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ICHTHYOPLANKTON AND STATION DATA FOR SURFACE TOWS TAKEN DURING THE 1988 EASTERN TROPICAL PACIFIC DOLPHIN SURVEY ON THE RESEARCH VESSELS *DAVID STARR JORDAN* AND *McARTHUR*

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Table 5. Average numbers of larvae (per 100 m^3 of water filtered) for each taxon taken in Manta net tows in the regions (Figure 3) occupied on *Jordan* cruise 8810JD and *McArthur* cruise 8810M4.

	Region										
Taxon	1	2	3	4	5	6	7	8	9	10	11
Ariosoma gilberti	-	-	0.0	-	-	-	-	-	-	-	-
Paraconger californiensis	-	-	0.0	-	-	-	-	-	-	-	-
Opisthonema spp.	-	-	-	-	-	-	-	0.3	-	-	-
Anchoa spp.	-	-	-	-	-	-	-	0.1	-	-	-
Cyclothone spp.	-	-	0.2	0.1	-	-	-	-	-	-	-
Cyclothone acclinidens	-	-	-	0.0	-	-	-	-	-	-	-
Diplophos proximus	-	-	0.1	0.1	-	-	-	-	-	-	-
Vinciguerria lucetia	0.5	0.2	10.1	10.1	4.2	3.6	0.3	0.4	1.3	-	-
Bathophilus filifer	-	-	-	-	-	-	-	0.1	-	-	-
Lestidium spp.	-	-	0.0	0.3	0.3	-	-	-	-	-	-
Scopelengys tristis	-	-	-	-	0.1	-	-	-	-	-	-
Myctophidae	-	-	0.1	-	-	-	-	-	-	-	-
Bolinichthys spp.	-	-	0.1	0.0	-	-	-	-	-	-	-
Diaphus spp.	-	-	0.1	0.0	0.1	-	-	-	-	-	-
Lampanyctus spp.	-	-	0.9	0.2	0.1	-	-	-	0.1	0.2	-
Lampanyctus parvicauda	-	-	0.7	0.0	0.1	-	-	-	-	-	-
Triphoturus spp.	-	-	0.1	0.0	-	-	-	-	-	-	-
Diogenichthys laternatus	-	-	-	-	0.1	-	-	-	-	-	-
Hygophum proximum	-	-	-	0.0	0.0	-	-	-	-	-	-
Myctophum asperum	-	-	-	0.0	-	-	-	-	-	-	-
Myctophum aurolaternatum	-	-	0.2	0.0	-	-	-	-	-	-	-
Myctophum nitidulum	-	-	0.1	-	-	-	-	-	-	-	-
Melanocetus spp.	-	-	0.0	0.0	-	-	-	-	-	-	-
Gigantactis spp.	-	-	0.0	-	-	-	-	-	-	-	-
Scomberesocidae	-	0.5	-	-	-	-	-	30.6	1.4	-	-
Exocoetidae	-	-	-	0.0	-	-	-	-	-	-	-
Cheilopogon spp.	7.4	-	0.4	0.5	0.1	-	-	-	-	-	-
Cheilopogon xenopterus	-	-	0.0	0.5	-	-	-	-	-	-	-
Exocoetus spp.	-	-	0.9	0.5	0.0	-	-	-	-	-	0.7
Hirundichthys spp.	-	-	0.2	0.1	-	-	-	-	-	-	-
Hirundichthys marginatus	-	0.4	0.1	0.7	-	-	-	-	0.1	0.2	-
Hirundichthys speculiger	-	-	-	0.0	-	-	-	-	-	-	-
Oxyporhamphus micropterus	8.8	1.7	2.2	12.4	1.3	0.5	-	-	-	-	-
Prognichthys spp.	-	-	0.6	0.4	-	-	-	-	-	-	-
Melamphaes spp.	-	-	-	0.0	-	-	-	-	-	-	-
Scopelogadus bispinosus	-	-	-	-	-	-	-	-	0.1	-	-
Pontinus spp.	-	-	-	0.0	-	-	-	-	-	-	-
Howella pammelas	-	-	0.0	0.1	-	-	0.3	-	-	-	-
Naucrates ductor	-	-	0.1	-	-	-	-	0.1	-	-	-
Seriola spp.	-	-	0.0	-	0.0	-	-	-	-	-	-
Coryphaena equiselis	9.1	0.8	2.7	1.3	0.1	0.4	-	-	-	-	-
Coryphaena hippurus	-	-	0.1	-	-	-	-	-	-	-	-
Brama dussumieri	-	-	0.1	-	-	-	-	-	-	-	-
Mugil spp.	-	-	-	0.0	-	-	-	0.1	-	-	-

	Region										
Taxon	1	2	3	4	5	6	7	8	9	10	11
Chiasmodontidae	-	-	-	-	0.0	-	-	-	-	-	-
Chiasmodon niger	-	-	0.0	0.0	-	-	-	-	-	-	-
Eleotridae	-	-	0.2	-	-	-	-	-	-	-	-
Gobiidae	-	-	0.2	-	-	-	-	-	-	-	-
Gempylus serpens	-	-	0.1	-	0.0	-	-	-	-	-	-
Nealotus tripes	-	-	0.5	-	-	-	-	-	-	-	-
Auxis spp.	24.5	-	0.7	3.1	0.1	-	0.3	0.1	-	-	-
Euthynnus lineatus	-	-	0.0	-	-	-	-	-	-	-	-
Katsuwonus pelamis	-	-	-	0.0	-	-	-	-	-	-	-
Thunnus spp.	-	-	0.2	0.1	0.1	-	-	-	-	-	-
Amarsipus carlsbergi	-	-	0.0	-	-	-	-	-	-	-	-
Cubiceps pauciradiatus	1.4	0.2	0.2	0.2	0.1	-	-	-	-	-	-
Nomeus gronovii	-	-	0.1	0.1	-	-	-	-	-	-	-
Psenes cyanophrys	-	-	0.0	-	0.1	0.1	-	-	-	-	-
Psenes sio	-	-	0.0	-	-	-	-	-	-	-	-
Tetragonurus atlanticus	-	-	-	0.0	-	-	-	-	-	-	-
Bothus spp.	-	-	0.1	-	-	-	-	-	-	-	-
Unidentified fish larvae	-	-	0.1	-	-	-	-	-	-	-	-

CONTENTS

LIST OF FIGURES

Page

LIST OF TABLES

Page

ABSTRACT

This report provides ichthyoplankton, juvenile/adult fish, and associated station and tow data from the surface plankton samples collected during the 1988 Southwest Fisheries Science Center eastern tropical Pacific dolphin survey. It is the second in a series of reports that presents these data for all SWFSC ETP dophin surveys from 1987 to the present. In total, 149 stations were sampled with Manta nets between 28 July and 6 December, 1988, during which two research vessels surveyed within an area extending from about 22° N to 12° S, and from the Gulf of Panama westward to about 148° W. The data are presented in six tables, and distributions of the 20 most frequently occurring larval fish taxa are shown in a series of figures. The background, methodology, and necessary interpretive information are given in an accompanying text.

INTRODUCTION

In 1986 the Southwest Fisheries Science Center (SWFSC) conducted the first of a series of dolphin surveys in the eastern tropical Pacific (ETP). The purpose of these multi-ship surveys was to monitor abundance and distribution of ETP dolphin stocks and concurrently to monitor physical and biological variables in their habitat (Holt. et al. 1987; Holt and Jackson 1987). A primary objective was to determine the relation between environmental variables and population trends in ETP dolphin stocks. The physical oceanography was conducted jointly with NOAA=s Atlantic Oceanographic and Meteorological Laboratory (AOML). On the 1988 survey and all surveys conducted since 1987 (Thayer et al. 1988a, b), Manta (surface) net tows were taken at night in conjunction with the oceanographic operations (1987 survey, Moser et al. 2000; 1988 survey, this report; 1989 survey, Charter et al. 2000; 1990 survey, Sandknop et al. 2000; 1992 survey, Watson et al. 2000). The purpose of this was to study the distribution and abundance of ETP fish larvae and extend the ichthyoplankton time series begun during the Eastropac Expedition (Ahlstrom 1971, 1972). This report provides ichthyoplankton and associated station and tow data from the 1988 eastern tropical Pacific dolphin survey conducted from July 28 to December 6, 1988.

The survey was conducted aboard NOAA research vessels *David Starr Jordan* and *McArthur*. Hydrographic and biological data for *Jordan* and *McArthur* cruises, other than Manta tow data, are reported in Lierheimer et al. (1989a, b) and analyzed further in Fiedler (1992), Fiedler and Philbrick (1991), and Fiedler et al. (1990, 1992). Usually two conductivity-temperature-depth instrument (CTD) casts were made each night to 1000 m to measure temperature, salinity, oxygen, chlorophyll, phaeophytin, and nutrients, and to collect water samples for productivity measurements. Sea surface temperature, salinity, and fluorescence were measured continuously while the ship was underway. Also, four to eight expendable bathythermograph (XBT) casts were made daily. In addition to marine mammal observations, data on bird and turtle sightings were made throughout the survey. Robert Pitman made observations on surface organisms and associated environmental variables at night light stations throughout the survey and made extensive collections of fishes, squids, and other surface-living organisms. Data on fish stomach contents were recorded from fishes caught incidentally by trolling and rod-and-reel; unidentifiable stomach contents were preserved for subsequent laboratory analysis. Surface plankton samples were collected with a Manta net after dark at most stations.

SAMPLING AREA AND PATTERN

A total of 149 Manta tows was made on the survey, 82 aboard the *Jordan* (Figure 1) and 67 aboard the *McArthur* (Figure 2). The survey was conducted in four legs for both vessels:

Jordan Leg 1	28 July–26 August	San Diego, California to San José, Guatemala
Jordan Leg 2	1–30 September	San José, Guatemala to Panama City, Panama
Jordan Leg 3	4 October–2 November	Panama City, Panama to Manzanillo, Mexico
Jordan Leg 4	7 November–6 December	Manzanillo, Mexico to San Diego, California

McArthur Leg 1 28 July–26 August	San Diego, California to Hilo, Hawaii
McArthur Leg 2 31August–30 September	Hilo, Hawaii to Panama City, Panama
McArthur Leg 3 4 October–2 November	Panama City, Panama to Callao, Peru
McArthur Leg 4 7 November–6 December	Callao, Peru to San Diego, California

ICHTHYOPLANKTON SAMPLING GEAR AND METHODS

Plankton tows were made with a Manta net (Brown and Cheng 1981) identical to that used on California Cooperative Oceanic Fisheries Investigations (CalCOFI) cruises. 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. These extensions stabilize the net when it is towed and keep the top of the net at the sea surface. The net material 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. Two towing procedures were used on this survey. On the *Jordan* the tow line attached to the bridle was attached to the hydrographic wire and then lowered to slightly below the surface of the water before the net was deployed. On the *McArthur* the net was towed from a boom on the starboard side of the ship. A weight attached to the tow line in front of the bridle kept the top of the net mouth at the surface and the tow line below the mouth of the net. Hauls were made 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 the samples contained limited numbers of surface-living juvenile, and occasionally adult, stages of fishes; these also were removed and bottled separately in 3% formalin. The volume of water filtered by each net was computed from the flowmeter readings. Constituent taxa in the samples were identified by the senior author of this report in the ichthyoplankton ecology laboratory of the La Jolla Fisheries Resources Division. Early ontogenetic stages of fishes are difficult to identify and this is further complicated by the large number and diversity of species which contribute to the ichthyoplankton in the ETP. Most identifications were based on descriptions of ontogenetic series of fishes in an identification guide to early stages of fishes in the California Current and adjacent regions (Moser 1996). Larval specimens that could not be identified with the guide 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 (Powles and Markle 1984). Fischer et al. (1995) was a primary source of information on distribution and taxonomy of adult fishes of the ETP. Except for damaged specimens, a large proportion of the larvae and most juvenile/adults taken in the surface tows could be identified to species. The types of larvae most difficult to identify were those of tropical shorefishes (e.g., Gobiidae, Eleotridae) but most oceanic fishes could be identified to species or at least to genus. A total of 62 larval fish categories (including unidentified) was identified: 34 to species, 21 to genus, and 6 to family.

The following taxonomic categories in Tables 2–5 require special explanation:

Cyclothone spp. – Small or damaged larvae lacking diagnostic characters.

Cyclothone acclinidens – Postflexion stage larvae having diagnostic pigmentation characters.

Exocoetus spp. – *E. monocirrhus* and *E. volitans* occur in the study area and their larvae smaller than about 10 mm cannot be reliably distinguished.

Hirundichthys spp. **B** Small or damaged larvae lacking diagnostic characters, probably most are *H. marginatus*.

Lestidium spp. **B** Larvae are a single species, *Lestidium* sp. Ege 1953. Adults collected during other studies of the ETP resemble *Lestidium bigelowi* Graae 1967, known from the Indian Ocean.

Mugil spp. **B** Mugilid larvae lacking the full complement of anal fin elements (larvae < ~ 5**B**6 mm) and those with 12 total anal fin elements could not be identified to species; *Mugil cephalus* has 11 (rarely 10) total anal fin elements.

Prognichthys spp. **B** *P. sealei* and *P. tringa* occur in the study area and their larvae cannot be reliably distinguished. The former species has a primarily oceanic distribution whereas the latter is coastal; the larvae collected during the 1988 survey probably are prodominantly (perhaps entirely) *P. tringa*.
Scomberesocidae **B** *Cololabis saira* and *Elassichthys adocoetus* co-occur in much of the study area and their larvae smaller than about 11-12 mm cannot be reliably distinguished. *Scomberesox saurus* and *E. adocoetus* co-occur south of the equator and small larvae of these two species cannot be distinguished. All larval records of this family are listed as Scomberesocidae; nearly all were collected south of the equator where *C. saira* does not occur.

Triphoturus spp. **B** Larvae of *Triphoturus* in the region of the ETP sampled by this expedition correspond to *Triphoturus oculeus* (Garman 1899), a species Hulley (1986) synonymized with *T. mexicanus* (Gilbert 1890). These larvae share pigment characteristics of *T. mexicanus* and *T. nigrescens* (the other *Triphoturus* species recognized by Hulley 1986).

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

Vinciguerria lucetia **B** *V. lucetia* is the most common *Vinciguerria* species in the study area, but *V. nimbaria* and *V. poweriae* also occur in the eastern Pacific, primarily west of about 130° W; larvae of the three species are very difficult to distinguish and it is possible that some *V. nimbaria* and *V. poweriae* were included within *V. lucetia*.

SPECIES SUMMARY

Of the five most abundant taxa for the entire 1988 survey, the Panama lightfish *Vinciguerria lucetia* ranked first in abundance and occurrence with 34.3% of the total larvae and 43.6% positive tows (Tables 2 and 3). The shortwing flyingfish *Oxyporhamphus micropterus* ranked second in abundance and occurrence with 19.6% of the total larvae and 28.2% positive tows. The saury family Scomberesocidae ranked third in abundance and tied for fifth in occurrence with 14.5% of total larvae and 10.1% positive tows. The scombrid genus *Auxis* ranked fourth in abundance and occurrence with 7.0% of the larvae and 12.1% positive tows. The pompano dolphinfish *Coryphaena equiselis* ranked fifth in abundance with 6.8% of the larvae and third in occurrence with 22.8% positive tows. The next five most abundant taxa were the flyingfish genus *Cheilopogon* (2.0% of total larvae), the flyingfish genus *Exocoetus* (1.7%), the myctophid genus *Lampanyctus* (1.7%), the flyingfish genus *Prognichthys* (1.3%), and the banded flyingfish *Hirundichthys marginatus* (1.1%). These species ranked tied for 7^{th}, tied for 7^{th}, tied for 5^{th}, tied for 17^{th}, and 9^{th} in frequency of occurrence, respectively. The ten most abundant taxa comprised 90.4% of all the larvae collected on ETP survey cruises in 1988. The remaining 9.6 % was distributed among 53 other taxa (including the "unidentified" category). Of the ten most abundant taxa, seven are epipelagic, one is coastal pelagic, and two (*V. lucetia* and *Lampanyctus* spp.) are midwater taxa that migrate to the epipelagic zone at night.

EXPLANATION OF FIGURES AND TABLES

Figures 4B23. Lengths of vertical bars are proportional to total larval counts for each station.

Table 1. This table lists for each tow the pertinent station and tow data for ichthyoplankton stations occupied during *Jordan* cruise 8810JD and *McArthur* cruise 8810M4. 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 M4 (*McArthur)*. Data are listed sequentially by tow number. Regions are based on 15° latitude H 15° longitude squares (Figure 3). Time is listed as local 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).

Table 2. Pooled occurrences of all larval fish taxa taken in Manta net tows on *Jordan* cruise 8810JD and *McArthur* cruise 8810M4. 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 *Jordan* cruise 8810JD and *McArthur* cruise 8810M4. Taxa are listed in rank order.

Table 4. Numbers of fish larvae for each taxon taken in Manta net tows on *Jordan* cruise 8810JD and *McArthur* cruise 8810M4, listed by tow number (Figures 1and 2). Numbers of larvae are listed as raw counts and number per 100 m^3 of water filtered. Fish orders and families are listed in phylogenetic sequence (Eschmeyer 1998); other taxa are listed alphabetically.

Table 5. Average number of larvae (per 100 m^3 of water filtered) for each taxon taken in Manta net tows in the regions (see Figure 3) occupied on *Jordan* cruise 8810JD and *McArthur* cruise 8810M4.

Table 6. Numbers (raw counts) and size ranges of juvenile fishes taken in Manta net tows on *Jordan* cruise 8810JD and *McArthur* cruise 8810M4. Fish orders and families are listed in phylogenetic sequence (Eschmeyer 1998), genera and species are listed in alphabetical order. For each entry, the tow number is given first in bold type, the count is next in parentheses, and size range is given last.

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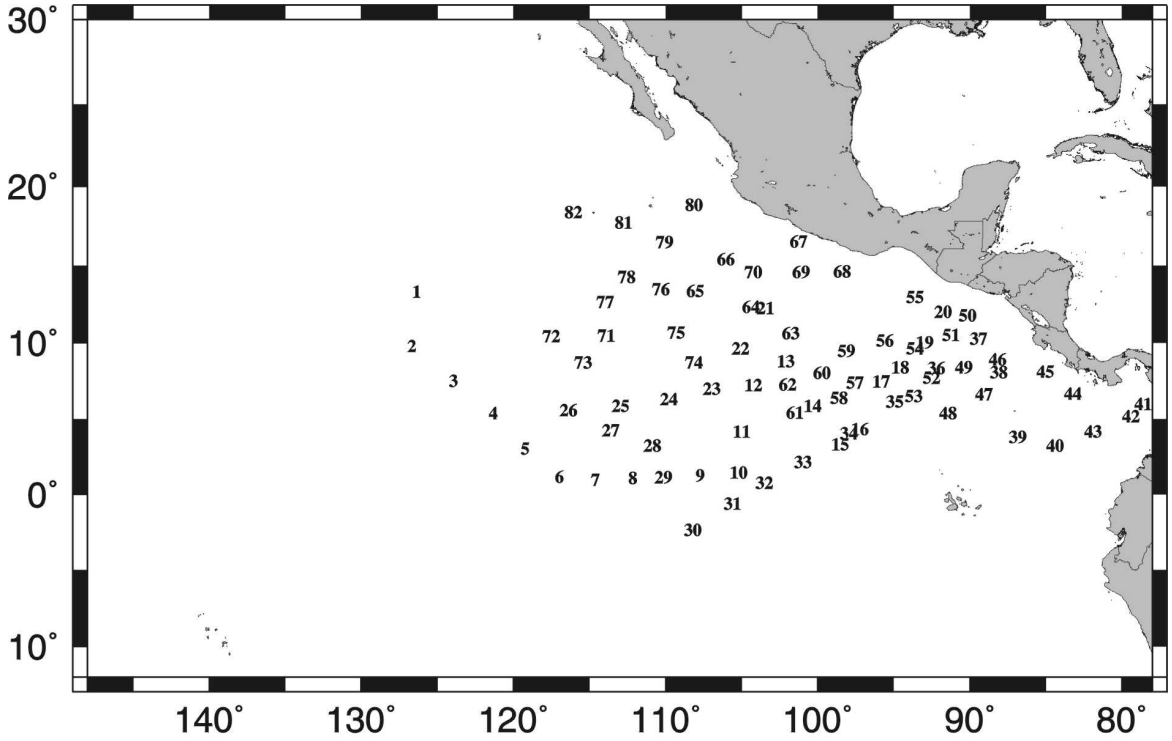

Figure 1. Manta net tow stations for *Jordan* cruise 8810JD.

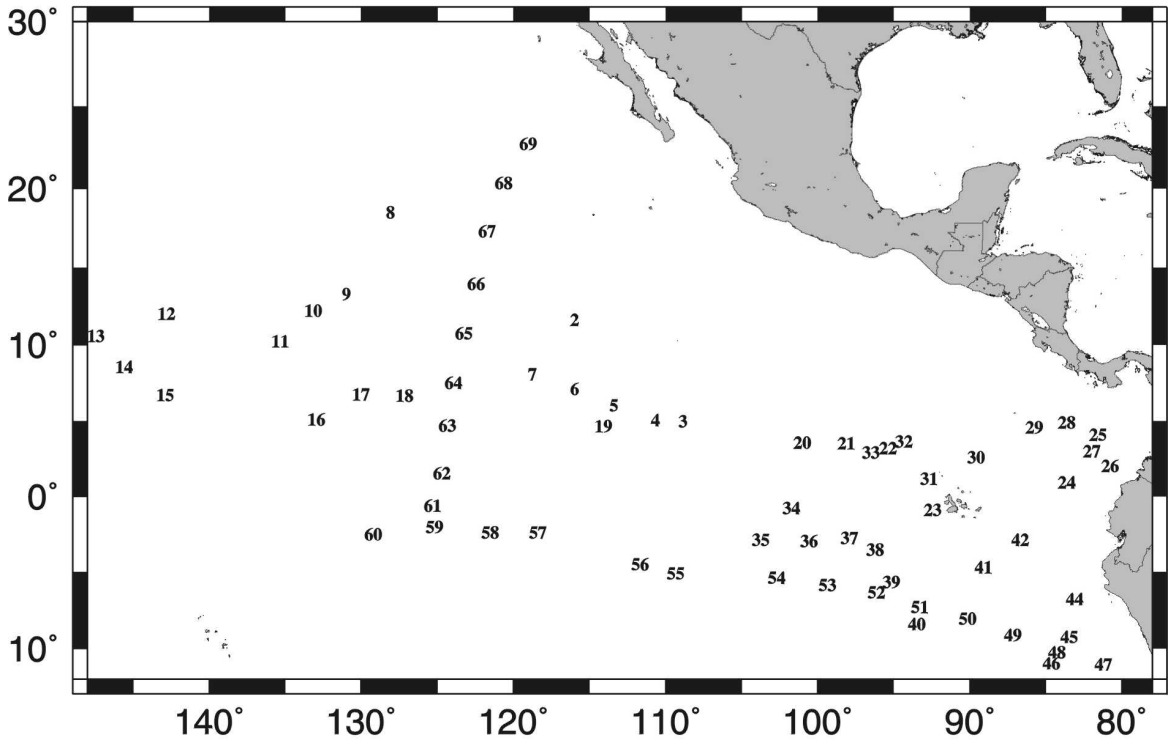

Figure 2. Manta net tow stations for *McArthur* cruise 8810M4.

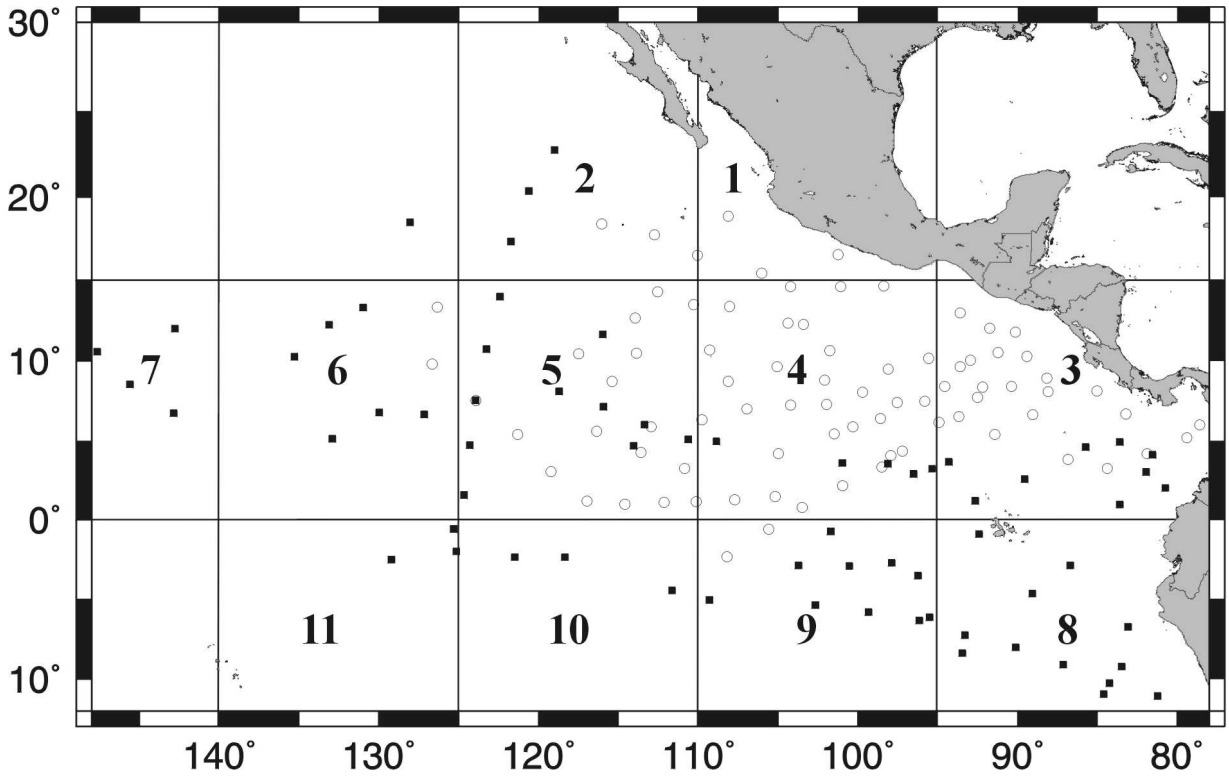

Figure 3. Sampling regions for 1988 eastern tropical Pacific dolphin survey indicated by numbers 1 to 11; Manta net tow stations for *Jordan* cruise 8810JD are indicated by circles and for *McArthur* cruise 8810M4 by solid squares. *McArthur* tow 8, to the left of region 2, was included in region 2.

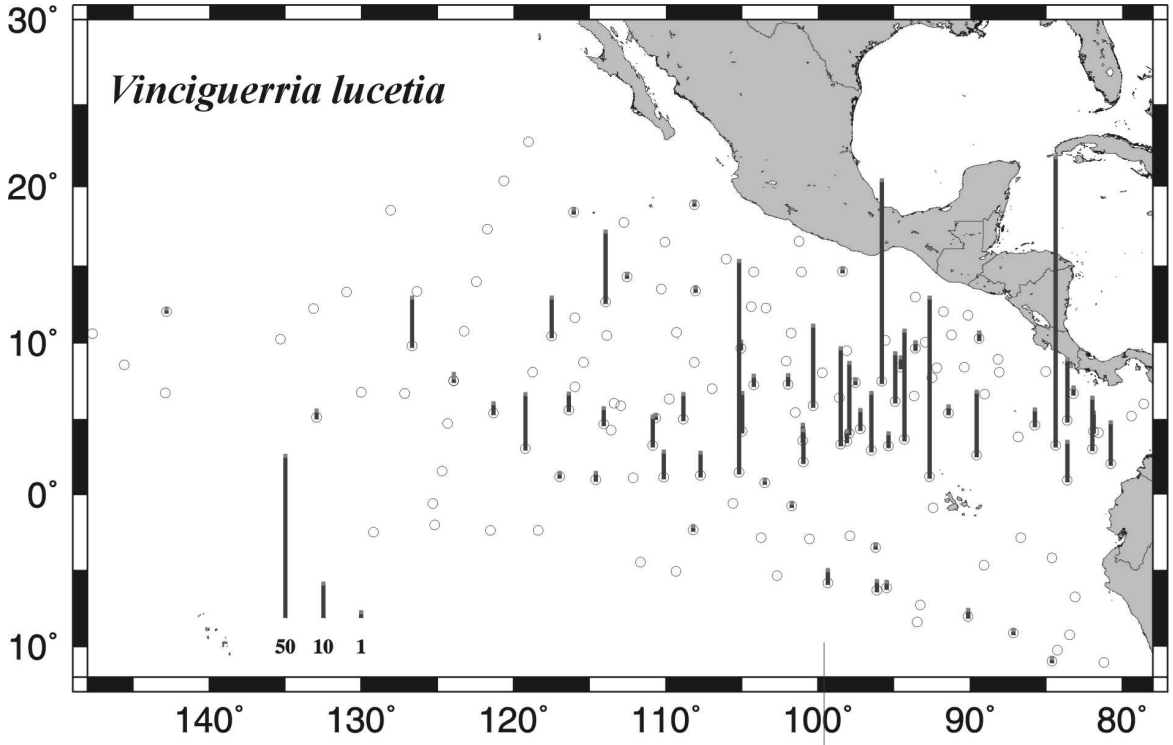

Figure 4. Distribution of *Vinciguerria lucetia* larvae from Manta net tows: 8810JD & 8810M4. Lengths of vertical bars are proportional to total larval counts for each station.

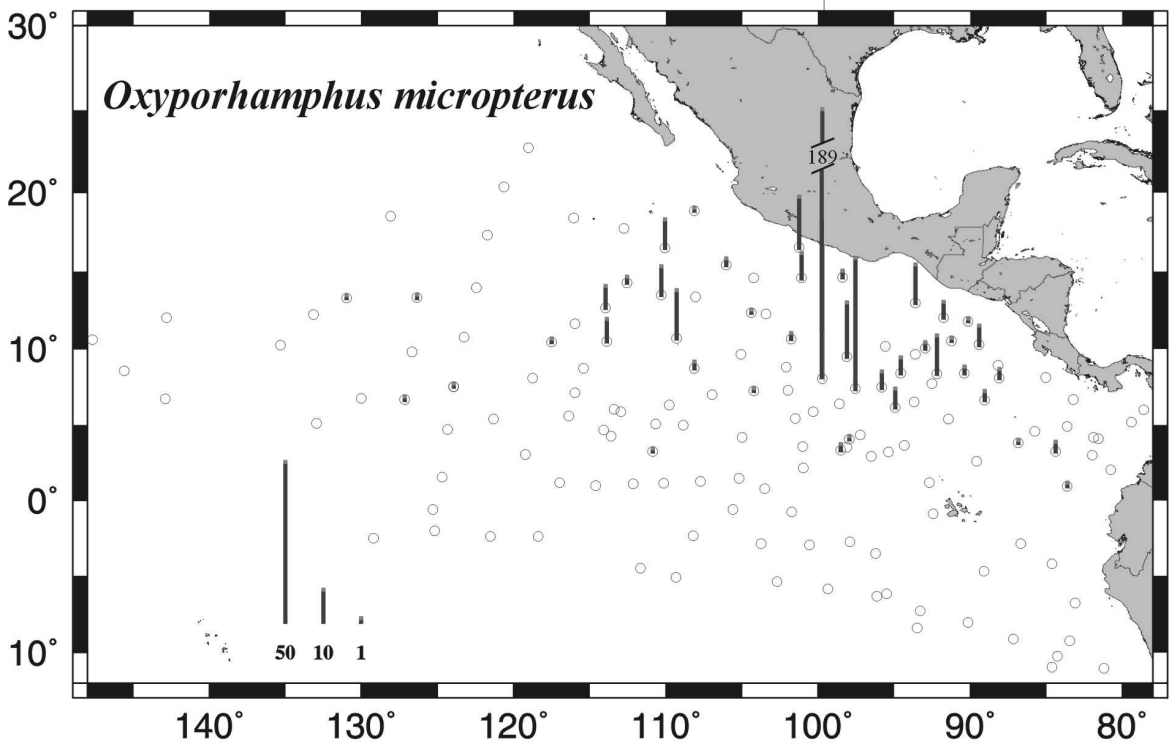

Figure 5. Distribution of *Oxyporhamphus micropterus* larvae from Manta net tows: 8810JD & 8810M4.

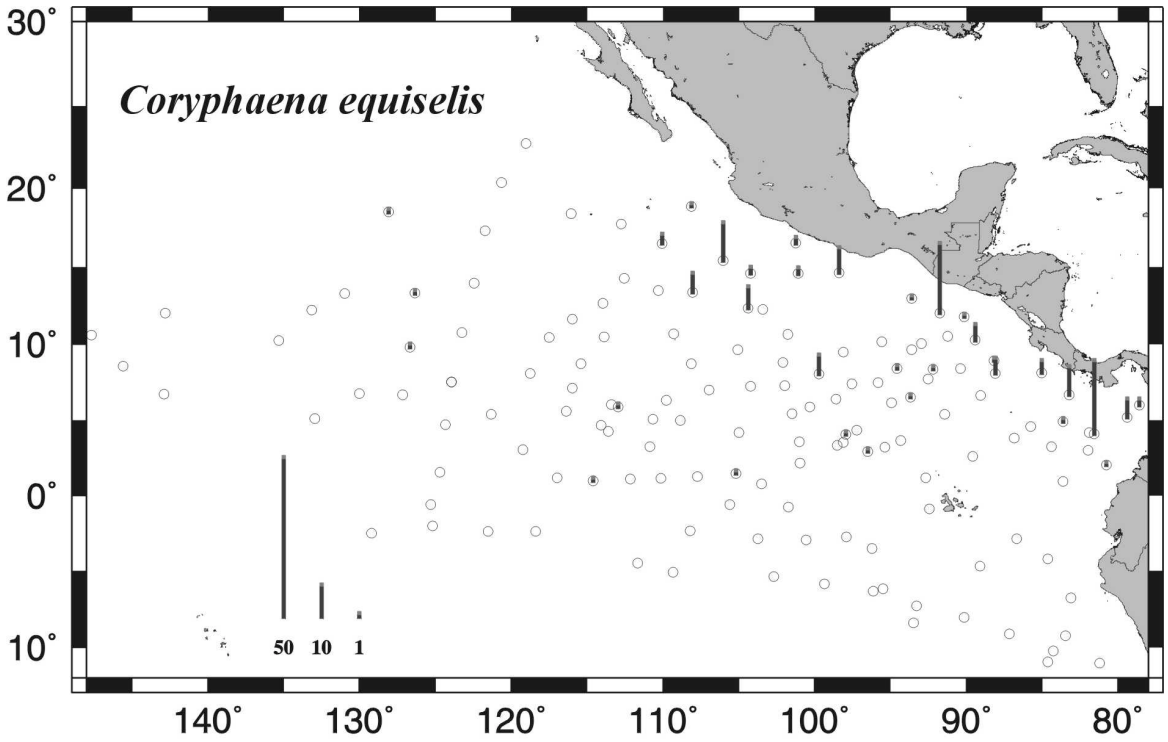

Figure 6. Distribution of *Coryphaena equiselis* larvae from Manta net tows: 8810JD & 8810M4.

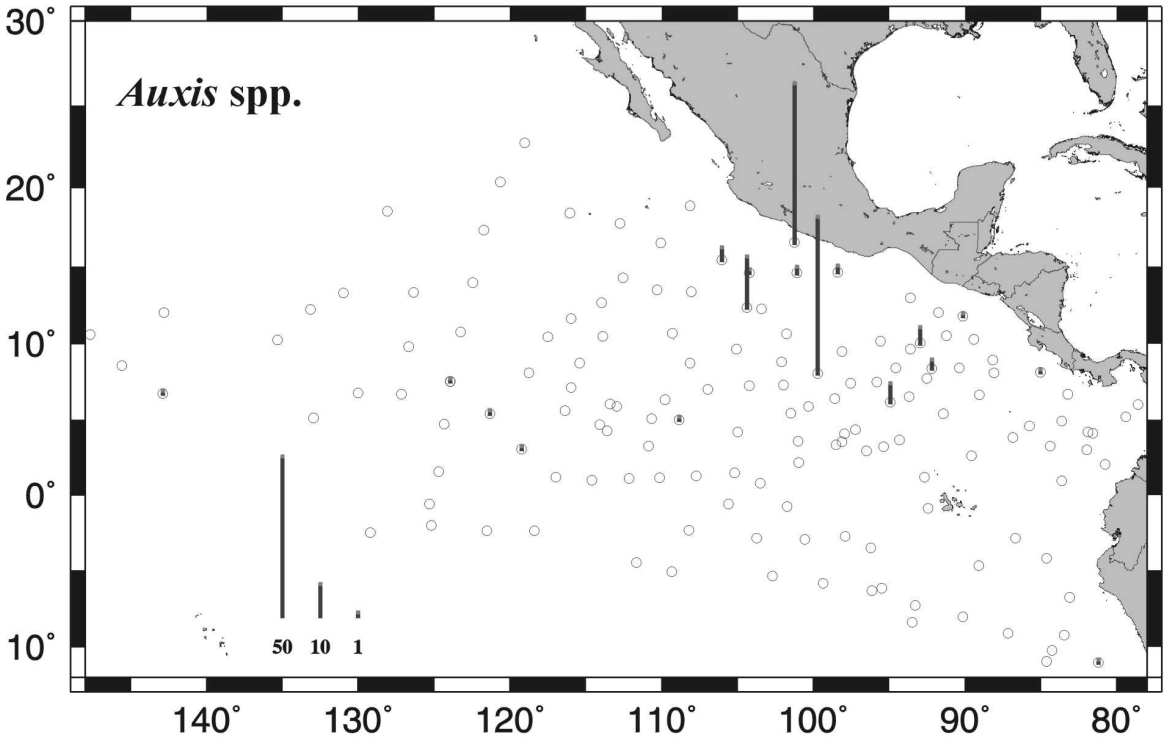

Figure 7. Distribution of *Auxis* spp. larvae from Manta net tows: 8810JD & 8810M4.

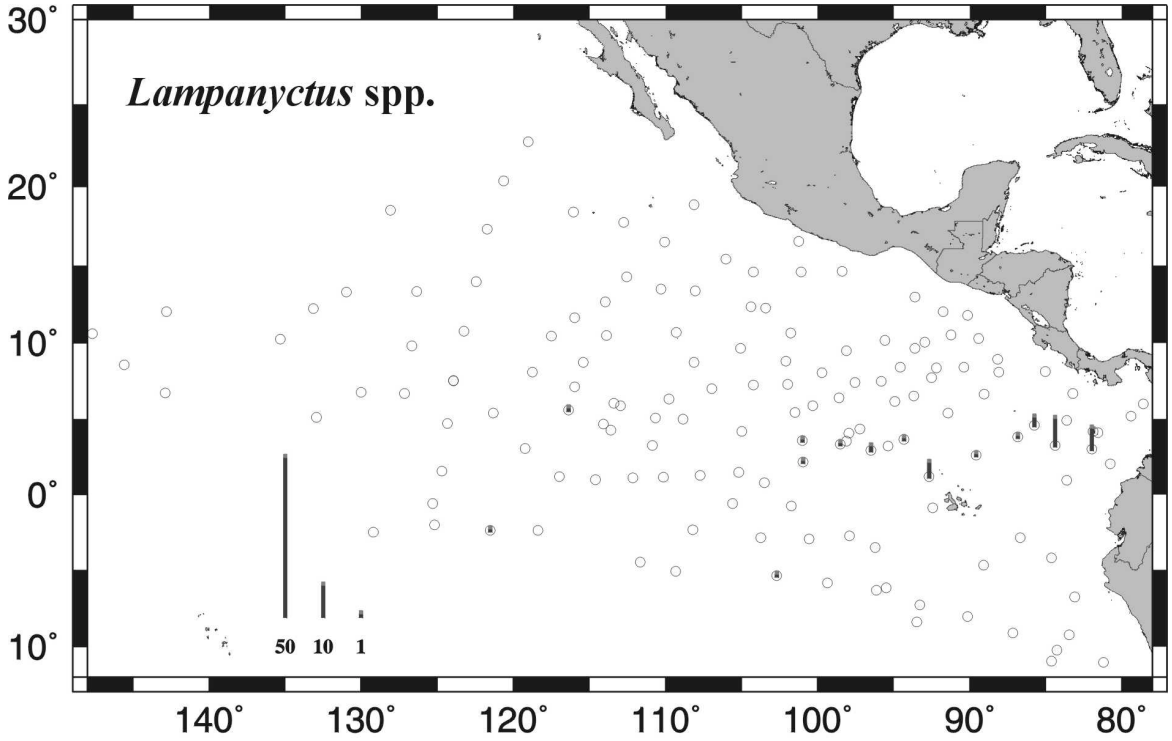

Figure 8. Distribution of *Lampanyctus* spp. larvae from Manta net tows: 8810JD & 8810M4.

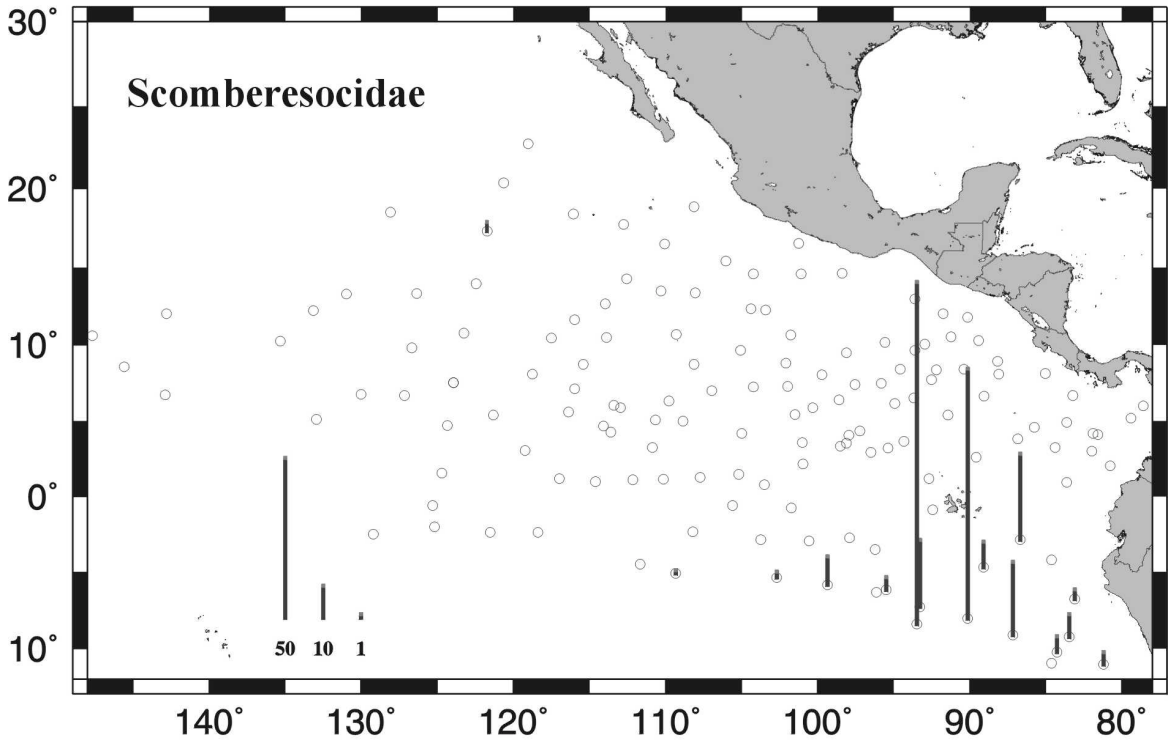

Figure 9. Distribution of Scomberesocidae larvae from Manta net tows: 8810JD & 8810M4.

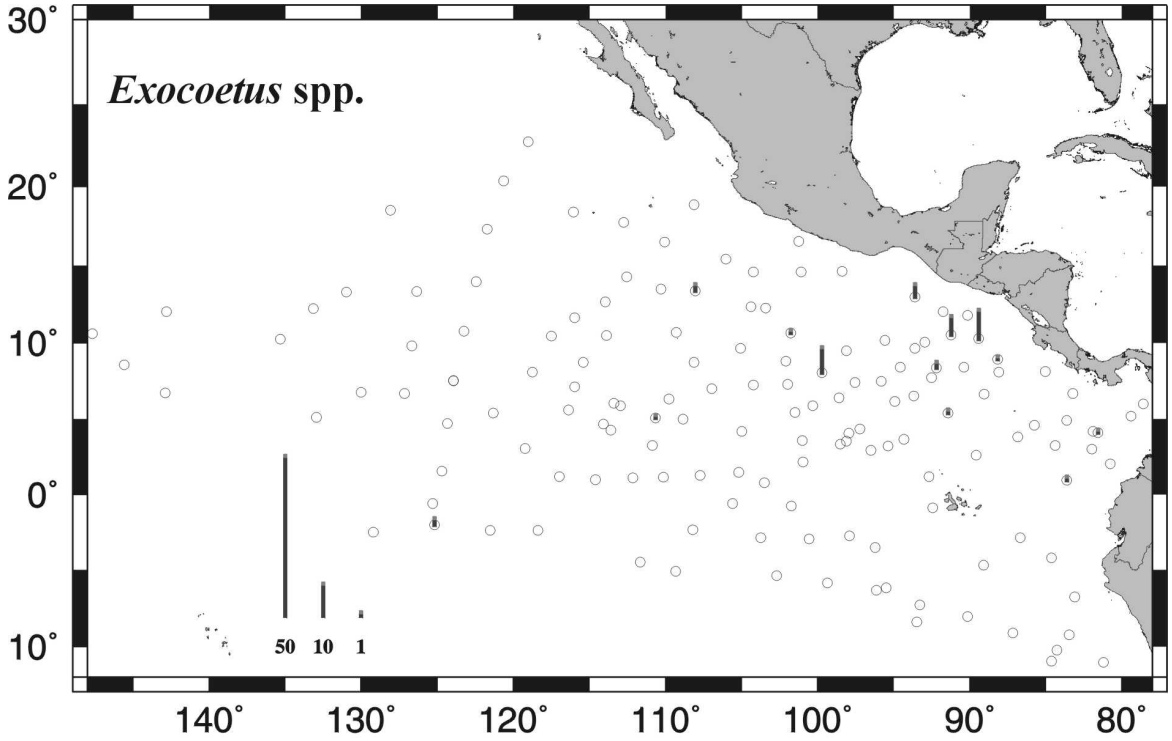

Figure 10. Distribution of *Exocoetus* spp. larvae from Manta net tows: 8810JD & 8810M4.

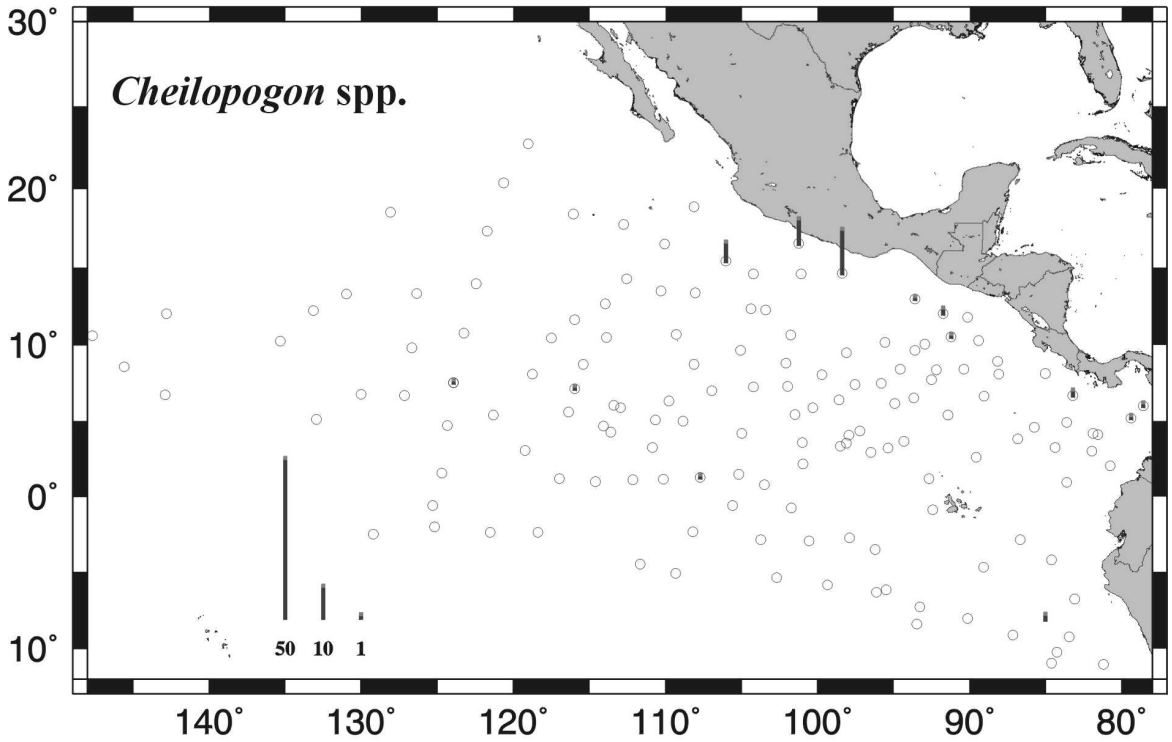

Figure 11. Distribution of *Cheilopogon* spp. larvae from Manta net tows: 8810JD & 8810M4.

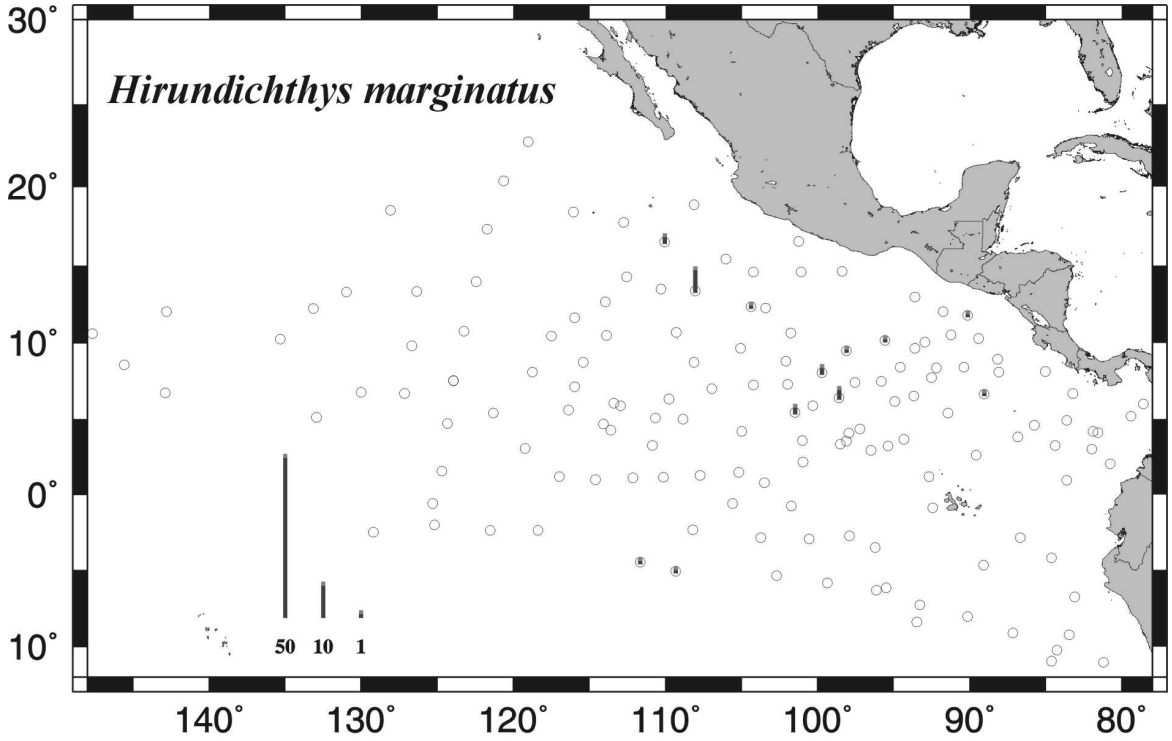

Figure 12. Distribution of *Hirundichthys marginatus* larvae from Manta net tows: 8810JD & 8810M4.

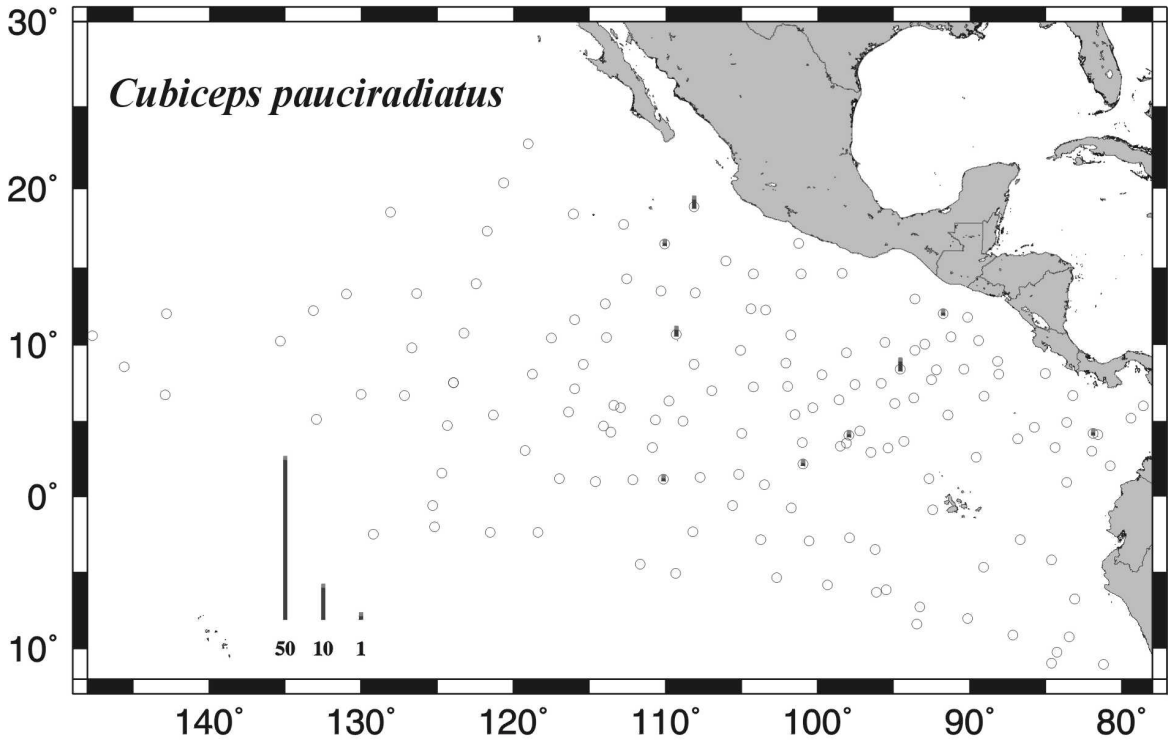

Figure 13. Distribution of *Cubiceps pauciradiatus* larvae from Manta net tows: 8810JD & 8810M4.

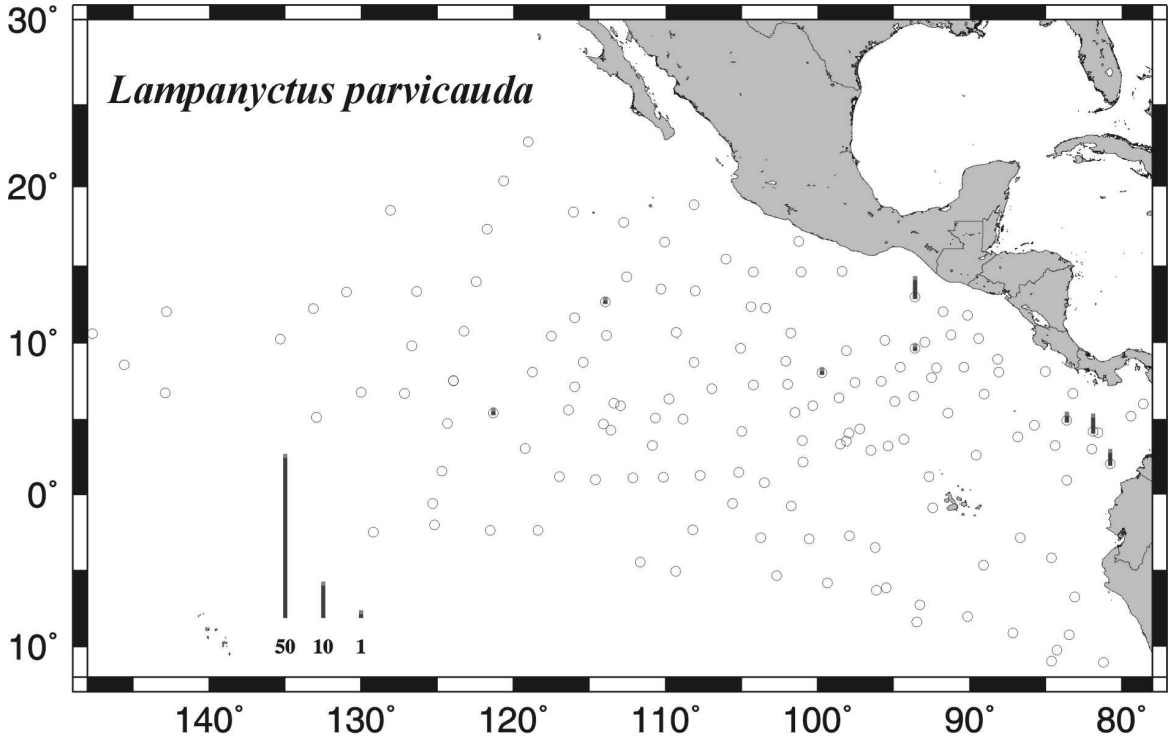

Figure 14. Distribution of *Lampanyctus parvicauda* larvae from Manta net tows: 8810JD & 8810M4.

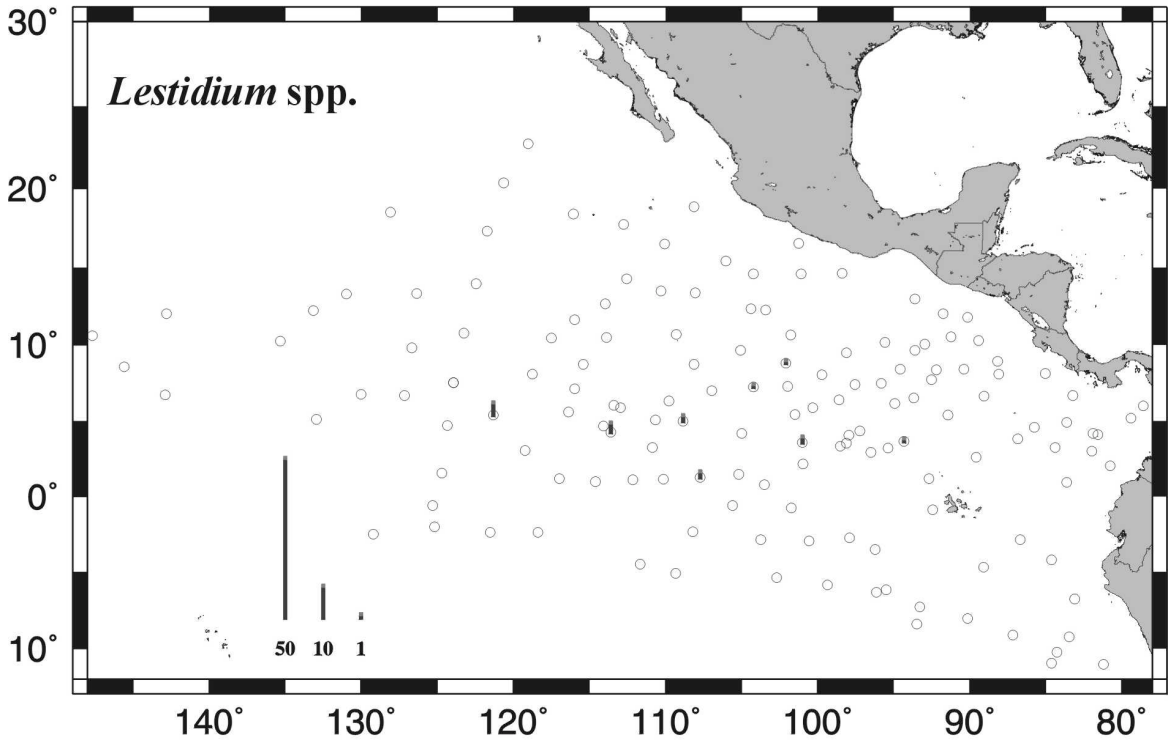

Figure 15. Distribution of *Lestidium* spp. larvae from Manta net tows: 8810JD & 8810M4.

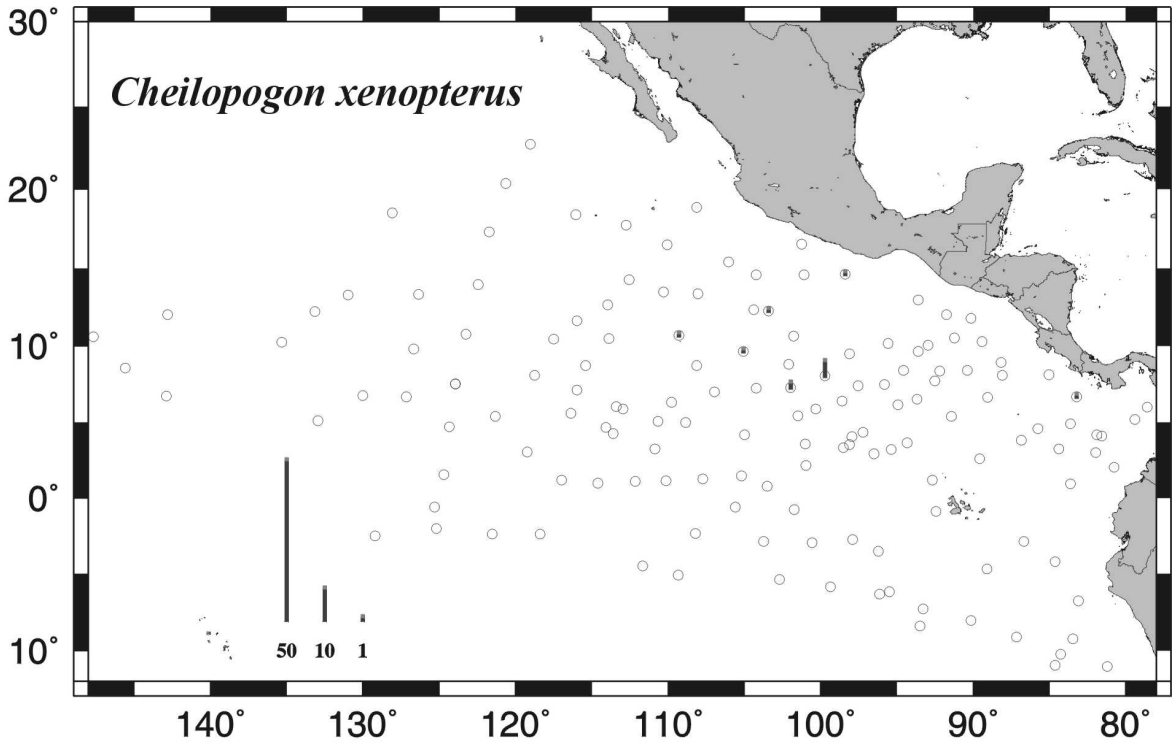

Figure 16. Distribution of *Cheilopogon xenopterus* larvae from Manta net tows: 8810JD & 8810M4.

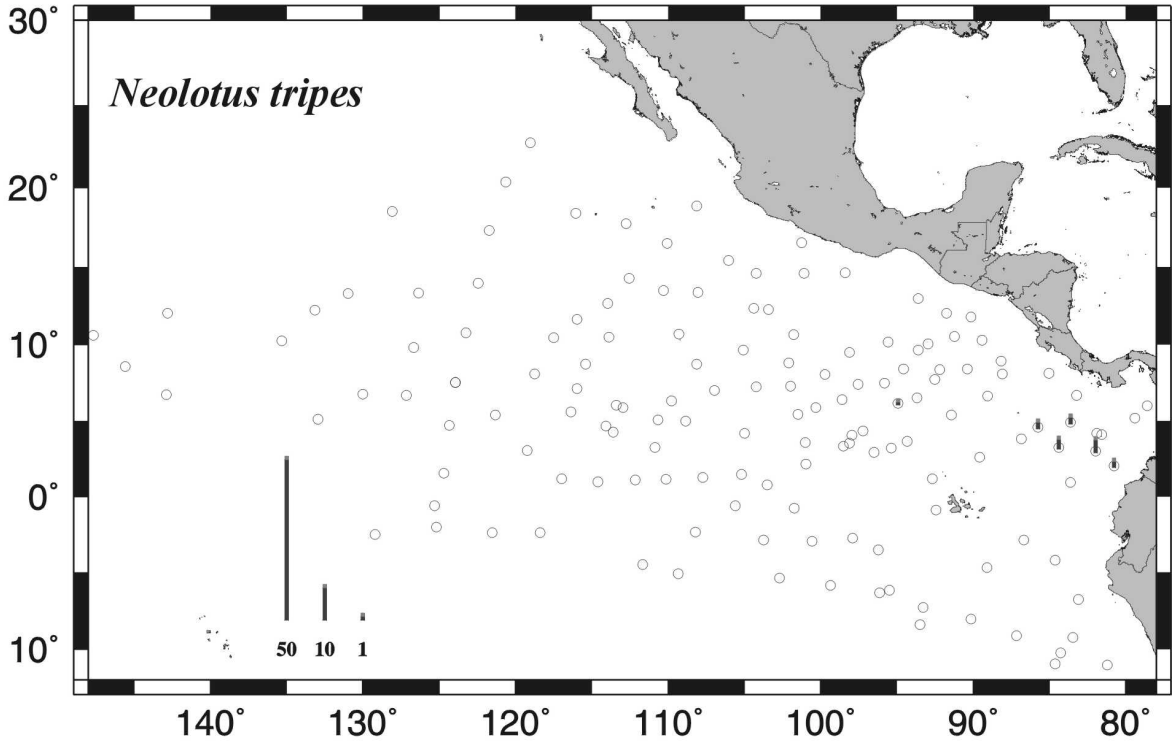

Figure 17. Distribution of *Neolotus tripes* larvae from Manta net tows: 8810JD & 8810M4.

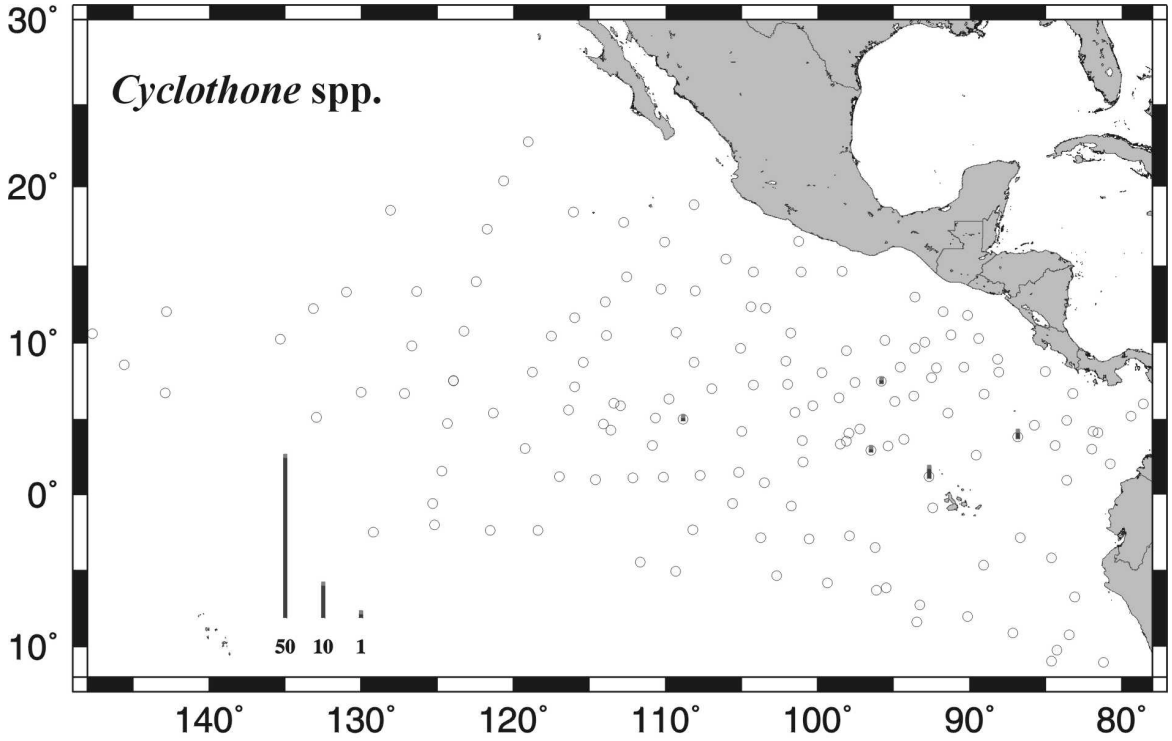

Figure 18. Distribution of *Cyclothone* spp. larvae from Manta net tows: 8810JD & 8810M4.

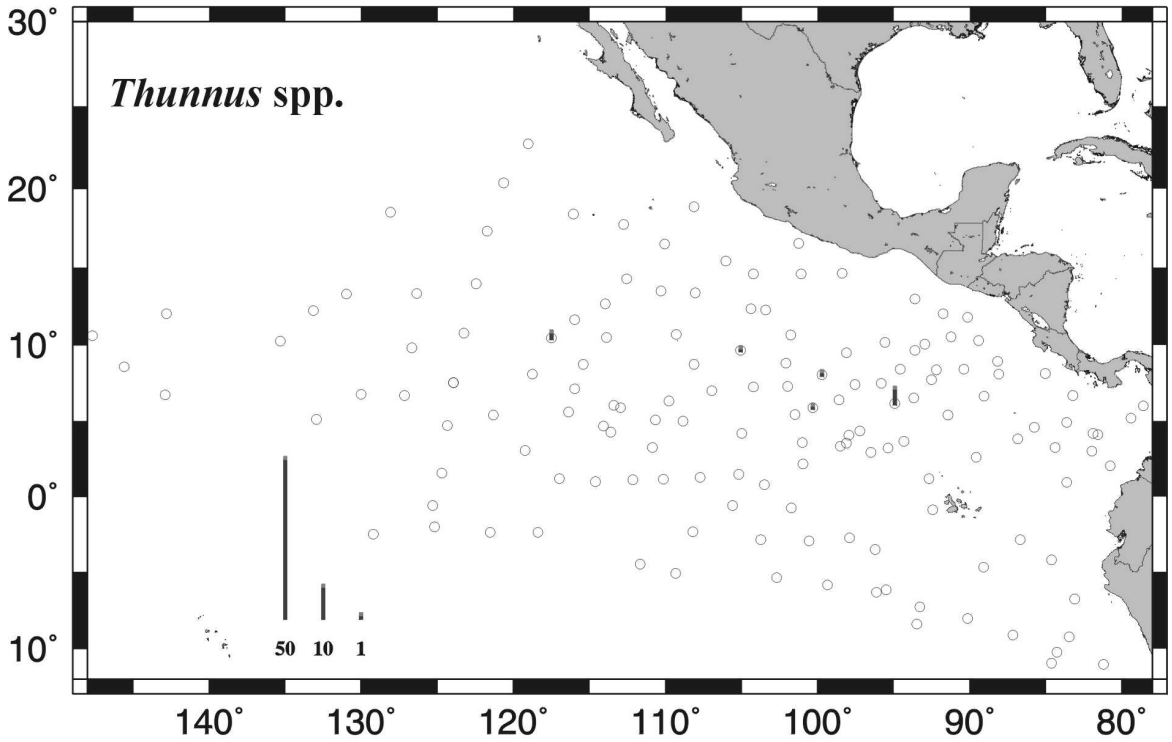

Figure 19. Distribution of *Thunnus* spp. larvae from Manta net tows: 8810JD & 8810M4.

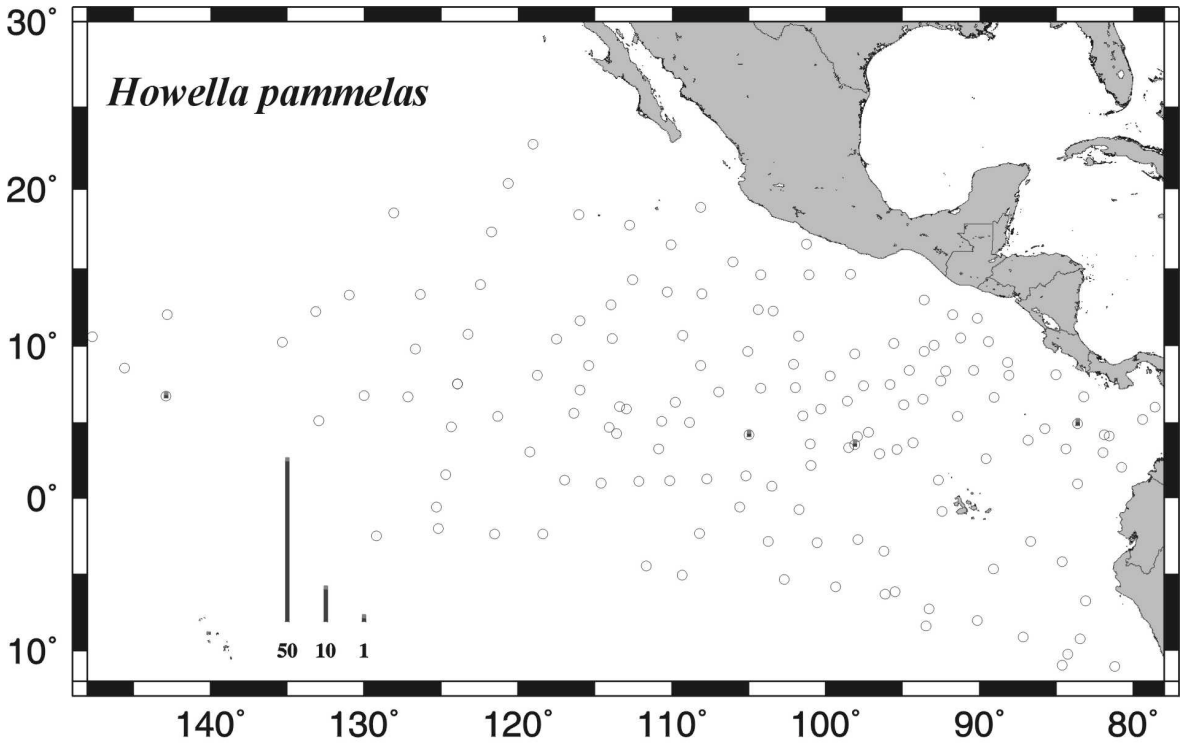

Figure 20. Distribution of *Howella pammelas* larvae from Manta net tows: 8810JD & 8810M4.

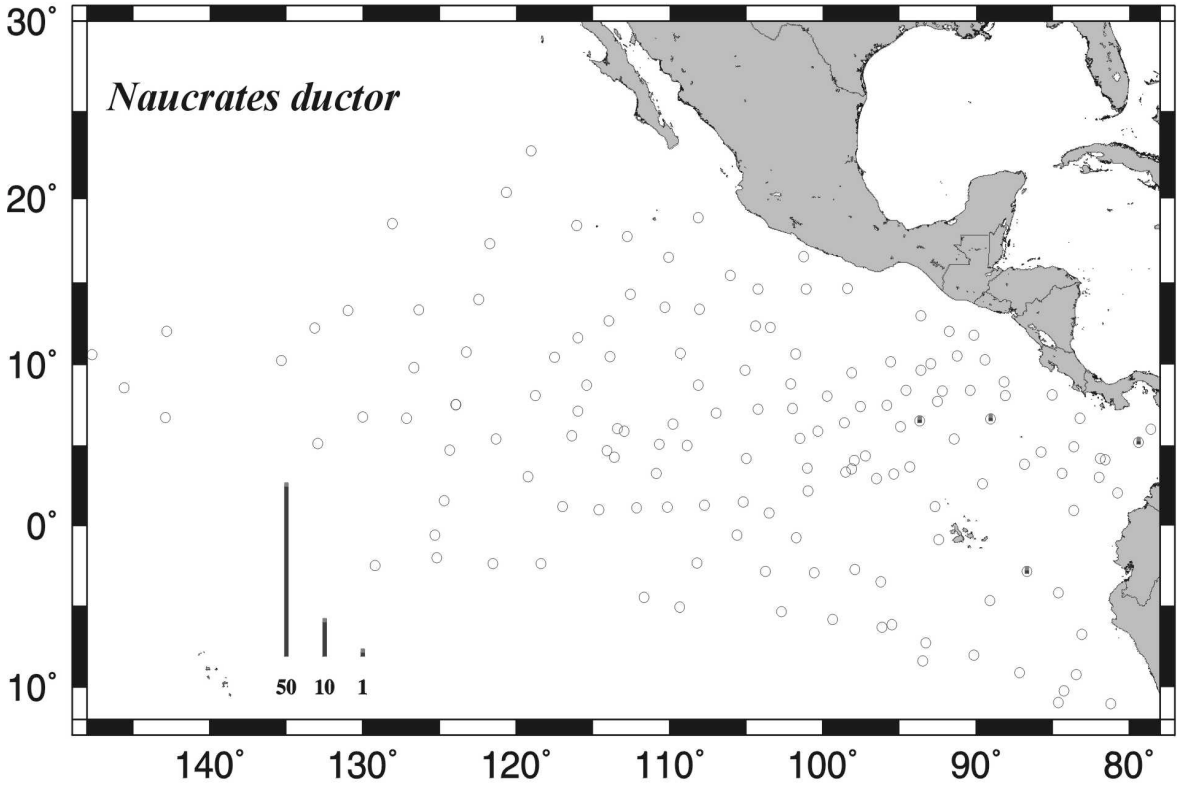

Figure 21. Distribution of *Naucrates ductor* larvae from Manta net tows: 8810JD & 8810M4.

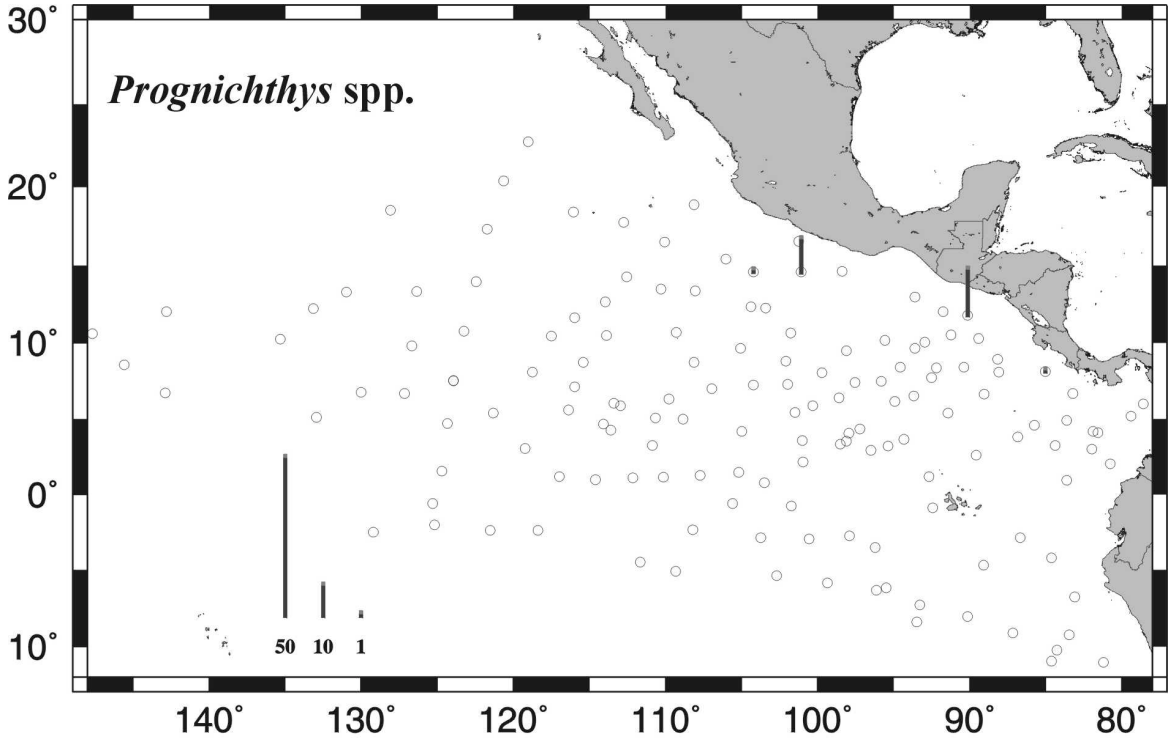

Figure 22. Distribution of *Prognichthys* spp. larvae from Manta net tows: 8810JD & 8810M4.

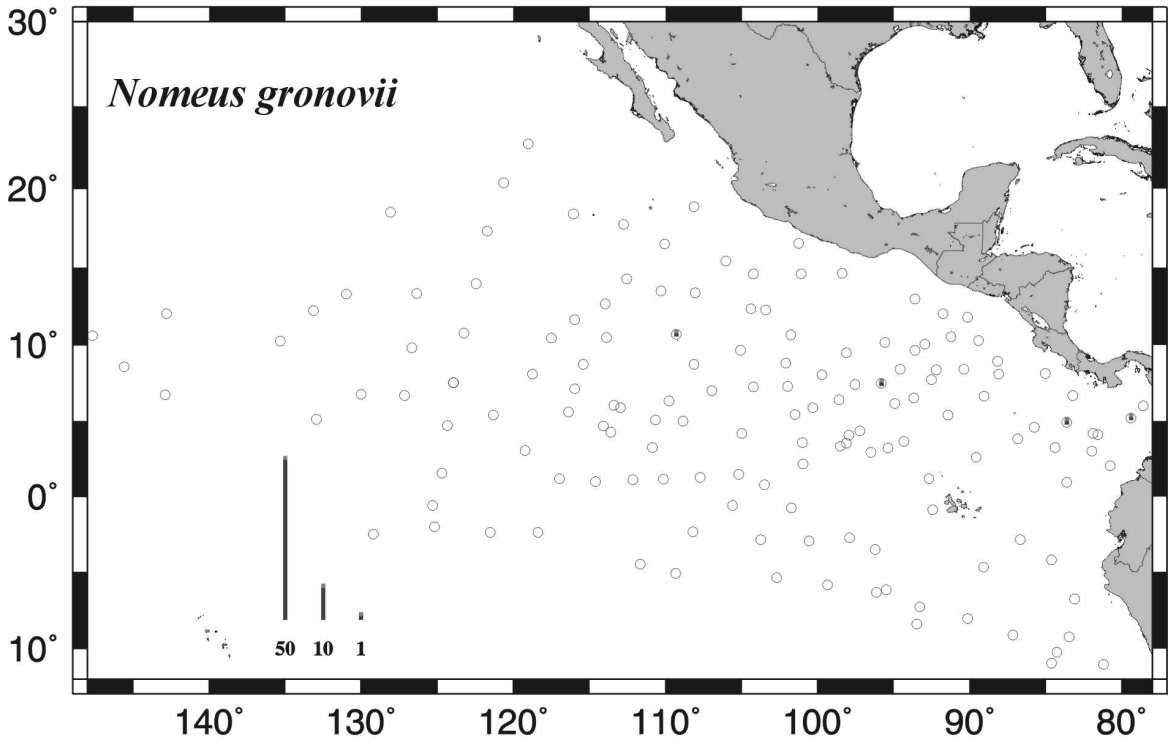

Figure 23. Distribution of *Nomeus gronovii* larvae from Manta net tows: 8810JD & 8810M4.

Table 1. Station and Manta net tow data for *Jordan* cruise 8810JD and *McArthur* cruise 8810M4.

Tow Number	CTD Station	Lat. deg.	Lat. min.		Long.(W) deg	Long.(W) min.	Region	Ship Code	Tow Date yymmdd	Time (Loc.)	Vol.(m;) Water Strained	Total Larvae	Total Eggs
1	1-008	13	19.5	N	126	21.4	6	JD	880804	2146	82.9	2	18
2	1-010	9	49.7	N	126	41.0	6	JD	880805	2134	58.1	16	1
3	1-012	7	31.0	N	123	57.5	5	JD	880806	2130	93.4	5	5
4	1-014	5	25.0	N	121	18.9	5	JD	880807	2129	95.8	14	1378
5	1-016	3	03.9	N	119	13.0	5	JD	880808	2121	92.5	18	53
6	1-018	1	12.5	N	116	58.1	5	JD	880809	2122	91.8	1	7
7	1-020	0	59.8	N	114	36.3	5	JD	880810	2120	85.4	3	22
8	1-022	1	07.9	N	112	09.4	5	JD	880811	2105	86.7	0	8
9	1-025	1	16.7	N	107	43.3	4	JD	880813	2105	91.8	11	10
10	1-027	1	29.4	N	105	11.9	4	JD	880814	2105	80.0	67	5
11	1-029	4	11.1	N	104	59.1	4	JD	880815	2105	88.7	13	15
12	1-031	7	14.1	N	104	14.9	4	JD	880816	2105	73.8	5	2
13	1-033	8	48.2	N	102	05.3	4	JD	880817	2105	78.1	1	11
14	1-035	5	52.7	N	100	19.7	4	JD	880818	2105	88.0	26	11
15	1-037	3	19.8	N	98	31.8	4	JD	880819	2105	72.0	37	10
16	1-039	4	21.1	N	97	12.7	4	JD	880820	2105	65.0	6	25
17	1-041	7	28.4	N	95	49.3	4	JD	880821	2105	94.9	72	58
18	1-043	8	25.7	N	94	35.5	3	JD	880822	2105	73.0	14	118
19	1-045	10	02.1	N	92	58.9	3	JD	880823	2105	65.3	10	7
20	1-046	12	02.6	N	91	45.5	3	JD	880824	2110	97.6	30	9
21	2-047	12	17.0	N	103	26.0	4	JD	880905	2108	57.6	1	19
22	2-049	9	40.0	N	105	04.0	4	JD	880906	2106	60.5	5	5
23	2-051	7	01.0	N	106	58.0	4	JD	880907	2108	58.4	0	7
24	2-053	6	19.0	N	109	46.0	4	JD	880908	2122	73.1	0	3
25	2-055	5	54.0	N	112	58.0	5	JD	880909	2113	85.5	2	7
26	2-057	5	37.0	N	116	22.0	5	JD	880910	2109	70.6	8	9
27	2-059	4	16.0	N	113	37.0	5	JD	880911	2206	70.0	4	1
28	2-061	3	16.0	N	110	52.3	5	JD	880912	2105	71.0	10	10
29	2-063	1	08.6	N	110	08.8	5	JD	880913	2107	60.5	9	13
30	2-065	2	18.5	S	108	13.0	9	JD	880915	2103	72.3	1	4
31	2-066	0	36.2	S	105	36.1	9	JD	880916	2103	66.6	0	5
32	2-067	0	48.0	N	103	30.0	4	JD	880917	2106	81.8	1	17
33	2-069	2	09.3	N	100	58.0	4	JD	880918	2104	79.3	15	10
34	2-070	4	04.3	N	97	56.5	4	JD	880919	2105	79.4	26	9
35	2-072	6	10.0	N	94	56.0	3	JD	880920	2105	71.3	33	7
36	2-074	8	21.8	N	92	13.1	3	JD	880921	2107	100.7	18	33
37	2-076	10	16.3	N	89	25.7	3	JD	880922	2108	92.1	22	40
38	2-078	8	05.0	N	88	06.0	3	JD	880923	2110	101.2	8	5
39	2-080	3	48.4	N	86	51.0	3	JD	880925	2104	82.9	7	297
40	2-082	3	16.4	N	84	24.5	3	JD	880926	2105	92.3	110	138
41		6	01.2	N	78	37.4	3	JD	880928	2105	103.0	3	605
42		5	12.1	N	79	24.3	3	JD	881005	2024	88.2	9	39
43	3-085	4	11.0	N	81	53.5	3	JD	881006	2111	79.5	16	444
44	3-086	6	41.0	N	83	14.0	3	JD	881007	2106	77.9	15	11
45	3-088	8	08.0	N	85	03.0	3	JD	881008	2110	76.9	8	11
46	3-090	8	56.0	N	88	11.0	3	JD	881009	2110	73.9	3	4
47	3-092	6	38.0	N	89	03.0	3	JD	881010	2108	82.5	7	16
48	3-095	5	25.0	N	91	26.0	3	JD	881012	2104	74.7	4	56
49	3-097	8	26.0	N	90	23.0	3	JD	881013	2110	73.5	2	8

Tow Number	CTD Station	Lat. deg.	Lat. min.		Long.(W) deg	Long.(W) min.	Region	Ship Code	Tow Date yymmdd	Time (Loc.)	Vol.(m;) Water Strained	Total Larvae	Total Eggs
50	3-098	11	48.0	N	90	09.0	3	JD	881014	2114	83.0	20	175
51	3-100	10	32.0	N	91	13.0	3	JD	881015	2100	85.6	8	20
52	3-102	7	45.0	N	92	31.0	3	JD	881016	2100	80.2	0	17
53	3-104	6	31.0	N	93	42.0	3	JD	881017	2110	98.8	2	7
54	3-106	9	38.0	N	93	37.0	3	JD	881018	2112	77.6	6	295
55	3-108	12	59.0	N	93	37.0	3	JD	881019	2110	86.0	26	440
56	3-110	10	11.0	N	95	35.0	4	JD	881020	2103	73.0	1	113
57	3-112	7	23.6	N	97	34.2	4	JD	881021	2104	71.3	42	273
58	3-114	6	24.0	N	98	36.0	4	JD	881022	2100	68.1	3	7
59	3-116	9	30.0	N	98	07.0	4	JD	881023	2105	72.2	19	48
60	3-118	8	04.0	N	99	43.0	4	JD	881024	2108	60.2	262	66
61	3-120	5	27.0	N	101	30.0	4	JD	881025	2105	58.7	2	7
62	3-122	7	17.0	N	101	59.0	4	JD	881026	2106	63.7	5	1
63	3-124	10	39.0	N	101	47.0	4	JD	881027	2102	79.3	3	163
64	3-126	12	21.0	N	104	23.0	4	JD	881028	2102	70.4	25	341
65	3-128	13	24.0	N	108	03.0	4	JD	881029	2103	60.9	17	24
66	3-130	15	26.0	N	106	02.0	1	JD	881030	2104	51.6	24	27
67	4-131	16	32.0	N	101	15.0	1	JD	881108	2105	76.1	76	41
68	4-133	14	39.0	N	98	23.0	4	JD	881109	2105	78.5	29	24
69	4-135	14	35.0	N	101	06.0	4	JD	881110	2104	91.6	23	96
70	4-137	14	37.0	N	104	14.0	4	JD	881111	2103	80.3	4	500
71	4-143	10	30.0	N	113	53.0	5	JD	881115	2104	63.2	7	101
72	4-145	10	28.0	N	117	30.0	5	JD	881116	2105	61.7	15	21
73	4-147	8	44.0	N	115	25.0	5	JD	881117	2104	71.4	0	13
74	4-151	8	45.0	N	108	09.0	4	JD	881119	2058	63.1	2	345
75	4-153	10	42.0	N	109	17.0	4	JD	881120	2107	66.2	20	3940
76	4-155	13	31.0	N	110	18.0	5	JD	881121	2105	78.0	9	75
77	4-157	12	40.0	N	113	59.0	5	JD	881122	2106	81.3	31	26
78	4-158	14	17.0	N	112	33.0	5	JD	881123	2106	83.2	3	289
79	4-160	16	31.0	N	110	04.0	2	JD	881124	2104	77.0	15	3
80	4-162	18	51.0	N	108	07.0	1	JD	881125	2103	72.6	6	182
81	4-165	17	46.0	N	112	45.0	2	JD	881127	2103	83.9	0	160
82	4-168	18	23.0	N	116	03.0	2	JD	881129	2104	73.0	1	2
2	1-008	11	38.9	N	115	59.4	5	M4	880804	2150	84.4	0	1
3	1-012	4	58.7	N	108	52.3	4	M4	880807	2108	82.9	13	2266
4	1-014	5	04.8	N	110	38.8	5	M4	880808	2118	90.0	2	19
5	1-016	6	01.9	N	113	23.5	5	M4	880809	2120	74.3	0	6
6	1-018	7	08.1	N	115	58.7	5	M4	880810	2102	82.8	1	8
7	1-020	8	05.7	N	118	45.2	5	M4	880811	2106	74.4	0	5
8	1-028	18	29.9	N	128	05.0	2	M4	880815	2120	52.0	1	18
9	1-030	13	17.8	N	130	59.6	6	M4	880816	2113	67.5	1	1
10	1-032	12	13.9	N	133	09.0	6	M4	880817	2131	46.1	0	7
11	1-034	10	15.5	N	135	19.8	6	M4	880818	2130	126.8	0	171
12	1-038	12	01.6	N	142	47.6	7	M4	880821	2117	75.8	1	225
13	2-040	10	36.1	N	147	40.9	7	M4	880903	2153	147.1	0	216
14	2-042	8	33.9	N	145	36.2	7	M4	880904	2039	116.6	0	1
15	2-044	6	44.4	N	142	53.7	7	M4	880905	2043	83.7	2	22
16	2-049	5	07.4	N	132	56.8	6	M4	880908	2027	63.8	2	821
17	2-051	6	45.6	N	130	00.7	6	M4	880909	2004	90.2	0	4
18	2-053	6	40.1	N	127	10.8	6	M4	880910	2007	91.8	2	12
19	2-063	4	41.2	N	114	05.5	5	M4	880915	1932	70.8	5	7

Tow Number	CTD Station	Lat. deg.	min.		Long.(W) deg	min.	Region	Ship Code	Tow Date yymmdd	Time (Loc.)	Vol.(m;) Water Strained	Total Larvae	Total Eggs
20	2-069	3	35.0	N	101	01.0	4	M4	880918	1958	45.4	8	3
21	2-073	3	33.0	N	98	08.0	4	M4	880920	1959	89.1	4	54
22	2-075	3	13.4	N	95	21.9	4	M4	880921	2035	65.0	4	15
23	2-078	0	53.0	S	92	26.0	8	M4	880923	2039	142.3	1	49
24	2-080	0	58.0	N	83	38.0	3	M4	880927	2050	69.9	14	442
25	2-081	4	07.0	N	81	34.0	3	M4	880928	2056	115.1	25	941
26	3-084	2	02.0	N	80	46.0	3	M4	881006	2023	80.0	21	621
27	3-0086	3	01.0	N	81	58.0	3	M4	881007	2032	89.5	32	160
28	3-088	4	56.0	N	83	37.0	3	M4	881008	2041	102.4	27	112
29	3-090	4	36.0	N	85	45.0	3	M4	881009	2031	75.4	14	423
30	3-096	2	36.0	N	89	35.0	3	M4	881012	2102	89.5	26	1655
31	3-098	1	12.4	N	92	40.2	3	M4	881013	2101	108.6	73	17
32	3-100	3	40.4	N	94	20.3	3	M4	881014	2101	79.4	37	14
33	3-102	2	55.6	N	96	31.4	4	M4	881015	2100	68.5	24	13
34	3-106	0	45.0	S	101	44.0	9	M4	881017	2031	112.5	1	10
35	3-108	2	52.0	S	103	45.0	9	M4	881018	2101	97.9	0	5
36	3-110	2	55.0	S	100	34.0	9	M4	881019	2101	95.5	0	3
37	3-112	2	44.0	S	97	54.0	9	M4	881020	2102	120.6	0	88
38	3-114	3	31.1	S	96	14.1	9	M4	881021	2104	67.2	1	1535
39	3-116	6	10.0	S	95	30.7	9	M4	881022	2106	72.3	7	52
40	3-118	8	25.1	S	93	28.3	8	M4	881023	2103	63.4	107	617
41	3-121	4	40.4	S	89	06.2	8	M4	881025	2103	142.0	9	656
42	3-123	2	52.0	S	86	41.9	8	M4	881026	2103	92.0	28	2287
44	3-127	6	45.4	S	83	06.9	8	M4	881028	2100	78.4	4	3
45	3-129	9	14.5	S	83	29.1	8	M4	881029	2104	129.1	7	6
46	3-131	10	58.0	S	84	37.4	8	M4	881030	2109	60.3	1	1
47	4-135	11	04.0	S	81	14.0	8	M4	881108	2114	57.2	8	0
48	4-137	10	16.1	S	84	16.2	8	M4	881109	2105	69.9	5	0
49	4-139	9	08.0	S	87	10.0	8	M4	881110	2005	59.7	24	48
50	4-141	8	02.0	S	90	09.0	8	M4	881111	2106	133.8	80	51
51	4-143	7	17.0	S	93	18.0	8	M4	881112	2106	48.9	21	69
52	4-145	6	20.1	S	96	09.4	9	M4	881113	2121	50.3	3	12
53	4-147	5	50.0	S	99	22.0	9	M4	881114	2134	111.0	13	161
54	4-149	5	22.6	S	102	41.8	9	M4	881115	2104	99.8	3	212
55	4-153	5	04.6	S	109	19.2	9	M4	881117	2106	123.4	2	170
56	4-155	4	28.4	S	111	40.4	10	M4	881118	2115	134.3	1	112
57	4-159	2	22.3	S	118	23.0	10	M4	881120	2126	130.2	0	24
58	4-161	2	22.6	S	121	31.4	10	M4	881121	2106	148.7	1	13
59	4-163	1	59.8	S	125	10.5	11	M4	881122	2105	101.4	2	93
60	4-165	2	30.1	S	129	13.4	11	M4	881123	2105	80.4	0	1
61	4-167	0	34.9	S	125	19.6	11	M4	881124	2113	84.3	0	1
62	4-169	1	33.6	N	124	41.4	5	M4	881125	2105	64.5	0	1
63	4-171	4	43.4	N	124	20.6	5	M4	881126	2104	83.7	0	14
64	4-173	7	32.5	N	123	57.4	5	M4	881127	2019	80.3	2	1
65	4-175	10	45.4	N	123	16.6	5	M4	881128	2009	105.2	0	547
66	4-177	13	58.9	N	122	26.4	5	M4	881129	2008	125.4	0	252
67	4-179	17	19.0	N	121	45.0	2	M4	881130	2004	94.1	3	8
68	4-181	20	21.0	N	120	38.0	2	M4	881201	2004	123.4	0	100
69	4-183	22	45.2	N	119	01.5	2	M4	881202	2011	103.1	0	464

Table 2. Pooled occurrences of fish larvae taken in Manta net tows on *Jordan* cruise 8810JD and *McArthur* cruise 8810M4.

Rank	Taxon	Occurrences
1	*Vinciguerria lucetia*	65
2	*Oxyporhamphus micropterus*	42
3	*Coryphaena equiselis*	34
4	*Auxis* spp.	18
5	Scomberesocidae	15
5	*Lampanyctus* spp.	15
7	*Cheilopogon* spp.	13
7	*Exocoetus* spp.	13
9	*Hirundichthys marginatus*	12
10	*Cubiceps pauciradiatus*	9
11	*Lampanyctus parvicauda*	8
11	*Lestidium* spp.	8
13	*Cheilopogon xenopterus*	7
14	*Nealotus tripes*	6
15	*Thunnus* spp.	5
15	*Cyclothone* spp.	5
17	*Myctophum aurolaternatum*	4
17	*Hirundichthys* spp.	4
17	*Prognichthys* spp.	4
17	*Howella pammelas*	4
17	*Naucrates ductor*	4
17	*Diplophos proximus*	4
17	Gobiidae	4
17	*Nomeus gronovii*	4
25	*Diaphus* spp.	3
25	*Triphoturus* spp.	3
25	*Bolinichthys* spp.	3
25	*Psenes cyanophrys*	3
25	Unidentified fish larvae	3
30	*Seriola* spp.	2
30	*Melanocetus* spp.	2
30	*Gempylus serpens*	2
30	*Hygophum proximum*	2
30	Eleotridae	2
30	*Chiasmodon niger*	2
30	*Bothus* spp.	2
30	*Mugil* spp.	2
30	*Opisthonema* spp.	2
30	*Brama dussumieri*	2
30	*Coryphaena hippurus*	2
41	*Cyclothone acclinidens*	1
41	*Psenes sio*	1
41	*Bathophilus filifer*	1
41	*Anchoa* spp.	1
41	*Scopelengys tristis*	1
41	Myctophidae	1
41	*Paraconger californiensis*	1
41	*Tetragonurus atlanticus*	1
41	*Amarsipus carlsbergi*	1

Table 2. (cont.)

Rank	Taxon	Occurrences
41	*Diogenichthys laternatus*	1
41	*Hirundichthys speculiger*	1
41	*Katsuwonus pelamis*	1
41	*Myctophum nitidulum*	1
41	*Gigantactis* spp.	1
41	*Euthynnus lineatus*	1
41	Exocoetidae	1
41	*Ariosoma gilberti*	1
41	Chiasmodontidae	1
41	*Melamphaes* spp.	1
41	*Scopelogadus bispinosus*	1
41	*Pontinus* spp.	1
41	*Myctophum asperum*	1
	Total	366

Table 3. Pooled counts of fish larvae taken in Manta net tows on *Jordan* cruise 8810JD and *McArthur* cruise 8810M4.

Rank	Taxon	Count
1	*Vinciguerria lucetia*	713
2	*Oxyporhamphus micropterus*	408
3	Scomberesocidae	302
4	*Auxis* spp.	146
5	*Coryphaena equiselis*	141
6	*Cheilopogon* spp.	41
7	*Exocoetus* spp.	39
8	*Lampanyctus* spp.	36
9	*Prognichthys* spp.	28
10	*Hirundichthys marginatus*	23
11	*Lampanyctus parvicauda*	21
12	*Lestidium* spp.	16
13	*Cubiceps pauciradiatus*	14
13	*Nealotus tripes*	14
15	*Cheilopogon xenopterus*	12
16	*Thunnus* spp.	10
16	*Diaphus* spp.	10
18	*Cyclothone* spp.	8
19	*Myctophum aurolaternatum*	7
20	*Hirundichthys* spp.	6
21	*Nomeus gronovii*	4
21	*Howella pammelas*	4
21	*Naucrates ductor*	4
21	*Diplophos proximus*	4
21	Eleotridae	4
21	Gobiidae	4
27	*Triphoturus* spp.	3
27	*Psenes cyanophrys*	3
27	*Gempylus serpens*	3
27	Unidentified fish larvae	3
27	*Bolinichthys* spp.	3
27	*Opisthonema* spp.	3
33	*Melanocetus* spp.	2
33	Myctophidae	2
33	*Bothus* spp.	2
33	*Chiasmodon niger*	2
33	*Hygophum proximum*	2
33	*Seriola* spp.	2
33	*Myctophum nitidulum*	2
33	*Coryphaena hippurus*	2
33	*Brama dussumieri*	2
33	*Mugil* spp.	2
43	*Bathophilus filifer*	1
43	Exocoetidae	1
43	*Cyclothone acclinidens*	1
43	*Anchoa* spp.	1
43	*Scopelogadus bispinosus*	1
43	Chiasmodontidae	1

Table 3. (cont.)

Rank	Taxon	Count
43	*Pontinus* spp.	1
43	*Katsuwonus pelamis*	1
43	*Euthynnus lineatus*	1
43	*Tetragonurus atlanticus*	1
43	*Scopelengys tristis*	1
43	*Psenes sio*	1
43	*Hirundichthys speculiger*	1
43	*Melamphaes* spp.	1
43	*Paraconger californiensis*	1
43	*Gigantactis* spp.	1
43	*Ariosoma gilberti*	1
43	*Myctophum asperum*	1
43	*Diogenichthys laternatus*	1
43	*Amarsipus carlsbergi*	1
	Total	2077

Table 4. Numbers of fish larvae taken in Manta net tows on *Jordan* cruise 8810JD and *McArthur* cruise 8810M4.

Ariosoma gilberti

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
29	M4	3-090	3	1	1.33

Paraconger californiensis

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
29	M4	3-090	3	1	1.33

Opisthonema spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
23	M4	2-078	8	1	0.70
47	M4	4-135	8	2	3.50

Anchoa spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
47	M4	4-135	8	1	1.75

Cyclothone spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
3	M4	1-012	4	1	1.21
17	JD	1-041	4	1	1.05
31	M4	3-098	3	3	2.76
33	M4	3-102	4	1	1.46
39	JD	2-080	3	2	2.41

Cyclothone acclinidens

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
33	JD	2-069	4	1	1.26

Diplophos proximus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
17	JD	1-041	4	1	1.05
18	JD	1-043	3	1	1.37
22	JD	2-049	4	1	1.65
48	JD	3-095	3	1	1.34

Vinciguerria lucetia

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
2	JD	1-010	6	15	25.82
3	M4	1-012	4	8	9.65

Vinciguerria lucetia (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
3	JD	1-012	5	1	1.07
4	JD	1-014	5	3	3.13
4	M4	1-014	5	1	1.11
5	JD	1-016	5	17	18.38
6	JD	1-018	5	1	1.09
7	JD	1-020	5	2	2.34
9	JD	1-025	4	7	7.63
10	JD	1-027	4	66	82.50
11	JD	1-029	4	12	13.53
12	JD	1-031	4	3	4.07
12	M4	1-038	7	1	1.32
14	JD	1-035	4	25	28.41
15	JD	1-037	4	30	41.67
16	JD	1-039	4	6	9.23
16	M4	2-049	6	2	3.13
17	JD	1-041	4	63	66.39
18	JD	1-043	3	3	4.11
19	M4	2-063	5	5	7.06
20	M4	2-069	4	5	11.01
21	M4	2-073	4	3	3.37
22	M4	2-075	4	4	6.15
22	JD	2-049	4	2	3.31
24	M4	2-080	3	12	17.17
26	M4	3-084	3	13	16.25
26	JD	2-057	5	5	7.08
27	M4	3-0086	3	16	17.88
28	M4	3-088	3	19	18.55
28	JD	2-061	5	9	12.68
29	JD	2-063	5	8	13.22
29	M4	3-090	3	5	6.63
30	JD	2-065	9	1	1.38
30	M4	3-096	3	20	22.35
31	M4	3-098	3	56	51.57
32	JD	2-067	4	1	1.22
32	M4	3-100	3	34	42.82
33	JD	2-069	4	10	12.61
33	M4	3-102	4	18	26.28
34	JD	2-070	4	22	27.71

Vinciguerria lucetia (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
34	M4	3-106	9	1	0.89
35	JD	2-072	3	15	21.04
37	JD	2-076	3	2	2.17
38	M4	3-114	9	1	1.49
39	M4	3-116	9	2	2.77
40	JD	2-082	3	90	97.51
43	JD	3-085	3	6	7.55
44	JD	3-086	3	2	2.57
46	M4	3-131	8	1	1.66
48	JD	3-095	3	2	2.68
49	M4	4-139	8	1	1.68
50	M4	4-141	8	2	1.49
52	M4	4-145	9	3	5.96
53	M4	4-147	9	4	3.60
54	JD	3-106	3	2	2.58
57	JD	3-112	4	1	1.40
62	JD	3-122	4	3	4.71
64	M4	4-173	5	2	2.49
65	JD	3-128	4	1	1.64
68	JD	4-133	4	1	1.27
72	JD	4-145	5	12	19.45
77	JD	4-157	5	22	27.06
78	JD	4-158	5	1	1.20
80	JD	4-162	1	1	1.38
82	JD	4-168	2	1	1.37

Bathophilus filifer

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
41	M4	3-121	8	1	0.70

Lestidium spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
3	M4	1-012	4	2	2.41
4	JD	1-014	5	4	4.18
9	JD	1-025	4	2	2.18
12	JD	1-031	4	1	1.36
13	JD	1-033	4	1	1.28
20	M4	2-069	4	2	4.41
27	JD	2-059	5	3	4.29
32	M4	3-100	3	1	1.26

Scopelengys tristis

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
26	JD	2-057	5	1	1.42

Myctophidae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
30	M4	3-096	3	2	2.23

Bolinichthys spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
3	M4	1-012	4	1	1.21
30	M4	3-096	3	1	1.12
32	M4	3-100	3	1	1.26

Diaphus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
4	JD	1-014	5	4	4.18
15	JD	1-037	4	1	1.39
31	M4	3-098	3	5	4.60

Lampanyctus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
15	JD	1-037	4	1	1.39
20	M4	2-069	4	1	2.20
26	JD	2-057	5	1	1.42
27	M4	3-0086	3	7	7.82
29	M4	3-090	3	3	3.98
30	M4	3-096	3	1	1.12
31	M4	3-098	3	5	4.60
32	M4	3-100	3	1	1.26
33	JD	2-069	4	1	1.26
33	M4	3-102	4	2	2.92
39	JD	2-080	3	1	1.21
40	JD	2-082	3	9	9.75
43	JD	3-085	3	1	1.26
54	M4	4-149	9	1	1.00
58	M4	4-161	10	1	0.67

Lampanyctus parvicauda

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
4	JD	1-014	5	1	1.04
26	M4	3-084	3	4	5.00
28	M4	3-088	3	2	1.95

Lampanyctus parvicauda (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
43	JD	3-085	3	5	6.29
54	JD	3-106	3	1	1.29
55	JD	3-108	3	6	6.98
60	JD	3-118	4	1	1.66
77	JD	4-157	5	1	1.23

Triphoturus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
30	M4	3-096	3	1	1.12
33	JD	2-069	4	1	1.26
39	JD	2-080	3	1	1.21

Diogenichthys laternatus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
26	JD	2-057	5	1	1.42

Hygophum proximum

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
4	JD	1-014	5	1	1.04
15	JD	1-037	4	1	1.39

Myctophum asperum

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
33	JD	2-069	4	1	1.26

Myctophum aurolaternatum

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
15	JD	1-037	4	1	1.39
27	M4	3-0086	3	2	2.23
31	M4	3-098	3	1	0.92
40	JD	2-082	3	3	3.25

Myctophum nitidulum

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
27	M4	3-0086	3	2	2.23

Melanocetus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
28	M4	3-088	3	1	0.98
33	M4	3-102	4	1	1.46

Gigantactis spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
31	M4	3-098	3	1	0.92

Scomberesocidae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
39	M4	3-116	9	4	5.53
40	M4	3-118	8	107	168.77
41	M4	3-121	8	8	5.63
42	M4	3-123	8	27	29.35
44	M4	3-127	8	3	3.83
45	M4	3-129	8	7	5.42
47	M4	4-135	8	4	6.99
48	M4	4-137	8	5	7.15
49	M4	4-139	8	23	38.53
50	M4	4-141	8	78	58.30
51	M4	4-143	8	21	42.94
53	M4	4-147	9	9	8.11
54	M4	4-149	9	2	2.00
55	M4	4-153	9	1	0.81
67	M4	4-179	2	3	3.19

Exocoetidae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
59	JD	3-116	4	1	1.39

Cheilopogon spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
3	JD	1-012	5	1	1.07
6	M4	1-018	5	1	1.21
9	JD	1-025	4	1	1.09
20	JD	1-046	3	2	2.05
41	JD		3	1	0.97
42	JD		3	1	1.13
44	JD	3-086	3	2	2.57
45	JD	3-088	3	2	2.60
51	JD	3-100	3	1	1.17
55	JD	3-108	3	1	1.16
66	JD	3-130	1	6	11.63
67	JD	4-131	1	8	10.51
68	JD	4-133	4	14	17.83

Cheilopogon xenopterus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
21	JD	2-047	4	1	1.74
22	JD	2-049	4	1	1.65
44	JD	3-086	3	1	1.28
60	JD	3-118	4	5	8.31
62	JD	3-122	4	2	3.14
68	JD	4-133	4	1	1.27
75	JD	4-153	4	1	1.51

Exocoetus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
4	M4	1-014	5	1	1.11
24	M4	2-080	3	1	1.43
25	M4	2-081	3	1	0.87
36	JD	2-074	3	2	1.99
37	JD	2-076	3	9	9.77
46	JD	3-090	3	1	1.35
48	JD	3-095	3	1	1.34
51	JD	3-100	3	6	7.01
55	JD	3-108	3	4	4.65
59	M4	4-163	11	2	1.97
60	JD	3-118	4	8	13.29
63	JD	3-124	4	1	1.26
65	JD	3-128	4	2	3.28

Hirundichthys spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
34	JD	2-070	4	1	1.26
47	JD	3-092	3	1	1.21
54	JD	3-106	3	3	3.87
60	JD	3-118	4	1	1.66

Hirundichthys marginatus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
47	JD	3-092	3	1	1.21
50	JD	3-098	3	1	1.20
55	M4	4-153	9	1	0.81
56	JD	3-110	4	1	1.37
56	M4	4-155	10	1	0.74
58	JD	3-114	4	3	4.41
59	JD	3-116	4	1	1.39
60	JD	3-118	4	2	3.32

Hirundichthys marginatus (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
61	JD	3-120	4	2	3.41
64	JD	3-126	4	1	1.42
65	JD	3-128	4	7	11.49
79	JD	4-160	2	2	2.60

Hirundichthys speculiger

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
65	JD	3-128	4	1	1.64

Oxyporhamphus micropterus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
1	JD	1-008	6	1	1.21
3	JD	1-012	5	1	1.07
9	M4	1-030	6	1	1.48
12	JD	1-031	4	1	1.36
15	JD	1-037	4	2	2.78
17	JD	1-041	4	5	5.27
18	M4	2-053	6	1	1.09
18	JD	1-043	3	5	6.85
19	JD	1-045	3	2	3.06
20	JD	1-046	3	5	5.12
24	M4	2-080	3	1	1.43
28	JD	2-061	5	1	1.41
34	JD	2-070	4	1	1.26
35	JD	2-072	3	6	8.42
36	JD	2-074	3	12	11.92
37	JD	2-076	3	6	6.51
38	JD	2-078	3	3	2.96
39	JD	2-080	3	1	1.21
40	JD	2-082	3	3	3.25
47	JD	3-092	3	3	3.64
49	JD	3-097	3	2	2.72
50	JD	3-098	3	1	1.20
51	JD	3-100	3	1	1.17
55	JD	3-108	3	12	13.95
57	JD	3-112	4	41	57.50
59	JD	3-116	4	17	23.55
60	JD	3-118	4	189	313.95
63	JD	3-124	4	2	2.52
64	JD	3-126	4	1	1.42

Oxyporhamphus micropterus (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
66	JD	3-130	1	2	3.88
67	JD	4-131	1	16	21.02
68	JD	4-133	4	2	2.55
69	JD	4-135	4	8	8.73
71	JD	4-143	5	7	11.08
72	JD	4-145	5	1	1.62
74	JD	4-151	4	2	3.17
75	JD	4-153	4	15	22.66
76	JD	4-155	5	9	11.54
77	JD	4-157	5	7	8.61
78	JD	4-158	5	2	2.40
79	JD	4-160	2	9	11.69
80	JD	4-162	1	1	1.38

Prognichthys spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
45	JD	3-088	3	1	1.30
50	JD	3-098	3	15	18.07
69	JD	4-135	4	11	12.01
70	JD	4-137	4	1	1.25

Melamphaes spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
9	JD	1-025	4	1	1.09

Scopelogadus bispinosus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
39	M4	3-116	9	1	1.38

Pontinus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
15	JD	1-037	4	1	1.39

Howella pammelas

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
11	JD	1-029	4	1	1.13
15	M4	2-044	7	1	1.19
21	M4	2-073	4	1	1.12
28	M4	3-088	3	1	0.98

Naucrates ductor

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
42	JD		3	1	1.13
42	M4	3-123	8	1	1.09
47	JD	3-092	3	1	1.21
53	JD	3-104	3	1	1.01

Seriola spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
18	JD	1-043	3	1	1.37
25	JD	2-055	5	1	1.17

Coryphaena equiselis

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
1	JD	1-008	6	1	1.21
2	JD	1-010	6	1	1.72
7	JD	1-020	5	1	1.17
8	M4	1-028	2	1	1.92
10	JD	1-027	4	1	1.25
18	JD	1-043	3	1	1.37
20	JD	1-046	3	22	22.54
25	M4	2-081	3	23	19.98
25	JD	2-055	5	1	1.17
26	M4	3-084	3	1	1.25
28	M4	3-088	3	1	0.98
33	M4	3-102	4	1	1.46
34	JD	2-070	4	1	1.26
36	JD	2-074	3	1	0.99
37	JD	2-076	3	5	5.43
38	JD	2-078	3	5	4.94
41	JD		3	2	1.94
42	JD		3	6	6.80
44	JD	3-086	3	9	11.55
45	JD	3-088	3	4	5.20
46	JD	3-090	3	1	1.35
50	JD	3-098	3	1	1.20
53	JD	3-104	3	1	1.01
55	JD	3-108	3	1	1.16
60	JD	3-118	4	6	9.97
64	JD	3-126	4	7	9.94
65	JD	3-128	4	6	9.85
66	JD	3-130	1	12	23.26
67	JD	4-131	1	2	2.63

Coryphaena equiselis (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
68	JD	4-133	4	8	10.19
69	JD	4-135	4	2	2.18
70	JD	4-137	4	2	2.49
79	JD	4-160	2	3	3.90
80	JD	4-162	1	1	1.38

Coryphaena hippurus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
47	JD	3-092	3	1	1.21
50	JD	3-098	3	1	1.20

Brama dussumieri

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
29	M4	3-090	3	1	1.33
40	JD	2-082	3	1	1.08

Mugil spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
44	M4	3-127	8	1	1.28
68	JD	4-133	4	1	1.27

Chiasmodontidae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
77	JD	4-157	5	1	1.23

Chiasmodon niger

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
17	JD	1-041	4	1	1.05
31	M4	3-098	3	1	0.92

Eleotridae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
19	JD	1-045	3	3	4.59
55	JD	3-108	3	1	1.16

Gobiidae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
26	M4	3-084	3	1	1.25
43	JD	3-085	3	1	1.26
46	JD	3-090	3	1	1.35
55	JD	3-108	3	1	1.16

Gempylus serpens

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
3	JD	1-012	5	1	1.07
43	JD	3-085	3	2	2.52

Nealotus tripes

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
26	M4	3-084	3	2	2.50
27	M4	3-0086	3	4	4.47
28	M4	3-088	3	2	1.95
29	M4	3-090	3	2	2.65
35	JD	2-072	3	1	1.40
40	JD	2-082	3	3	3.25

Auxis spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
3	JD	1-012	5	1	1.07
3	M4	1-012	4	1	1.21
4	JD	1-014	5	1	1.04
5	JD	1-016	5	1	1.08
15	M4	2-044	7	1	1.19
19	JD	1-045	3	5	7.66
35	JD	2-072	3	6	8.42
36	JD	2-074	3	3	2.98
45	JD	3-088	3	1	1.30
47	M4	4-135	8	1	1.75
50	JD	3-098	3	1	1.20
60	JD	3-118	4	49	81.40
64	JD	3-126	4	16	22.73
66	JD	3-130	1	4	7.75
67	JD	4-131	1	50	65.70
68	JD	4-133	4	2	2.55
69	JD	4-135	4	2	2.18
70	JD	4-137	4	1	1.25

Euthynnus lineatus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
39	JD	2-080	3	1	1.21

Katsuwonus pelamis

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
75	JD	4-153	4	1	1.51

Thunnus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
14	JD	1-035	4	1	1.14
22	JD	2-049	4	1	1.65
35	JD	2-072	3	5	7.01
60	JD	3-118	4	1	1.66
72	JD	4-145	5	2	3.24

Amarsipus carlsbergi

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
27	M4	3-0086	3	1	1.12

Cubiceps pauciradiatus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
18	JD	1-043	3	3	4.11
20	JD	1-046	3	1	1.02
29	JD	2-063	5	1	1.65
33	JD	2-069	4	1	1.26
34	JD	2-070	4	1	1.26
43	JD	3-085	3	1	1.26
75	JD	4-153	4	2	3.02
79	JD	4-160	2	1	1.30
80	JD	4-162	1	3	4.13

Nomeus gronovii

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
17	JD	1-041	4	1	1.05
28	M4	3-088	3	1	0.98
42	JD		3	1	1.13
75	JD	4-153	4	1	1.51

Psenes cyanophrys

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
18	M4	2-053	6	1	1.09
25	M4	2-081	3	1	0.87
27	JD	2-059	5	1	1.43

Psenes sio

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
31	M4	3-098	3	1	0.92

Tetragonurus atlanticus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
33	M4	3-102	4	1	1.46

Bothus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
29	M4	3-090	3	1	1.33
44	JD	3-086	3	1	1.28

Unidentified fish larvae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
30	M4	3-096	3	1	1.12
39	JD	2-080	3	1	1.21
40	JD	2-082	3	1	1.08

Table 5. Average numbers of larvae (per 100 m^3 of water filtered) for each taxon taken in Manta net tows in the regions (Figure 3) occupied on *Jordan* cruise 8810JD and *McArthur* cruise 8810M4.

	Region										
Taxon	1	2	3	4	5	6	7	8	9	10	11
Ariosoma gilberti	-	-	0.8	-	-	-	-	-	-	-	-
Paraconger californiensis	-	-	0.8	-	-	-	-	-	-	-	-
Opisthonema spp.	-	-	-	-	-	-	-	1.3	-	-	-
Anchoa spp.	-	-	-	-	-	-	-	0.6	-	-	-
Cyclothone spp.	-	-	2.5	0.8	-	-	-	-	-	-	-
Cyclothone acclinidens	-	-	-	0.8	-	-	-	-	-	-	-
Diplophos proximus	-	-	0.7	0.8	-	-	-	-	-	-	-
Vinciguerria lucetia	0.7	0.7	16.8	11.3	4.9	5.0	0.8	1.3	1.7	-	-
Bathophilus filifer	-	-	-	-	-	-	-	1.4	-	-	-
Lestidium spp.	-	-	0.8	1.2	3.0	-	-	-	-	-	-
Scopelengys tristis	-	-	-	-	0.7	-	-	-	-	-	-
Myctophidae	-	-	1.8	-	-	-	-	-	-	-	-
Bolinichthys spp.	-	-	0.8	0.8	-	-	-	-	-	-	-
Diaphus spp.	-	-	5.4	0.7	3.8	-	-	-	-	-	-
Lampanyctus spp.	-	-	3.2	0.8	0.7	-	-	-	1.0	1.5	-
Lampanyctus parvicauda	-	-	3.0	0.6	0.9	-	-	-	-	-	-
Triphoturus spp.	-	-	0.9	0.8	-	-	-	-	-	-	-
Diogenichthys laternatus	-	-	-	-	0.7	-	-	-	-	-	-
Hygophum proximum	-	-	-	0.7	1.0	-	-	-	-	-	-
Myctophum asperum	-	-	-	0.8	-	-	-	-	-	-	-
Myctophum aurolaternatum	-	-	1.9	0.7	-	-	-	-	-	-	-
Myctophum nitidulum	-	-	1.8	-	-	-	-	-	-	-	-
Melanocetus spp.	-	-	1.0	0.7	-	-	-	-	-	-	-
Gigantactis spp.	-	-	1.1	-	-	-	-	-	-	-	-
Scomberesocidae	-	2.8	-	-	-	-	-	25.0	4.0	-	-
Exocoetidae	-	-	-	0.7	-	-	-	-	-	-	-
Cheilopogon spp.	4.6	-	1.2	6.0	0.9	-	-	-	-	-	-
Cheilopogon xenopterus	-	-	0.8	1.2	-	-	-	-	-	-	-
Exocoetus spp.	-	-	2.8	2.3	0.9	-	-	-	-	-	2.0
Hirundichthys spp.	-	-	1.6	0.7	-	-	-	-	-	-	-
Hirundichthys marginatus	-	1.5	0.8	1.5	-	-	-	-	1.2	1.3	-
Hirundichthys speculiger	-	-	-	0.6	-	-	-	-	-	-	-
Oxyporhamphus micropterus	4.6	6.9	3.7	14.3	3.0	0.8	-	-	-	-	-
Prognichthys spp.	-	-	6.6	5.4	-	-	-	-	-	-	-
Melamphaes spp.	-	-	-	0.9	-	-	-	-	-	-	-
Scopelogadus bispinosus	-	-	-	-	-	-	-	-	0.7	-	-
Pontinus spp.	-	-	-	0.7	-	-	-	-	-	-	-
Howella pammelas	-	-	1.0	0.9	-	-	0.8	-	-	-	-
Naucrates ductor	-	-	0.9	-	-	-	-	0.9	-	-	-
Seriola spp.	-	-	0.7	-	0.9	-	-	-	-	-	-
Coryphaena equiselis	2.8	1.4	5.1	2.7	0.9	0.7	-	-	-	-	-
Coryphaena hippurus	-	-	0.8	-	-	-	-	-	-	-	-
Brama dussumieri	-	-	0.8	-	-	-	-	-	-	-	-
Mugil spp.	-	-	-	0.8	-	-	-	0.8	-	-	-

Taxon	Region										
	1	2	3	4	5	6	7	8	9	10	11
Chiasmodontidae	-	-	-	-	0.8	-	-	-	-	-	-
Chiasmodon niger	-	-	1.1	0.9	-	-	-	-	-	-	-
Eleotridae	-	-	1.4	-	-	-	-	-	-	-	-
Gobiidae	-	-	0.8	-	-	-	-	-	-	-	-
Gempylus serpens	-	-	1.6	-	0.9	-	-	-	-	-	-
Nealotus tripes	-	-	2.0	-	-	-	-	-	-	-	-
Auxis spp.	20.1	-	2.4	7.6	0.9	-	0.8	0.6	-	-	-
Euthynnus lineatus	-	-	0.8	-	-	-	-	-	-	-	-
Katsuwonus pelamis	-	-	-	0.7	-	-	-	-	-	-	-
Thunnus spp.	-	-	3.6	0.7	1.2	-	-	-	-	-	-
Amarsipus carlsbergi	-	-	0.9	-	-	-	-	-	-	-	-
Cubiceps pauciradiatus	2.2	0.8	1.3	1.0	0.6	-	-	-	-	-	-
Nomeus gronovii	-	-	1.0	0.8	-	-	-	-	-	-	-
Psenes cyanophrys	-	-	1.2	-	0.7	0.9	-	-	-	-	-
Psenes sio	-	-	1.1	-	-	-	-	-	-	-	-
Tetragonurus atlanticus	-	-	-	0.7	-	-	-	-	-	-	-
Bothus spp.	-	-	0.8	-	-	-	-	-	-	-	-
Unidentified fish larvae	-	-	0.9	-	-	-	-	-	-	-	-

Table 6. Numbers (raw counts) and size ranges of juvenile fishes taken in Manta tows on *Jordan* cruise 8810JD and *McArthur* cruise 8810M4. Some larger specimens (e.g., myctophids) may be adults.

STOMIIFORMES

Sternoptychidae

Sternoptyx obscura
M4 27 (1) 33mm.

Phosichthyidae

Vinciguerria lucetia
JD 58 (1) 14mm.
M4 49 (1) 15mm.

Astronesthidae

Astronesthes gibbsi
JD 11 (1) 30mm.
M4 6 (1) 28mm; **M4 13** (1) 25mm.

MYCTOPHIFORMES

Myctophidae

Lampanyctus omostigma
JD 11 (1) 41mm; **JD 48** (6) 44-51mm.
M4 13 (3) 44-57; **M4 65** (2) 45-48mm; **M4 66** (1) 51mm.

Gonichthys tenuiculus
JD 1 (1) 16mm; **JD 6** (1) 15mm; **JD 7** (2) 17-17mm; **JD 8** (5) 16-17mm; **JD 9** (16) 16-18mm; **JD 10** (4) 16-21mm; **JD 11** (1) 32mm; **JD 13** (1) 16mm; **JD 15** (1) 19mm; **JD 22** (1)16mm; **JD 28** (2) 16-16mm; **JD 29** (5) 17-23mm; **JD 30** (12) 17-27mm; **JD 32** (1) 18mm; **JD 33** (1) 19mm; **JD 34** (5) 18-25mm; **JD 37** (1) 21mm; **JD 38** (1) 21mm; **JD 40** (1) 17mm; **JD 41** (2) 17-21mm; **JD 42** (8) 15-20mm; **JD 43** (1) 16mm; **JD 44** (2) 25-26mm; **JD 45** (43) 16-28mm; **JD 46** (10) 17-26mm; **JD 47** (42) 16-39mm; **JD 48** (3) 16-33mm; **JD 49** (7) 18-27mm; **JD 51** (8) 15-19mm; **JD 52** (17) 16-34mm; **JD 53** (7) 17-40mm; **JD 54** (1) 19mm; **JD 58** (3) 17-18mm; **JD 60** (8) 18-21mm; **JD 61** (3) 19-43mm; **JD 71** (15) 18-28mm; **JD 72** (2) 20-29mm.

M4 4 (2) 16-17mm; **M4 6** (1) 16mm; **M4 7** (4) 16-18mm; **M4 9** (2) 18-22mm; **M4 10** (1) 15mm; **M4 11** (5) 17-37mm; **M4 12** (15) 17-36mm; **M4 13** (5) 16-38mm; **M4 17** (1) 41mm; **M4 21** (1) 23mm; **M4 22** (1) 24mm; **M4 23** (11) 22-46mm; **M4 24** (1) 20mm; **M4 25** (12) 15-44mm; **M4 26** (32) 16-42mm; **M4 27** (11)14-31mm; **M4 28** (4) 15-33mm; **M4 29** (1) 17mm; **M4 30** (2) 16-17mm; **M4 31** (3) 17-38mm; **M4 32** (2) 25-32mm; **M4 36**(4) 17-35mm; **M4 37** (4)22-34mm; **M4 39** (19) 19-37mm; **M4 40** (4) 24-27mm; **M4 41** (44) 19-40mm; **M4 42** (10) 24-40mm; **M4 47** (2) 24-31mm; **M4 48** (1) 25mm; **M4 49** (1) 24mm; **M4 50** (53) 17-39mm; **M4 51** (1) 19mm; **M4 52** (2) 17-20mm; **M4 53** (25) 17-45mm; **M4 55** (1) 17mm; **M4 56** (9) 25-38mm; **M4 57** (15) 20-36mm; **M4 58** (13) 19-37mm; **M4 59** (4) 19-36mm; **M4 60** (3) 24-27mm; **M4 61** (14) 24-47mm; **M4 63** (3) 21-40mm; **M4 65** (75) 18-48mm; **M4 66** (1) 19mm; **M4 69** (1) 43mm.

Hygophum proximum
JD 6 (3) 20-22mm; **JD 11** (1) 50mm; **JD 30** (1) 32mm; **JD 32** (2) 13-13mm.
M4 23 (1) 14mm; **M4 36** (2) 13-33mm; **M4 51** (1) 14mm; **M4 53** (2) 18-33mm; **M4 56** (1) 22mm; **M4 58** (7) 15-17mm; **M4 61** (3) 15-16mm; **M4 65** (1) 24mm.

Hygophum reinhardtii
JD 6 (1) 20mm.

Myctophum asperum
JD 11 (1) 56mm; **JD 4** (1) 56mm.
M4 15 (2) 15-16mm; **M4 19** (1) 14mm; **M4 32** (1) 14mm.

Myctophum aurolaternatum
JD 1 (1) 29mm; **JD 8** (1) 29mm; **JD 13** (1) 25mm; **JD 23** (1) 24mm; **JD 24** (1) 26mm; **JD 47** (6) 36-82mm; **JD 50** (1) 55mm; **JD 52** (1) 28mm; **JD 64** (3) 28-31mm; **JD 69** (4) 24-27mm; **JD 70** (3) 24-26mm.
M4 47 (1) 37mm; **M4 49** (1) 28mm; **M4 65** (1) 32mm.

Myctophum lychnobium
JD 24 (1) 16mm; **JD 25** (1) 32mm.
M4 15 (1) 15mm; **M4 18** (1) 17mm.

Myctophum nitidulum
JD 3 (10) 14-24mm; **JD 4** (4) 14-25mm; **JD 6** (8) 16-32mm; **JD 7** (7) 16-23mm; **JD 8** (12) 16-50mm; **JD 9** (11) 16-24mm; **JD 10** (1) 16mm; **JD 11** (5) 17-19mm; **JD 14** (1) 16mm; **JD 15** (1) 17mm; **JD 16** (4) 17-27mm; **JD 23** (1) 15mm; **JD 24** (1) 16mm; **JD 25** (16) 15-18mm; **JD 28** (3) 17-24mm; **JD 29** (16) 16-20mm; **JD 31** (14) 16-28mm; **JD 32** (5) 18-19mm; **JD 52** (4) 19-45mm; **JD 53** (4) 16-46mm; **JD 58** (2) 16-17mm; **JD 61** (1) 19mm.

M4 5 (1) 14mm; **M4 6** (2) 16-16mm; **M4 13** (1) 24mm; **M4 17** (3) 16-16mm; **M4 18** (1) 15mm; **M4 23** (3) 19-39mm; **M4 25** (2) 51-52mm; **M4 26** (6) 15-49mm; **M4 27** (2) 16-55mm; **M4 28** (1) 51mm; **M4 30** (3) 16-17mm; **M4 31** (2) 15-18mm; **M4 32** (1) 25mm; **M4 36** (3) 19-20mm; **M4 37** (1) 29mm; **M4 42** (6) 15-18mm; **M4 50** (1) 17mm; **M4 51** (1) 16mm; **M4 52** (1) 17mm; **M4 54** (2) 19-20mm; **M4 55** (2) 17-19mm; **M4 56** (5) 17-26mm; **M4 57** (35) 16-32mm; **M4 58** (13) 17-20mm; **M4 59** (1) 20mm; **M4 60** (4) 22-32mm; **M4 61** (5) 18-29mm; **M4 63** (1) 21mm.

Myctophum obtusirostrum
JD 25 (3) 15-16mm; **JD 28** (1) 14mm.

Symbolophorus evermanni
JD 11 (1) 44mm; **JD 23** (3) 20-22mm; **JD 24** (4) 20-27mm; **JD 25** (8) 20-35mm; **JD 47** (1) 51mm; **JD 71** (1) 47mm.
M4 9 (2) 23-64mm; **M4 13** (2) 22-28; **M4 14** (1) 20mm; **M4 18** (1) 20mm; **M4 27** (1) 63mm; **M4 41** (1) 64mm; **M4 51** (1) 21mm.

BELONIFORMES
Scombersocidae

Elassichthys adocetus
M4 39 (1) 24mm; **M4 40** (14) 22-28mm; **M4 41** (9)24-35mm; **M4 49** (1) 48mm; **M4 50** (4) 23-32mm; **M4 51** (1) 38mm; **M4 52** (1) 53mm.

Exocoetidae

Cheilopogon xenopterus
JD 55 (1) 46mm.

Exocoetus monocirrhus
JD 53 (1) 22mm; **JD 60** (1) 25mm.
M4 14 (1) 53mm.

Exocoetus volitans
M4 66 (1) 29mm.

Hirundichthys speculiger
JD 65 (1) 95mm.

Oxyporhamphus micropterus
JD 49 (1) 77mm.

PERCIFORMES
Carangidae

Naucrates ductor
JD 36 (2) 22-27mm; **JD 42** (1) 23mm.
M4 40 (1) 24mm; **M4 69** (1) 15mm.

Coryphaenidae

Coryphaena equiselis
JD 61 (2) 16-18mm.
M4 11 (1) 15mm; **M4 26** (1) 22mm.

Brammidae

Bramma dussumieri
M4 5 (1) 13mm.

Mullidae

Mugil spp.
JD 42 (1) 20mm.

Scombridae

Auxis spp.
JD 50 (1) 29mm.

Nomeidae

Nomeus gronovii
JD 42 (1) 30mm; **JD 58** (1) 18mm.
M4 66 (1) 18mm.

TETRAODONTIFORMES
Balistidae

Canthidermis maculatus
JD 69 (3) 8-13mm.

PHYLOGENETIC INDEX TO TABLES 4 AND 6

ALPHABETICAL INDEX TO TABLES 4 AND 6

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