07	1730	88	13	0
93.3	60.0	31	50.8	119	34.5	NH	89	11	07	2137	80	5	2
93.3	70.0	31	30.9	120	14.3	NH	89	11	08	0304	82	10	0
93.3	80.0	31	11.8	120	55.0	NH	89	11	08	0848	85	1	0
93.3	90.0	30	50.7	121	35.5	NH	89	11	08	1652	89	8	17
93.3	100.0	30	30.7	122	15.4	NH	89	11	08	2229	87	7	3
93.3	110.0	30	11.1	122	55.1	NH	89	11	09	0410	96	21	5
93.3	120.0	29	50.9	123	35.3	NH	89	11	09	1058	98	2	1

TABLE 2. Pooled occurrences of fish larvae taken in Manta tows on the 1989 CalCOFI survey.

Rank	Taxon	Occurrences
1	*Engraulis mordax*	95
2	*Cololabis saira*	93
3	*Sebastes* spp.	64
4	*Sardinops sagax*	48
5	*Scorpaenichthys marmoratus*	36
6	*Merluccius productus*	21
7	*Trachurus symmetricus*	19
7	*Scomber japonicus*	19
9	*Girella nigricans*	16
9	*Hypsoblennius jenkinsi*	16
11	*Medialuna californiensis*	12
11	*Oxyjulis californica*	12
13	*Pleuronichthys coenosus*	10
13	*Atherinopsis californiensis*	10
13	*Sphyraena argentea*	10
13	*Pleuronichthys verticalis*	10
17	*Ceratoscopelus townsendi*	8
17	*Chromis punctipinnis*	8
19	*Citharichthys stigmaeus*	7
19	*Paralabrax* spp.	7
19	*Vinciguerria lucetia*	7
22	*Citharichthys sordidus*	6
22	*Icichthys lockingtoni*	6
24	*Hexagrammos decagrammus*	5
24	*Hypsoblennius gilberti*	5
24	*Tetragonurus cuvieri*	5
24	*Leuresthes tenuis*	5
28	*Genyonemus lineatus*	4
28	*Sebastes diploproa*	4
28	Disintegrated fish larvae	4
31	*Ophiodon elongatus*	3
31	*Nannobrachium ritteri*	3
31	*Oxylebius pictus*	3
31	*Xenistius californiensis*	3
31	*Cheilotrema saturnum*	3
31	*Triphoturus mexicanus*	3
31	*Peprilus simillimus*	3
31	*Coryphopterus nicholsii*	3
31	*Neoclinus blanchardi*	3
31	*Seriphus politus*	3
41	*Pleuronichthys decurrens*	2
41	*Cheilopogon* spp.	2
41	*Gigantactis* spp.	2
41	*Sebastes aurora*	2
41	*Sebastes paucispinis*	2
41	*Cyclothone* spp.	2
41	*Stenobrachius leucopsarus*	2
41	*Neoclinus stephensae*	2
41	*Paralichthys californicus*	2

TABLE 2. (cont.)

Rank	Taxon	Occurrences
41	*Liparis mucosus*	2
41	*Parophrys vetulus*	2
41	*Lampadena urophaos*	2
41	*Cryptotrema corallinum*	2
54	*Cyclothone signata*	1
54	*Bolinichthys longipes*	1
54	*Oneirodes* spp.	1
54	*Ophidion scrippsae*	1
54	*Aristostomias scintillans*	1
54	*Trachipterus altivelis*	1
54	*Taaningichthys minimus*	1
54	*Sternoptyx* spp.	1
54	*Diogenichthys atlanticus*	1
54	*Symbolophorus californiensis*	1
54	*Argyropelecus sladeni*	1
54	*Anisotremus davidsoni*	1
54	*Lyopsetta exilis*	1
54	*Citharichthys* spp.	1
54	*Sarda chiliensis*	1
54	*Typhlogobius californiensis*	1
54	*Hypsoblennius gentilis*	1
54	*Neoclinus* spp.	1
54	*Chiasmodon niger*	1
54	*Rathbunella* spp.	1
54	*Semicossyphus pulcher*	1
54	*Odontopyxis trispinosa*	1
54	Sciaenidae	1
54	*Atherinops affinis*	1
54	Unidentified fish larvae	1
54	*Liparis fucensis*	1
54	*Ruscarius creaseri*	1
54	*Oligocottus* spp.	1
54	*Icelinus* spp.	1
54	*Hemilepidotus spinosus*	1
54	*Hexagrammos lagocephalus*	1
54	*Macroramphosus gracilis*	1
54	*Fodiator acutus*	1
54	*Halichoeres semicinctus*	1
	Total	662

TABLE 3. Pooled raw counts of fish larvae taken in Manta tows on the 1989 CalCOFI survey.

Rank	Taxon	Count
1	*Engraulis mordax*	8810
2	*Sardinops sagax*	4606
3	*Hexagrammos decagrammus*	2021
4	*Hypsoblennius jenkinsi*	1963
5	*Sebastes* spp.	507
6	*Scomber japonicus*	413
7	*Cololabis saira*	402
8	*Scorpaenichthys marmoratus*	232
9	*Trachurus symmetricus*	229
10	*Xenistius californiensis*	218
11	*Girella nigricans*	190
12	*Merluccius productus*	147
13	*Hypsoblennius gilberti*	114
14	*Sphyraena argentea*	89
15	*Oxyjulis californica*	76
16	*Atherinopsis californiensis*	57
17	*Paralabrax* spp.	46
18	*Citharichthys stigmaeus*	38
19	*Ceratoscopelus townsendi*	35
20	*Leuresthes tenuis*	34
21	*Chromis punctipinnis*	32
22	*Pleuronichthys verticalis*	26
23	*Pleuronichthys coenosus*	24
24	*Sebastes diploproa*	22
25	*Medialuna californiensis*	21
26	*Stenobrachius leucopsarus*	15
27	*Bolinichthys longipes*	14
28	*Vinciguerria lucetia*	12
29	*Genyonemus lineatus*	11
29	*Citharichthys sordidus*	11
31	*Icichthys lockingtoni*	9
31	*Cryptotrema corallinum*	9
33	*Neoclinus blanchardi*	8
33	*Citharichthys* spp.	8
35	*Neoclinus* spp.	7
35	*Anisotremus davidsoni*	7
35	*Triphoturus mexicanus*	7
38	*Tetragonurus cuvieri*	6
38	*Ophiodon elongatus*	6
40	*Oxylebius pictus*	5
41	*Peprilus simillimus*	4
41	*Sebastes aurora*	4
41	*Liparis mucosus*	4
41	*Coryphopterus nicholsii*	4
41	Disintegrated fish larvae	4
41	*Hypsoblennius gentilis*	4
41	*Neoclinus stephensae*	4
41	*Seriphus politus*	4
49	*Sternoptyx* spp.	3

TABLE 3. (cont.)

Rank	Taxon	Count
49	*Nannobrachium ritteri*	3
49	*Cheilopogon* spp.	3
49	*Cheilotrema saturnum*	3
53	*Lampadena urophaos*	2
53	*Cyclothone* spp.	2
53	*Taaningichthys minimus*	2
53	*Pleuronichthys decurrens*	2
53	*Gigantactis* spp.	2
53	*Parophrys vetulus*	2
53	Unidentified fish larvae	2
53	*Paralichthys californicus*	2
53	*Rathbunella* spp.	2
53	*Sebastes paucispinis*	2
63	*Ruscarius creaseri*	1
63	*Aristostomias scintillans*	1
63	*Oligocottus* spp.	1
63	*Argyropelecus sladeni*	1
63	*Atherinops affinis*	1
63	*Cyclothone signata*	1
63	*Fodiator acutus*	1
63	*Liparis fucensis*	1
63	*Macroramphosus gracilis*	1
63	*Typhlogobius californiensis*	1
63	*Chiasmodon niger*	1
63	*Odontopyxis trispinosa*	1
63	*Icelinus* spp.	1
63	Sciaenidae	1
63	*Ophidion scrippsae*	1
63	*Lyopsetta exilis*	1
63	*Hexagrammos lagocephalus*	1
63	*Diogenichthys atlanticus*	1
63	*Oneirodes* spp.	1
63	*Halichoeres semicinctus*	1
63	*Symbolophorus californiensis*	1
63	*Trachipterus altivelis*	1
63	*Semicossyphus pulcher*	1
63	*Sarda chiliensis*	1
63	*Hemilepidotus spinosus*	1
	Total	20576

TABLE 4. Numbers of fish larvae taken in Manta net tows on the 1989 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	70.0	-	0.0	-	17.9	8.9	-	-	0.0	-	-	0.0	-
80.0	51.0	0.0	-	-	0.0	-	-	1793.5	-	-	-	0.0	-
80.0	55.0	0.0	-	-	1.9	-	-	53.5	-	-	-	0.0	-
80.0	60.0	0.0	-	-	2.6	-	-	22.0	-	-	-	0.0	-
80.0	70.0	-	0.9	-	0.0	-	-	0.0	-	-	-	0.0	-
80.0	80.0	-	0.0	-	2.0	-	-	0.0	-	-	-	0.0	-
80.0	90.0	-	0.0	-	2.8	-	-	0.0	-	-	-	0.0	-
80.0	100.0	-	-	-	-	-	-	9.0	-	-	-	0.0	-
81.8	46.9	0.0	-	-	0.0	-	-	261.8	-	-	-	0.0	-
83.3	40.6	43.9	-	-	1.1	-	-	256.9	-	-	-	0.0	-
83.3	42.0	0.0	-	-	0.0	-	-	6.6	-	-	-	0.0	-
83.3	51.0	0.0	-	-	0.0	-	-	35.3	-	-	-	0.0	-
83.3	55.0	0.0	-	-	0.0	-	-	1.5	-	-	-	0.0	-
83.3	90.0	0.0	-	-	0.0	-	-	3.0	-	-	-	0.0	-
86.7	33.0	19.4	-	-	6.3	-	-	164.3	-	-	-	0.0	-
86.7	35.0	0.0	-	-	0.0	-	-	203.3	-	-	-	0.0	-
86.7	39.5	0.0	-	-	5.6	-	-	-	-	-	-	-	-
86.7	40.0	-	-	-	-	-	-	0.8	-	-	-	0.0	-
86.7	50.0	0.0	-	-	0.8	-	-	0.0	-	-	-	0.0	-
86.7	60.0	1.0	-	-	2.7	-	-	2.5	-	-	-	0.0	-
86.7	70.0	0.0	-	-	4.0	-	-	0.0	-	-	-	0.0	-
86.7	90.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
86.7	100.0	0.0	-	-	0.0	-	-	16.4	-	-	-	0.0	-
90.0	28.0	0.0	-	-	14.3	-	-	105.8	-	-	-	0.0	-
90.0	30.0	0.0	-	-	0.0	-	-	668.3	-	-	-	0.0	-
90.0	53.0	0.0	-	-	1.6	-	-	0.0	-	-	-	0.0	-
90.0	80.0	-	-	-	18.6	-	-	1.0	-	-	-	0.0	-
90.0	110.0	0.0	-	-	21.8	-	-	0.0	-	-	-	0.0	-
93.3	30.0	0.0	-	-	0.0	-	-	29.6	-	-	-	0.0	-
93.3	45.0	0.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
93.3	50.0	1.7	-	-	0.0	-	-	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	55.0	0.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
93.3	60.0	0.0	-	-	42.7	-	-	4.1	-	-	-	0.0	-
93.3	70.0	0.0	-	-	0.0	-	-	6.2	-	-	-	0.0	-
93.3	90.0	0.0	-	-	2.8	-	-	-	-	-	-	0.0	-
93.3	100.0	0.0	-	-	2.5	-	-	-	-	-	-	0.0	-

Engraulis mordax

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7	49.0	-	717.8	-	3.4	-	-	-	0.8	-	-	112.5	-
76.7	51.0	-	256.0	-	0.0	-	-	-	11.9	-	-	140.7	-
76.7	55.0	-	10.0	-	4.7	-	-	-	0.0	-	-	0.0	-
76.7	55.6	-	-	-	-	0.9	-	-	-	-	-	-	-
76.7	59.1	-	-	-	-	0.9	-	-	-	-	-	-	-
76.7	60.0	-	0.0	-	31.0	-	-	-	0.0	-	-	0.0	-
76.7	70.0	-	0.0	-	0.0	0.0	-	-	0.0	-	-	1.9	-
76.7	80.0	-	4.5	-	0.0	-	-	0.8	-	-	-	0.0	-
76.7	90.0	-	1.0	-	0.0	-	-	0.0	-	-	-	0.0	-
80.0	51.0	5.4	-	-	1.8	-	-	116.6	-	-	-	0.0	-
80.0	55.0	159.4	-	-	0.9	-	-	52.4	-	-	-	0.0	-
80.0	60.0	42.5	-	-	0.0	-	-	30.0	-	-	-	6.7	-
80.0	70.0	-	115.6	-	0.0	-	-	0.0	-	-	-	0.0	-
81.8	46.9	2.0	-	-	0.0	-	-	38.0	-	-	-	5.3	-
83.3	40.6	53.9	-	-	85.3	-	-	29.4	-	-	-	12.1	-
83.3	42.0	231.3	-	-	30.8	-	-	0.0	-	-	-	0.0	-
83.3	51.0	1070.2	-	-	32.7	-	-	35.3	-	-	-	0.8	-
83.3	55.0	945.7	-	-	870.9	-	-	10.5	-	-	-	0.0	-
83.3	60.0	0.0	-	-	0.9	-	-	0.0	-	-	-	3.8	-
86.7	33.0	19.4	-	-	473.5	-	-	89.2	-	-	-	0.0	-
86.7	35.0	345.1	-	-	100.5	-	-	16.6	-	-	-	0.0	-
86.7	39.5	232.0	-	-	6.5	-	-	-	-	-	-	-	-
86.7	40.0	-	-	-	-	-	-	0.0	-	-	-	25.9	-
86.7	45.0	1.0	-	-	0.0	-	-	0.0	-	-	-	9.8	-
86.7	55.0	62.8	-	-	0.0	-	-	360.0	-	-	-	0.0	-
86.7	60.0	0.0	-	-	0.0	-	-	2.5	-	-	-	0.0	-
90.0	28.0	15.6	-	-	3.4	-	-	33.3	-	-	-	0.0	-
90.0	30.0	26.3	-	-	0.0	-	-	54.5	-	-	-	0.0	-

TABLE 4. (cont.)

Engraulis mordax (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 35.0	6.4	-	-	16.4	-	-	0.0	-	-	-	1.0	-
90.0 37.0	444.9	-	-	11.2	-	-	3.2	-	-	-	6.0	-
90.0 45.0	0.0	-	-	-	-	-	50.1	-	-	-	0.0	-
90.0 53.0	2.7	-	-	0.0	-	-	28.6	-	-	-	0.0	-
90.0 60.0	58.1	-	-	0.0	-	-	0.0	-	-	-	0.0	-
90.0 120.0	0.0	-	-	3.8	-	-	-	-	-	-	0.0	-
93.3 26.7	0.0	-	-	0.0	-	-	0.0	-	-	-	4.2	-
93.3 28.0	0.0	-	-	14.5	-	-	9.8	-	-	-	0.0	-
93.3 30.0	0.0	-	-	190.8	-	-	3.0	-	-	-	0.0	-
93.3 35.0	2.7	-	-	3.9	-	-	197.3	-	-	-	0.0	-
93.3 40.0	0.0	-	-	0.0	-	-	3.2	-	-	-	0.0	-
93.3 45.0	2.6	-	-	0.0	-	-	6.4	-	-	-	0.0	-
93.3 50.0	5.0	-	-	1.0	-	-	0.0	-	-	-	0.0	-
93.3 55.0	16.5	-	-	2.5	-	-	4.7	-	-	-	10.6	-
93.3 60.0	0.0	-	-	0.8	-	-	34.0	-	-	-	0.8	-

***Cyclothone* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 110.0	0.0	-	-	0.9	-	-	-	-	-	-	0.0	-
90.0 120.0	1.0	-	-	0.0	-	-	-	-	-	-	0.0	-

Cyclothone signata

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

Argyropelecus sladeni

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 28.0	0.0	-	-	0.0	-	-	1.0	-	-	-	0.0	-

***Sternoptyx* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 80.0	-	0.0	-	0.0	-	-	2.4	-	-	-	0.0	-

Vinciguerria lucetia

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 100.0	-	-	-	-	-	-	0.0	-	-	-	0.9	-
83.3 80.0	0.0	-	-	0.0	-	-	3.2	-	-	-	0.0	-
83.3 110.0	0.0	-	-	0.0	-	-	-	-	-	-	1.6	-

TABLE 4. (cont.)

Vinciguerria lucetia (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 100.0	0.0	-	-	0.0	-	-	0.0	-	-	-	0.9	-
86.7 110.0	0.0	-	-	0.0	-	-	-	-	-	-	0.9	-
93.3 70.0	0.0	-	-	0.0	-	-	1.6	-	-	-	0.0	-
93.3 100.0	0.0	-	-	0.0	-	-	-	-	-	-	0.9	-

Aristostomias scintillans

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 100.0	0.0	-	-	0.9	-	-	0.0	-	-	-	0.0	-

Bolinichthys longipes

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 120.0	0.0	-	-	0.0	-	-	-	-	-	-	13.5	-

Ceratoscopelus townsendi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 70.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
83.3 80.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
83.3 90.0	0.0	-	-	0.0	-	-	1.5	-	-	-	0.0	-
83.3 110.0	0.0	-	-	0.0	-	-	-	-	-	-	19.5	-
86.7 90.0	0.0	-	-	0.8	-	-	0.0	-	-	-	0.0	-
86.7 110.0	0.0	-	-	2.6	-	-	-	-	-	-	0.0	-
90.0 120.0	0.0	-	-	0.0	-	-	-	-	-	-	1.0	-
93.3 70.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-

Lampadena urophaos

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 120.0	1.0	-	-	0.0	-	-	-	-	-	-	1.0	-

Nannobrachium ritteri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 100.0	0.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7 60.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
90.0 90.0	-	-	-	0.8	-	-	0.0	-	-	-	0.0	-

Stenobrachius leucopsarus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	2.7	-	-	0.0	-	-	0.0	-	-	-	0.0	-

TABLE 4. (cont.)

Stenobrachius leucopsarus (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 51.0	0.0	-	-	10.6	-	-	0.0	-	-	-	0.0	-

Taaningichthys minimus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 120.0	0.0	-	-	0.0	-	-	-	-	-	-	1.9	-

Triphoturus mexicanus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 120.0	1.0	-	-	0.0	-	-	-	-	-	-	0.0	-
93.3 30.0	0.0	-	-	0.0	-	-	4.9	-	-	-	0.0	-
93.3 70.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-

Diogenichthys atlanticus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 120.0	0.0	-	-	0.0	-	-	-	-	-	-	1.0	-

Symbolophorus californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 90.0	-	0.0	-	0.0	-	-	0.7	-	-	-	0.0	-

Trachipterus altivelis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 55.0	0.0	-	-	0.9	-	-	0.0	-	-	-	0.0	-

Merluccius productus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	1.9	-	0.0	-	-	-	0.0	-	-	0.0	-
76.7 51.0	-	1.0	-	0.0	-	-	-	0.0	-	-	0.0	-
76.7 55.0	-	2.5	-	0.0	-	-	-	0.0	-	-	0.0	-
76.7 70.0	-	17.0	-	0.0	0.0	-	-	0.0	-	-	0.0	-
76.7 80.0	-	11.6	-	0.0	-	-	0.0	-	-	-	0.0	-
76.7 90.0	-	1.0	-	0.0	-	-	0.0	-	-	-	0.0	-
80.0 60.0	2.2	-	-	0.0	-	-	0.0	-	-	-	0.8	-
80.0 70.0	-	10.7	-	0.0	-	-	0.0	-	-	-	0.0	-
80.0 80.0	-	56.5	-	0.0	-	-	0.0	-	-	-	0.0	-
83.3 40.6	1.0	-	-	0.0	-	-	0.0	-	-	-	0.0	-
83.3 42.0	3.1	-	-	0.0	-	-	0.0	-	-	-	0.0	-

TABLE 4. (cont.)

Merluccius productus (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 51.0	0.0	-	-	0.0	-	-	0.0	-	-	-	1.6	-
83.3 80.0	3.7	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7 60.0	3.8	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7 70.0	2.7	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7 80.0	9.8	-	-	0.0	-	-	0.0	-	-	-	0.0	-
90.0 53.0	0.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
90.0 60.0	3.1	-	-	0.0	-	-	0.0	-	-	-	0.0	-
93.3 35.0	0.0	-	-	1.0	-	-	0.0	-	-	-	0.0	-
93.3 55.0	1.7	-	-	0.0	-	-	0.0	-	-	-	0.0	-

Ophidion scrippsae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 60.0	0.0	-	-	0.0	-	-	0.7	-	-	-	0.0	-

Oneirodes spp.

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 120.0	0.0	-	-	0.0	-	-	-	-	-	-	1.0	-

Gigantactis spp.

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

Atherinops affinis

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

Atherinopsis californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	1.0	-	0.0	-	-	-	0.0	-	-	0.0	-
80.0 51.0	0.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
83.3 40.6	4.0	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7 33.0	0.0	-	-	0.0	-	-	0.0	-	-	-	3.0	-
90.0 28.0	1.9	-	-	0.0	-	-	0.0	-	-	-	11.4	-
90.0 30.0	1.0	-	-	0.0	-	-	0.0	-	-	-	0.0	-
93.3 26.7	1.1	-	-	9.7	-	-	0.0	-	-	-	23.3	-

TABLE 4. (cont.)

Leuresthes tenuis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
83.3 42.0	0.0	-	-	0.0	-	-	1.9	-	-	-	0.0	-
86.7 33.0	0.0	-	-	0.0	-	-	4.7	-	-	-	0.0	-
86.7 35.0	0.0	-	-	0.0	-	-	22.2	-	-	-	0.0	-
93.3 30.0	0.0	-	-	1.8	-	-	0.0	-	-	-	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	-	-	1.0	-
76.7 55.0	-	0.0	-	0.9	-	-	-	0.0	-	-	0.0	-
76.7 60.0	-	0.0	-	5.0	-	-	-	0.0	-	-	0.0	-
76.7 70.0	-	0.0	-	4.0	0.0	-	-	0.0	-	-	1.9	-
76.7 80.0	-	0.0	-	1.0	-	-	0.8	-	-	-	11.6	-
76.7 90.0	-	0.0	-	6.1	-	-	0.0	-	-	-	0.8	-
76.7 100.0	-	-	-	-	-	-	3.2	-	-	-	1.7	-
80.0 60.0	0.0	-	-	0.0	-	-	0.7	-	-	-	0.8	-
80.0 80.0	-	0.0	-	0.0	-	-	0.0	-	-	-	0.9	-
80.0 90.0	-	0.0	-	0.0	-	-	0.8	-	-	-	0.0	-
80.0 100.0	-	-	-	-	-	-	1.8	-	-	-	16.1	-
83.3 40.6	0.0	-	-	2.1	-	-	0.0	-	-	-	0.0	-
83.3 42.0	0.0	-	-	0.0	-	-	1.9	-	-	-	0.0	-
83.3 55.0	0.9	-	-	6.2	-	-	0.0	-	-	-	0.0	-
83.3 70.0	0.0	-	-	0.0	-	-	0.0	-	-	-	0.9	-
83.3 80.0	0.0	-	-	0.0	-	-	0.8	-	-	-	1.0	-
83.3 90.0	1.0	-	-	0.0	-	-	0.8	-	-	-	1.8	-
83.3 100.0	0.0	-	-	0.0	-	-	0.7	-	-	-	4.7	-
83.3 110.0	0.0	-	-	0.0	-	-	-	-	-	-	11.7	-
86.7 33.0	0.0	-	-	0.0	-	-	0.9	-	-	-	0.0	-
86.7 40.0	-	-	-	-	-	-	1.5	-	-	-	0.0	-
86.7 45.0	0.0	-	-	0.0	-	-	2.5	-	-	-	2.9	-
86.7 55.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
86.7 70.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
86.7 80.0	0.0	-	-	0.0	-	-	0.8	-	-	-	9.6	-
86.7 90.0	0.0	-	-	0.0	-	-	0.8	-	-	-	12.7	-
86.7 100.0	0.0	-	-	0.9	-	-	3.9	-	-	-	15.1	-

TABLE 4. (cont.)

Cololabis saira (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 110.0	0.0	-	-	0.0	-	-	-	-	-	-	8.4	-
90.0 28.0	0.0	-	-	0.8	-	-	0.0	-	-	-	0.0	-
90.0 30.0	1.0	-	-	0.9	-	-	0.0	-	-	-	0.0	-
90.0 37.0	0.0	-	-	0.0	-	-	0.0	-	-	-	1.0	-
90.0 45.0	0.0	-	-	-	-	-	3.8	-	-	-	0.0	-
90.0 53.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.9	-
90.0 60.0	0.0	-	-	0.0	-	-	1.8	-	-	-	0.0	-
90.0 70.0	-	-	-	0.0	-	-	0.0	-	-	-	1.9	-
90.0 80.0	-	-	-	0.0	-	-	4.8	-	-	-	11.9	-
90.0 90.0	-	-	-	0.0	-	-	6.4	-	-	-	2.7	-
90.0 100.0	0.0	-	-	0.0	-	-	0.9	-	-	-	24.3	-
90.0 110.0	0.0	-	-	2.7	-	-	0.0	-	-	-	35.0	-
90.0 120.0	3.9	-	-	1.9	-	-	-	-	-	-	8.7	-
93.3 26.7	0.0	-	-	1.0	-	-	0.0	-	-	-	0.0	-
93.3 30.0	0.0	-	-	3.5	-	-	0.0	-	-	-	2.0	-
93.3 35.0	0.0	-	-	1.0	-	-	0.8	-	-	-	0.0	-
93.3 40.0	0.0	-	-	0.0	-	-	12.6	-	-	-	0.0	-
93.3 45.0	0.9	-	-	0.9	-	-	1.8	-	-	-	0.0	-
93.3 50.0	0.8	-	-	6.8	-	-	0.0	-	-	-	2.8	-
93.3 55.0	0.0	-	-	3.3	-	-	0.0	-	-	-	0.9	-
93.3 60.0	0.0	-	-	0.0	-	-	0.8	-	-	-	3.2	-
93.3 70.0	0.0	-	-	0.0	-	-	3.1	-	-	-	7.4	-
93.3 80.0	0.7	-	-	0.0	-	-	-	-	-	-	0.8	-
93.3 90.0	0.8	-	-	0.9	-	-	-	-	-	-	7.1	-
93.3 100.0	0.0	-	-	0.0	-	-	-	-	-	-	5.2	-
93.3 110.0	0.0	-	-	5.9	-	-	-	-	-	-	20.2	-
93.3 120.0	0.0	-	-	1.0	-	-	-	-	-	-	1.0	-

***Cheilopogon* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 26.7	0.0	-	-	0.0	-	-	0.0	-	-	-	1.1	-
93.3 50.0	0.0	-	-	0.0	-	-	1.6	-	-	-	0.0	-

Fodiator acutus

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

TABLE 4. (cont.)

Macroramphosus gracilis

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0	45.0	0.0	-	-	-	-	-	0.0	-	-	-	0.9	-

Sebastes spp.

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7	49.0	-	4.8	-	0.0	-	-	-	0.0	-	-	9.4	-
76.7	51.0	-	6.0	-	0.0	-	-	-	13.3	-	-	16.4	-
76.7	55.0	-	14.2	-	0.0	-	-	-	0.0	-	-	0.0	-
76.7	60.0	-	0.9	-	0.0	-	-	-	0.0	-	-	0.0	-
76.7	70.0	-	0.0	-	1.0	0.0	-	-	0.0	-	-	0.0	-
76.7	90.0	-	1.0	-	0.0	-	-	0.0	-	-	-	0.0	-
80.0	51.0	17.2	-	-	0.0	-	-	1.6	-	-	-	0.0	-
80.0	55.0	10.3	-	-	0.0	-	-	20.3	-	-	-	0.0	-
80.0	60.0	0.0	-	-	0.0	-	-	5.9	-	-	-	2.5	-
80.0	70.0	-	2.7	-	0.0	-	-	0.0	-	-	-	0.0	-
80.0	80.0	-	1.9	-	0.0	-	-	0.0	-	-	-	0.0	-
81.8	46.9	24.4	-	-	0.9	-	-	0.0	-	-	-	0.9	-
83.3	40.6	4.0	-	-	1.1	-	-	0.0	-	-	-	0.0	-
83.3	42.0	5.1	-	-	9.3	-	-	0.0	-	-	-	0.0	-
83.3	51.0	3.1	-	-	4.4	-	-	0.0	-	-	-	0.0	-
83.3	55.0	65.2	-	-	7.2	-	-	1.5	-	-	-	0.0	-
83.3	60.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.9	-
83.3	70.0	3.7	-	-	0.0	-	-	0.0	-	-	-	0.0	-
83.3	100.0	1.8	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7	33.0	14.5	-	-	7.2	-	-	0.0	-	-	-	1.0	-
86.7	35.0	1.0	-	-	3.9	-	-	0.0	-	-	-	0.0	-
86.7	39.5	5.9	-	-	4.0	-	-	-	-	-	-	-	-
86.7	45.0	2.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7	50.0	4.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7	55.0	120.2	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7	60.0	1.0	-	-	1.8	-	-	0.0	-	-	-	0.0	-
86.7	80.0	2.7	-	-	0.0	-	-	0.0	-	-	-	0.0	-
90.0	28.0	1.9	-	-	0.0	-	-	0.0	-	-	-	1.9	-
90.0	30.0	0.0	-	-	2.8	-	-	0.0	-	-	-	0.0	-
90.0	37.0	1.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
90.0	53.0	2.7	-	-	1.6	-	-	0.0	-	-	-	0.0	-

TABLE 4. (cont.)

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

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 60.0	3.1	-	-	0.0	-	-	0.0	-	-	-	0.0	-
93.3 26.7	0.0	-	-	0.0	-	-	0.0	-	-	-	1.1	-
93.3 28.0	0.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
93.3 30.0	0.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
93.3 35.0	0.9	-	-	2.0	-	-	0.0	-	-	-	0.0	-
93.3 40.0	0.8	-	-	0.9	-	-	0.0	-	-	-	0.0	-
93.3 45.0	0.0	-	-	0.9	-	-	0.0	-	-	-	0.0	-
93.3 50.0	1.7	-	-	1.0	-	-	0.0	-	-	-	0.0	-
93.3 70.0	1.8	-	-	0.0	-	-	0.0	-	-	-	0.0	-

Sebastes aurora

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 55.0	2.7	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7 35.0	1.0	-	-	0.0	-	-	0.0	-	-	-	0.0	-

Sebastes diploproa

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	0.0	-	0.0	-	-	-	11.2	-	-	0.0	-
93.3 26.7	0.0	-	-	0.0	-	-	0.0	-	-	-	1.1	-
93.3 40.0	0.8	-	-	0.0	-	-	0.0	-	-	-	0.0	-
93.3 50.0	3.3	-	-	0.0	-	-	0.0	-	-	-	0.0	-

Sebastes paucispinis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	1.0	-	0.0	-	-	-	0.0	-	-	0.0	-
80.0 55.0	0.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-

Oxylebius pictus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 55.0	-	0.0	-	0.9	-	-	-	0.0	-	-	0.0	-
76.7 60.0	-	0.0	-	3.0	-	-	-	0.0	-	-	0.0	-
80.0 60.0	0.0	-	-	0.0	-	-	0.0	-	-	-	0.8	-

Hexagrammos decagrammus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	1922.6	-	0.0	-	-	-	0.0	-	-	0.0	-
76.7 51.0	-	2.0	-	0.0	-	-	-	0.0	-	-	0.0	-
81.8 46.9	5.1	-	-	0.0	-	-	0.0	-	-	-	0.0	-

TABLE 4. (cont.)

Hexagrammos decagrammus (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 55.0	3.6	-	-	0.0	-	-	0.0	-	-	-	0.0	-
90.0 60.0	0.8	-	-	0.0	-	-	0.0	-	-	-	0.0	-

Hexagrammos lagocephalus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	1.0	-	0.0	-	-	-	0.0	-	-	0.0	-

Ophiodon elongatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	1.0	-	0.0	-	-	-	0.0	-	-	0.0	-
81.8 46.9	1.0	-	-	0.0	-	-	0.0	-	-	-	0.0	-
83.3 51.0	4.1	-	-	0.0	-	-	0.0	-	-	-	0.0	-

Hemilepidotus spinosus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	1.0	-	0.0	-	-	-	0.0	-	-	0.0	-

***Icelinus* spp.**

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

***Oligocottus* spp.**

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

Ruscarius creaseri

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

Scorpaenichthys marmoratus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	2.9	-	0.0	-	-	-	0.0	-	-	7.3	-
76.7 51.0	-	0.0	-	0.0	-	-	-	0.0	-	-	1.0	-
76.7 60.0	-	1.9	-	8.0	-	-	-	0.0	-	-	0.0	-
80.0 55.0	2.8	-	-	0.0	-	-	0.0	-	-	-	0.0	-
80.0 60.0	4.4	-	-	0.0	-	-	0.0	-	-	-	5.0	-
80.0 70.0	-	1.8	-	0.0	-	-	0.0	-	-	-	0.0	-
81.8 46.9	8.1	-	-	0.0	-	-	0.0	-	-	-	0.9	-

TABLE 4. (cont.)

Scorpaenichthys marmoratus (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	1.0	-	-	1.1	-	-	0.0	-	-	-	0.0	-
83.3 42.0	17.5	-	-	0.0	-	-	0.0	-	-	-	1.0	-
83.3 51.0	10.3	-	-	0.0	-	-	0.0	-	-	-	0.0	-
83.3 55.0	18.1	-	-	3.1	-	-	0.0	-	-	-	0.8	-
83.3 60.0	0.0	-	-	0.0	-	-	0.0	-	-	-	0.9	-
86.7 35.0	61.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7 50.0	1.0	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7 55.0	1.8	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7 60.0	0.0	-	-	0.9	-	-	0.0	-	-	-	0.0	-
90.0 28.0	1.0	-	-	0.0	-	-	0.0	-	-	-	5.7	-
90.0 30.0	4.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
90.0 37.0	4.8	-	-	0.0	-	-	0.0	-	-	-	0.0	-
90.0 60.0	11.6	-	-	0.0	-	-	0.0	-	-	-	0.0	-
93.3 26.7	30.6	-	-	0.0	-	-	0.0	-	-	-	0.0	-
93.3 28.0	1.8	-	-	0.0	-	-	0.0	-	-	-	0.0	-
93.3 30.0	0.0	-	-	0.0	-	-	0.0	-	-	-	2.0	-
93.3 45.0	0.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
93.3 50.0	0.0	-	-	1.0	-	-	0.0	-	-	-	0.0	-
93.3 55.0	0.9	-	-	0.8	-	-	0.0	-	-	-	0.0	-

Odontopyxis trispinosa

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

Liparis fucensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 55.0	0.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-

Liparis mucosus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.0	-	0.0	-	-	-	2.5	-	-	0.0	-
80.0 55.0	0.0	-	-	0.0	-	-	1.1	-	-	-	0.0	-

***Paralabrax* spp.**

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

TABLE 4. (cont.)

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

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 55.0	0.0	-	-	0.0	-	-	10.7	-	-	-	0.0	-
86.7 33.0	0.0	-	-	0.0	-	-	4.7	-	-	-	0.0	-
86.7 35.0	0.0	-	-	0.0	-	-	22.2	-	-	-	0.0	-
90.0 28.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
90.0 30.0	0.0	-	-	0.0	-	-	0.9	-	-	-	0.0	-
93.3 30.0	0.0	-	-	0.0	-	-	1.0	-	-	-	0.0	-

Trachurus symmetricus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 70.0	0.0	-	-	60.5	-	-	8.8	-	-	-	0.0	-
86.7 80.0	0.0	-	-	0.0	-	-	12.8	-	-	-	0.0	-
86.7 90.0	0.0	-	-	3.3	-	-	1.7	-	-	-	0.0	-
86.7 100.0	0.0	-	-	2.7	-	-	3.1	-	-	-	0.0	-
86.7 110.0	0.0	-	-	4.4	-	-	-	-	-	-	0.9	-
90.0 70.0	-	-	-	0.0	-	-	14.8	-	-	-	0.0	-
90.0 80.0	-	-	-	0.9	-	-	1.0	-	-	-	0.0	-
90.0 110.0	0.0	-	-	2.7	-	-	0.0	-	-	-	0.0	-
93.3 28.0	0.0	-	-	2.9	-	-	0.0	-	-	-	0.0	-
93.3 60.0	0.0	-	-	1.7	-	-	0.8	-	-	-	0.0	-
93.3 70.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
93.3 80.0	0.0	-	-	65.4	-	-	-	-	-	-	0.0	-
93.3 90.0	0.0	-	-	1.9	-	-	-	-	-	-	0.0	-

Anisotremus davidsoni

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	0.0	-	-	0.0	-	-	6.6	-	-	-	0.0	-

Xenistius californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	0.0	-	-	0.0	-	-	167.1	-	-	-	0.0	-
86.7 35.0	0.0	-	-	0.0	-	-	33.3	-	-	-	0.0	-
90.0 30.0	0.0	-	-	0.0	-	-	3.6	-	-	-	0.0	-

Sciaenidae

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

TABLE 4. (cont.)

Cheilotrema saturnum

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 51.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
86.7 33.0	0.0	-	-	0.0	-	-	0.9	-	-	-	0.0	-
86.7 35.0	0.0	-	-	0.0	-	-	0.9	-	-	-	0.0	-

Genyonemus lineatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 40.6	6.0	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7 33.0	2.9	-	-	0.0	-	-	0.0	-	-	-	1.0	-
90.0 28.0	1.0	-	-	0.0	-	-	0.0	-	-	-	0.0	-

Seriphus politus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	0.0	-	-	0.0	-	-	1.6	-	-	-	0.0	-
86.7 35.0	0.0	-	-	0.0	-	-	0.9	-	-	-	0.0	-
90.0 28.0	0.0	-	-	0.8	-	-	0.0	-	-	-	0.0	-

Girella nigricans

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.0	-	0.0	-	-	-	0.0	-	-	1.0	-
80.0 51.0	0.0	-	-	0.0	-	-	8.7	-	-	-	0.0	-
81.8 46.9	0.0	-	-	0.0	-	-	3.5	-	-	-	0.0	-
83.3 40.6	0.0	-	-	0.0	-	-	12.1	-	-	-	0.0	-
83.3 42.0	0.0	-	-	0.0	-	-	26.4	-	-	-	0.0	-
86.7 33.0	0.0	-	-	0.0	-	-	16.9	-	-	-	0.0	-
86.7 35.0	0.0	-	-	0.0	-	-	27.7	-	-	-	0.0	-
86.7 39.5	0.0	-	-	0.8	-	-	-	-	-	-	-	-
86.7 45.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
86.7 60.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
86.7 80.0	0.0	-	-	0.0	-	-	1.6	-	-	-	0.0	-
90.0 28.0	0.0	-	-	0.0	-	-	56.6	-	-	-	0.0	-
90.0 30.0	0.0	-	-	0.0	-	-	6.4	-	-	-	0.0	-
93.3 26.7	0.0	-	-	0.0	-	-	0.0	-	-	-	1.1	-
93.3 30.0	0.0	-	-	0.0	-	-	2.0	-	-	-	0.0	-
93.3 55.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-

TABLE 4. (cont.)

Medialuna californiensis

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	-
76.7 80.0	-	0.0	-	0.0	-	-	1.6	-	-	-	0.0	-
80.0 60.0	0.0	-	-	0.0	-	-	0.0	-	-	-	0.8	-
80.0 100.0	-	-	-	-	-	-	1.8	-	-	-	0.0	-
83.3 40.6	0.0	-	-	0.0	-	-	4.3	-	-	-	0.0	-
83.3 42.0	0.0	-	-	0.0	-	-	0.9	-	-	-	0.0	-
90.0 28.0	0.0	-	-	0.0	-	-	2.5	-	-	-	0.0	-
90.0 30.0	0.0	-	-	0.0	-	-	0.9	-	-	-	0.0	-
90.0 70.0	-	-	-	0.0	-	-	0.8	-	-	-	0.0	-
93.3 30.0	0.0	-	-	0.0	-	-	1.0	-	-	-	0.0	-
93.3 70.0	0.0	-	-	0.0	-	-	1.6	-	-	-	0.8	-

Chromis punctipinnis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 55.0	-	0.0	-	0.0	-	-	-	0.8	-	-	0.0	-
80.0 51.0	0.0	-	-	0.0	-	-	3.9	-	-	-	0.0	-
80.0 55.0	0.0	-	-	0.0	-	-	1.1	-	-	-	0.0	-
83.3 40.6	0.0	-	-	0.0	-	-	7.8	-	-	-	0.0	-
83.3 42.0	0.0	-	-	0.0	-	-	2.8	-	-	-	0.0	-
86.7 33.0	0.0	-	-	0.0	-	-	1.9	-	-	-	0.0	-
86.7 35.0	0.0	-	-	0.0	-	-	9.2	-	-	-	0.0	-
86.7 55.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-

Halichoeres semicinctus

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

Oxyjulis californica

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 70.0	-	0.0	-	0.0	0.0	-	-	0.8	-	-	0.0	-
80.0 55.0	0.0	-	-	0.0	-	-	7.5	-	-	-	0.0	-
80.0 60.0	0.0	-	-	0.0	-	-	1.5	-	-	-	0.0	-
81.8 46.9	0.0	-	-	0.0	-	-	0.9	-	-	-	0.0	-
83.3 40.6	0.0	-	-	0.0	-	-	32.9	-	-	-	0.0	-
83.3 42.0	0.0	-	-	0.0	-	-	16.0	-	-	-	0.0	-
83.3 60.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-

TABLE 4. (cont.)

Oxyjulis californica (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 39.5	0.0	-	-	2.4	-	-	-	-	-	-	-	-
90.0 28.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
90.0 30.0	0.0	-	-	0.0	-	-	2.7	-	-	-	0.0	-
90.0 35.0	0.0	-	-	0.0	-	-	0.9	-	-	-	0.0	-
93.3 70.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-

Semicossyphus pulcher

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

***Rathbunella* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 35.0	0.0	-	-	0.0	-	-	1.8	-	-	-	0.0	-

Chiasmodon niger

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

Cryptotrema corallinum

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
81.8 46.9	0.0	-	-	0.0	-	-	3.5	-	-	-	0.0	-
83.3 51.0	0.0	-	-	0.0	-	-	3.8	-	-	-	0.0	-

***Neoclinus* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	0.0	-	-	0.0	-	-	5.5	-	-	-	0.0	-

Neoclinus blanchardi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	1.0	-	0.0	-	-	-	3.5	-	-	0.0	-
86.7 35.0	2.0	-	-	0.0	-	-	0.0	-	-	-	0.0	-

Neoclinus stephensae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 55.0	0.0	-	-	1.0	-	-	0.0	-	-	-	0.0	-
86.7 33.0	0.0	-	-	0.0	-	-	0.0	-	-	-	3.0	-

TABLE 4. (cont.)

Hypsoblennius gentilis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 28.0	0.0	-	-	0.0	-	-	0.0	-	-	-	3.8	-

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	-
80.0 51.0	0.0	-	-	0.0	-	-	85.9	-	-	-	0.0	-
90.0 28.0	0.0	-	-	0.0	-	-	0.0	-	-	-	1.0	-
93.3 30.0	0.0	-	-	1.8	-	-	0.0	-	-	-	1.0	-

Hypsoblennius jenkinsi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.0	-	0.0	-	-	-	0.0	-	-	1.0	-
80.0 51.0	0.0	-	-	0.0	-	-	6.3	-	-	-	0.0	-
80.0 60.0	0.0	-	-	0.0	-	-	0.7	-	-	-	0.8	-
81.8 46.9	0.0	-	-	0.0	-	-	2.6	-	-	-	0.0	-
83.3 40.6	0.0	-	-	0.0	-	-	0.0	-	-	-	0.9	-
83.3 42.0	0.0	-	-	0.0	-	-	7.5	-	-	-	0.0	-
86.7 33.0	0.0	-	-	0.0	-	-	655.4	-	-	-	1.0	-
86.7 35.0	0.0	-	-	0.0	-	-	1116.2	-	-	-	0.0	-
86.7 40.0	-	-	-	-	-	-	0.0	-	-	-	0.9	-
90.0 28.0	0.0	-	-	0.0	-	-	12.5	-	-	-	0.0	-
90.0 30.0	0.0	-	-	0.0	-	-	5.4	-	-	-	4.5	-
90.0 45.0	0.0	-	-	-	-	-	2.8	-	-	-	0.0	-
93.3 35.0	0.0	-	-	0.0	-	-	2.5	-	-	-	0.0	-

Coryphopterus nicholsii

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 60.0	1.1	-	-	0.0	-	-	1.5	-	-	-	0.0	-
86.7 33.0	0.0	-	-	0.9	-	-	0.0	-	-	-	0.0	-

Typhlogobius californiensis

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

TABLE 4. (cont.)

Sphyraena argentea

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	0.0	-	-	0.0	-	-	1.6	-	-	-	0.0	-
80.0 55.0	0.0	-	-	0.0	-	-	1.1	-	-	-	0.0	-
81.8 46.9	0.0	-	-	0.0	-	-	5.2	-	-	-	0.0	-
83.3 40.6	0.0	-	-	0.0	-	-	13.8	-	-	-	0.0	-
83.3 42.0	0.0	-	-	0.0	-	-	2.8	-	-	-	0.0	-
86.7 33.0	0.0	-	-	0.0	-	-	20.7	-	-	-	0.0	-
86.7 35.0	0.0	-	-	0.0	-	-	11.1	-	-	-	0.0	-
90.0 28.0	0.0	-	-	0.0	-	-	16.7	-	-	-	0.0	-
90.0 30.0	0.0	-	-	0.0	-	-	0.9	-	-	-	0.0	-
93.3 30.0	0.0	-	-	0.0	-	-	5.9	-	-	-	0.0	-

Sarda chiliensis

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

Scomber japonicus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	0.0	-	-	0.0	-	-	7.9	-	-	-	0.0	-
80.0 55.0	0.0	-	-	0.0	-	-	2.1	-	-	-	0.0	-
81.8 46.9	0.0	-	-	0.0	-	-	45.8	-	-	-	0.0	-
83.3 40.6	0.0	-	-	0.0	-	-	45.0	-	-	-	0.0	-
83.3 42.0	0.0	-	-	0.0	-	-	5.7	-	-	-	0.0	-
83.3 51.0	0.0	-	-	0.0	-	-	1.5	-	-	-	0.0	-
83.3 90.0	0.0	-	-	61.1	-	-	0.0	-	-	-	0.0	-
86.7 33.0	0.0	-	-	0.0	-	-	16.0	-	-	-	0.0	-
86.7 35.0	0.0	-	-	0.0	-	-	171.9	-	-	-	0.0	-
86.7 55.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
90.0 28.0	0.0	-	-	0.0	-	-	3.3	-	-	-	0.0	-
90.0 110.0	0.0	-	-	1.8	-	-	0.0	-	-	-	0.0	-
93.3 26.7	0.0	-	-	3.9	-	-	0.0	-	-	-	0.0	-
93.3 28.0	0.0	-	-	1.0	-	-	0.0	-	-	-	0.0	-
93.3 30.0	0.0	-	-	0.0	-	-	7.9	-	-	-	0.0	-
93.3 35.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
93.3 60.0	0.0	-	-	0.8	-	-	0.0	-	-	-	0.0	-
93.3 70.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
93.3 80.0	0.0	-	-	0.9	-	-	-	-	-	-	0.0	-

TABLE 4. (cont.)

Icichthys lockingtoni

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 70.0	-	1.9	-	0.0	0.0	-	-	0.0	-	-	0.0	-
80.0 60.0	1.1	-	-	0.0	-	-	0.0	-	-	-	0.0	-
80.0 70.0	-	0.0	-	0.0	-	-	0.7	-	-	-	0.0	-
86.7 35.0	0.0	-	-	0.0	-	-	0.9	-	-	-	0.0	-
90.0 53.0	0.0	-	-	0.8	-	-	0.0	-	-	-	0.0	-
90.0 110.0	2.5	-	-	0.0	-	-	0.0	-	-	-	0.0	-

Tetragonurus cuvieri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 55.0	0.0	-	-	0.9	-	-	0.0	-	-	-	0.0	-
83.3 80.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
83.3 100.0	0.0	-	-	0.0	-	-	0.0	-	-	-	0.9	-
86.7 60.0	0.0	-	-	0.0	-	-	1.7	-	-	-	0.0	-
90.0 120.0	1.0	-	-	0.0	-	-	-	-	-	-	0.0	-

Peprilus simillimus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.0	-	0.0	-	-	-	0.8	-	-	0.0	-
80.0 60.0	0.0	-	-	0.0	-	-	0.0	-	-	-	0.8	-
93.3 30.0	0.0	-	-	1.8	-	-	0.0	-	-	-	0.0	-

***Citharichthys* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	0.0	-	0.0	-	-	-	5.6	-	-	0.0	-

Citharichthys sordidus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	3.0	-	0.0	-	-	-	2.1	-	-	0.0	-
76.7 90.0	-	1.0	-	0.0	-	-	0.0	-	-	-	0.0	-
80.0 55.0	0.0	-	-	0.0	-	-	1.1	-	-	-	0.0	-
80.0 60.0	0.0	-	-	0.0	-	-	0.7	-	-	-	0.0	-
86.7 55.0	1.8	-	-	0.0	-	-	0.0	-	-	-	0.0	-

Citharichthys stigmaeus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	0.0	-	0.0	-	-	-	0.7	-	-	0.0	-
76.7 55.0	-	0.8	-	3.8	-	-	-	0.0	-	-	0.0	-

TABLE 4. (cont.)

Citharichthys stigmaeus (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 90.0	-	1.0	-	0.0	-	-	0.0	-	-	-	0.0	-
80.0 55.0	0.0	-	-	0.0	-	-	31.0	-	-	-	0.0	-
80.0 60.0	0.0	-	-	0.0	-	-	0.7	-	-	-	0.0	-
83.3 40.6	0.0	-	-	1.1	-	-	0.0	-	-	-	0.0	-

Paralichthys californicus

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

Lyopsetta exilis

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

Parophrys vetulus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	1.0	-	0.0	-	-	-	0.0	-	-	0.0	-
86.7 33.0	1.0	-	-	0.0	-	-	0.0	-	-	-	0.0	-

Pleuronichthys coenosus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	1.0	-	0.0	-	-	-	0.0	-	-	0.0	-
76.7 51.0	-	0.0	-	0.0	-	-	-	3.5	-	-	0.0	-
80.0 51.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
80.0 55.0	0.0	-	-	0.0	-	-	3.2	-	-	-	0.0	-
80.0 60.0	0.0	-	-	0.0	-	-	0.0	-	-	-	1.7	-
81.8 46.9	0.0	-	-	0.9	-	-	0.0	-	-	-	0.9	-
86.7 33.0	0.0	-	-	0.0	-	-	0.0	-	-	-	4.0	-
93.3 30.0	0.0	-	-	0.0	-	-	0.0	-	-	-	2.0	-
93.3 35.0	0.0	-	-	0.0	-	-	3.3	-	-	-	0.0	-

Pleuronichthys decurrens

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 55.0	0.0	-	-	0.9	-	-	0.0	-	-	-	0.0	-
93.3 50.0	0.0	-	-	1.0	-	-	0.0	-	-	-	0.0	-

TABLE 4. (cont.)

Pleuronichthys verticalis

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7	49.0	-	0.0	-	0.0	-	-	-	7.4	-	-	0.0	-
76.7	51.0	-	1.0	-	0.0	-	-	-	0.7	-	-	0.0	-
80.0	51.0	0.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
80.0	55.0	3.7	-	-	0.0	-	-	0.0	-	-	-	0.0	-
83.3	55.0	0.9	-	-	0.0	-	-	0.0	-	-	-	0.0	-
86.7	33.0	0.0	-	-	0.9	-	-	0.0	-	-	-	0.0	-
86.7	35.0	3.0	-	-	0.0	-	-	0.0	-	-	-	0.0	-
93.3	26.7	3.4	-	-	1.9	-	-	0.0	-	-	-	0.0	

Disintegrated fish larvae

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3	51.0	0.0	-	-	0.0	-	-	0.8	-	-	-	0.0	-
86.7	33.0	0.0	-	-	0.0	-	-	0.9	-	-	-	0.0	-
86.7	39.5	0.0	-	-	0.8	-	-	-	-	-	-	-	-
86.7	50.0	0.0	-	-	0.8	-	-	0.0	-	-	-	0.0	-

Unidentified fish larvae

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0	55.0	0.0	-	-	1.9	-	-	0.0	-	-	-	0.0	-

PHYLOGENETIC INDEX TO TABLE 4

ALPHABETICAL INDEX TO TABLE 4

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(May 2002)

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

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D.A. AMBROSE, R.L. CHARTER, H.G. MOSER
(May 2002)

322 Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations Survey Cruises in 1986.
S.R. CHARTER, R.L. CHARTER, H.G. MOSER
(May 2002)

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

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