NOAA Technical Memorandum NMFS

MAY 2002

ICHTHYOPLANKTON AND STATION DATA FOR MANTA (SURFACE) TOWS TAKEN ON CALIFORNIA COOPERATIVE OCEANIC FISHERIES INVESTIGATIONS SURVEY CRUISES IN 1996

William Watson
Richard L. Charter
H. Geoffrey Moser

NOAA-TM-NMFS-SWFSC-332

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

The National Oceanic and Atmospheric Administration (NOAA), organized in 1970, has evolved into an agency which establishes national policies and manages and conserves our oceanic, coastal, and atmospheric resources. An organizational element within NOAA, the Office of Fisheries is responsible for fisheries policy and the direction of the National Marine Fisheries Service (NMFS).

In addition to its formal publications, the NMFS uses the NOAA Technical Memorandum series to issue informal scientific and technical publications when complete formal review and editorial processing are not appropriate or feasible. Documents within this series, however, reflect sound professional work and may be referenced in the formal scientific and technical literature.

NOAA Technical Memorandum NMFS

MAY 2002

ICHTHYOPLANKTON AND STATION DATA FOR MANTA (SURFACE) TOWS TAKEN ON CALIFORNIA COOPERATIVE OCEANIC FISHERIES INVESTIGATIONS SURVEY CRUISES IN 1996

William Watson
Richard L. Charter
H. Geoffrey Moser

NOAA-TM-NMFS-SWFSC-332

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

CONTENTS

Page

List of Figures iii

List of Tables iii

Abstract 1

Introduction 1

Sampling Area and Pattern 2

Sampling Gear and Methods 3

Laboratory Procedures 3

Identification 3

Species Summary 4

Explanation of Tables 5

Acknowledgments 5

Literature Cited 6

Figures 10

Tables 14

Phylogenetic Index to Table 4 43

Alphabetical Index to Table 4 45

LIST OF FIGURES

Page

Figure 1. Diagram of the Manta net used on CalCOFI surveys 10

Figure 2. Stations and cruise tracks for CalCOFI Cruises 9602 and 9604 11

Figure 3. Stations and cruise tracks for CalCOFI Cruises 9608 and 9610 12

Figure 4. Basic station plan for CalCOFI cruises from 1950 to 1984 13

LIST OF TABLES

Page

Table 1. Station and plankton tow data for Manta tows taken on the 1996 CalCOFI survey 14

Table 2. Pooled occurrences of fish larvae taken in Manta tows on the 1996 CalCOFI survey 20

Table 3. Pooled raw counts of fish larvae taken in Manta tows on 1996 CalCOFI survey 22

Table 4. Numbers of fish larvae (larvae per 100 m^3 of water filtered) taken in Manta tows on the 1996 CalCOFI survey, listed by taxon, station, and month 24

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 1996. It is the 15th report in a series that presents surface tow data for all biological-oceanographic CalCOFI surveys from 1977 to the present. A total of 260 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 259 Manta net tows was taken during 1996. 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 82 larval fish categories identified from Manta tows taken on the surveys. 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 15th 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 1996. 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 1996 CalCOFI survey are published in Watson et al. (1999). Ahlstrom and Stevens (1976), Gruber et al. (1982) and Doyle (1992a, b) provided initial information

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

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

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

SAMPLING AREA AND PATTERN

The 1996 CalCOFI survey consisted of four quarterly cruises on which a total of 259 Manta net tows was taken at the 260 standard CalCOFI net tow stations occupied during the survey (Table 1; Figures 2 and 3). Three vessels were employed on the survey, the NOAA vessel RV *David Starr Jordan* and the SIO vessels RV *New Horizon* and RV *Roger Revelle*. Dates and numbers of stations sampled with the Manta net in 1996 (Figures 2 and 3) are summarized below:

9602, RV *David Starr Jordan*, 66 stations, January 29–February 14;

9604, RV *David Starr Jordan*, 62 stations, April 15–May 1;

9608, RV *New Horizon*, 66 stations, August 7–22;

9610, RV *Roger Revelle*, 65 stations, October 10–November 1.

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 9602, when station 120.0 was not sampled on line 93.3 (Figures 2 and 3).

SAMPLING GEAR AND METHODS

Plankton tows were made with a modified version of the Manta net originally designed by Brown and Cheng (1981). It consists of a rectangular mouth 15.5 cm deep and 86 cm wide attached to a frame that supports square lateral extensions covered with plywood and urethane foam (Figure 1). These extensions stabilize the net when it is towed and keep the top of the net at the sea surface. The net is constructed of 0.505 mm nylon mesh. The towing bridle is asymmetrical with one side longer than the other; when the net is towed this bridle arrangement forces the mouth away from the ship at a slight angle. A General Oceanics flowmeter was suspended across the center of the net mouth to measure the amount of water filtered during each tow. At each Manta tow station the tow line from the bridle was attached to the hydrographic wire and then lowered to slightly below the surface of the water before the net was deployed. The net was towed at a ship speed of 1.0–2.0 knots for 15 minutes. Samples were preserved in 5% buffered formalin and returned to the plankton sorting laboratory at the SWFSC at the end of the cruise.

LABORATORY PROCEDURES

The ichthyoplankton was removed from the invertebrate portion of each sample and bottled separately in 3% buffered formalin. In addition to fish eggs and larvae, some samples contained surface-living juvenile, and occasionally adult, stages of fishes; these were removed and bottled separately in 3% formalin. The volume of water filtered by each net was computed from the flowmeter readings. A "standard haul factor" is used for oblique CalCOFI net tows to calculate the total number of ichthyoplankters of a taxon per unit surface area (Kramer et al 1972; Smith and Richardson 1977; Moser et al. 1993). A requirement for this is the entire depth distribution of the taxon must be encompassed during the tow. The Manta net samples only the upper ~15.5 cm of the water column and most, if not all, ichthyoplankton taxa that inhabit the surface zone have a vertical range > 15.5 cm. Even taxa associated with the immediate surface layer may range deeper than 15.5 cm as a result of diel migratory patterns or vertical mixing (Hempel and Weikert 1972; Doyle 1992b). Calculation of total numbers of eggs or larvae per unit surface area from Manta net samples awaits accurate information on the fine-scale vertical distribution of these organisms in the upper region of the water column. Even if there are few species whose larvae are restricted to the upper 15.5 cm of the water column, the time series of Manta samples provides a useful index of relative abundance for species whose larvae appear in these samples. In this report we express quantities of eggs or larvae in each sample as unadjusted counts or as numbers of eggs or larvae per unit volume of water filtered by the net.

IDENTIFICATION

Constituent taxa in the samples were identified by the senior author. Early ontogenetic stages of fishes are difficult to identify; most identifications were based on descriptions of ontogenetic series of fishes in published identification guides to early stages of fishes in the northeastern Pacific (Matarese et al. 1989; Moser 1996). Larval specimens that could not be identified with these guides were identified by establishing ontogenetic series on the basis of morphology, meristics, and pigmentation, and then linking these series through overlapping features to known metamorphic, juvenile, or adult stages (Miller and Lea 1972; Eschmeyer et al. 1983; Powles and Markle 1984). Except for damaged specimens, most of the larvae and juvenile/adults taken in the surface tows could be identified to species. A total of 82 larval fish categories (including the unidentified and disintegrated categories) was identified: 68 to species, 10 to genus, and 2 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.

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

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

Glyptocephalus zachirus–Sakamoto (1984) changed pleuronectid generic designations for some of the species in the CalCOFI area, including *Glyptocephalus zachirus*, which was changed to *Errex zachirus* and *Lepidopsetta bilineata* and *Parophrys vetulus*, which were transferred into *Pleuronectes*; although these changes were incorporated in the lists of Robins et al. (1991) and Eschmeyer (1998) we follow Nelson (1994) in retaining the older nomenclature because Sakamoto's (1984) changes were based on a phenetic study; also, the older names are used in the major identification guides to fishes of our region (Miller and Lea 1972, Eschmeyer et al. 1983, Matarese et al. 1989, and Moser 1996).

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).

Lepidopsetta bilineata–see comment for *Glyptocephalus zachirus*.

Parophrys vetulus–see comment for *Glyptocephalus zachirus*.

Scorpaenidae–newly hatched larvae with morphological characteristics typical of the family Scorpaenidae, but with pigment characters that differ from all the known species in the area.

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, an unidentified scorpionfish (Scorpaenidae) ranked first in abaundance with 39.9% of the total fish larvae but was taken in only one sample (station 90.0 100.0, cruise 9608NH, 3791 newly hatched larvae) and tied with 32 other taxa for last in occurrence (Tables 2 and 3). The second most abundant taxon, Pacific sardine (*Sardinops sagax*), accounted for 25.9% of the total larvae and ranked third in occurrence (23.9% of the total samples). Northern anchovy (*Engraulis mordax*) was the third most abundant taxon with 14.1% of the total larvae and ranked first in frequency of occurrence (27.8% of the samples). The rockfish genus *Sebastes* ranked fourth in abundance (3.3% of total larvae) and tied with

Panama lightfish for fourth in total occurrences (13.1% of the samples). The mussel blenny *Hypsoblennius jenkensi* ranked fifth in abundance (2.9% of total larvae) and tied with a lanternfish species for sixth in total occurrences (9.7% of the samples). The next five most abundant taxa were Panama lightfish *Vinciguerria lucetia* (2.2% of total larvae), Pacific saury *Cololabis saira* (2.0%), splitnose rockfish *Sebastes diploproa* (1.0%), Pacific mackerel *Scomber japonicus* (0.9%), and jack mackerel *Trachurus symmetricus* (0.8%). These species tied for fourth, ranked 2nd, tied for 10th, tied for 12th, and tied for 10th in frequency of occurrence, respectively. The ten most abundant taxa comprised 93.0% of all the larvae collected in Manta net tows on CalCOFI cruises in 1996. The remaining 7.0% was distributed among 58 other taxa (including the unidentified and disintegrated categories). Of the ten most abundant taxa, four were coastal demersal taxa, four were coastal pelagic species, one was epipelagic, and one was mesopelagic.

In contrast to the surface collections, among the 142 taxa collected in the oblique tows during the 1996 survey, northern anchovy ranked first in abundance (20.2% of the total), followed by Panama lightfish (16.4%), and Pacific sardine (11.0%). Larval scorpionfish were not collected in the oblique samples. Among the ten most abundant taxa in the oblique samples, all but one mesopelagic blacksmelt species also occurred in the Manta collections, and five were among the ten most abundant taxa in the surface samples (Watson 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 1996 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*), NH (*New Horizon*), RR (*Roger Revelle*). 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*, RV *New Horizon*, and RV *Roger Revelle* during the 1996 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*, RV *New Horizon* , and RV *Roger Revelle* during the 1996 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*, RV *New Horizon* , and RV *Roger Revelle* during the 1996 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.

ACKNOWLEDGMENTS

The following NMFS personnel were responsible for making the collections at sea: Dimitry

Abramenkoff (all cruises), Ronald Dotson (9602, 9604), David Griffith (9604, 9608, 9610), and Amy Hays (all cruises). The samples were sorted by Lucy Dunn and Jeanne Haddox. Susan Manion entered the data and Susan Jacobson provided programming assistance. The cooperation and assistance provided by the crews of the CalCOFI research vessels were instrumental in making the collections and observations at sea.

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. 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.

Ambrose, D. A., R. L. Charter, and H. G. Moser. 2002c. Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations survey cruises in 1989. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-325. 45 pp.

Ambrose, D. A., R. L. Charter, and H. G. Moser. 2002d. Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations survey cruises in 1993. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-329. 41 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.

Charter, S. R, R. L. Charter, and H. G. Moser. 2002c. Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations survey cruises in 1990. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-326. 41 pp.

Charter, S. R, R. L. Charter, and H. G. Moser. 2002d. Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations survey cruises in 1994. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-330. 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.

Nelson, J. S. 1994. Fishes of the world. Third edition. John Wiley and Sons, N.Y. 600 pp.

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.

Robins, C. R., R. M. Bailey, C. E. Bond, J. R. Brooker, E. A. Lachner, R. N. Lea, and W. B. Scott. 1991. Common and scientific names of fishes from the United States and Canada. Fifth edition. Am. Fish. Soc. Spec. Publ. 20. 183 pp.

Sakamoto, K. 1984. Interrelationships of the family Pleuronectidae (Pisces: Pleuronectiformes). Mem. Fac. Fish. Hokkaido Univ. 31:95-215.

Sandknop, E. M., 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 1987. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS--SWFSC-323. 40 pp.

Sandknop, E. M., 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 1991. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-327. 41 pp.

Sandknop, E. M., R. L. Charter, and H. G. Moser. 2002c. Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations survey cruises in 1995. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-331. 42 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. 1996. Data Report. Physical, chemical and biological data. CalCOFI Cruise 9602, 29 January–16 February 1996 and CalCOFI Cruise 9604, 15 April–3 May 1996. SIO Ref 96-19. 98 pp.

University of California, Scripps Institution of Oceanography. 1998. Data Report. Physical, chemical and biological data. CalCOFI Cruise 9608, 7–25 August 1996 and CalCOFI Cruise 9610, 10 October–2 November 1996. SIO Ref 98-11. 118 pp.

Watson, W., R. L. Charter, and H. G. Moser. 1999. Ichthyoplankton and station data for California Cooperative Oceanic Fisheries Investigations survey cruises in 1996. U.S. Dep. Commer., NOAA Tech. Memo., NOAA-TM-NMFS-SWFSC-277. 91 pp.

Watson, W, 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 1988. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-324. 44 pp.

Watson, W, 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 1992. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-328. 40 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.]

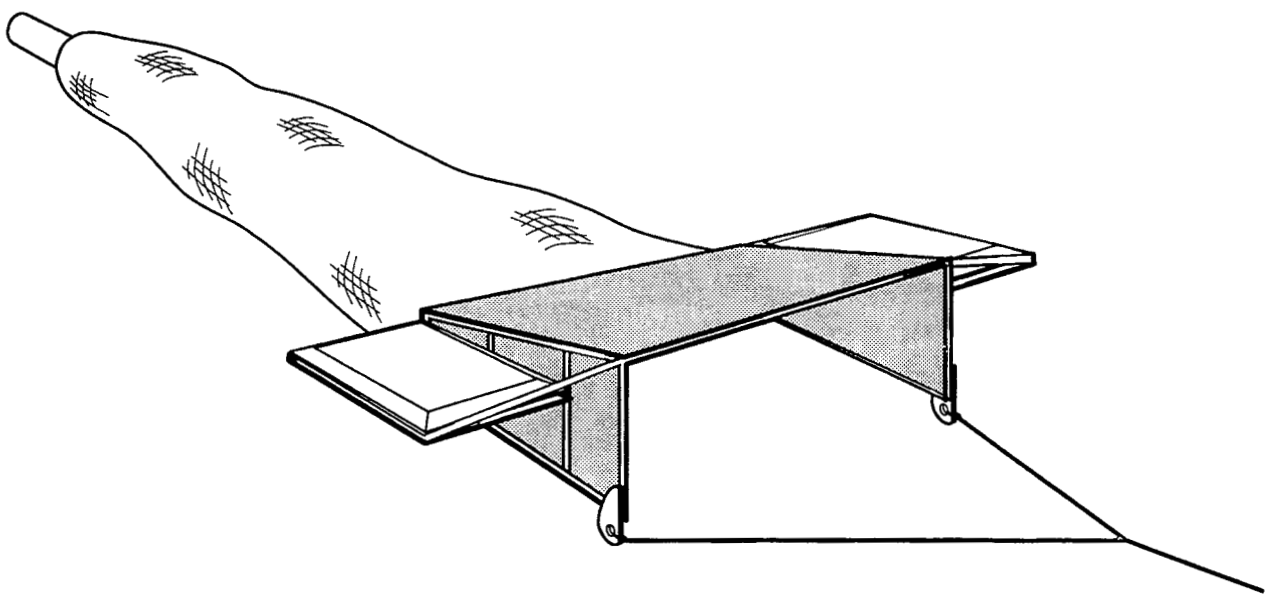

Figure 1. Diagram of the Manta net used on CalCOFI surveys.

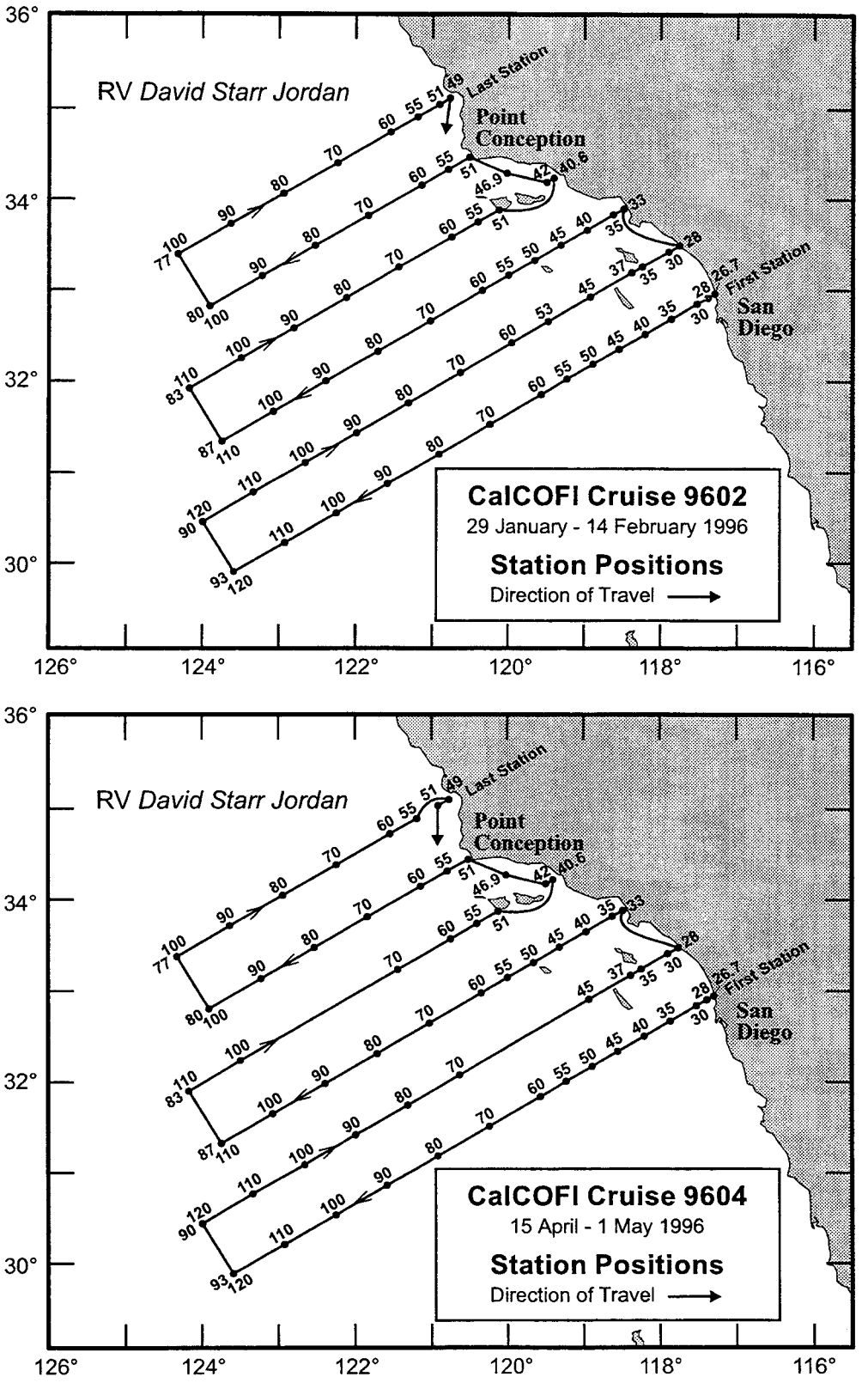

Figure 2. Stations and cruise tracks for CalCOFI cruises 9602 (above) and 9604 (below). Dots indicate stations where Manta and oblique tows were taken; open circles indicate stations where only oblique tows were taken. A Manta tow unaccompanied by an oblique tow was taken at station 93.3 120.0 on Cruise 9602 and another at station 83.3 100.0 on Cruise 9604.

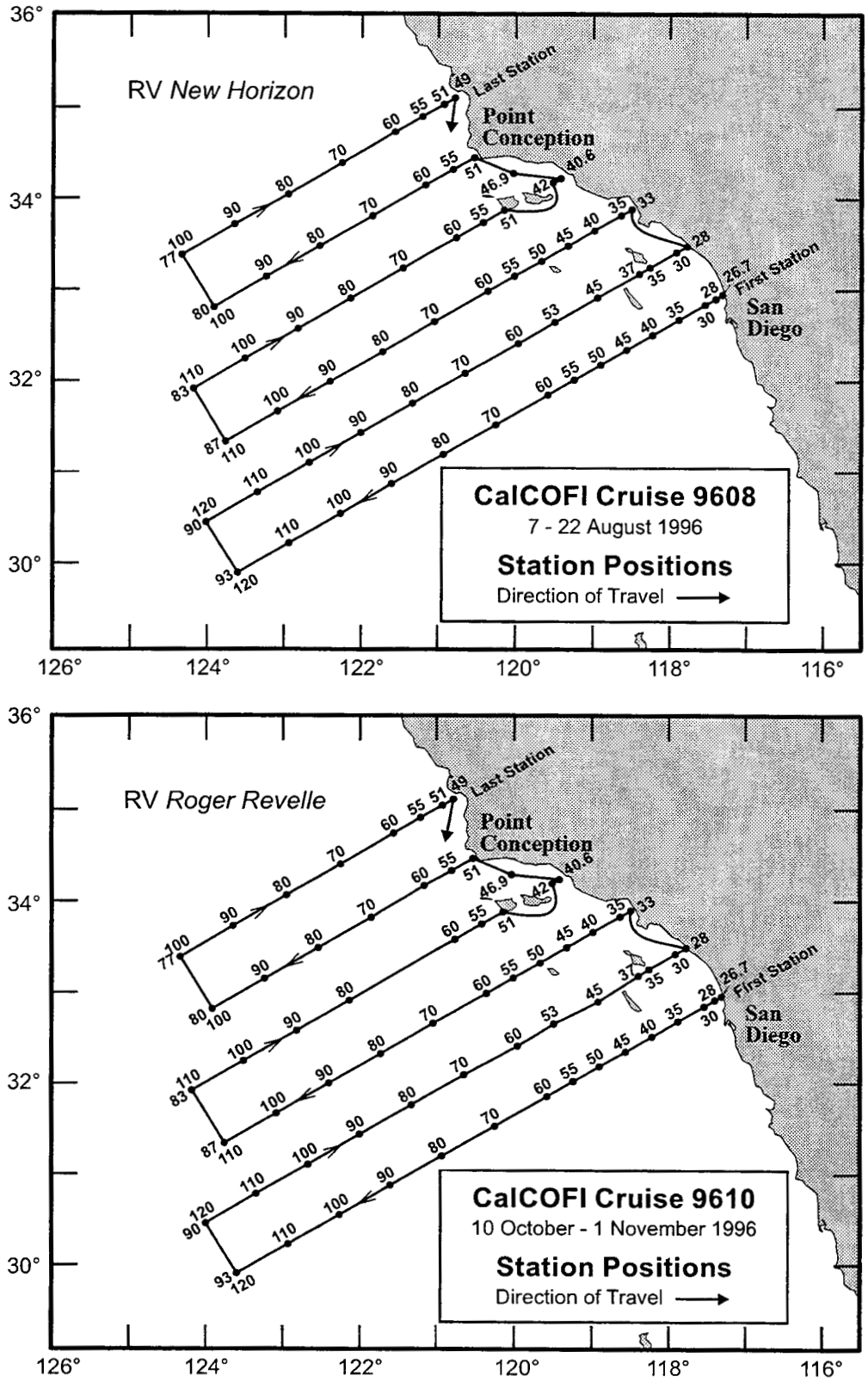

Figure 3. Stations and cruise tracks for CalCOFI cruises 9608 (above) and 9610 (below). Symbols as in Figure 2. A Manta tow without an accompanying oblique tow was taken at station 90.0 60.0 on Cruise 9610.

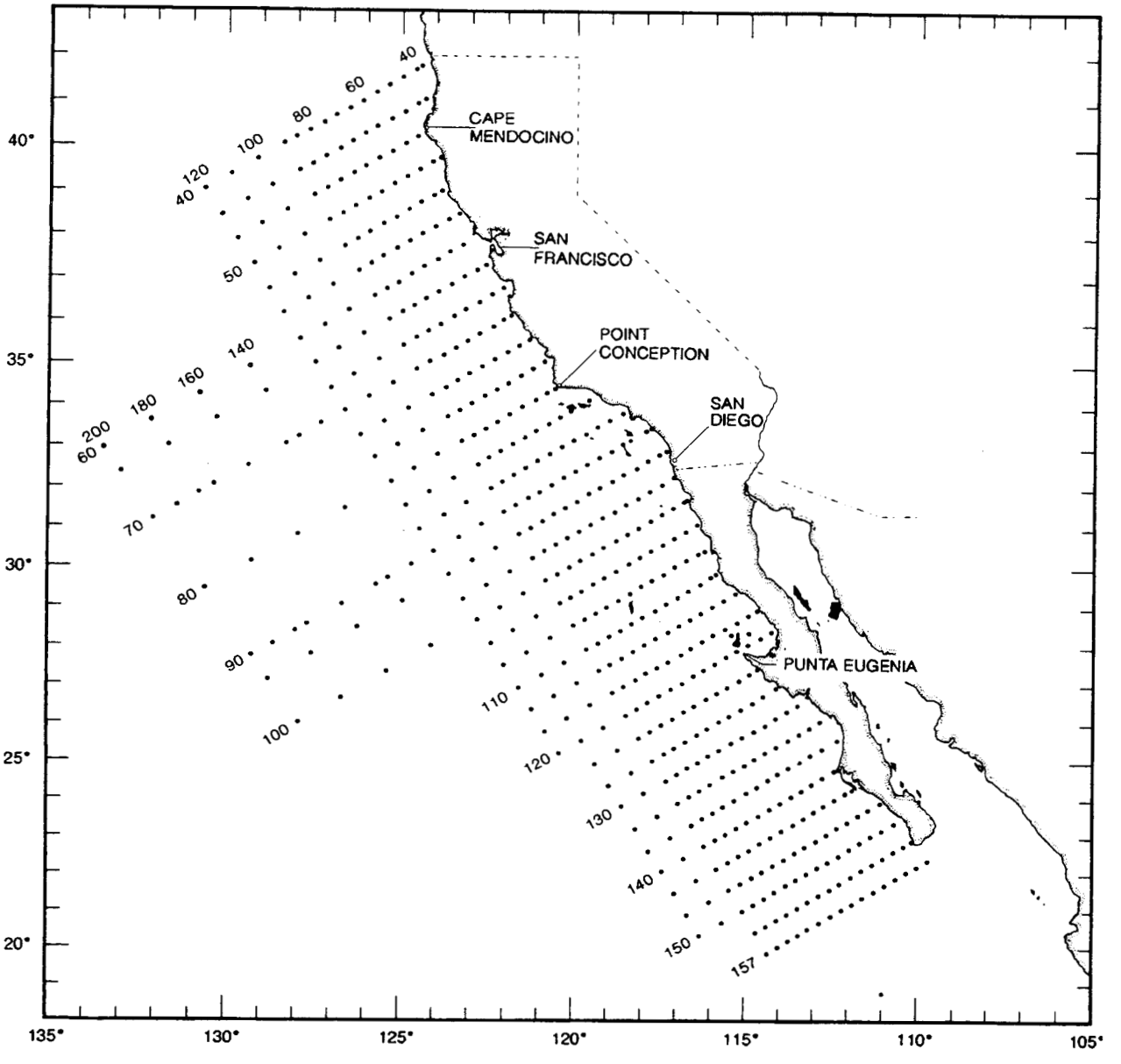

Figure 4. The basic station plan for CalCOFI cruises from 1950 - 1984.

TABLE 1. Station and plankton tow data for Manta tows taken on the 1996 CalCOFI survey. Numbers of fish eggs and larvae are raw counts, unadjusted for volume (cubic meters) of water filtered.

CalCOFI Cruise 9602

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	96	02	14	1253	86	56	91
76.7	51.0	35	01.2	120	55.1	JD	96	02	14	1048	75	168	11
76.7	55.0	34	53.2	121	11.9	JD	96	02	14	0724	72	42	16
76.7	60.0	34	43.3	121	32.9	JD	96	02	14	0337	85	53	1073
76.7	70.0	34	23.3	122	14.8	JD	96	02	13	2150	86	28	23
76.7	80.0	34	03.2	122	56.5	JD	96	02	13	1617	76	3	348
76.7	90.0	33	43.3	123	38.0	JD	96	02	13	0902	78	4	112
76.7	100.0	33	23.3	124	19.4	JD	96	02	13	0315	79	16	3
80.0	51.0	34	27.0	120	31.4	JD	96	02	11	1152	86	1	960
80.0	55.0	34	19.1	120	48.1	JD	96	02	11	1500	81	2	9
80.0	60.0	34	09.0	121	08.9	JD	96	02	11	1857	72	28	1
80.0	70.0	33	49.0	121	50.5	JD	96	02	12	0057	77	8	31
80.0	80.0	33	29.0	122	32.0	JD	96	02	12	0855	72	0	23
80.0	90.0	33	09.0	123	13.2	JD	96	02	12	1551	75	0	4
80.0	100.0	32	49.0	123	54.4	JD	96	02	12	2129	72	0	1
81.8	46.9	34	16.5	120	01.5	JD	96	02	11	0743	78	187	123
83.3	40.6	34	13.5	119	24.7	JD	96	02	11	0128	86	9	1485
83.3	42.0	34	10.7	119	30.4	JD	96	02	11	0320	86	113	1552
83.3	51.0	33	52.6	120	08.0	JD	96	02	10	1435	83	44	4173
83.3	55.0	33	44.6	120	24.6	JD	96	02	10	0818	66	52	202
83.3	60.0	33	34.7	120	45.3	JD	96	02	10	0455	65	38	509
83.3	70.0	33	14.7	121	26.6	JD	96	02	09	2244	75	15	1
83.3	80.0	32	54.7	122	07.7	JD	96	02	09	1651	74	1	5
83.3	90.0	32	34.7	122	48.7	JD	96	02	09	0802	74	0	1
83.3	100.0	32	14.7	123	29.5	JD	96	02	08	2349	73	1	1
83.3	110.0	31	54.6	124	10.1	JD	96	02	08	1726	66	0	1
86.7	33.0	33	53.3	118	29.3	JD	96	02	05	2041	67	73	1109
86.7	35.0	33	49.4	118	37.7	JD	96	02	05	2310	70	52	4765
86.7	40.0	33	39.3	118	58.4	JD	96	02	06	0308	72	45	5075
86.7	45.0	33	29.4	119	19.1	JD	96	02	06	0725	63	8	42
86.7	50.0	33	19.4	119	39.8	JD	96	02	06	1203	69	5	65
86.7	55.0	33	09.4	120	00.4	JD	96	02	06	1645	69	3	38
86.7	60.0	32	59.3	120	21.0	JD	96	02	06	2123	70	15	0
86.7	70.0	32	39.3	121	02.0	JD	96	02	07	0417	67	2	4
86.7	80.0	32	19.4	121	42.9	JD	96	02	07	1215	69	2	3
86.7	90.0	31	59.4	122	23.5	JD	96	02	07	1904	73	1	0
86.7	100.0	31	39.4	123	04.2	JD	96	02	08	0115	78	1	0
86.7	110.0	31	19.4	123	44.6	JD	96	02	08	0801	68	0	1
90.0	28.0	33	29.1	117	46.1	JD	96	02	05	0837	79	16	1787
90.0	30.0	33	25.0	117	54.3	JD	96	02	05	0635	75	103	778
90.0	35.0	33	15.1	118	15.1	JD	96	02	05	0225	73	111	593
90.0	37.0	33	11.1	118	23.2	JD	96	02	04	2349	82	29	56
90.0	45.0	32	55.1	118	56.0	JD	96	02	04	1834	73	1	3
90.0	53.0	32	39.1	119	28.9	JD	96	02	04	1243	86	3	3
90.0	60.0	32	25.0	119	57.6	JD	96	02	04	0700	75	1	5
90.0	70.0	32	05.1	120	38.3	JD	96	02	04	0053	74	3	8
90.0	80.0	31	45.1	121	18.9	JD	96	02	03	1851	72	11	12

TABLE 1. (cont.) CalCOFI Cruise 9602 (cont.)

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
90.0	90.0	31	25.1	121	59.3	JD	96	02	03	1220	73	0	4
90.0	100.0	31	05.0	122	39.6	JD	96	02	03	0553	75	0	5
90.0	110.0	30	45.1	123	19.9	JD	96	02	03	0018	77	0	4
90.0	120.0	30	25.0	123	59.8	JD	96	02	02	1827	76	1	6
93.3	26.7	32	57.4	117	18.3	JD	96	01	29	2155	80	1	0
93.3	28.0	32	54.7	117	23.7	JD	96	01	30	0035	82	2	2361
93.3	30.0	32	50.8	117	31.9	JD	96	01	30	0407	71	0	0
93.3	35.0	32	40.8	117	52.4	JD	96	01	30	0810	79	3	6
93.3	40.0	32	30.8	118	12.7	JD	96	01	30	1613	78	0	1
93.3	45.0	32	20.8	118	33.1	JD	96	01	30	2024	68	0	3
93.3	50.0	32	10.8	118	53.5	JD	96	01	31	0112	73	2	5
93.3	55.0	32	00.8	119	13.9	JD	96	01	31	0624	73	4	6
93.3	60.0	31	50.8	119	34.2	JD	96	01	31	1155	69	1	3
93.3	70.0	31	30.8	120	14.7	JD	96	01	31	1917	67	0	0
93.3	80.0	31	10.8	120	55.1	JD	96	02	01	0252	69	0	13
93.3	90.0	30	50.8	121	35.3	JD	96	02	01	1101	63	0	14
93.3	100.0	30	30.9	122	15.4	JD	96	02	01	1825	74	0	3
93.3	110.0	30	10.8	122	55.4	JD	96	02	02	0038	76	1	4
93.3	120.0	29	50.8	123	35.2	JD	96	02	02	0822	84	3	6

CalCOFI Cruise 9604

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
76.7	49.0	35	05.4	120	46.7	JD	96	05	01	0208	74	34	32
76.7	51.0	35	01.4	120	55.2	JD	96	05	01	0411	68	110	16
76.7	55.0	34	53.3	121	12.0	JD	96	04	30	1952	66	26	1
76.7	60.0	34	43.3	121	32.9	JD	96	04	30	1612	64	0	45
76.7	70.0	34	23.3	122	14.9	JD	96	04	30	0844	67	1	40
76.7	80.0	34	03.4	122	56.5	JD	96	04	30	0309	69	14	148
76.7	90.0	33	43.3	123	38.0	JD	96	04	29	2200	67	3	710
76.7	100.0	33	23.3	124	19.4	JD	96	04	29	1617	59	4	72
80.0	51.0	34	26.8	120	31.5	JD	96	04	27	1927	66	10	6
80.0	55.0	34	19.0	120	48.1	JD	96	04	27	2307	71	20	26
80.0	60.0	34	09.1	121	09.0	JD	96	04	28	0325	65	4	7
80.0	70.0	33	49.1	121	50.6	JD	96	04	28	0839	54	4	5
80.0	80.0	33	29.0	122	32.0	JD	96	04	28	1647	64	12	29
80.0	90.0	33	09.0	123	13.3	JD	96	04	28	2245	77	25	133
80.0	100.0	32	49.0	123	54.4	JD	96	04	29	0805	60	14	80
81.8	46.9	34	16.5	120	01.6	JD	96	04	27	1525	75	2	0
83.3	40.6	34	13.5	119	24.6	JD	96	04	27	0908	69	29	224
83.3	42.0	34	10.7	119	30.5	JD	96	04	27	0751	79	0	198
83.3	51.0	33	52.8	120	08.1	JD	96	04	27	0138	73	56	94
83.3	55.0	33	44.7	120	24.6	JD	96	04	26	2217	63	33	8
83.3	60.0	33	34.7	120	45.3	JD	96	04	26	1724	65	58	709
83.3	70.0	33	14.7	121	26.7	JD	96	04	26	1110	51	0	472
83.3	100.0	32	14.7	123	29.6	JD	96	04	25	1224	70	2	1285
83.3	110.0	31	54.5	124	10.1	JD	96	04	25	0400	66	0	66
86.7	33.0	33	53.4	118	29.3	JD	96	04	22	1623	73	8	439

TABLE 1. (cont.) CalCOFI Cruise 9604 (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	35.0	33	49.5	118	37.7	JD	96	04	22	1844	69	132	0
86.7	40.0	33	39.4	118	58.5	JD	96	04	22	2230	77	120	5
86.7	45.0	33	29.4	119	19.2	JD	96	04	23	0210	72	20	7
86.7	50.0	33	19.4	119	39.8	JD	96	04	23	0527	61	3	97
86.7	55.0	33	09.4	120	00.3	JD	96	04	23	0831	58	6	236
86.7	60.0	32	59.4	120	21.0	JD	96	04	23	1445	64	13	309
86.7	70.0	32	39.3	121	02.0	JD	96	04	23	2050	65	12	77
86.7	80.0	32	19.4	121	42.9	JD	96	04	24	0240	64	633	658
86.7	90.0	31	59.5	122	23.5	JD	96	04	24	0830	62	5	1
86.7	100.0	31	39.4	123	04.2	JD	96	04	24	1609	67	1	210
86.7	110.0	31	19.4	123	44.6	JD	96	04	24	2152	67	6	75
90.0	28.0	33	29.1	117	46.1	JD	96	04	22	0739	68	8	4094
90.0	30.0	33	25.1	117	54.3	JD	96	04	22	0552	72	9	6
90.0	35.0	33	15.1	118	15.0	JD	96	04	22	0203	84	190	32
90.0	37.0	33	11.0	118	23.2	JD	96	04	21	2325	72	167	39
90.0	45.0	32	55.2	118	56.1	JD	96	04	21	1830	72	38	10
90.0	70.0	32	05.1	120	38.4	JD	96	04	20	1643	70	153	75
90.0	80.0	31	45.0	121	18.9	JD	96	04	20	0805	62	4	18
90.0	90.0	31	25.1	121	59.5	JD	96	04	19	2325	71	13	49
90.0	100.0	31	05.0	122	39.7	JD	96	04	19	1707	72	10	85
90.0	110.0	30	45.1	123	20.0	JD	96	04	19	0753	63	0	105
90.0	120.0	30	25.1	123	59.8	JD	96	04	19	0011	69	1	262
93.3	26.7	32	57.3	117	18.3	JD	96	04	15	1208	90	5	2353
93.3	28.0	32	54.8	117	23.6	JD	96	04	15	1441	71	0	61
93.3	30.0	32	50.9	117	31.8	JD	96	04	15	1840	68	71	3
93.3	35.0	32	40.8	117	52.4	JD	96	04	15	2243	69	177	768
93.3	40.0	32	30.8	118	12.7	JD	96	04	16	0302	75	131	223
93.3	45.0	32	20.9	118	33.2	JD	96	04	16	0714	76	1	964
93.3	50.0	32	10.8	118	53.5	JD	96	04	16	1441	68	2	1234
93.3	55.0	32	00.8	119	14.0	JD	96	04	16	1914	73	743	102
93.3	60.0	31	50.7	119	34.3	JD	96	04	16	2314	72	38	72
93.3	70.0	31	30.8	120	14.8	JD	96	04	17	0524	74	6	44
93.3	80.0	31	10.7	120	55.2	JD	96	04	17	1655	77	17	30
93.3	90.0	30	50.8	121	35.4	JD	96	04	17	2256	64	1	5
93.3	100.0	30	30.8	122	15.5	JD	96	04	18	0507	70	8	81
93.3	110.0	30	10.9	122	55.3	JD	96	04	18	1149	67	0	35
93.3	120.0	29	50.9	123	35.2	JD	96	04	18	1738	62	3	443

CalCOFI Cruise 9608

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
76.7	49.0	35	05.3	120	46.6	NH	96	08	22	0945	80	0	505
76.7	51.0	35	01.3	120	55.1	NH	96	08	22	0747	69	1	65
76.7	55.0	34	53.3	121	11.8	NH	96	08	22	0418	70	79	0
76.7	60.0	34	43.3	121	32.9	NH	96	08	21	2356	81	1	5
76.7	70.0	34	23.3	122	14.8	NH	96	08	21	1719	69	2	5
76.7	80.0	34	02.7	122	56.3	NH	96	08	21	0902	83	2	44
76.7	90.0	33	43.3	123	38.0	NH	96	08	21	0230	87	11	205

TABLE 1. (cont.) CalCOFI Cruise 9608 (cont.)

Line	Station	Latitude (N) deg.	min.	Longitude (W) deg.	min.	Ship Code	Tow Date yr.	mo.	day	Time (PST)	Volume Water Strained	Total Larvae	Total Eggs
76.7	100.0	33	23.3	124	19.4	NH	96	08	20	2018	89	28	8
80.0	51.0	34	26.9	120	31.4	NH	96	08	18	2103	71	6	185
80.0	55.0	34	19.0	120	48.1	NH	96	08	19	0017	85	2	1
80.0	60.0	34	09.0	121	09.0	NH	96	08	19	0343	71	0	8
80.0	70.0	33	49.0	121	50.6	NH	96	08	19	1137	86	1	4
80.0	80.0	33	29.0	122	32.0	NH	96	08	19	1805	65	8	6
80.0	90.0	33	09.0	123	13.3	NH	96	08	20	0007	86	31	25
80.0	100.0	32	48.8	123	53.9	NH	96	08	20	0807	77	11	63
81.8	46.9	34	16.5	120	01.4	NH	96	08	18	1633	79	5	29
83.3	40.6	34	13.4	119	24.8	NH	96	08	18	1113	87	0	2925
83.3	42.0	34	10.6	119	30.6	NH	96	08	18	0855	93	3	1415
83.3	51.0	33	52.7	120	08.2	NH	96	08	18	0237	84	60	629
83.3	55.0	33	44.6	120	24.7	NH	96	08	17	2245	82	7	3
83.3	60.0	33	34.6	120	45.2	NH	96	08	17	1825	65	1	1
83.3	70.0	33	14.6	121	26.7	NH	96	08	17	1144	77	1	13
83.3	80.0	32	54.7	122	07.7	NH	96	08	17	0535	69	2	21
83.3	90.0	32	34.7	122	48.8	NH	96	08	16	2348	85	1	14
83.3	100.0	32	14.7	123	29.6	NH	96	08	16	1724	77	3	1
83.3	110.0	31	54.7	124	10.1	NH	96	08	16	0852	77	0	40
86.7	33.0	33	53.4	118	29.4	NH	96	08	13	1559	94	87	1539
86.7	35.0	33	49.4	118	37.6	NH	96	08	13	1827	91	24	524
86.7	40.0	33	39.4	118	58.5	NH	96	08	13	2222	80	14	2
86.7	45.0	33	29.3	119	19.1	NH	96	08	14	0206	103	15	11
86.7	50.0	33	19.3	119	39.7	NH	96	08	14	0919	92	12	212
86.7	55.0	33	09.4	120	00.3	NH	96	08	14	1520	94	0	55
86.7	60.0	32	59.3	120	21.0	NH	96	08	14	1946	66	1	4
86.7	70.0	32	39.4	121	02.1	NH	96	08	15	0134	87	5	7
86.7	80.0	32	19.3	121	42.5	NH	96	08	15	0804	83	0	55
86.7	90.0	31	59.4	122	23.5	NH	96	08	15	1548	74	0	40
86.7	100.0	31	39.5	123	04.2	NH	96	08	15	2114	74	4	35
86.7	110.0	31	19.3	123	44.6	NH	96	08	16	0256	90	3	274
90.0	28.0	33	29.1	117	46.1	NH	96	08	13	0841	92	166	2238
90.0	30.0	33	25.1	117	54.3	NH	96	08	13	0545	93	8	8
90.0	35.0	33	15.1	118	14.9	NH	96	08	13	0112	103	22	13
90.0	37.0	33	11.0	118	23.2	NH	96	08	12	2212	88	53	98
90.0	45.0	32	55.2	118	56.0	NH	96	08	12	1654	80	1	0
90.0	53.0	32	39.1	119	29.0	NH	96	08	12	0929	86	0	2
90.0	60.0	32	25.1	119	57.5	NH	96	08	12	0546	83	0	23
90.0	70.0	32	05.1	120	38.3	NH	96	08	11	2300	79	3	43
90.0	80.0	31	45.1	121	19.0	NH	96	08	11	1705	86	2	287
90.0	90.0	31	25.2	121	59.5	NH	96	08	11	1114	103	3	402
90.0	100.0	31	05.0	122	39.7	NH	96	08	11	0532	86	3799	72
90.0	110.0	30	45.1	123	19.8	NH	96	08	11	0002	93	6	819
90.0	120.0	30	25.0	123	59.9	NH	96	08	10	1824	85	15	711
93.3	26.7	32	57.2	117	18.2	NH	96	08	07	1159	111	0	8
93.3	28.0	32	54.4	117	23.7	NH	96	08	07	1534	91	0	2
93.3	30.0	32	50.8	117	31.9	NH	96	08	07	1900	74	13	1
93.3	35.0	32	40.8	117	52.3	NH	96	08	07	2305	80	2	33
93.3	40.0	32	30.6	118	12.9	NH	96	08	08	0310	93	1	7

TABLE 1. (cont.) CalCOFI Cruise 9608 (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	45.0	32	20.8	118	33.3	NH	96	08	08	0745	70	0	34
93.3	50.0	32	10.8	118	53.4	NH	96	08	08	1221	92	0	9
93.3	55.0	32	00.8	119	13.9	NH	96	08	08	1738	80	0	94
93.3	60.0	31	50.8	119	34.3	NH	96	08	08	2147	86	0	26
93.3	70.0	31	30.8	120	14.6	NH	96	08	09	0325	93	67	5
93.3	80.0	31	10.8	120	55.1	NH	96	08	09	0901	85	10	82
93.3	90.0	30	50.8	121	35.3	NH	96	08	09	1729	85	6	233
93.3	100.0	30	30.8	122	15.4	NH	96	08	09	2316	85	20	50
93.3	110.0	30	10.8	122	55.4	NH	96	08	10	0546	81	15	9
93.3	120.0	29	50.8	123	35.1	NH	96	08	10	1202	95	0	12

CalCOFI Cruise 9610

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	RR	96	11	01	1321	90	4	76
76.7	51.0	35	01.3	120	55.1	RR	96	11	01	0823	83	3	132
76.7	55.0	34	53.3	121	11.9	RR	96	11	01	0428	85	1	5
76.7	60.0	34	43.3	121	32.9	RR	96	11	01	0030	43	3	0
76.7	70.0	34	23.3	122	14.8	RR	96	10	31	1843	85	4	36
76.7	80.0	34	03.3	122	56.5	RR	96	10	31	0825	54	3	2
76.7	90.0	33	43.3	123	38.0	RR	96	10	31	0043	51	1	4
76.7	100.0	33	23.3	124	19.4	RR	96	10	30	1906	87	5	5
80.0	51.0	34	27.0	120	31.4	RR	96	10	28	2023	79	6	768
80.0	55.0	34	19.0	120	48.1	RR	96	10	29	0035	47	7	22
80.0	60.0	34	09.3	121	09.0	RR	96	10	29	0505	71	3	11
80.0	70.0	33	49.0	121	50.5	RR	96	10	29	1159	53	0	9
80.0	80.0	33	29.0	122	31.9	RR	96	10	29	1925	88	2	6
80.0	90.0	33	09.0	123	13.3	RR	96	10	30	0107	43	0	6
80.0	100.0	32	49.0	123	54.5	RR	96	10	30	0821	72	4	6
81.8	46.9	34	16.5	120	01.5	RR	96	10	28	1545	93	3	5991
83.3	40.6	34	13.5	119	24.7	RR	96	10	28	0552	109	30	3016
83.3	42.0	34	10.7	119	30.5	RR	96	10	28	0400	67	16	1954
83.3	51.0	33	52.4	120	08.2	RR	96	10	27	2150	69	3	179
83.3	55.0	33	44.7	120	24.6	RR	96	10	27	0537	100	11	2
83.3	60.0	33	34.7	120	45.3	RR	96	10	26	1725	43	4	0
83.3	80.0	32	54.7	122	07.7	RR	96	10	25	1350	82	2	14
83.3	90.0	32	34.7	122	48.7	RR	96	10	24	2321	77	1	4
83.3	100.0	32	14.6	123	29.5	RR	96	10	24	0835	100	0	2
83.3	110.0	31	54.7	124	10.2	RR	96	10	23	1753	91	2	0
86.7	33.0	33	53.3	118	29.4	RR	96	10	20	1810	89	28	38
86.7	35.0	33	49.4	118	37.7	RR	96	10	20	2103	78	15	24
86.7	40.0	33	39.4	118	58.6	RR	96	10	21	0104	95	2	0
86.7	45.0	33	29.3	119	19.1	RR	96	10	21	0432	97	2	7
86.7	50.0	33	19.4	119	39.8	RR	96	10	21	0910	81	1	33
86.7	55.0	33	09.4	120	00.4	RR	96	10	21	1539	106	0	0
86.7	60.0	32	59.4	120	21.1	RR	96	10	21	1949	92	2	1
86.7	70.0	32	39.4	121	01.9	RR	96	10	22	0120	63	0	6
86.7	80.0	32	19.4	121	42.9	RR	96	10	22	0819	70	0	21

TABLE 1. (cont.) CalCOFI Cruise 9610 (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	90.0	31	59.4	122	23.7	RR	96	10	22	1849	83	6	4
86.7	100.0	31	39.4	123	04.2	RR	96	10	23	0100	43	6	0
86.7	110.0	31	19.4	123	44.6	RR	96	10	23	0812	84	0	1
90.0	28.0	33	29.1	117	46.1	RR	96	10	20	0602	104	3	81
90.0	30.0	33	25.1	117	54.3	RR	96	10	20	0221	92	2	0
90.0	35.0	33	15.1	118	15.0	RR	96	10	19	2051	117	11	12
90.0	37.0	33	11.0	118	23.4	RR	96	10	19	1802	85	2	0
90.0	45.0	32	53.9	118	54.7	RR	96	10	19	0900	62	0	0
90.0	53.0	32	39.1	119	28.9	RR	96	10	19	0341	86	3	0
90.0	60.0	32	24.4	119	56.9	RR	96	10	18	0844	86	0	1
90.0	70.0	32	05.1	120	38.3	RR	96	10	18	0318	100	4	16
90.0	80.0	31	45.1	121	18.9	RR	96	10	17	1933	88	1	12
90.0	90.0	31	25.2	121	59.7	RR	96	10	17	1115	66	1	13
90.0	100.0	31	05.1	122	39.6	RR	96	10	17	0347	56	15	18
90.0	110.0	30	45.1	123	19.9	RR	96	10	16	2119	43	4	19
90.0	120.0	30	25.0	123	59.8	RR	96	10	15	1140	66	2	233
93.3	26.7	32	57.4	117	18.3	RR	96	10	10	1627	105	11	5
93.3	28.0	32	54.8	117	23.7	RR	96	10	10	1313	101	0	0
93.3	30.0	32	50.8	117	32.1	RR	96	10	10	1956	69	0	0
93.3	35.0	32	40.8	117	52.4	RR	96	10	11	0050	67	1	4
93.3	40.0	32	30.8	118	12.8	RR	96	10	11	0512	76	11	0
93.3	45.0	32	20.8	118	33.3	RR	96	10	11	1248	123	0	6
93.3	50.0	32	10.8	118	53.6	RR	96	10	11	1702	96	2	7
93.3	55.0	32	00.8	119	14.0	RR	96	10	13	0113	101	3	1
93.3	60.0	31	50.8	119	34.3	RR	96	10	13	0812	91	1	2
93.3	70.0	31	30.8	120	14.8	RR	96	10	13	1710	94	0	4
93.3	80.0	31	10.8	120	55.2	RR	96	10	13	2313	27	0	0
93.3	90.0	30	50.8	121	35.5	RR	96	10	14	0447	98	1	6
93.3	100.0	30	30.8	122	15.5	RR	96	10	14	1210	65	1	13
93.3	110.0	30	10.8	122	55.4	RR	96	10	14	1857	71	2	97
93.3	120.0	29	50.8	123	35.1	RR	96	10	15	0110	66	6	40

TABLE 2. Pooled occurrences of fish larvae taken in Manta tows on the 1996 CalCOFI survey.

Rank	Taxon	Occurrences
1	*Engraulis mordax*	72
2	*Cololabis saira*	65
3	*Sardinops sagax*	62
4	*Sebastes* spp.	34
4	*Vinciguerria lucetia*	34
6	*Hypsoblennius jenkinsi*	25
6	*Ceratoscopelus townsendi*	25
8	*Scorpaenichthys marmoratus*	18
8	*Tetragonurus cuvieri*	18
10	*Trachurus symmetricus*	15
10	*Sebastes diploproa*	15
12	*Chromis punctipinnis*	11
12	*Scomber japonicus*	11
12	*Merluccius productus*	11
15	*Leuresthes tenuis*	10
16	*Atherinopsis californiensis*	9
17	*Oxyjulis californica*	8
18	*Sphyraena argentea*	7
19	*Sebastes jordani*	6
19	*Medialuna californiensis*	6
19	*Cyclothone signata*	6
22	*Hexagrammos decagrammus*	5
22	*Citharichthys sordidus*	5
22	*Triphoturus mexicanus*	5
22	*Citharichthys stigmaeus*	5
22	*Paralabrax* spp.	5
27	*Diaphus* spp.	4
27	*Neoclinus blanchardi*	4
27	*Aristostomias scintillans*	4
27	*Hypsoblennius gilberti*	4
31	*Cyclothone* spp.	3
31	*Pleuronichthys coenosus*	3
31	Disintegrated fish larvae	3
31	Unidentified fish larvae	3
31	*Lampadena urophaos*	3
31	*Icichthys lockingtoni*	3
31	*Genyonemus lineatus*	3
31	*Tactostoma macropus*	3
39	*Oxylebius pictus*	2
39	*Cheilopogon heterurus*	2
39	*Rathbunella alleni*	2
39	*Parophrys vetulus*	2
39	*Halichoeres semicinctus*	2
39	*Hygophum reinhardtii*	2
39	*Anoplopoma fimbria*	2
39	*Stenobrachius leucopsarus*	2
39	*Cheilopogon pinnatibarbatus*	2
39	*Atractoscion nobilis*	2
39	*Gigantactis* spp.	2

TABLE 2. (cont.)

Rank	Taxon	Occurrences
50	*Stomias atriventer*	1
50	*Oneirodes* spp.	1
50	*Bathophilus flemingi*	1
50	*Lampanyctus* spp.	1
50	*Nannobrachium ritteri*	1
50	*Bathylagus wesethi*	1
50	*Notoscopelus resplendens*	1
50	*Girella nigricans*	1
50	*Pleuronichthys verticalis*	1
50	*Pleuronichthys decurrens*	1
50	*Microstomus pacificus*	1
50	*Lepidopsetta bilineata*	1
50	*Glyptocephalus zachirus*	1
50	*Icosteus aenigmaticus*	1
50	*Hypsoblennius gentilis*	1
50	*Hypsoblennius* spp.	1
50	*Neoclinus stephensae*	1
50	*Rathbunella* spp.	1
50	Cottidae	1
50	*Hypsypops rubicundus*	1
50	*Macroramphosus gracilis*	1
50	*Seriphus politus*	1
50	*Menticirrhus undulatus*	1
50	*Anisotremus davidsoni*	1
50	*Pteraclis aesticola*	1
50	*Howella* spp.	1
50	*Ruscarius meanyi*	1
50	*Ophiodon elongatus*	1
50	*Sebastes paucispinis*	1
50	*Sebastes levis*	1
50	*Sebastes aurora*	1
50	Scorpaenidae	1
50	*Semicossyphus pulcher*	1
	Total	588

TABLE 3. Pooled raw counts of fish larvae taken in Manta tows on the 1996 CalCOFI survey.

Rank	Taxon	Count
1	Scorpaenidae	3791
2	*Sardinops sagax*	2460
3	*Engraulis mordax*	1343
4	*Sebastes* spp.	312
5	*Hypsoblennius jenkinsi*	276
6	*Vinciguerria lucetia*	205
7	*Cololabis saira*	191
8	*Sebastes diploproa*	94
9	*Scomber japonicus*	81
10	*Trachurus symmetricus*	80
11	*Leuresthes tenuis*	74
12	*Chromis punctipinnis*	62
13	*Ceratoscopelus townsendi*	56
14	*Merluccius productus*	54
15	*Scorpaenichthys marmoratus*	53
16	*Atherinopsis californiensis*	27
17	*Hypsoblennius* spp.	25
17	*Sebastes jordani*	25
19	*Oxyjulis californica*	24
20	*Hexagrammos decagrammus*	23
21	*Medialuna californiensis*	22
21	*Tetragonurus cuvieri*	22
23	*Sphyraena argentea*	17
24	*Rathbunella alleni*	15
25	*Paralabrax* spp.	12
26	*Hypsoblennius gilberti*	10
26	*Neoclinus blanchardi*	10
28	*Citharichthys sordidus*	9
29	*Citharichthys stigmaeus*	8
29	*Genyonemus lineatus*	8
29	*Cyclothone signata*	8
32	*Lampadena urophaos*	7
33	*Aristostomias scintillans*	6
33	*Triphoturus mexicanus*	6
35	*Diaphus* spp.	4
35	*Oxylebius pictus*	4
37	Unidentified fish larvae	3
37	*Seriphus politus*	3
37	*Icichthys lockingtoni*	3
37	*Ophiodon elongatus*	3
37	*Cyclothone* spp.	3
37	*Parophrys vetulus*	3
37	*Gigantactis* spp.	3
37	*Tactostoma macropus*	3
37	*Pleuronichthys coenosus*	3
37	Disintegrated fish larvae	3
47	*Atractoscion nobilis*	2
47	*Anoplopoma fimbria*	2
47	*Halichoeres semicinctus*	2

TABLE 3. (cont.)

Rank	Taxon	Count
47	*Cheilopogon pinnatibarbatus*	2
47	*Microstomus pacificus*	2
47	*Cheilopogon heterurus*	2
47	*Stenobrachius leucopsarus*	2
47	*Hygophum reinhardtii*	2
55	*Lampanyctus* spp.	1
55	*Bathylagus wesethi*	1
55	*Bathophilus flemingi*	1
55	*Stomias atriventer*	1
55	*Nannobrachium ritteri*	1
55	*Sebastes paucispinis*	1
55	*Pleuronichthys verticalis*	1
55	*Pleuronichthys decurrens*	1
55	*Lepidopsetta bilineata*	1
55	*Glyptocephalus zachirus*	1
55	*Rathbunella* spp.	1
55	*Hypsoblennius gentilis*	1
55	*Neoclinus stephensae*	1
55	*Macroramphosus gracilis*	1
55	Cottidae	1
55	*Menticirrhus undulatus*	1
55	*Sebastes aurora*	1
55	*Notoscopelus resplendens*	1
55	*Sebastes levis*	1
55	*Girella nigricans*	1
55	*Semicossyphus pulcher*	1
55	*Oneirodes* spp.	1
55	*Hypsypops rubicundus*	1
55	*Anisotremus davidsoni*	1
55	*Pteraclis aesticola*	1
55	*Icosteus aenigmaticus*	1
55	*Howella* spp.	1
55	*Ruscarius meanyi*	1
	Total	9498

TABLE 4. Numbers of fish larvae taken in Manta net tows on the 1996 CalCOFI survey, listed by taxon, station, and month. Numbers of larvae are expressed as larvae per 100 cubic meters of water filtered. Unoccupied stations are indicated by a dash.

Sardinops sagax

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7	49.0	-	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-
76.7	51.0	-	4.5	-	-	25.2	-	-	0.0	-	-	0.0	-
76.7	55.0	-	0.0	-	5.3	-	-	-	0.7	-	-	0.0	-
76.7	60.0	-	0.0	-	0.0	-	-	-	0.8	-	-	0.0	-
80.0	51.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
80.0	55.0	-	0.0	-	7.1	-	-	-	0.0	-	0.0	-	-
80.0	60.0	-	0.0	-	2.6	-	-	-	0.0	-	0.0	-	-
80.0	70.0	-	0.0	-	0.5	-	-	-	0.0	-	0.0	-	-
80.0	90.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
81.8	46.9	-	101.9	-	0.0	-	-	-	0.0	-	0.0	-	-
83.3	40.6	-	2.6	-	4.1	-	-	-	0.0	-	0.0	-	-
83.3	42.0	-	13.8	-	0.0	-	-	-	0.0	-	0.0	-	-
83.3	51.0	-	3.3	-	16.7	-	-	-	0.0	-	0.0	-	-
83.3	55.0	-	23.0	-	8.2	-	-	-	0.0	-	0.0	-	-
83.3	60.0	-	18.9	-	36.6	-	-	-	0.0	-	0.0	-	-
83.3	90.0	-	0.0	-	-	-	-	-	0.8	-	0.0	-	-
86.7	33.0	-	4.0	-	2.9	-	-	-	1.9	-	0.0	-	-
86.7	35.0	-	1.4	-	6.2	-	-	-	1.8	-	0.0	-	-
86.7	40.0	-	0.7	-	0.8	-	-	-	0.0	-	0.0	-	-
86.7	45.0	-	0.6	-	0.7	-	-	-	0.0	-	0.0	-	-
86.7	50.0	-	0.7	-	0.0	-	-	-	0.0	-	0.0	-	-
86.7	55.0	-	0.7	-	2.3	-	-	-	0.0	-	0.0	-	-
86.7	60.0	-	0.7	-	3.2	-	-	-	0.0	-	0.0	-	-
86.7	70.0	-	0.0	-	3.9	-	-	-	4.4	-	0.0	-	-
86.7	80.0	-	0.0	-	387.4	-	-	-	0.0	-	0.0	-	-
86.7	90.0	-	0.0	-	1.9	-	-	-	0.0	-	0.0	-	-
90.0	30.0	-	34.4	-	3.6	-	-	-	0.0	-	0.0	-	-
90.0	35.0	-	80.7	-	1.7	-	-	-	2.1	-	0.0	-	-
90.0	37.0	-	15.5	-	4.3	-	-	-	1.8	-	0.0	-	-
90.0	45.0	-	0.7	-	22.9	-	-	-	0.0	-	0.0	-	-
90.0	70.0	-	0.0	-	101.9	-	-	-	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 30.0	0.0	-	-	28.5	-	-	-	0.0	-	0.0	-	-
93.3 35.0	1.6	-	-	86.1	-	-	-	0.0	-	0.0	-	-
93.3 40.0	0.0	-	-	84.9	-	-	-	0.0	-	0.0	-	-
93.3 45.0	0.0	-	-	0.8	-	-	-	0.0	-	0.0	-	-
93.3 50.0	0.0	-	-	0.7	-	-	-	0.0	-	0.0	-	-
93.3 55.0	0.0	-	-	516.1	-	-	-	0.0	-	0.0	-	-
93.3 60.0	0.0	-	-	24.6	-	-	-	0.0	-	0.0	-	-
93.3 80.0	-	0.0	-	6.2	-	-	-	0.0	-	0.0	-	-
93.3 100.0	-	0.0	-	3.5	-	-	-	0.0	-	0.0	-	-

Engraulis mordax

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	9.4	-	-	5.2	-	-	0.0	-	-	0.0	-
76.7 51.0	-	29.3	-	-	18.4	-	-	0.0	-	-	0.0	-
76.7 55.0	-	5.0	-	6.6	-	-	-	4.9	-	-	0.0	-
76.7 60.0	-	23.7	-	0.0	-	-	-	0.0	-	-	0.0	-
76.7 70.0	-	14.6	-	0.0	-	-	-	0.0	-	0.0	-	-
80.0 51.0	-	0.9	-	3.3	-	-	-	2.1	-	0.8	-	-
80.0 55.0	-	0.8	-	4.3	-	-	-	0.0	-	2.8	-	-
80.0 60.0	-	20.2	-	0.0	-	-	-	0.0	-	1.4	-	-
80.0 70.0	-	0.8	-	0.0	-	-	-	0.0	-	0.0	-	-
81.8 46.9	-	18.8	-	0.0	-	-	-	0.0	-	0.0	-	-
83.3 40.6	-	5.2	-	0.7	-	-	-	0.0	-	31.7	-	-
83.3 42.0	-	82.8	-	0.0	-	-	-	0.0	-	8.0	-	-
83.3 51.0	-	32.4	-	11.6	-	-	-	30.1	-	1.4	-	-
83.3 55.0	-	5.3	-	0.0	-	-	-	3.3	-	0.0	-	-
83.3 60.0	-	2.0	-	0.0	-	-	-	0.0	-	0.9	-	-
83.3 70.0	-	10.5	-	0.0	-	-	-	0.0	-	-	-	-
86.7 33.0	-	44.8	-	1.5	-	-	-	42.4	-	6.3	-	-
86.7 35.0	-	33.4	-	31.2	-	-	-	0.0	-	0.8	-	-
86.7 40.0	-	30.1	-	91.0	-	-	-	0.8	-	0.0	-	-
86.7 45.0	-	0.0	-	9.3	-	-	-	1.0	-	0.0	-	-
86.7 55.0	-	0.7	-	1.2	-	-	-	0.0	-	0.0	-	-
86.7 60.0	-	0.0	-	1.9	-	-	-	0.0	-	0.9	-	-
86.7 70.0	-	0.7	-	0.0	-	-	-	0.0	-	0.0	-	-
86.7 80.0	-	0.0	-	12.7	-	-	-	0.0	-	0.0	-	-

TABLE 4. (cont.)

Engraulis mordax (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 28.0	-	4.0	-	2.0	-	-	-	0.9	-	3.1	-	-
90.0 30.0	-	42.6	-	2.9	-	-	-	0.0	-	0.0	-	-
90.0 35.0	-	0.0	-	120.5	-	-	-	4.1	-	0.0	-	-
90.0 37.0	-	2.5	-	108.7	-	-	-	4.4	-	0.0	-	-
90.0 45.0	-	0.0	-	4.3	-	-	-	0.0	-	0.0	-	-
90.0 80.0	-	0.7	-	0.0	-	-	-	0.0	-	0.0	-	-
93.3 26.7	0.0	-	-	0.0	-	-	-	0.0	-	1.1	-	-
93.3 28.0	1.6	-	-	0.0	-	-	-	0.0	-	0.0	-	-
93.3 30.0	0.0	-	-	0.0	-	-	-	3.0	-	0.0	-	-
93.3 35.0	0.8	-	-	6.2	-	-	-	0.0	-	0.0	-	-
93.3 40.0	0.0	-	-	11.2	-	-	-	0.0	-	0.0	-	-
93.3 55.0	0.0	-	-	5.1	-	-	-	0.0	-	0.0	-	-

Bathylagus wesethi

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

***Cyclothone* spp.**

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

Cyclothone signata

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 80.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
80.0 90.0	-	0.0	-	1.5	-	-	-	0.9	-	0.0	-	-
86.7 70.0	-	0.7	-	1.3	-	-	-	0.0	-	0.0	-	-
93.3 100.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-

Vinciguerria lucetia

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 70.0	-	0.0	-	0.0	-	-	-	0.7	-	0.0	-	-
76.7 80.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
76.7 90.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
76.7 100.0	-	0.0	-	0.0	-	-	-	21.5	-	0.0	-	-
80.0 80.0	-	0.0	-	0.0	-	-	-	2.0	-	0.9	-	-

TABLE 4. (cont.)

Vinciguerria lucetia (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 90.0	-	0.0	-	0.0	-	-	-	20.7	-	0.0	-	-
80.0 100.0	-	0.0	-	0.0	-	-	-	6.2	-	1.4	-	-
83.3 60.0	-	0.0	-	0.0	-	-	-	0.0	-	0.9	-	-
86.7 90.0	-	0.0	-	0.0	-	-	-	0.0	-	1.7	-	-
86.7 100.0	-	0.0	-	0.0	-	-	-	0.0	-	1.3	-	-
90.0 53.0	-	0.0	-	-	-	-	-	0.0	-	0.9	-	-
90.0 70.0	-	0.0	-	0.0	-	-	-	1.6	-	4.0	-	-
90.0 90.0	-	0.0	-	5.0	-	-	-	0.0	-	0.0	-	-
90.0 100.0	-	0.0	-	0.0	-	-	-	1.7	-	8.3	-	-
90.0 110.0	-	0.0	-	0.0	-	-	-	4.6	-	1.3	-	-
90.0 120.0	-	0.0	-	0.0	-	-	-	0.0	-	0.7	-	-
93.3 40.0	0.0	-	-	0.0	-	-	-	0.0	-	1.5	-	-
93.3 50.0	0.0	-	-	0.0	-	-	-	0.0	-	1.0	-	-
93.3 55.0	0.0	-	-	0.0	-	-	-	0.0	-	3.0	-	-
93.3 60.0	0.0	-	-	0.0	-	-	-	0.0	-	0.9	-	-
93.3 70.0	0.0	-	-	0.0	-	-	-	53.0	-	0.0	-	-
93.3 80.0	-	0.0	-	0.0	-	-	-	1.7	-	0.0	-	-
93.3 90.0	-	0.0	-	0.0	-	-	-	0.8	-	1.0	-	-
93.3 100.0	-	0.0	-	0.0	-	-	-	11.1	-	0.0	-	-
93.3 110.0	-	0.0	-	0.0	-	-	-	6.5	-	0.7	-	-
93.3 120.0	-	0.0	-	0.6	-	-	-	0.0	-	1.3	-	-

Stomias atriventer

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

Bathophilus flemingi

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

Tactostoma macropus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 90.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
90.0 100.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
93.3 50.0	0.7	-	-	0.0	-	-	-	0.0	-	0.0	-	-

TABLE 4. (cont.)

Aristostomias scintillans

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 100.0	-	0.0	-	0.6	-	-	-	0.0	-	0.0	-	-
90.0 100.0	-	0.0	-	1.4	-	-	-	0.9	-	0.0	-	-
93.3 120.0	-	1.7	-	0.0	-	-	-	0.0	-	0.0	-	-

Ceratoscopelus townsendi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 100.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
80.0 80.0	-	0.0	-	0.0	-	-	-	1.3	-	0.0	-	-
80.0 90.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
80.0 100.0	-	0.0	-	0.0	-	-	-	1.5	-	0.0	-	-
83.3 55.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
86.7 90.0	-	0.0	-	0.6	-	-	-	0.0	-	0.0	-	-
86.7 100.0	-	0.0	-	0.7	-	-	-	0.0	-	0.4	-	-
86.7 110.0	-	0.0	-	2.0	-	-	-	0.0	-	0.0	-	-
90.0 53.0	-	0.0	-	-	-	-	-	0.0	-	0.9	-	-
90.0 80.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
90.0 90.0	-	0.0	-	2.8	-	-	-	0.0	-	0.0	-	-
90.0 100.0	-	0.0	-	4.3	-	-	-	3.4	-	0.0	-	-
90.0 120.0	-	0.8	-	0.7	-	-	-	7.6	-	0.0	-	-
93.3 80.0	-	0.0	-	0.0	-	-	-	1.7	-	0.0	-	-
93.3 90.0	-	0.0	-	0.6	-	-	-	0.8	-	0.0	-	-
93.3 100.0	-	0.0	-	1.4	-	-	-	4.3	-	0.0	-	-
93.3 110.0	-	0.0	-	0.0	-	-	-	1.6	-	0.7	-	-
93.3 120.0	-	0.0	-	1.2	-	-	-	0.0	-	0.0	-	-

***Diaphus* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 100.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
80.0 100.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
86.7 110.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
90.0 90.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-

Lampadena urophaos

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 120.0	-	0.0	-	0.0	-	-	-	3.4	-	0.0	-	-
93.3 80.0	-	0.0	-	0.0	-	-	-	1.7	-	0.0	-	-

TABLE 4. (cont.)

Lampadena urophaos (cont.)

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

***Lampanyctus* spp.**

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

Nannobrachium ritteri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 80.0	-	0.0	-	0.8	-	-	-	0.0	-	0.0	-	-

Notoscopelus resplendens

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

Stenobrachius leucopsarus

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

Triphoturus mexicanus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 45.0	-	0.0	-	0.0	-	-	-	1.0	-	0.0	-	-
90.0 110.0	-	0.0	-	0.0	-	-	-	0.0	-	0.4	-	-
93.3 50.0	0.0	-	-	0.0	-	-	-	0.0	-	1.0	-	-
93.3 70.0	0.0	-	-	0.0	-	-	-	1.9	-	0.0	-	-
93.3 80.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-

Hygophum reinhardtii

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 70.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
90.0 90.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-

Merluccius productus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.9	-	-	0.0	-	-	0.0	-	-	0.9	-
76.7 51.0	-	0.8	-	-	0.0	-	-	0.0	-	-	0.0	-
76.7 55.0	-	22.3	-	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.
76.7 60.0	-	0.8	-	0.0	-	-	-	0.0	-	-	0.0	-
81.8 46.9	-	5.5	-	0.0	-	-	-	0.0	-	0.0	-	-
83.3 55.0	-	1.3	-	0.0	-	-	-	0.0	-	0.0	-	-
83.3 60.0	-	2.6	-	0.0	-	-	-	0.0	-	0.0	-	-
86.7 40.0	-	0.7	-	0.0	-	-	-	0.0	-	0.0	-	-
86.7 45.0	-	2.5	-	0.0	-	-	-	0.0	-	0.0	-	-
93.3 55.0	0.7	-	-	0.0	-	-	-	0.0	-	0.0	-	-

***Oneirodes* spp.**

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

***Gigantactis* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 120.0	-	0.0	-	0.0	-	-	-	0.0	-	0.7	-	-
93.3 120.0	-	0.0	-	0.0	-	-	-	0.0	-	1.3	-	-

Atherinopsis californiensis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	1.7	-	-	0.0	-	-	0.0	-	-	0.0	-
76.7 51.0	-	1.5	-	-	0.0	-	-	0.0	-	-	0.0	-
81.8 46.9	-	0.0	-	0.0	-	-	-	0.0	-	0.9	-	-
83.3 51.0	-	0.0	-	2.2	-	-	-	0.0	-	0.0	-	-
86.7 45.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
90.0 28.0	-	7.9	-	0.0	-	-	-	0.0	-	0.0	-	-
90.0 35.0	-	0.0	-	0.8	-	-	-	0.0	-	0.0	-	-
93.3 26.7	0.8	-	-	0.0	-	-	-	0.0	-	6.3	-	-

Leuresthes tenuis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 51.0	-	0.0	-	1.3	-	-	-	0.7	-	0.0	-	-
81.8 46.9	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
86.7 33.0	-	0.0	-	1.5	-	-	-	0.0	-	0.0	-	-
86.7 35.0	-	0.0	-	0.0	-	-	-	2.7	-	0.0	-	-
90.0 28.0	-	0.0	-	2.7	-	-	-	7.4	-	0.0	-	-
90.0 35.0	-	0.0	-	35.4	-	-	-	0.0	-	0.0	-	-

TABLE 4. (cont.)

Leuresthes tenuis (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 37.0	-	0.0	-	4.3	-	-	-	0.0	-	0.0	-	-
93.3 26.7	0.0	-	-	4.5	-	-	-	0.0	-	0.0	-	-

Cololabis saira

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 55.0	-	1.4	-	0.0	-	-	-	0.0	-	-	0.0	-
76.7 60.0	-	0.8	-	0.0	-	-	-	0.0	-	-	0.9	-
76.7 70.0	-	9.4	-	0.7	-	-	-	0.7	-	1.7	-	-
76.7 80.0	-	2.3	-	9.0	-	-	-	0.0	-	1.1	-	-
76.7 90.0	-	3.1	-	0.0	-	-	-	8.7	-	0.5	-	-
76.7 100.0	-	12.7	-	0.0	-	-	-	0.9	-	4.3	-	-
80.0 70.0	-	5.4	-	0.0	-	-	-	0.9	-	0.0	-	-
80.0 80.0	-	0.0	-	0.0	-	-	-	0.7	-	0.9	-	-
80.0 90.0	-	0.0	-	0.8	-	-	-	3.4	-	0.0	-	-
80.0 100.0	-	0.0	-	0.0	-	-	-	0.0	-	1.4	-	-
83.3 42.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
83.3 55.0	-	0.7	-	0.0	-	-	-	0.0	-	0.0	-	-
83.3 70.0	-	0.8	-	0.0	-	-	-	0.0	-	-	-	-
83.3 80.0	-	0.0	-	-	-	-	-	1.4	-	0.8	-	-
83.3 90.0	-	0.0	-	-	-	-	-	0.0	-	0.8	-	-
83.3 100.0	-	0.0	-	1.4	-	-	-	2.3	-	0.0	-	-
86.7 35.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
86.7 60.0	-	3.5	-	0.6	-	-	-	0.0	-	0.0	-	-
86.7 80.0	-	1.4	-	0.0	-	-	-	0.0	-	0.0	-	-
86.7 90.0	-	0.7	-	0.0	-	-	-	0.0	-	1.7	-	-
86.7 100.0	-	0.8	-	0.0	-	-	-	2.9	-	0.4	-	-
86.7 110.0	-	0.0	-	1.3	-	-	-	2.7	-	0.0	-	-
90.0 35.0	-	0.0	-	1.7	-	-	-	0.0	-	0.0	-	-
90.0 37.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
90.0 70.0	-	1.5	-	0.0	-	-	-	0.8	-	0.0	-	-
90.0 80.0	-	7.2	-	0.0	-	-	-	0.9	-	0.9	-	-
90.0 90.0	-	0.0	-	0.0	-	-	-	3.1	-	0.0	-	-
90.0 100.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
90.0 110.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
90.0 120.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-

TABLE 4. (cont.)

Cololabis saira (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 35.0	0.0	-	-	0.0	-	-	-	0.8	-	0.7	-	-
93.3 55.0	0.7	-	-	0.0	-	-	-	0.0	-	0.0	-	-
93.3 60.0	0.7	-	-	2.9	-	-	-	0.0	-	0.0	-	-
93.3 70.0	0.0	-	-	3.7	-	-	-	7.4	-	0.0	-	-
93.3 80.0	-	0.0	-	5.4	-	-	-	2.5	-	0.0	-	-
93.3 90.0	-	0.0	-	0.0	-	-	-	3.4	-	0.0	-	-
93.3 100.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
93.3 110.0	-	0.0	-	0.0	-	-	-	3.2	-	0.0	-	-

Cheilopogon heterurus

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

Cheilopogon pinnatibarbatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 28.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
93.3 40.0	0.0	-	-	0.0	-	-	-	0.9	-	0.0	-	-

Macroramphosus gracilis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
93.3 70.0	0.0	-	-	0.7	-	-	-	0.0	-	0.0	-	-

***Sebastes* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	31.6	-	-	3.0	-	-	0.0	-	-	1.8	-
76.7 51.0	-	70.6	-	-	11.6	-	-	0.0	-	-	0.0	-
76.7 55.0	-	0.0	-	3.3	-	-	-	0.0	-	-	0.0	-
80.0 51.0	-	0.0	-	0.0	-	-	-	0.7	-	0.0	-	-
80.0 55.0	-	0.8	-	0.7	-	-	-	0.0	-	0.0	-	-
81.8 46.9	-	11.0	-	1.5	-	-	-	0.0	-	0.9	-	-
83.3 40.6	-	0.0	-	6.9	-	-	-	0.0	-	0.0	-	-
83.3 51.0	-	0.8	-	0.7	-	-	-	0.0	-	0.0	-	-
83.3 55.0	-	2.0	-	10.7	-	-	-	0.0	-	0.0	-	-
83.3 60.0	-	0.7	-	0.0	-	-	-	0.0	-	0.0	-	-
86.7 35.0	-	0.0	-	47.2	-	-	-	0.0	-	0.0	-	-
86.7 45.0	-	1.3	-	3.6	-	-	-	0.0	-	0.0	-	-

TABLE 4. (cont.)

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

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 50.0	-	2.8	-	1.8	-	-	-	0.0	-	0.0	-	-
86.7 55.0	-	0.7	-	0.0	-	-	-	0.0	-	0.0	-	-
86.7 60.0	-	1.4	-	2.6	-	-	-	0.0	-	0.0	-	-
90.0 37.0	-	0.8	-	0.0	-	-	-	0.0	-	0.0	-	-
90.0 53.0	-	1.7	-	-	-	-	-	0.0	-	0.0	-	-
90.0 60.0	-	0.7	-	-	-	-	-	0.0	-	0.0	-	-
90.0 70.0	-	0.0	-	1.4	-	-	-	0.0	-	0.0	-	-
93.3 35.0	0.0	-	-	0.7	-	-	-	0.0	-	0.0	-	-
93.3 50.0	0.0	-	-	0.7	-	-	-	0.0	-	0.0	-	-
93.3 55.0	0.7	-	-	1.5	-	-	-	0.0	-	0.0	-	-

Sebastes aurora

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 37.0	-	0.8	-	0.0	-	-	-	0.0	-	0.0	-	-

Sebastes diploproa

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.0	-	-	0.0	-	-	0.0	-	-	0.9	-
76.7 51.0	-	2.3	-	-	13.6	-	-	0.7	-	-	2.5	-
76.7 55.0	-	0.0	-	0.0	-	-	-	39.4	-	-	0.0	-
76.7 60.0	-	0.0	-	0.0	-	-	-	0.0	-	-	0.4	-
76.7 70.0	-	0.0	-	0.0	-	-	-	0.0	-	0.8	-	-
80.0 51.0	-	0.0	-	0.0	-	-	-	0.0	-	0.8	-	-
80.0 55.0	-	0.0	-	0.0	-	-	-	1.7	-	0.0	-	-
80.0 60.0	-	0.0	-	0.0	-	-	-	0.0	-	0.7	-	-
81.8 46.9	-	0.0	-	0.0	-	-	-	0.0	-	0.9	-	-
83.3 55.0	-	0.7	-	0.0	-	-	-	0.0	-	0.0	-	-
86.7 50.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
90.0 53.0	-	0.9	-	-	-	-	-	0.0	-	0.0	-	-

Sebastes jordani

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.0	-	-	3.7	-	-	0.0	-	-	0.0	-
76.7 51.0	-	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-
81.8 46.9	-	3.1	-	0.0	-	-	-	0.0	-	0.0	-	-
83.3 40.6	-	0.0	-	7.6	-	-	-	0.0	-	0.0	-	-

TABLE 4. (cont.)

Sebastes jordani (cont.)

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

Sebastes levis

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

Sebastes paucispinis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 45.0	-	0.6	-	0.0	-	-	-	0.0	-	0.0	-	-

Scorpaenidae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 100.0	-	0.0	-	0.0	-	-	-	3256.5	-	0.0	-	-

Anoplopoma fimbria

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-
76.7 60.0	-	0.8	-	0.0	-	-	-	0.0	-	-	0.0	-

Oxylebius pictus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 60.0	-	0.7	-	0.0	-	-	-	0.0	-	0.0	-	-
86.7 80.0	-	0.0	-	1.9	-	-	-	0.0	-	0.0	-	-

Hexagrammos decagrammus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-
76.7 51.0	-	9.8	-	-	0.0	-	-	0.0	-	-	0.0	-
76.7 60.0	-	5.1	-	0.0	-	-	-	0.0	-	-	0.0	-
81.8 46.9	-	0.8	-	0.0	-	-	-	0.0	-	0.0	-	-
86.7 60.0	-	1.4	-	0.0	-	-	-	0.0	-	0.0	-	-

Ophiodon elongatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 51.0	-	2.3	-	-	0.0	-	-	0.0	-	-	0.0	-

TABLE 4. (cont.)

Cottidae

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

Ruscarius meanyi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-

Scorpaenichthys marmoratus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.0	-	-	1.5	-	-	0.0	-	-	0.0	-
76.7 51.0	-	5.3	-	-	4.8	-	-	0.0	-	-	0.0	-
76.7 55.0	-	0.0	-	0.7	-	-	-	0.0	-	-	0.0	-
76.7 60.0	-	13.6	-	0.0	-	-	-	0.0	-	-	0.0	-
76.7 70.0	-	0.0	-	0.0	-	-	-	0.0	-	0.8	-	-
76.7 80.0	-	0.0	-	0.0	-	-	-	0.0	-	0.5	-	-
80.0 51.0	-	0.0	-	0.7	-	-	-	0.0	-	2.4	-	-
83.3 40.6	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
83.3 51.0	-	0.0	-	2.2	-	-	-	0.0	-	0.7	-	-
83.3 55.0	-	1.3	-	0.0	-	-	-	0.0	-	3.0	-	-
86.7 33.0	-	0.0	-	0.0	-	-	-	0.0	-	0.9	-	-
86.7 35.0	-	0.7	-	0.7	-	-	-	0.0	-	0.0	-	-
93.3 55.0	0.7	-	-	0.0	-	-	-	0.0	-	0.0	-	-

***Howella* spp.**

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

***Paralabrax* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 51.0	-	0.0	-	0.0	-	-	-	6.7	-	0.0	-	-
86.7 45.0	-	0.0	-	0.0	-	-	-	1.0	-	0.0	-	-
90.0 28.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
90.0 35.0	-	0.0	-	0.0	-	-	-	1.0	-	0.0	-	-
90.0 37.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-

Trachurus symmetricus

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

TABLE 4. (cont.)

Trachurus symmetricus (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 90.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
76.7 100.0	-	0.0	-	1.2	-	-	-	0.0	-	0.0	-	-
80.0 70.0	-	0.0	-	1.6	-	-	-	0.0	-	0.0	-	-
80.0 80.0	-	0.0	-	6.4	-	-	-	0.0	-	0.0	-	-
80.0 90.0	-	0.0	-	15.3	-	-	-	0.0	-	0.0	-	-
80.0 100.0	-	0.0	-	7.2	-	-	-	0.0	-	0.0	-	-
83.3 60.0	-	0.0	-	1.3	-	-	-	0.0	-	0.0	-	-
86.7 70.0	-	0.0	-	0.6	-	-	-	0.0	-	0.0	-	-
86.7 90.0	-	0.0	-	0.6	-	-	-	0.0	-	0.0	-	-
90.0 70.0	-	0.0	-	2.8	-	-	-	0.0	-	0.0	-	-
90.0 80.0	-	0.0	-	2.5	-	-	-	0.0	-	0.0	-	-
93.3 35.0	0.0	-	-	7.6	-	-	-	0.0	-	0.0	-	-
93.3 40.0	0.0	-	-	1.5	-	-	-	0.0	-	0.0	-	-
93.3 55.0	0.0	-	-	4.4	-	-	-	0.0	-	0.0	-	-

Pteraclis aesticola

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
90.0 120.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-

Anisotremus davidsoni

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

Atractoscion nobilis

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	-	-
93.3 55.0	0.0	-	-	0.7	-	-	-	0.0	-	0.0	-	-

Genyonemus lineatus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
81.8 46.9	-	4.7	-	0.0	-	-	-	0.0	-	0.0	-	-
83.3 42.0	-	0.9	-	0.0	-	-	-	0.0	-	0.0	-	-
90.0 28.0	-	0.8	-	0.0	-	-	-	0.0	-	0.0	-	-

Menticirrhus undulatus

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	-	-

TABLE 4. (cont.)

Seriphus politus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	-	0.0	-	0.0	-	-	-	2.8	-	0.0	-	-

Girella nigricans

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

Medialuna californiensis

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	-	-
90.0 30.0	-	0.0	-	0.0	-	-	-	6.5	-	0.0	-	-
90.0 35.0	-	0.0	-	0.0	-	-	-	2.1	-	0.0	-	-
90.0 37.0	-	0.0	-	0.0	-	-	-	1.8	-	0.8	-	-
93.3 30.0	0.0	-	-	0.0	-	-	-	6.7	-	0.0	-	-

Chromis punctipinnis

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 55.0	-	0.0	-	0.0	-	-	-	8.4	-	-	0.0	-
81.8 46.9	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
83.3 40.6	-	0.0	-	0.0	-	-	-	0.0	-	1.1	-	-
83.3 51.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
86.7 33.0	-	0.0	-	0.0	-	-	-	0.0	-	1.8	-	-
86.7 40.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
86.7 45.0	-	0.0	-	0.0	-	-	-	1.0	-	0.0	-	-
90.0 30.0	-	0.0	-	0.0	-	-	-	0.0	-	0.9	-	-
90.0 35.0	-	0.0	-	0.0	-	-	-	5.2	-	0.0	-	-
90.0 37.0	-	0.0	-	0.0	-	-	-	31.8	-	0.0	-	-
93.3 26.7	0.0	-	-	0.0	-	-	-	0.0	-	1.1	-	-

Hypsypops rubicundus

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

Halichoeres semicinctus

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	-	-
90.0 37.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-

TABLE 4. (cont.)

Oxyjulis californica

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 55.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
83.3 60.0	-	0.0	-	0.0	-	-	-	0.6	-	0.0	-	-
86.7 35.0	-	0.0	-	1.4	-	-	-	0.0	-	0.0	-	-
86.7 60.0	-	0.0	-	0.0	-	-	-	0.7	-	0.0	-	-
86.7 70.0	-	0.0	-	1.9	-	-	-	0.0	-	0.0	-	-
90.0 37.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
93.3 35.0	0.0	-	-	0.7	-	-	-	0.0	-	0.0	-	-
93.3 55.0	0.0	-	-	10.2	-	-	-	0.0	-	0.0	-	-

Semicossyphus pulcher

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 40.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-

***Rathbunella* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-

Rathbunella alleni

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.0	-	-	10.4	-	-	0.0	-	-	0.0	-
83.3 51.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-

Neoclinus blanchardi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.9	-	-	0.0	-	-	0.0	-	-	0.0	-
83.3 51.0	-	0.0	-	5.1	-	-	-	0.0	-	0.0	-	-
86.7 35.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
90.0 37.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-

Neoclinus stephensae

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	-	-

***Hypsoblennius* spp.**

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	-	0.0	-	0.0	-	-	-	23.6	-	0.0	-	-

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	-	-	-	0.9	-	0.0	-	-

Hypsoblennius gilberti

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
81.8 46.9	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
83.3 51.0	-	0.0	-	0.0	-	-	-	4.2	-	0.0	-	-
86.7 50.0	-	0.0	-	0.0	-	-	-	2.8	-	0.0	-	-
86.7 60.0	-	0.0	-	0.0	-	-	-	0.0	-	0.9	-	-

Hypsoblennius jenkinsi

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 55.0	-	0.0	-	0.0	-	-	-	1.4	-	-	0.0	-
81.8 46.9	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
83.3 42.0	-	0.0	-	0.0	-	-	-	0.0	-	1.3	-	-
83.3 51.0	-	0.0	-	0.0	-	-	-	3.3	-	0.0	-	-
83.3 55.0	-	0.0	-	0.0	-	-	-	0.8	-	8.0	-	-
86.7 33.0	-	0.0	-	0.0	-	-	-	0.9	-	15.2	-	-
86.7 35.0	-	0.0	-	0.0	-	-	-	10.0	-	10.9	-	-
86.7 40.0	-	0.0	-	0.0	-	-	-	7.2	-	1.9	-	-
86.7 45.0	-	0.0	-	0.0	-	-	-	9.2	-	1.9	-	-
86.7 50.0	-	0.0	-	0.0	-	-	-	7.3	-	0.8	-	-
90.0 28.0	-	0.0	-	0.7	-	-	-	140.4	-	0.0	-	-
90.0 30.0	-	0.0	-	0.0	-	-	-	0.9	-	0.9	-	-
90.0 35.0	-	0.0	-	0.0	-	-	-	6.2	-	12.9	-	-
90.0 37.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
93.3 26.7	0.0	-	-	0.0	-	-	-	0.0	-	3.2	-	-
93.3 40.0	0.0	-	-	0.0	-	-	-	0.0	-	6.1	-	-

Icosteus aenigmaticus

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

Sphyraena argentea

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	0.0	-	-	-	1.9	-	0.0	-	-
83.3 51.0	-	0.0	-	0.0	-	-	-	2.5	-	0.0	-	-

TABLE 4. (cont.)

Sphyraena argentea (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	-	0.0	-	0.0	-	-	-	3.8	-	0.0	-	-
86.7 40.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
86.7 45.0	-	0.0	-	0.0	-	-	-	2.1	-	0.0	-	-
90.0 35.0	-	0.0	-	0.0	-	-	-	1.0	-	0.0	-	-
90.0 37.0	-	0.0	-	0.0	-	-	-	3.5	-	0.0	-	-

Scomber japonicus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 90.0	-	0.0	-	0.8	-	-	-	0.0	-	0.0	-	-
83.3 51.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
86.7 33.0	-	0.0	-	0.0	-	-	-	2.8	-	0.0	-	-
86.7 35.0	-	0.0	-	0.0	-	-	-	5.4	-	0.0	-	-
86.7 40.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
90.0 35.0	-	0.0	-	0.0	-	-	-	1.0	-	0.0	-	-
93.3 30.0	0.0	-	-	19.7	-	-	-	0.0	-	0.0	-	-
93.3 35.0	0.0	-	-	20.0	-	-	-	0.8	-	0.0	-	-
93.3 55.0	0.0	-	-	5.9	-	-	-	0.0	-	0.0	-	-
93.3 80.0	-	0.0	-	0.8	-	-	-	0.0	-	0.0	-	-

Icichthys lockingtoni

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 55.0	-	0.7	-	0.0	-	-	-	0.0	-	-	0.0	-
80.0 55.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
93.3 35.0	0.0	-	-	0.7	-	-	-	0.0	-	0.0	-	-

Tetragonurus cuvieri

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 90.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
76.7 100.0	-	0.0	-	1.2	-	-	-	0.0	-	0.0	-	-
80.0 80.0	-	0.0	-	1.3	-	-	-	0.7	-	0.0	-	-
80.0 90.0	-	0.0	-	0.8	-	-	-	0.0	-	0.0	-	-
83.3 51.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
83.3 60.0	-	0.7	-	0.0	-	-	-	0.0	-	0.0	-	-
83.3 70.0	-	0.0	-	0.0	-	-	-	0.8	-	-	-	-
83.3 80.0	-	0.7	-	-	-	-	-	0.0	-	0.0	-	-
83.3 100.0	-	0.7	-	0.0	-	-	-	0.0	-	0.0	-	-

TABLE 4. (cont.)

Tetragonurus cuvieri (cont.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 110.0	-	0.0	-	0.0	-	-	-	0.0	-	1.8	-	-
86.7 90.0	-	0.0	-	0.0	-	-	-	0.0	-	1.7	-	-
86.7 100.0	-	0.0	-	0.0	-	-	-	0.0	-	0.4	-	-
90.0 35.0	-	0.7	-	0.0	-	-	-	0.0	-	0.0	-	-
90.0 70.0	-	0.7	-	0.0	-	-	-	0.0	-	0.0	-	-
90.0 90.0	-	0.0	-	0.0	-	-	-	0.0	-	0.7	-	-
93.3 50.0	0.7	-	-	0.0	-	-	-	0.0	-	0.0	-	-
93.3 100.0	-	0.0	-	0.0	-	-	-	0.0	-	0.6	-	-

Citharichthys sordidus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
80.0 55.0	-	0.0	-	0.0	-	-	-	0.0	-	0.5	-	-
81.8 46.9	-	0.8	-	0.0	-	-	-	0.0	-	0.0	-	-
86.7 35.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-
86.7 40.0	-	0.7	-	0.0	-	-	-	0.0	-	0.0	-	-
90.0 37.0	-	4.1	-	0.0	-	-	-	0.0	-	0.0	-	-

Citharichthys stigmaeus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 55.0	-	0.0	-	0.0	-	-	-	0.7	-	-	0.0	-
80.0 51.0	-	0.0	-	0.0	-	-	-	0.7	-	0.0	-	-
83.3 51.0	-	0.0	-	0.0	-	-	-	0.8	-	0.0	-	-
86.7 35.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
86.7 60.0	-	2.8	-	0.0	-	-	-	0.0	-	0.0	-	-

Glyptocephalus zachirus

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

Lepidopsetta bilineata

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

Microstomus pacificus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 55.0	-	0.0	-	1.3	-	-	-	0.0	-	-	0.0	-

TABLE 4. (cont.)

Parophrys vetulus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 49.0	-	0.0	-	-	1.5	-	-	0.0	-	-	0.0	-
83.3 51.0	-	0.0	-	0.7	-	-	-	0.0	-	0.0	-	-

Pleuronichthys coenosus

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
76.7 55.0	-	0.0	-	0.0	-	-	-	0.0	-	-	0.9	-
86.7 40.0	-	0.0	-	0.8	-	-	-	0.0	-	0.0	-	-
90.0 37.0	-	0.0	-	0.0	-	-	-	0.0	-	0.8	-	-

Pleuronichthys decurrens

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

Pleuronichthys verticalis

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

Disintegrated fish larvae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
86.7 33.0	-	0.0	-	0.0	-	-	-	0.0	-	0.9	-	-
90.0 53.0	-	0.0	-	-	-	-	-	0.0	-	0.9	-	-
93.3 100.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-

Unidentified fish larvae

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
83.3 42.0	-	0.0	-	0.0	-	-	-	0.0	-	0.7	-	-
90.0 37.0	-	0.0	-	0.0	-	-	-	0.9	-	0.0	-	-
93.3 120.0	-	0.8	-	0.0	-	-	-	0.0	-	0.0	-	-

PHYLOGENETIC INDEX TO TABLE 4

Clupeiformes
Clupeidae
Sardinops sagax 24
Engraulidae
Engraulis mordax 25
Osmeriformes
Bathylagidae
Bathylagus wesethi 26
Stomiiformes
Gonostomatidae
Cyclothone spp. 26
Cyclothone signata 26
Phosichthyidae
Vinciguerria lucetia 26
Stomiidae
Stomiinae
Stomias atriventer 27
Melanostomiinae
Bathophilus flemingi 27
Tactostoma macropus 27
Malacosteinae
Aristostomias scintillans 28
Myctophiformes
Myctophidae
Lampanyctinae
Ceratoscopelus townsendi 28
Diaphus spp. 28
Lampadena urophaos 28
Lampanyctus spp. 29
Nannobrachium ritteri 29
Notoscopelus resplendens 29
Stenobrachius leucopsarus 29
Triphoturus mexicanus 29
Myctophinae
Hygophum reinhardtii 29
Gadiformes
Merlucciidae
Merluccius productus 29
Lophiiformes
Oneirodidae
Oneirodes spp. 30
Gigantactinidae
Gigantactis spp. 30
Atheriniformes
Atherinidae
Atherinopsis californiensis 30
Leuresthes tenuis 30
Beloniformes
Scomberesocidae
Cololabis saira 31
Exocoetidae
Cheilopogon heterurus 32
Cheilopogon pinnatibarbatus 32
Syngnathiformes
Centriscidae
Macroramphosus gracilis 32
Scorpaeniformes
Sebastidae
Sebastes spp. 32
Sebastes aurora 33
Sebastes diploproa 33
Sebastes jordani 33
Sebastes levis 34
Sebastes paucispinis 34
Scorpaenidae 34
Anoplopomatidae
Anoplopoma fimbria 34
Zaniolepididae
Oxylebius pictus 34
Hexagrammidae
Hexagrammos decagrammus 34
Ophiodon elongatus 34
Cottidae 35
Ruscarius meanyi 35
Scorpaenichthys marmoratus 35
Perciformes
Percoidei
Howellidae
Howella spp. 35
Serranidae
Paralabrax spp. 35
Carangidae
Trachurus symmetricus 35
Bramidae
Pteraclis aesticola 36
Haemulidae
Anisotremus davidsoni 36
Sciaenidae
Atractoscion nobilis 36
Genyonemus lineatus 36
Menticirrhus undulatus 36
Seriphus politus 37
Kyphosidae
Girella nigricans 37

Medialuna californiensis 37
Labroidei
Pomacentridae
Chromis punctipinnis 37
Hypsypops rubicundus 37
Labridae
Halichoeres semicinctus 37
Oxyjulis californica 38
Semicossyphus pulcher 38
Zoarcoidei
Bathymasteridae
Rathbunella spp. 38
Rathbunella alleni 38
Blennioidei
Chaenopsidae
Neoclinus blanchardi 38
Neoclinus stephensae 38
Blenniidae
Hypsoblennius spp. 38
Hypsoblennius gentilis 39
Hypsoblennius gilberti 39
Hypsoblennius jenkinsi 39
Icosteoidei
Icosteidae
Icosteus aenigmaticus 39
Sphyraenoidei
Sphyraenidae
Sphyraena argentea 39
Scombroidei
Scombridae
Scomber japonicus 40
Stromateoidei
Centrolophidae
Icichthys lockingtoni 40
Tetragonuridae
Tetragonurus cuvieri 40
Pleuronectiformes
Paralichthyidae
Citharichthys sordidus 41
Citharichthys stigmaeus 41
Pleuronectidae
Glyptocephalus zachirus 41
Lepidopsetta bilineata 41
Microstomus pacificus 41
Parophrys vetulus 42
Pleuronichthys coenosus 42
Pleuronichthys decurrens 42
Pleuronichthys verticalis 42
Unidentified fish larvae 42
Disintegrated fish larvae 42

ALPHABETICAL INDEX TO TABLE 4

Anisotremus davidsoni 36
Anoplopoma fimbria 34
Aristostomias scintillans 28
Atherinopsis californiensis 30
Atractoscion nobilis 36
Bathophilus flemingi 27
Bathylagus wesethi 26
Ceratoscopelus townsendi 28
Cheilopogon heterurus 32
Cheilopogon pinnatibarbatus 32
Chromis punctipinnis 37
Citharichthys sordidus 41
Citharichthys stigmaeus 41
Cololabis saira 31
Cottidae 35
Cyclothone signata 26
Cyclothone spp. 26
Diaphus spp. 28
Disintegrated fish larvae 42
Engraulis mordax 25
Genyonemus lineatus 36
Gigantactis spp. 30
Girella nigricans 37
Glyptocephalus zachirus 41
Halichoeres semicinctus 37
Hexagrammos decagrammus 34
Howella spp. 35
Hygophum reinhardtii 29
Hypsoblennius gentilis 39
Hypsoblennius gilberti 39
Hypsoblennius jenkinsi 39
Hypsoblennius spp. 38
Hypsypops rubicundus 37
Icichthys lockingtoni 40
Icosteus aenigmaticus 39
Lampadena urophaos 28
Lampanyctus spp. 29
Lepidopsetta bilineata 41
Leuresthes tenuis 30
Macroramphosus gracilis 32
Medialuna californiensis 37
Menticirrhus undulatus 36
Merluccius productus 29
Microstomus pacificus 41
Nannobrachium ritteri 29
Neoclinus blanchardi 38
Neoclinus stephensae 38
Notoscopelus resplendens 29
Oneirodes spp. 30
Ophiodon elongatus 34
Oxyjulis californica 38
Oxylebius pictus 34
Paralabrax spp. 35
Parophrys vetulus 42
Pleuronichthys coenosus 42
Pleuronichthys decurrens 42
Pleuronichthys verticalis 42
Pteraclis aesticola 36
Rathbunella alleni 38
Rathbunella spp. 38
Ruscarius meanyi 35
Sardinops sagax 24
Scomber japonicus 40
Scorpaenichthys marmoratus 35
Scorpaenidae 34
Sebastes aurora 33
Sebastes diploproa 33
Sebastes jordani 33
Sebastes levis 34
Sebastes paucispinis 34
Sebastes spp. 32
Semicossyphus pulcher 38
Seriphus politus 37
Sphyraena argentea 39
Stenobrachius leucopsarus 29
Stomias atriventer 27
Tactostoma macropus 27
Tetragonurus cuvieri 40
Trachurus symmetricus 35
Triphoturus mexicanus 29
Unidentified fish larvae 42
Vinciguerria lucetia 26

RECENT TECHNICAL MEMORANDUMS

Copies of this and other NOAA Technical Memorandums are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22167. Paper copies vary in price. Microfiche copies cost $9.00. Recent issues of NOAA Technical Memorandums from the NMFS Southwest Fisheries Science Center are listed below:

NOAA-TM-NMFS-SWFSC-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)

323 Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations Survey Cruises in 1987.
E.M. SANDKNOP, R.L. CHARTER, H.G. MOSER
(May 2002)

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

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

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

327 Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations Survey Cruises in 1991.
E.M. SANDKNOP, R.L. CHARTER, H.G. MOSER
(May 2002)

328 Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations Survey Cruises in 1992.
W. WATSON, R.L. CHARTER, H.G. MOSER
(May 2002)

329 Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations Survey Cruises in 1993.
D.A. AMBROSE, R.L. CHARTER, H.G. MOSER
(May 2002)

330 Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations Survey Cruises in 1994.
S.R. CHARTER, R.L. CHARTER, H.G. MOSER
(May 2002)

331 Ichthyoplankton and station data for Manta (surface) tows taken on California Cooperative Oceanic Fisheries Investigations Survey Cruises in 1995.
E.M. SANDKNOP, R.L. CHARTER, H.G. MOSER
(May 2002)