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ICHTHYOPLANKTON AND STATION DATA FOR SURFACE TOWS TAKEN DURING THE 1989 EASTERN TROPICAL PACIFIC DOLPHIN SURVEY ON THE RESEARCH VESSELS *DAVID STARR JORDAN* AND *McARTHUR*

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ABSTRACT

This report provides ichthyoplankton, juvenile/adult fish, and associated station and tow data from the surface plankton samples collected during the 1989 Southwest Fisheries Science Center eastern tropical Pacific dolphin survey. It is the third in a series of reports that presents these data for all SWFSC ETP dophin surveys from 1987 to the present. In total, 167 stations were sampled with Manta nets between 29 July and 7 December, 1989, during which two research vessels surveyed within an area extending from about 9° S to 30° N, and from the Gulf of Panama westward to about 150° 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 1989 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, Ambrose et al. 2000; 1989 survey, this report; 1990 survey, Sandknop et al. 2000; 1992 survey, Watson 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 1989 eastern tropical Pacific dolphin survey conducted from July 29 to December 7, 1989.

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. (1990a, 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. Acoustic backscatter and sea surface temperature, salinity, and fluorescence were measured continuously while the ship was underway. Four expendable bathythermograph (XBT) casts were made each day. 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 167 Manta tows was made on the survey, 81 aboard the *Jordan* (Figure 1) and 86 aboard the *McArthur* (Figure 2). The survey was conducted in four legs for both vessels:

Jordan Leg 1	29 July–11 August	San Diego, California to Manzanillo, Mexico
Jordan Leg 1	11–27 August	Manzanillo, Mexico to Puerto Quetzal, Guatemala
Jordan Leg 2	3–11 September	Puerto Quetzal, Guatemala to Acapulco, Mexico
Jordan Leg 2	14–30 September	Acapulco, Mexico to La Libertad, Ecuador

Jordan Leg 3	5–25 October	La Libertad, Ecuador to Manzanillo, Mexico
Jordan Leg 4	1–30 November	Manzanillo, Mexico to Manzanillo, Mexico
Jordan Leg 4	1–7 December	Manzanillo, Mexico to San Diego, California
McArthur Leg 1	29 July–26 August	San Diego, California to Hilo, Hawaii
McArthur Leg 2	31August –30 September	Hilo, Hawaii to La Libertad, Ecuador
McArthur Leg 3	5 October–3 November	La Libertad, Ecuador to Puerto Caldera, Costa Rica
McArthur Leg 4	8 November–7 December	Puerto Caldera, Costa Rica 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 William Watson 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 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., Sciaenidae, Gerreidae) but most oceanic fishes could be identified to species or at least to genus. A total of 86 larval fish categories (including unidentified and disintegrated) was identified: 55 to species, 21 to genus, 7 to family or subfamily, and 1 to order.

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

Bothus spp. – Larvae represent a single species for which two names are available, *B. constellatus* and *B. leopardinus* (see discussion in Moser 1996).

Cyclothone spp. **B** Small or damaged larvae lacking diagnostic characters.

Cyclothone acclinidens **B** Postflexion stage larvae having diagnostic pigmentation characters.

Disintegrated fish larvae **B** 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.

Exocoetus spp. **B** *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.
Sardinops sagax **B** Two larvae from station M4 43 were ascribed to the southern subspecies, *S. sagax sagax* (see Whitehead 1985).

Scomber japonicus **B** The larva taken on station M4 38 belongs to the geographically disjunct southeastern Pacific population of *S. japonicus*.

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.

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 1989 survey, the Panama lightfish *Vinciguerria lucetia* ranked first in abundance and occurrence with 21.6% of the total larvae and 39.5% positive tows (Tables 2 and

3). The shortwing flyingfish *Oxyporhamphus micropterus* ranked second in abundance and occurrence with 15.9% of the total larvae and 29.9% positive tows. The scombrid genus *Auxis* ranked third in abundance and fourth in occurrence with 14.2% of total larvae and 15.6% positive tows. The saury family Scomberesocidae ranked fourth in abundance and sixth in occurrence with 9.8% of the larvae and 10.2% positive tows. The round herring *Etrumeus teres* ranked fifth in abundance with 6.3% of the larvae and tied for 48th in occurrence with 0.6% positive tows. The next five most abundant taxa were the Pacific sardine *Sardinops sagax* (3.6% of the total larvae), the flyingfish genus *Prognichthys* (3.4%), the bigeye cigarfish *Cubiceps pauciradiatus* (2.5%), the pompano dolphinfish *Coryphaena equiselis* (2.3%), and the myctophid genus *Lampanyctus* (1.5%). These species were tied for 31st, tied for 11th, ranked 5th, tied for 8th, and tied for 8th in frequency of occurrence, respectively. The ten most abundant taxa comprised 81.1% of all the larvae collected on ETP survey cruises in 1989. The remaining 18.9 % was distributed among 76 other taxa (including the Adisintegrated@ and Aunidentified@ category). Of the ten most abundant taxa, six are epipelagic, two are midwater taxa that migrate to the epipelagic zone at night, and two are coastal pelagic species.

EXPLANATION OF FIGURES AND TABLES

Figures 4B23. Lengths of vertic al 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 8910JD and *McArthur* cruise 8910M4. 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 8910JD and *McArthur* cruise 8910M4. 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 8910JD and *McArthur* cruise 8910M4. Taxa are listed in rank order.

Table 4. Numbers of fish larvae for each taxon taken in Manta net tows on *Jordan* cruise 8910JD and *McArthur* cruise 8910M4, listed by tow number (Figures 1 and 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 8910JD and *McArthur* cruise 8910M4.

Table 6. Numbers (raw counts) and size ranges of juvenile fishes taken in Manta net tows on *Jordan* cruise 8910JD and *McArthur* cruise 8910M4. 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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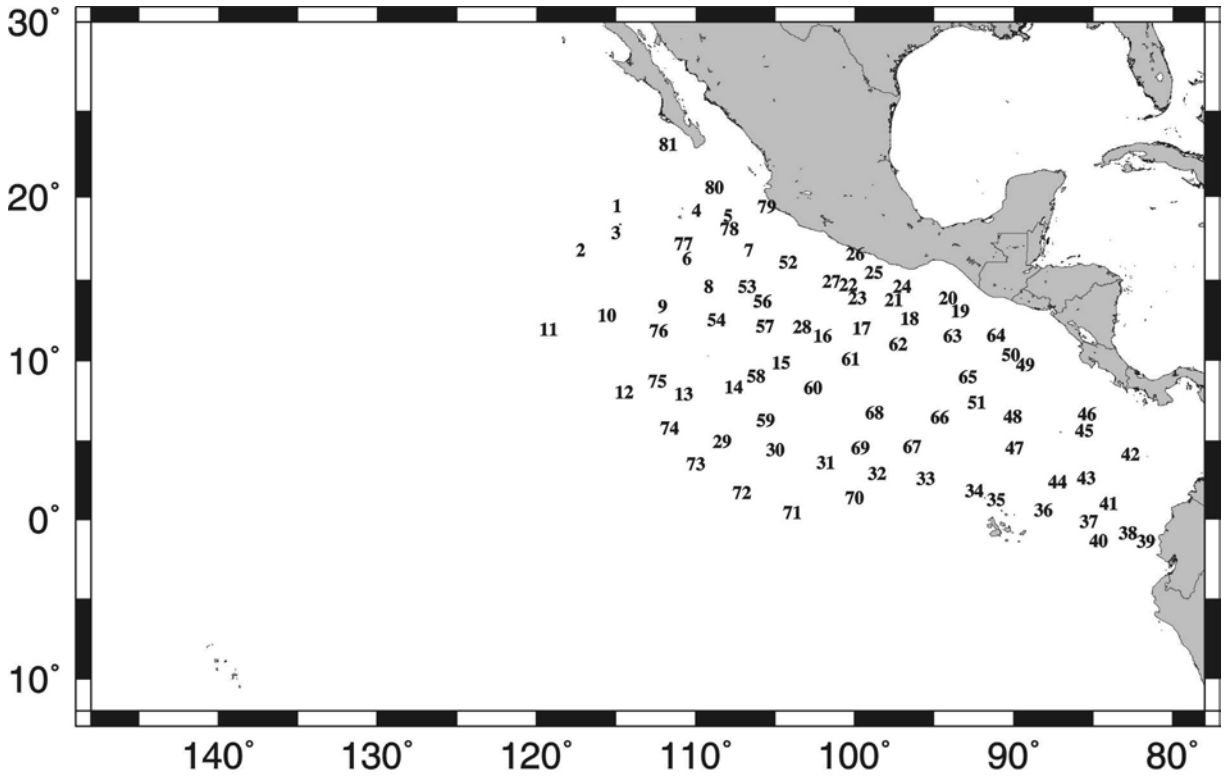

Figure 1. Manta net tow stations for *Jordan* cruise 8910JD.

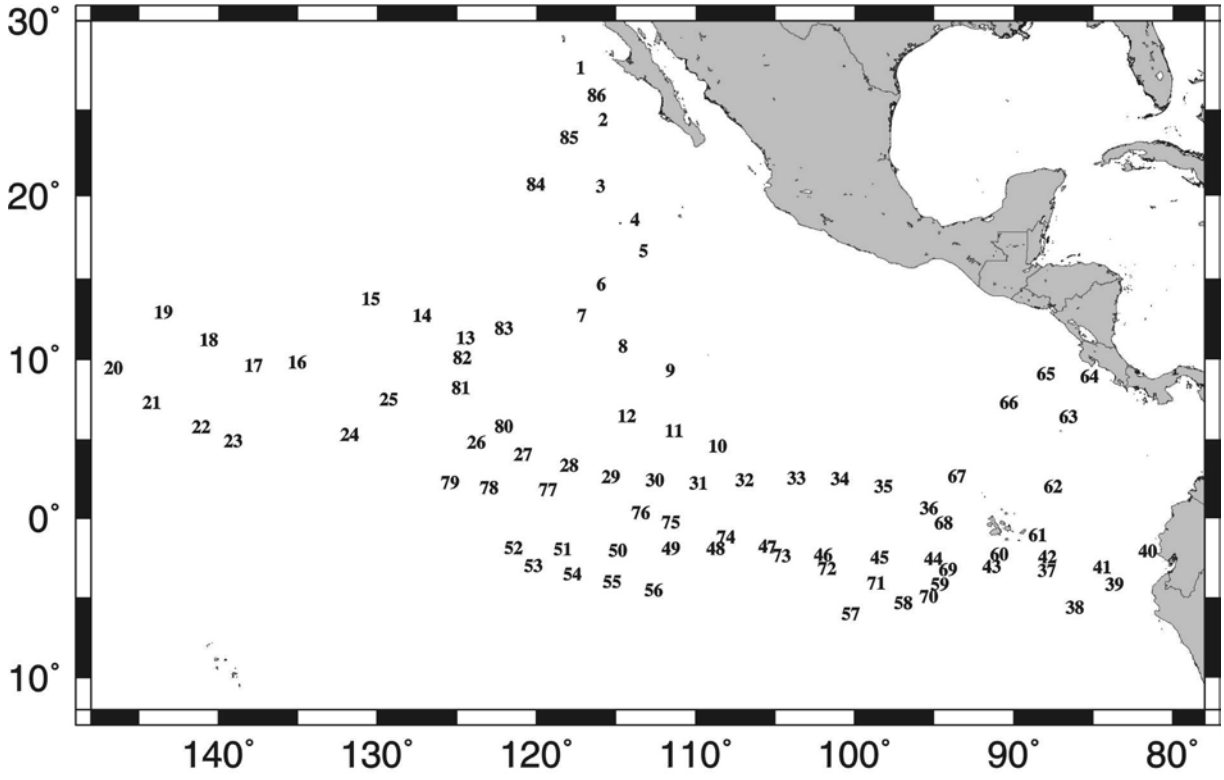

Figure 2. Manta net tow stations for *McArthur* cruise 8910M4.

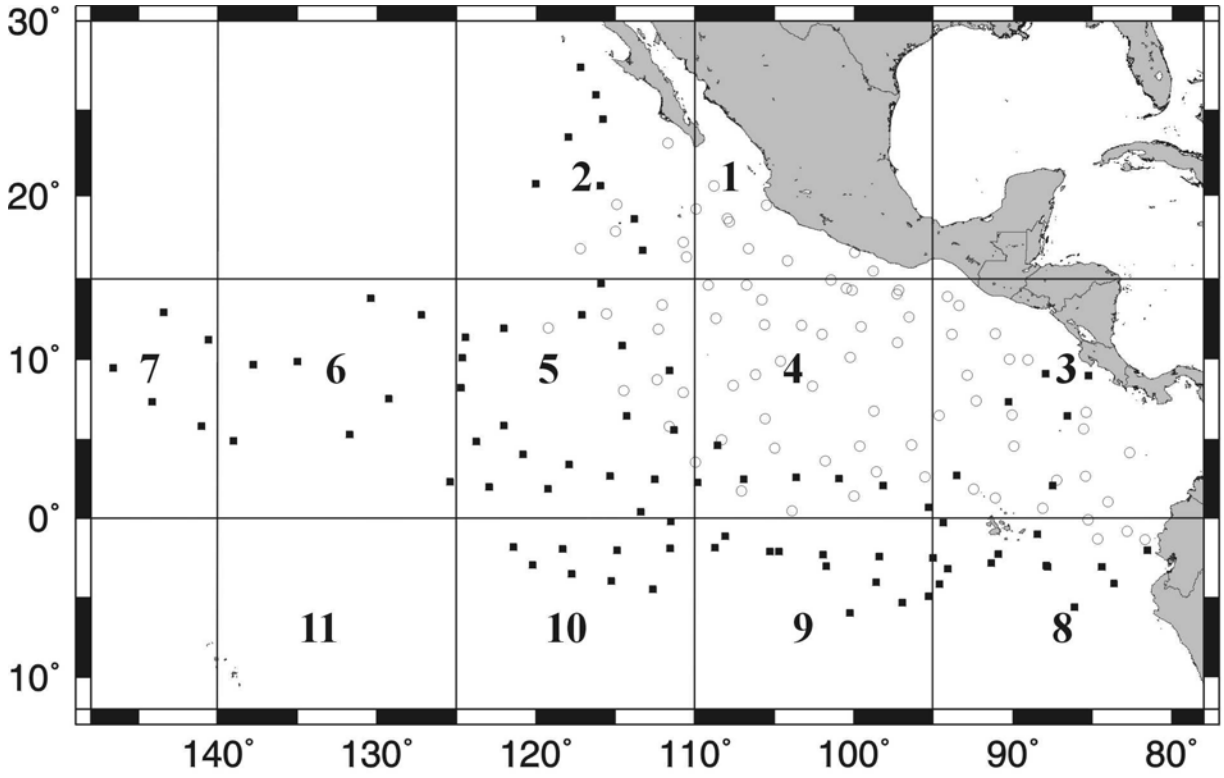

Figure 3. Sampling regions for 1989 eastern tropical Pacific dolphin survey indicated by numbers 1 to 11; Manta net tow stations for *Jordan* cruise 8910JD are indicated by circles and for *McArthur* cruise 8910M4 by solid squares.

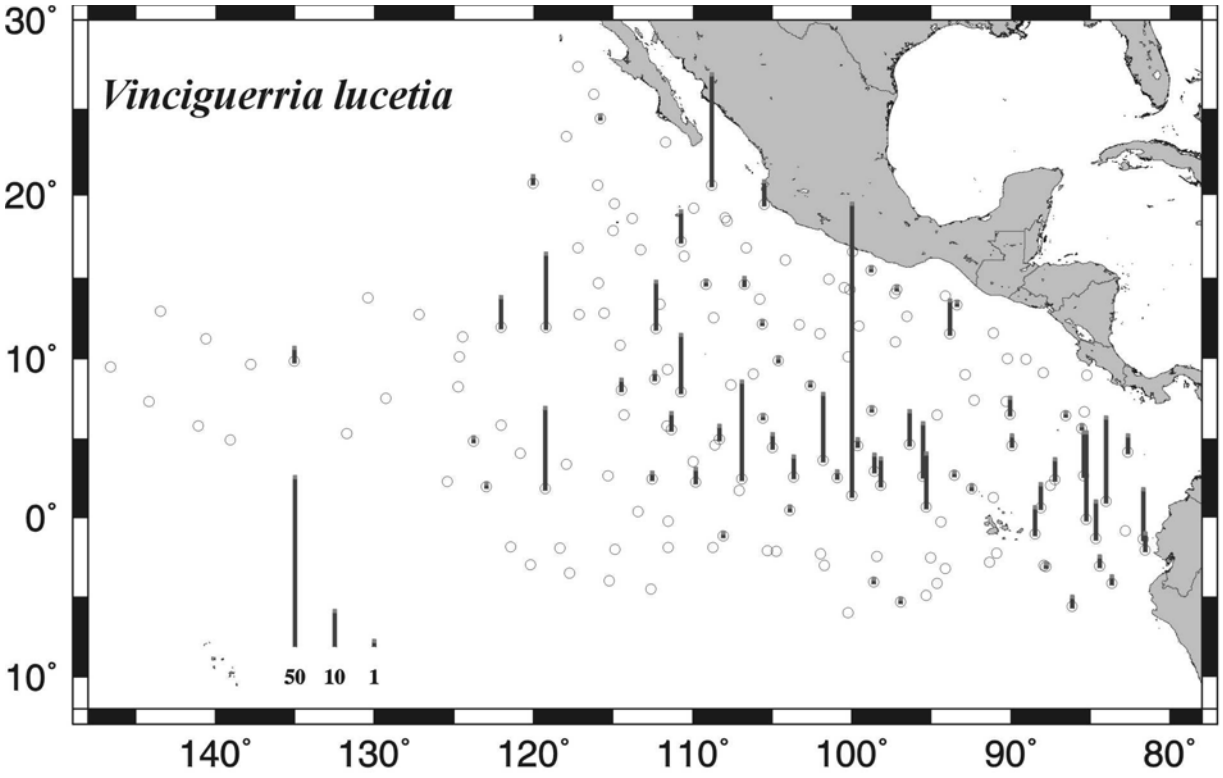

Figure 4. Distribution of *Vinciguerria lucetia* larvae from Manta net tows: 8910JD & 8910M4. Lengths of vertical bars are proportional to total larval counts for each station.

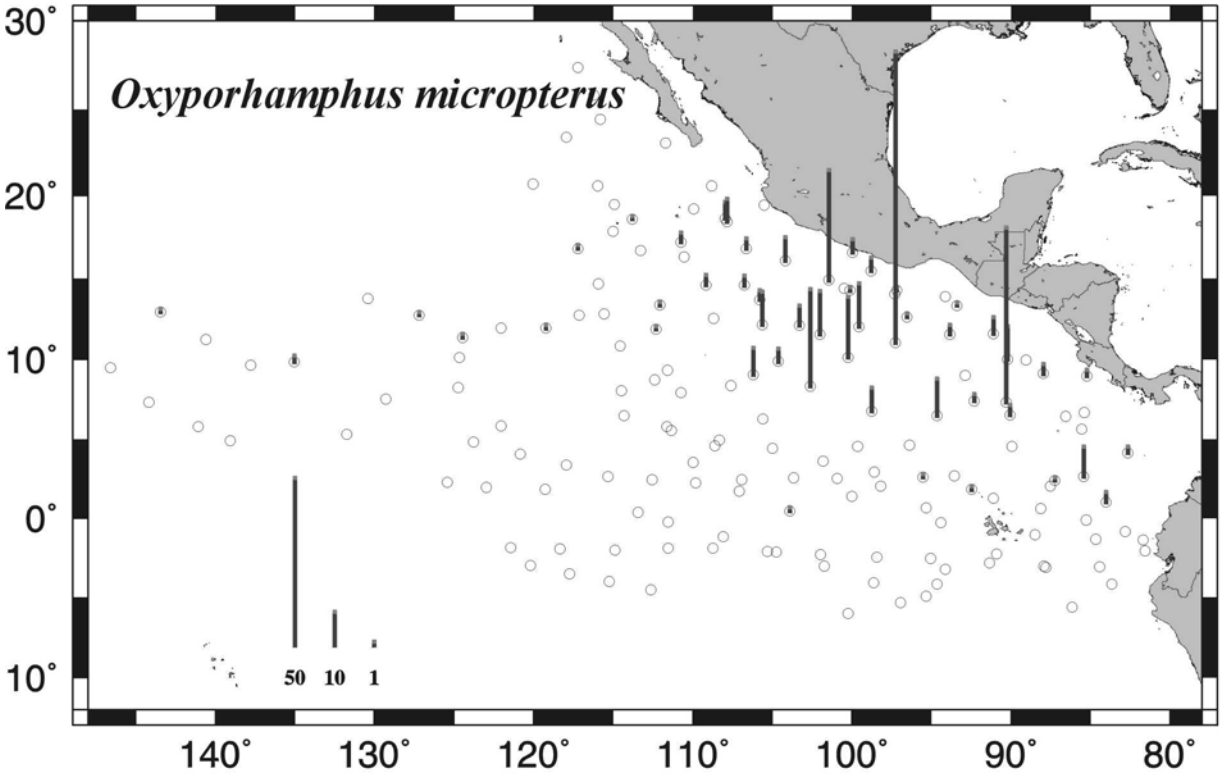

Figure 5. Distribution of *Oxyporhamphus micropterus* larvae from Manta net tows: 8910JD & 8910M4.

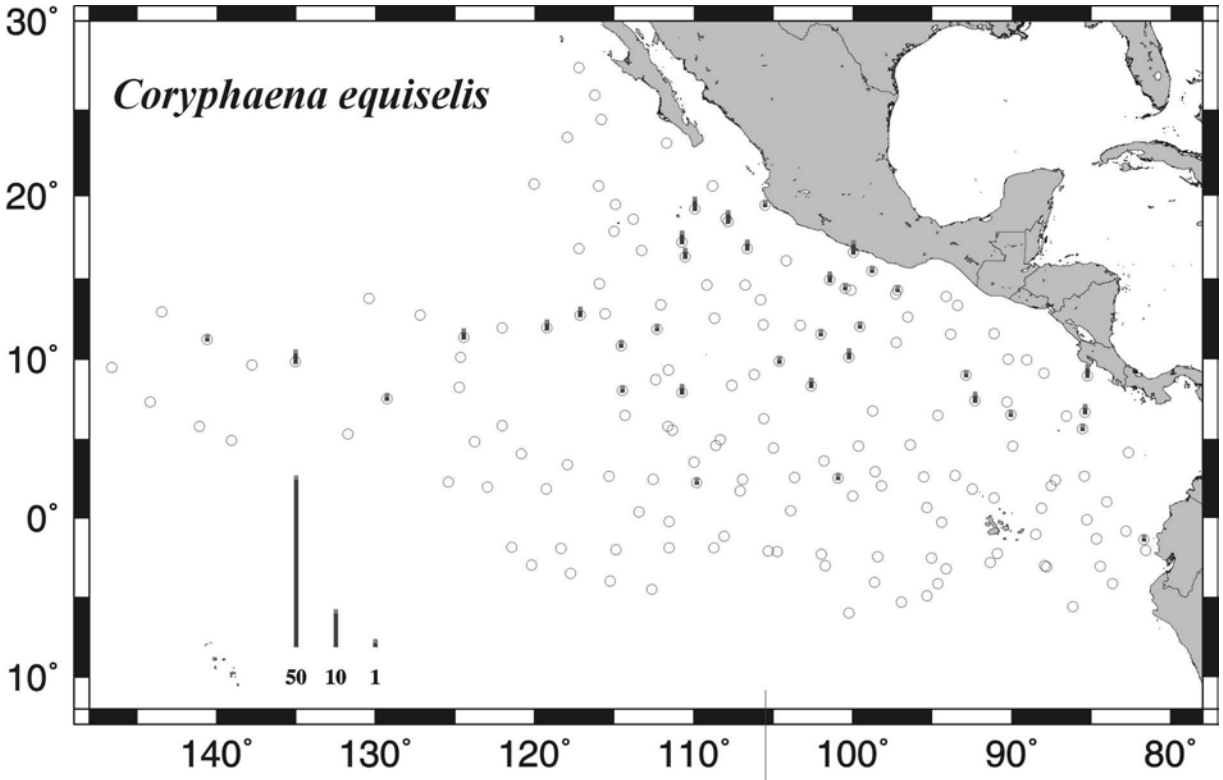

Figure 6. Distribution of *Coryphaena equiselis* larvae from Manta net tows: 8910JD & 8910M4.

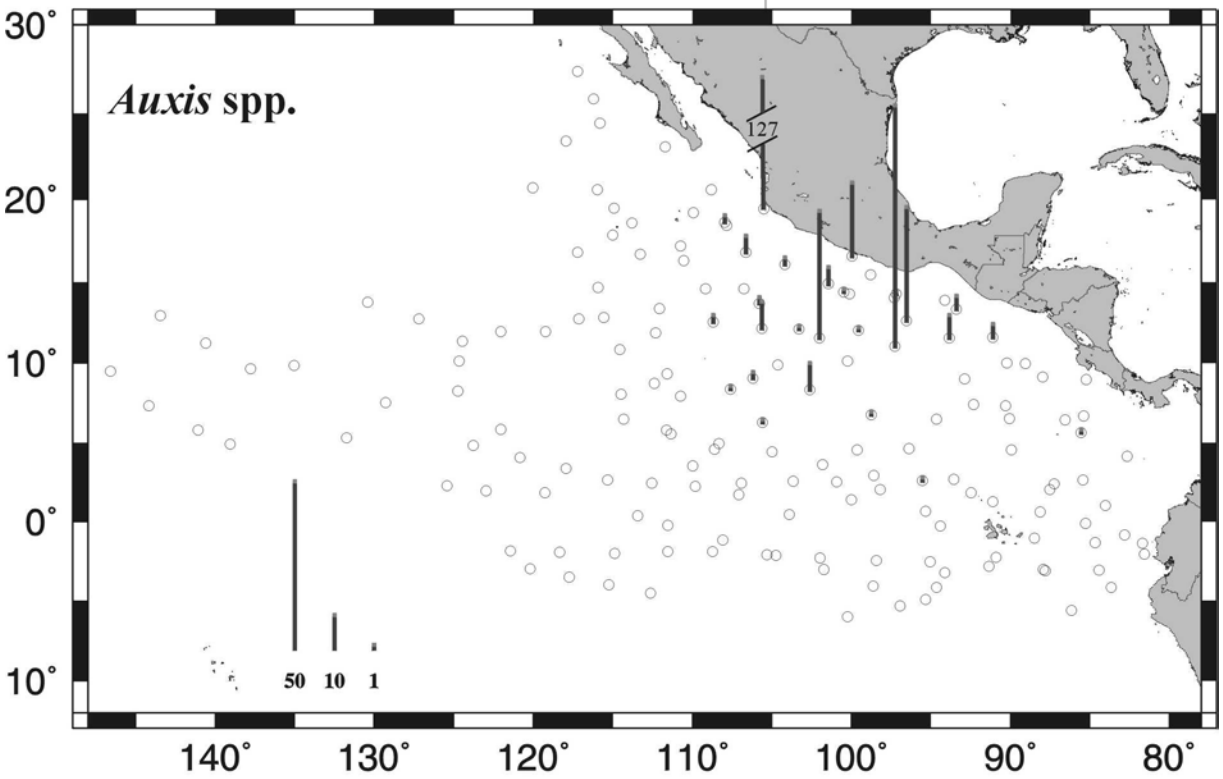

Figure 7. Distribution of *Auxis* spp. larvae from Manta net tows: 8910JD & 8910M4.

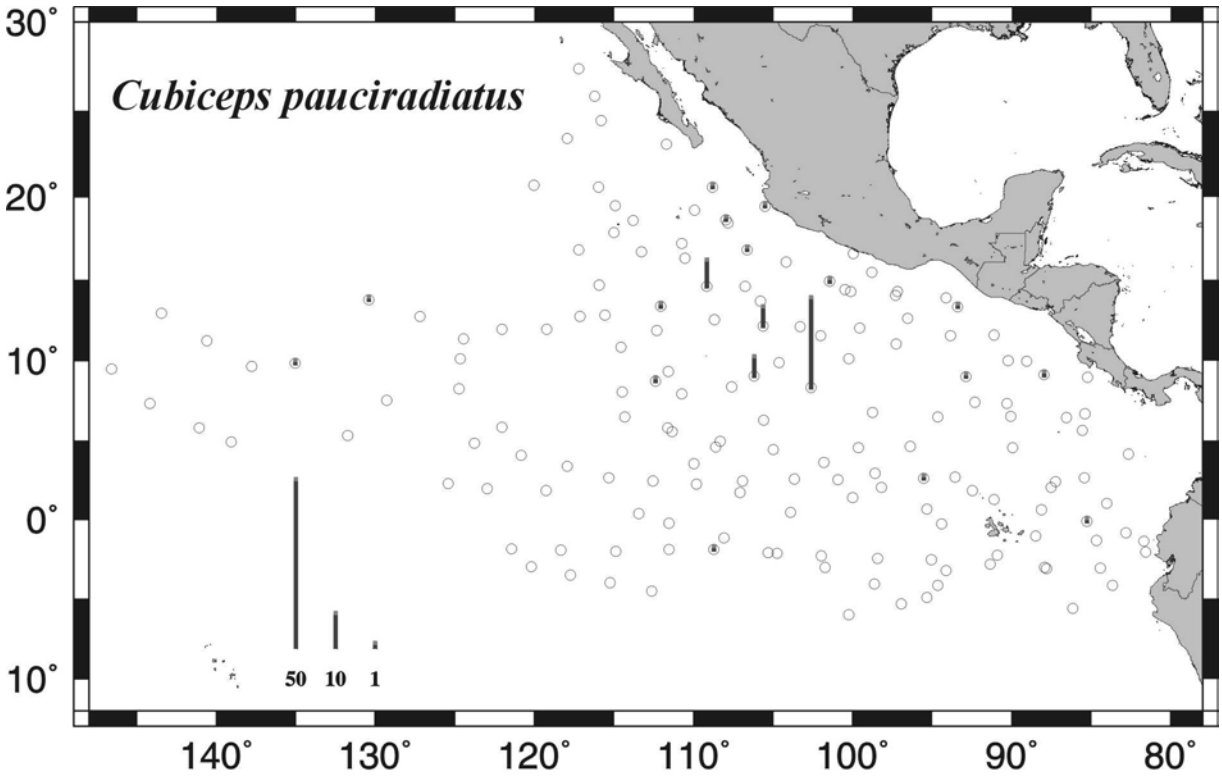

Figure 8. Distribution of *Cubiceps pauciradiatus* larvae from Manta net tows: 8910JD & 8910M4.

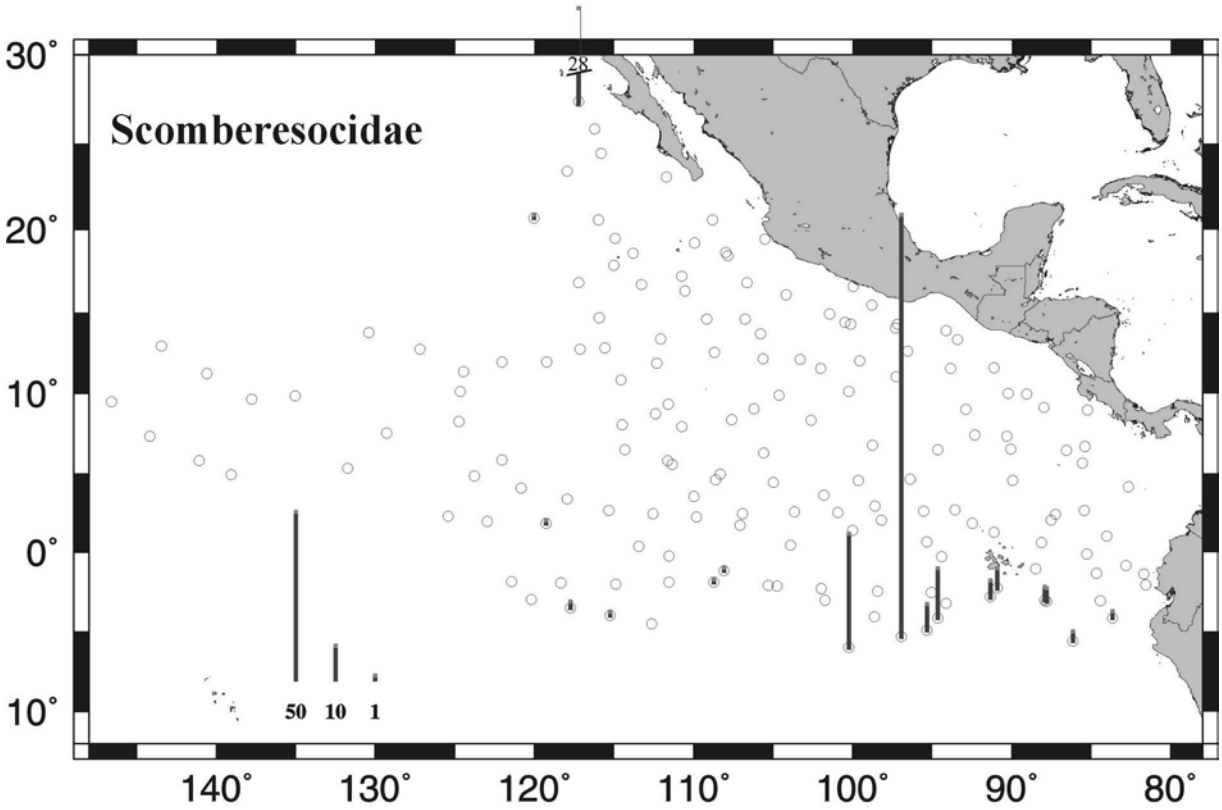

Figure 9. Distribution of Scomberesocidae larvae from Manta net tows: 8910JD & 8910M4.

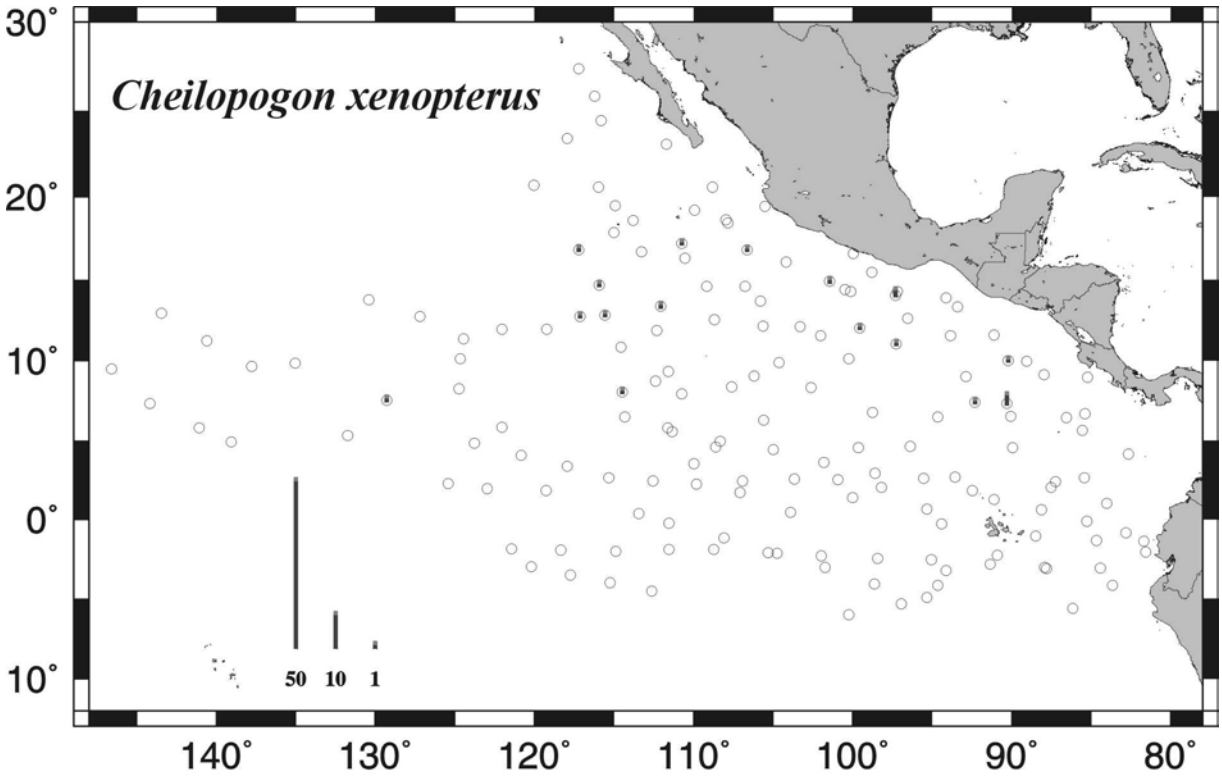

Figure 10. Distribution of *Cheilopogon xenopterus* larvae from Manta net tows: 8910JD & 8910M4.

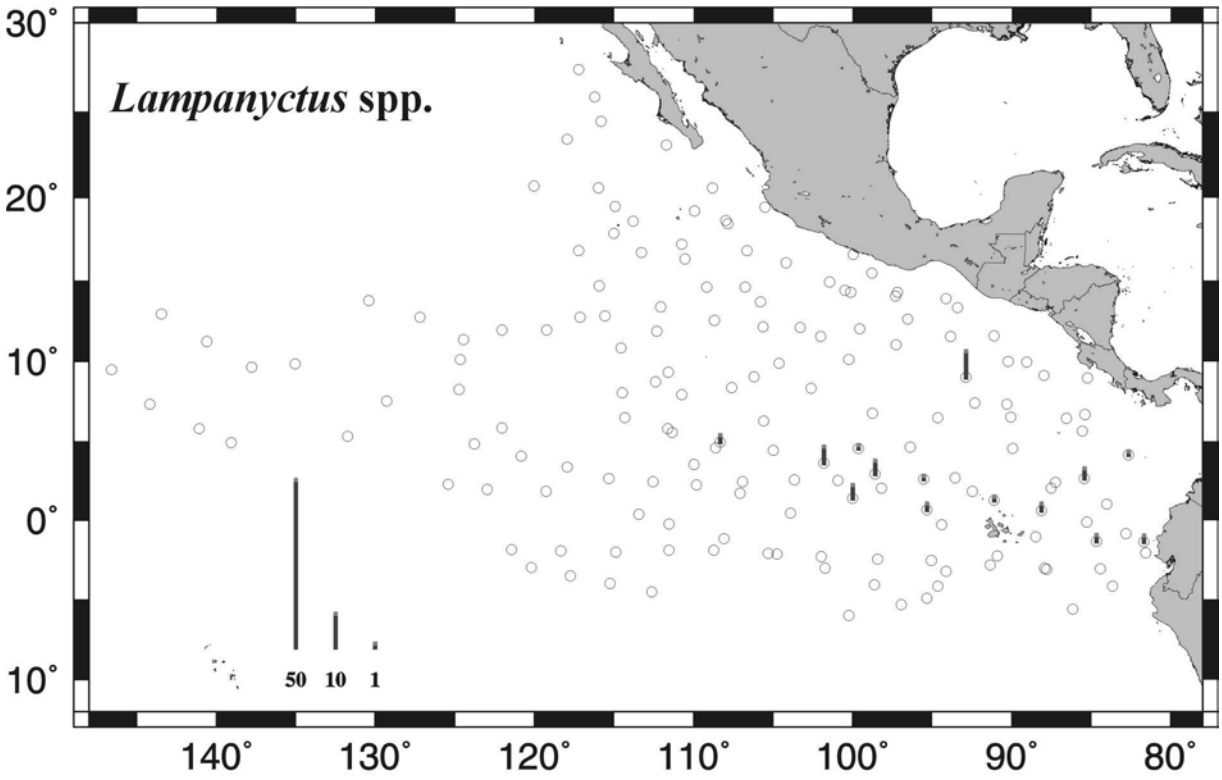

Figure 11. Distribution of *Lampanyctus* spp. larvae from Manta net tows: 8910JD & 8910M4.

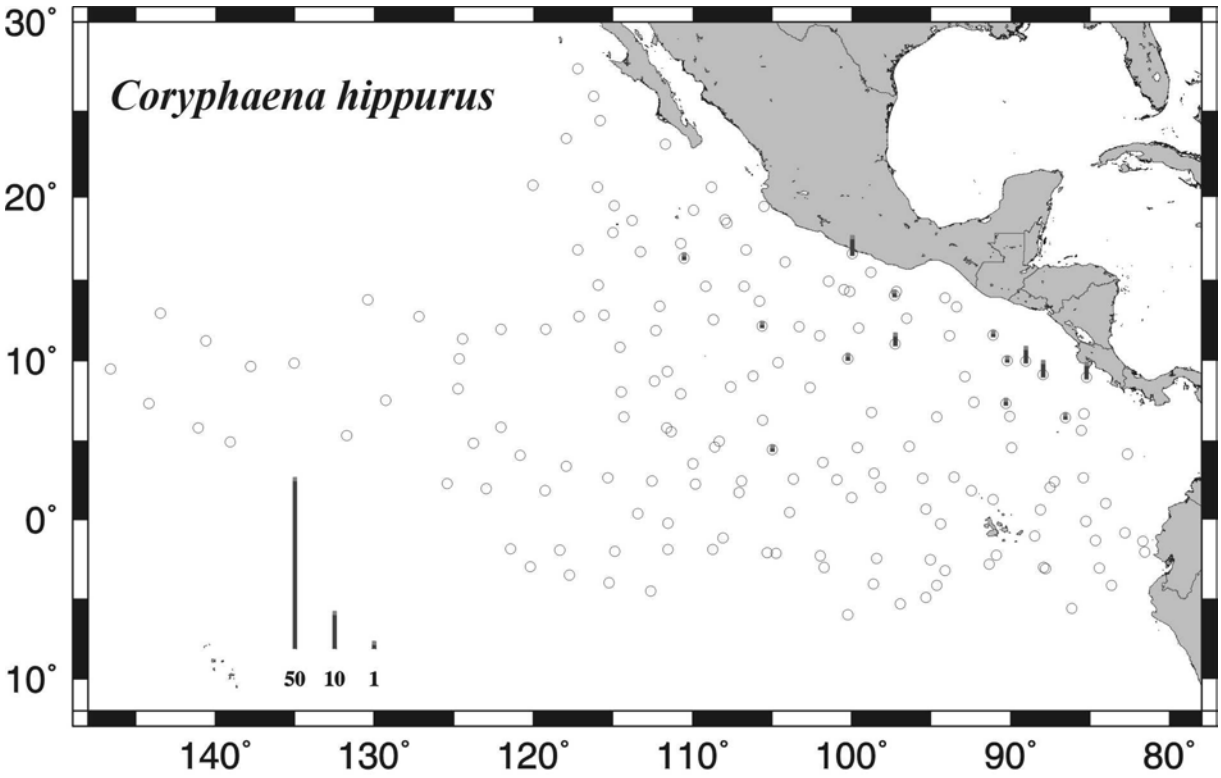

Figure 12. Distribution of *Coryphaena hippurus* larvae from Manta net tows: 8910JD & 8910M4.

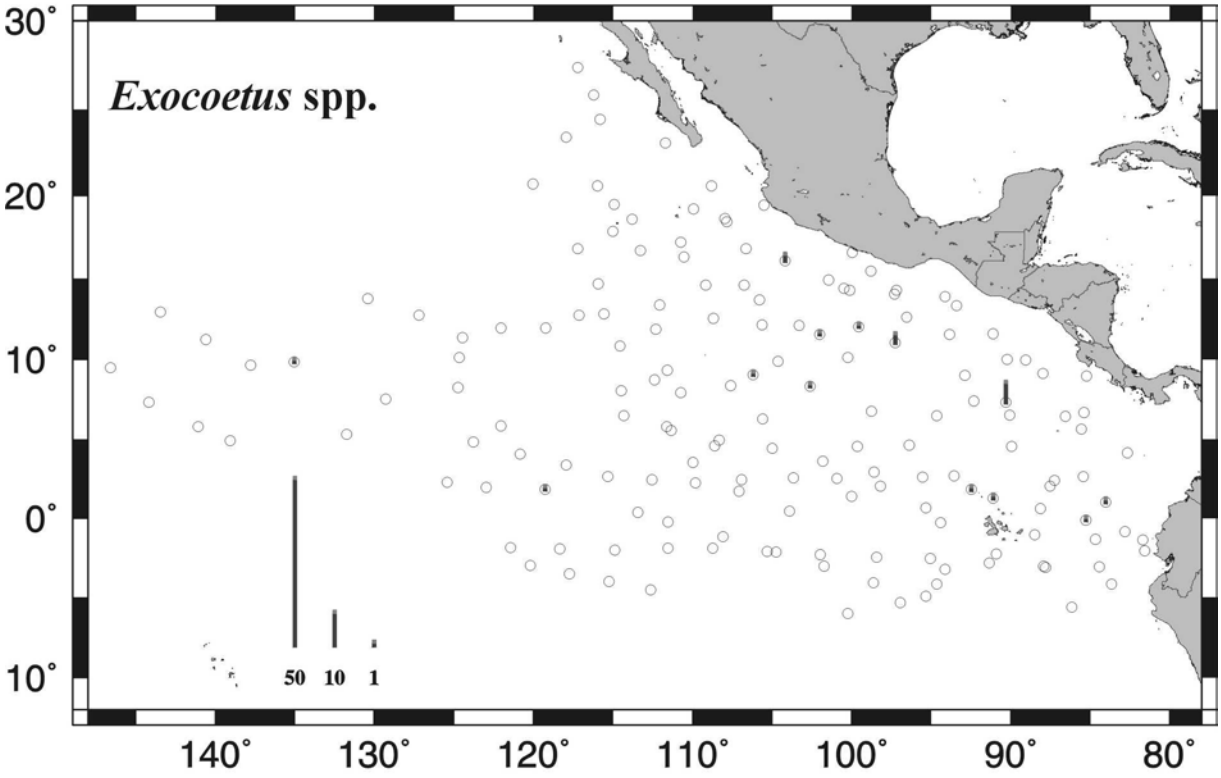

Figure 13. Distribution of *Exocoetus* spp. larvae from Manta tows: 8910JD & 8910M4.

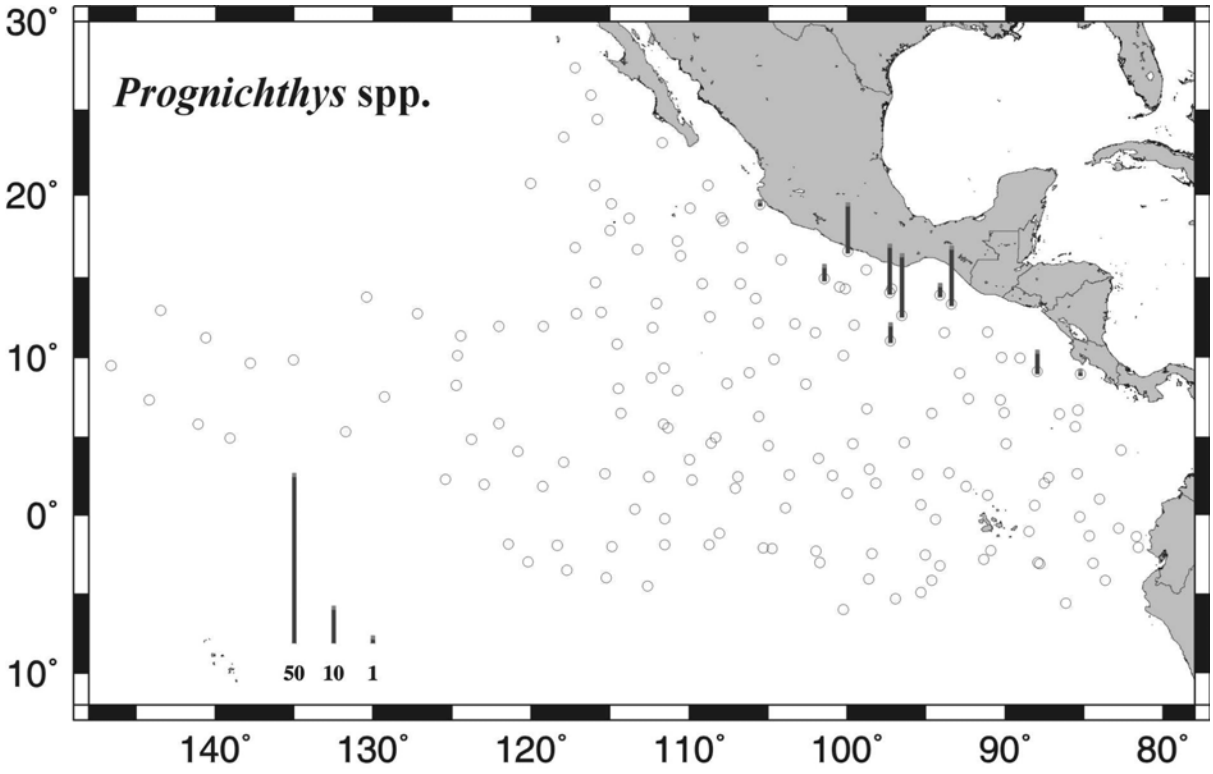

Figure 14. Distribution of *Prognichthys* spp. larvae from Manta net tows: 8910JD & 8910M4.

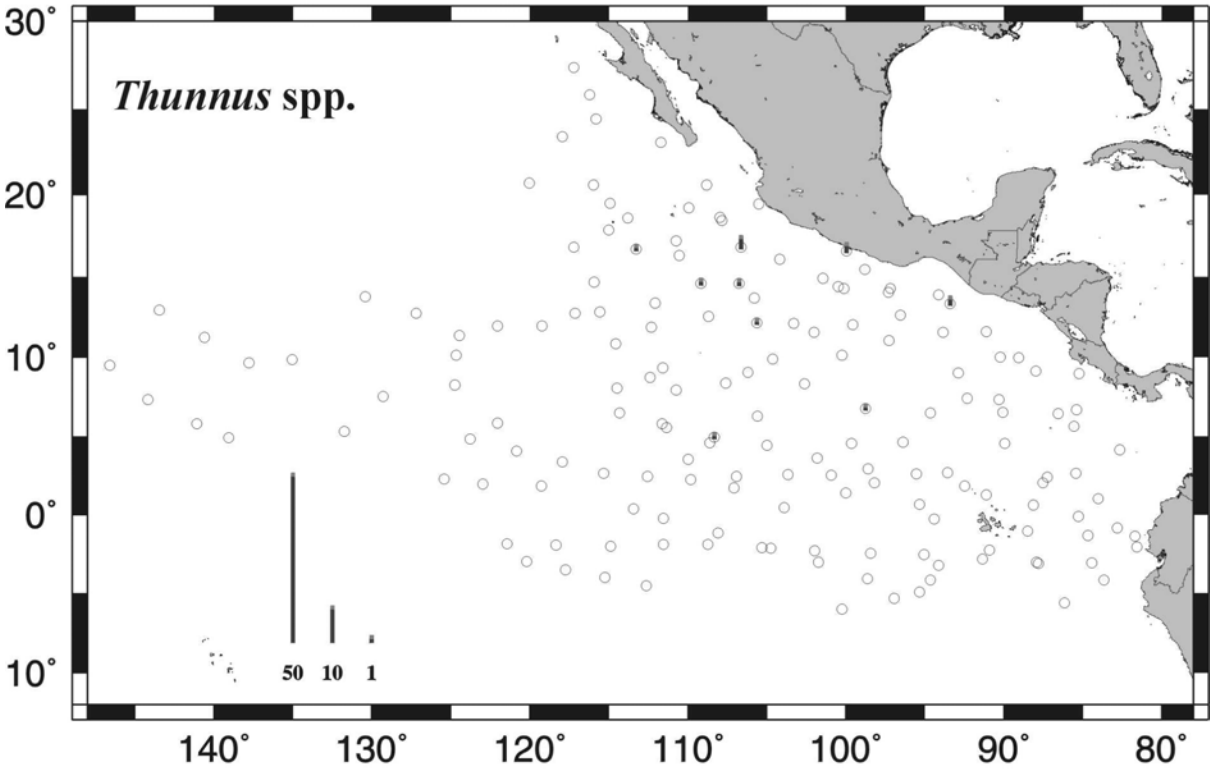

Figure 15. Distribution of *Thunnus* spp. larvae from Manta net tows: 8910JD & 8910M4.

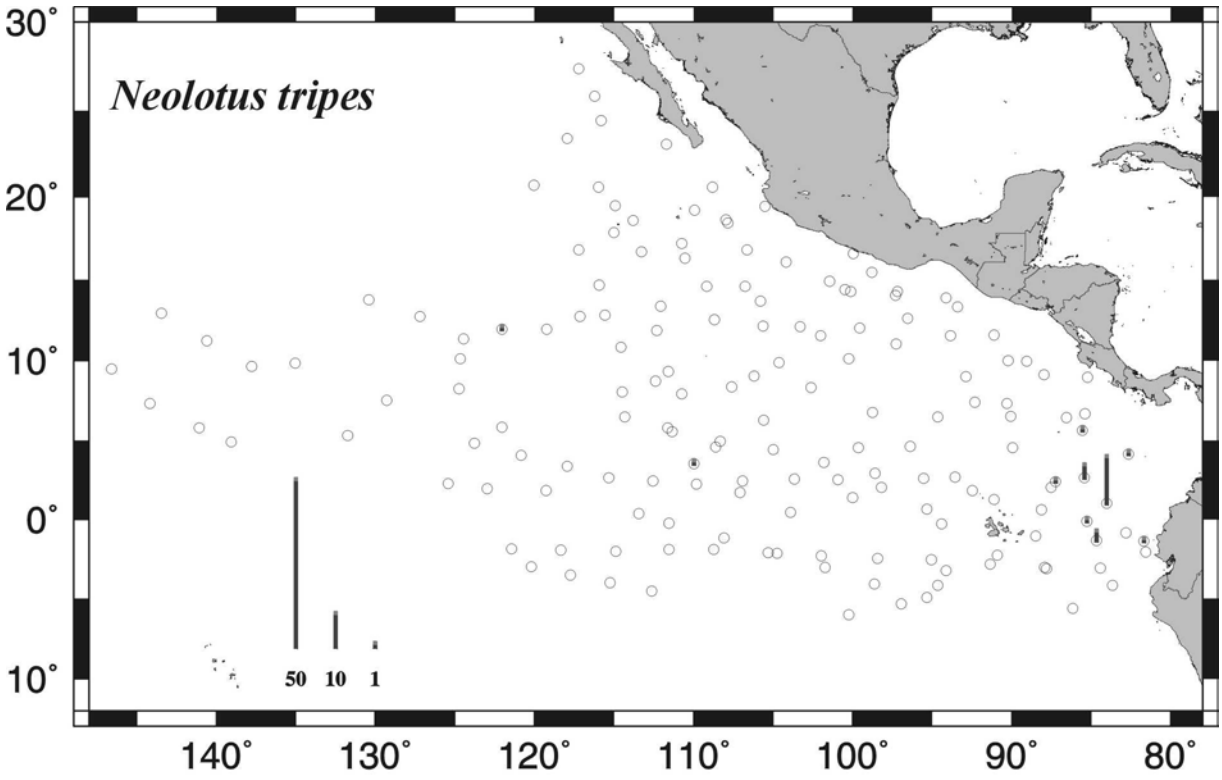

Figure 16. Distribution of *Neolotus tripes* larvae from Manta net tows: 8910JD & 8910M4.

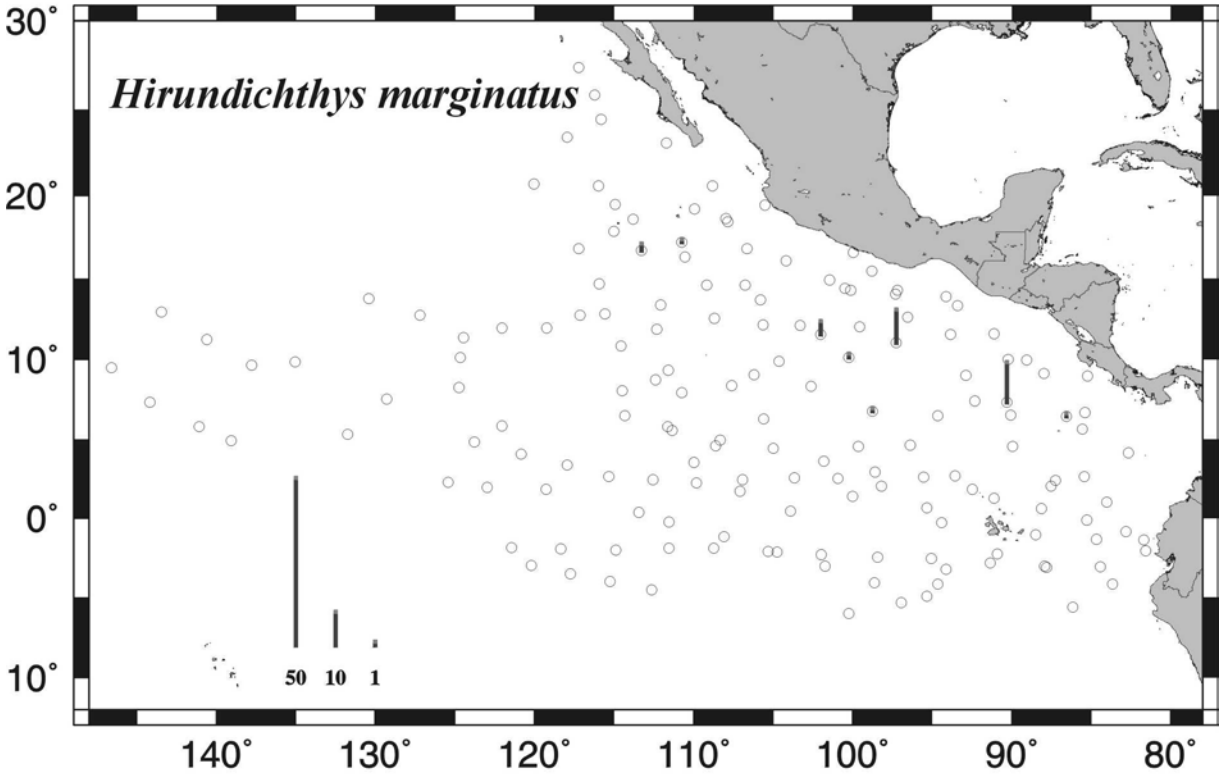

Figure 17. Distribution of *Hirundichthys marginatus* larvae from Manta net tows: 8910JD & 8910M4.

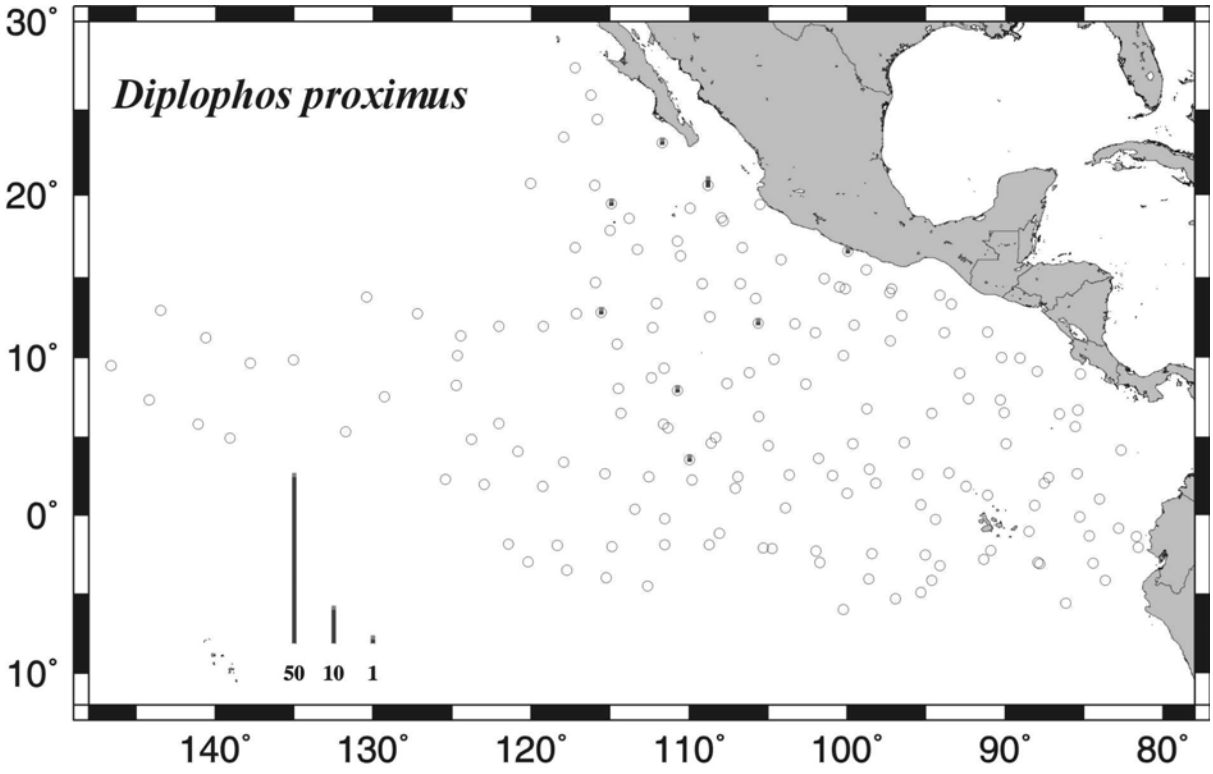

Figure 18. Distribution of *Diplophos proximus* larvae from Manta net tows: 8910JD & 8910M4.

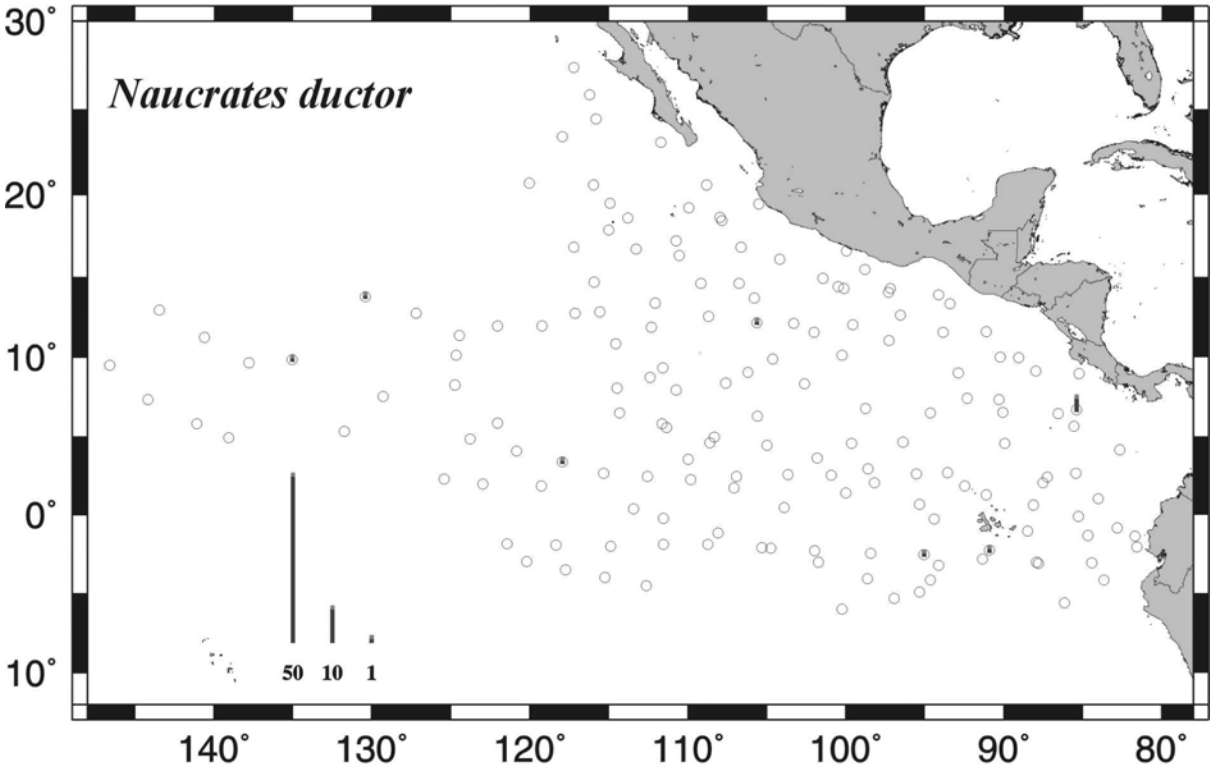

Figure 19. Distribution of *Naucrates ductor* larvae from Manta net tows: 8910JD & 8910M4.

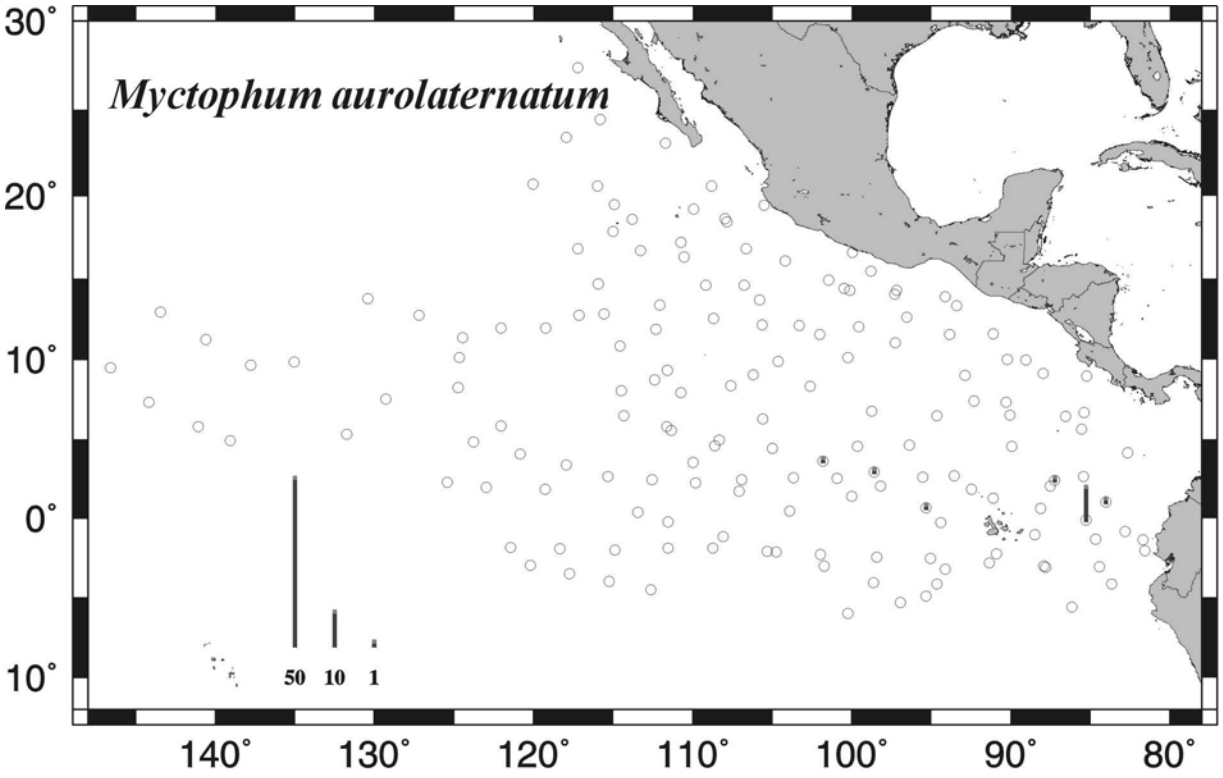

Figure 20. Distribution of *Myctophum aurolaternatum* larvae from Manta net tows: 8910JD & 8910M4.

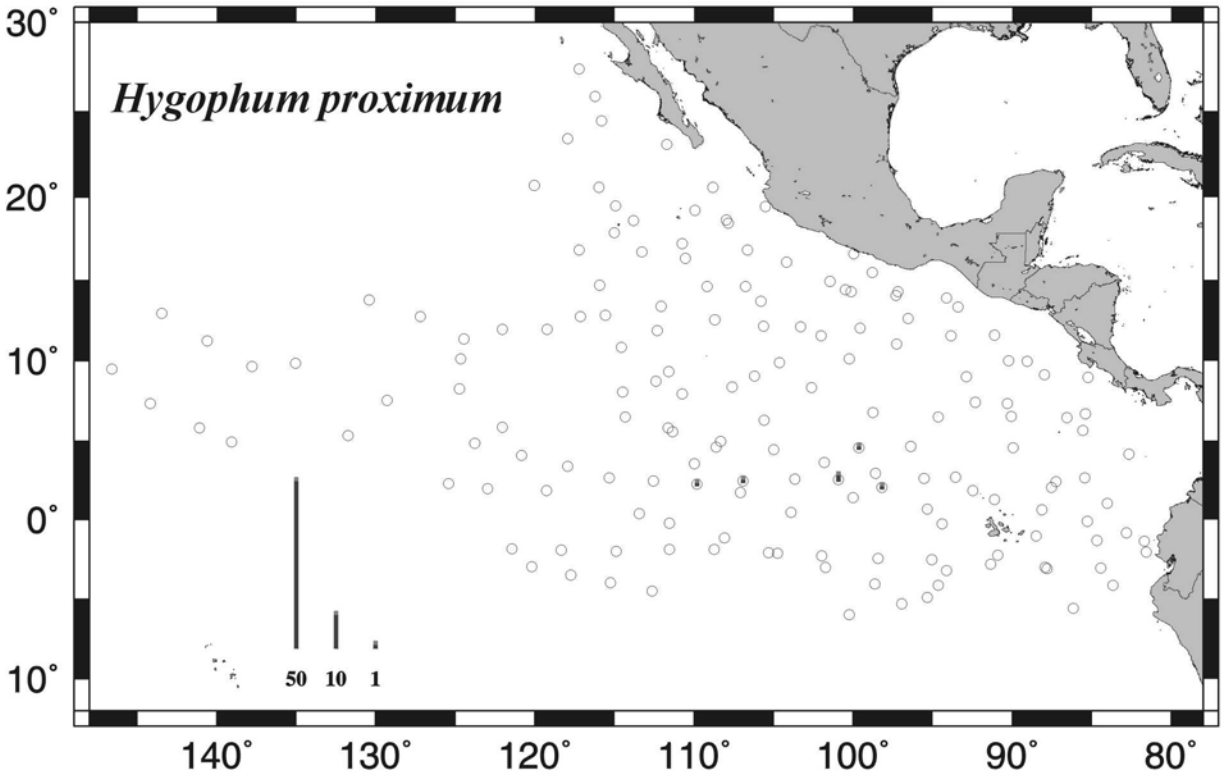

Figure 21. Distribution of *Hygophum proximum* larvae from Manta net tows: 8910JD & 8910M4.

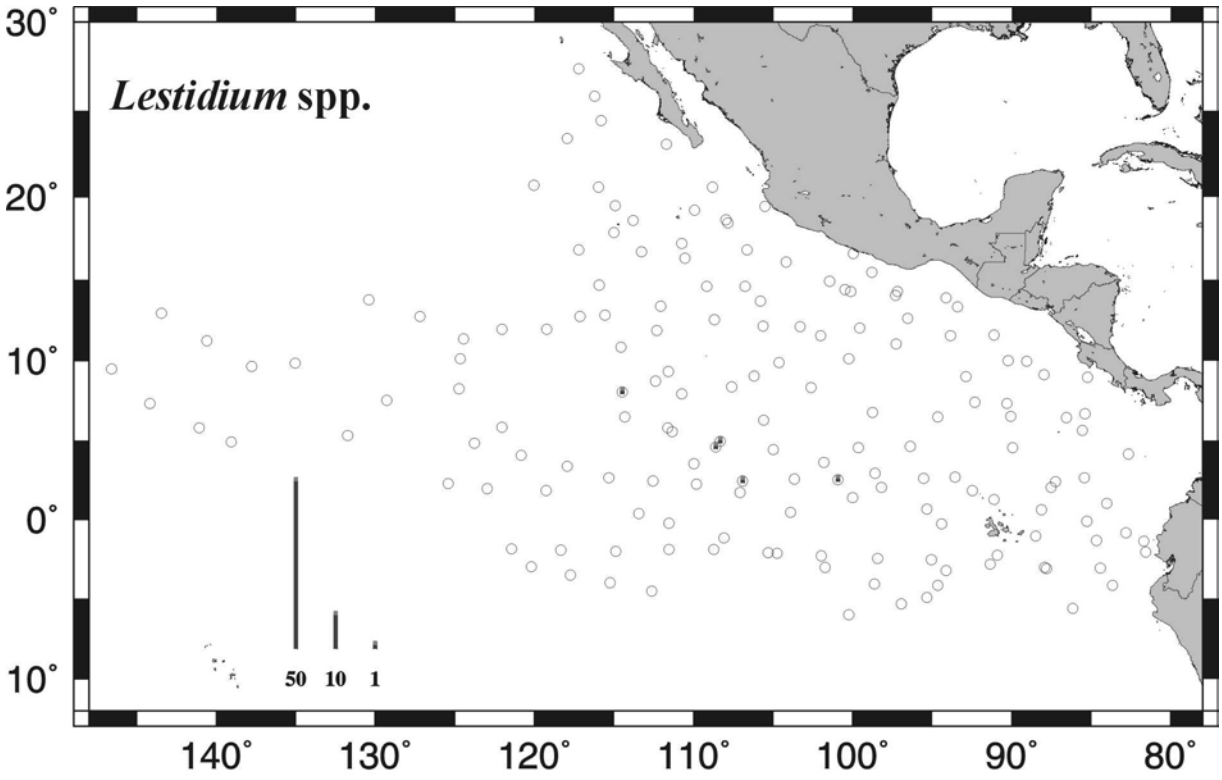

Figure 22. Distribution of *Lestidium* spp. larvae from Manta net tows: 8910JD & 8910M4.

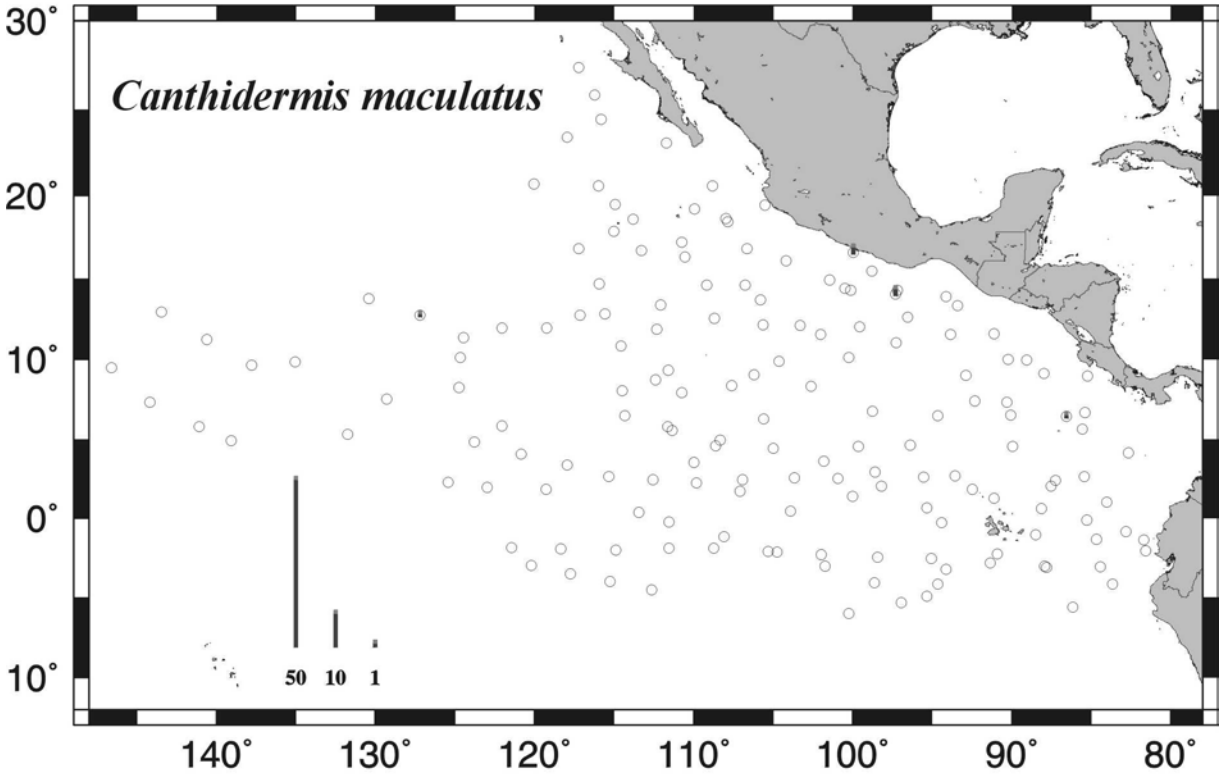

Figure 23. Distribution of *Canthidermis maculatus* larvae from Manta net tows: 8910JD & 8910M4.

Table 1. Station and Manta net tow data for *Jordan* cruise 8910JD and *McArthur* cruise 8910M4.

Tow Number	CTD Station	Lat. deg.	Lat. min.		Long.(W) deg	Long.(W) min.	Region	Ship Code	Tow Date yymmdd	Time (Loc.)	Vol.(m^3) Water Strained	Total Larvae	Total Eggs
1		19	28.9	N	114	56.4	2	JD	890802	2116	102.4	2	125
2	1-003	16	50.2	N	117	13.7	2	JD	890803	2110	104.3	2	2392
3	1-005	17	51.0	N	115	00.0	2	JD	890804	2105	96.3	0	267
4	1-008	19	13.0	N	109	57.0	1	JD	890806	0912	107.0	3	927
5	1-010	18	38.4	N	107	57.9	1	JD	890807	2111	87.2	11	165
6	1-012	16	20.0	N	110	33.0	2	JD	890808	2109	92.1	3	1270
7	1-015	16	50.0	N	106	38.0	1	JD	890812	2110	90.4	15	164874
8	1-017	14	37.0	N	109	10.0	4	JD	890813	2111	87.1	13	1147
9	1-019	13	21.9	N	112	04.2	5	JD	890814	2105	85.1	3	132
10	1-021	12	49.9	N	115	34.2	5	JD	890815	2108	95.6	2	87
11	1-023	11	56.5	N	119	14.0	5	JD	890816	2105	63.4	25	9026
12		8	03.0	N	114	29.0	5	JD	890818	2128	80.7	7	62
13	1-027	7	55.0	N	110	45.4	5	JD	890819	2104	78.4	20	103
14	1-029	8	22.0	N	107	36.0	4	JD	890820	2004	89.5	1	12
15	1-031	9	52.5	N	104	37.3	4	JD	890821	2105	95.7	7	202
16	1-033	11	34.0	N	102	00.0	4	JD	890822	2106	100.9	59	62
17	1-035	12	02.5	N	99	34.3	4	JD	890823	2124	97.9	18	228
18	1-037	12	39.0	N	96	32.0	4	JD	890824	2105	102.5	55	1032
19	1-039	13	20.7	N	93	25.1	3	JD	890825	2106	100.6	26	19
20	2-040	13	54.0	N	94	08.0	3	JD	890903	2112	104.1	3	21
21	2-042	14	04.0	N	97	18.0	4	JD	890904	2040	96.8	24	366
22	2-044	14	24.1	N	100	28.9	4	JD	890905	2042	110.5	2	6
23	2-048	14	16.1	N	100	08.4	4	JD	890907	2109	82.8	1	518
24	2-050	14	17.2	N	97	10.5	4	JD	890908	2110	66.8	4	183
25	2-052	15	27.8	N	98	48.1	1	JD	890909	2042	79.6	6	160
26		16	36.1	N	99	58.2	1	JD	890810	2113	94.4	97	1132
27		14	53.6	N	101	26.5	4	JD	890914	2116	99.3	46	32
28	2-056	12	07.0	N	103	19.0	4	JD	890915	2100	86.9	7	244
29	2-062	4	57.9	N	108	19.1	4	JD	890919	2052	81.0	10	13
30	2-064	4	25.1	N	104	59.7	4	JD	890920	2044	77.9	6	17
31	2-066	3	36.8	N	101	47.8	4	JD	890921	2110	81.4	36	26
32	2-068	2	55.9	N	98	36.8	4	JD	890922	2109	74.8	15	77
33	2-070	2	36.1	N	95	33.2	4	JD	890923	2113	68.0	24	28
34	2-072	1	49.4	N	92	29.9	3	JD	890924	2040	74.6	3	38
35	2-073	1	17.6	N	91	07.8	3	JD	890925	2040	90.7	2	51
36	2-075	0	38.0	N	88	09.0	3	JD	890926	2041	76.9	11	9
37	2-077	0	06.2	S	85	17.7	8	JD	890927	2140	82.9	49	32
38	2-079	0	50.8	S	82	49.3	8	JD	890928	2120	85.6	0	10
39		1	22.0	S	81	41.0	8	JD	890929	2116	95.7	28	314
40	3-080	1	19.0	S	84	40.0	8	JD	891006	2105	90.0	19	87
41	3-082	1	03.0	N	84	03.0	3	JD	891007	2107	81.6	46	27
42	3-085	4	08.0	N	82	39.0	3	JD	891009	2105	80.7	11	112
43	3-087	2	39.0	N	85	26.0	3	JD	891010	2118	79.2	30	53
44	3-089	2	25.0	N	87	14.0	3	JD	891011	2110	79.4	10	66
45	3-091	5	38.0	N	85	34.0	3	JD	891012	2104	88.3	4	5602
46	3-093	6	41.0	N	85	25.0	3	JD	891013	2107	78.5	6	1528
47	3-096	4	34.0	N	89	57.0	3	JD	891015	2105	87.0	4	534
48	3-098	6	32.0	N	90	03.0	3	JD	891016	2111	80.5	14	18

Tow Number	CTD Station	Lat. deg.	min.		Long.(W) deg	min.	Region	Ship Code	Tow Date yymmdd	Time (Loc.)	Vol.(m^3) Water Strained	Total Larvae	Total Eggs
49	3-100	9	59.0	N	89	04.0	3	JD	891017	2114	92.8	4	22
50	3-102	10	00.0	N	90	14.0	3	JD	891018	2115	96.9	13	41
51	3-104	7	25.0	N	92	19.0	3	JD	891019	2107	71.1	11	8
52	4-107	16	06.0	N	104	12.0	1	JD	891102	2107	86.6	13	168
53	4-109	14	35.0	N	106	46.0	4	JD	891103	2105	109.6	6	59
54	4-111	12	34.0	N	108	42.0	4	JD	891104	2107	99.0	2	16
56	4-113	13	41.0	N	105	47.0	4	JD	891105	2106	94.3	5	573
57	4-115	12	09.0	N	105	39.0	4	JD	891106	2104	93.6	29	662
58	4-117	9	03.0	N	106	11.0	4	JD	891107	2106	100.5	18	1391
59	4-119	6	17.0	N	105	35.0	4	JD	891108	2104	78.3	2	49
60	4-121	8	20.0	N	102	38.0	4	JD	891109	2106	87.6	68	156
61	4-123	10	09.0	N	100	15.0	4	JD	891110	2108	97.3	24	83
62	4-125	11	02.0	N	97	16.0	4	JD	891111	2107	86.9	208	528
63	4-127	11	33.0	N	93	51.0	3	JD	891112	2106	88.1	24	158
64	4-129	11	37.0	N	91	08.0	3	JD	891113	2103	86.9	14	59
65	4-131	9	00.0	N	92	54.0	3	JD	891114	2106	100.4	13	32
66	4-133	6	30.0	N	94	39.0	3	JD	891115	2106	80.5	11	470
67	4-135	4	38.0	N	96	22.0	4	JD	891116	2104	70.1	10	16
68	4-137	6	46.0	N	98	45.0	4	JD	891117	2104	82.8	12	21
69	4-139	4	33.0	N	99	39.0	4	JD	891118	2104	78.9	5	6
70	4-141	1	24.0	N	99	60.0	4	JD	891119	2104	82.7	96	9
71	4-143	0	29.0	N	103	54.0	4	JD	891120	2103	80.8	2	101
72	4-145	1	43.0	N	107	05.0	4	JD	891121	2104	92.2	0	7
73	4-147	3	33.0	N	109	58.0	4	JD	891122	2105	66.6	4	11
74	4-149	5	48.0	N	111	38.0	5	JD	891123	2008	84.7	0	1
75	4-151	8	45.0	N	112	23.0	5	JD	891124	2004	86.3	3	127
76	4-153	11	52.0	N	112	20.0	5	JD	891125	2004	80.4	16	170
77	4-157	17	12.0	N	110	46.0	2	JD	891127	2003	85.5	17	566
78	4-159	18	26.0	N	107	52.0	1	JD	891128	2003	96.0	11	29
79	4-161	19	26.0	N	105	32.0	1	JD	891201	2050	113.8	140	321
80	4-162	20	35.0	N	108	49.0	1	JD	891202	2017	79.9	37	19
81	4-163	23	05.0	N	111	42.0	2	JD	891203	2104	99.9	1	141
1	1-001	27	24.4	N	117	13.0	2	M4	890730	2145	96.7	316	0
2	1-003	24	27.5	N	115	49.3	2	M4	890731	2105	111.5	2	84
3	1-004	20	35.0	N	115	59.0	2	M4	890801	2112	142.2	0	16
4	1-006	18	36.0	N	113	49.0	2	M4	890802	2103	82.9	1	3181
5	1-008	16	43.0	N	113	18.0	2	M4	890803	2057	116.7	3	610
6	1-010	14	41.0	N	115	56.0	5	M4	890804	2107	103.2	1	478
7	1-012	12	45.0	N	117	09.0	5	M4	890805	2103	111.8	3	32
8	1-014	10	52.0	N	114	35.0	5	M4	890806	2042	126.6	1	5
9	1-016	9	19.0	N	111	36.0	5	M4	890807	2032	73.0	0	20
10	1-018	4	36.0	N	108	37.0	4	M4	890809	2101	100.8	1	25
11	1-019	5	34.0	N	111	21.0	5	M4	890810	2031	45.3	5	92
12	1-021	6	28.0	N	114	19.0	5	M4	890811	2032	100.7	0	16
13	1-026	11	23.0	N	124	27.0	5	M4	890815	2036	79.4	3	69
14	1-028	12	45.0	N	127	13.0	6	M4	890816	2034	120.1	4	3157
15	1-030	13	47.0	N	130	24.0	6	M4	890817	2103	79.6	2	14
16	1-034	9	51.0	N	135	02.0	6	M4	890819	2105	132.2	12	163
17	1-036	9	40.0	N	137	48.0	6	M4	890820	2104	79.0	0	4

Tow Number	CTD Station	Lat. deg.	min.		Long.(W) deg	min.	Region	Ship Code	Tow Date yymmdd	Time (Loc.)	Vol.(m^3) Water Strained	Total Larvae	Total Eggs
19	1-040	12	56.0	N	143	27.0	7	M4	890822	2035	62.6	1	3
20	2-042	9	29.0	N	146	36.0	7	M4	890904	2035	92.5	0	7
21	2-044	7	20.0	N	144	10.0	7	M4	890905	2036	64.7	0	0
22	2-046	5	48.0	N	141	04.0	7	M4	890906	2044	100.7	0	4
23	2-048	4	54.0	N	139	04.0	6	M4	890907	2008	81.1	0	2
24	2-050	5	18.0	N	131	44.0	6	M4	890909	2034	74.9	0	2
25	2-052	7	33.0	N	129	17.0	6	M4	890910	2035	66.7	2	3
26	2-054	4	51.0	N	123	47.0	5	M4	890912	2005	57.8	1	0
27	2-056	4	03.0	N	120	51.0	5	M4	890913	2005	48.5	0	8
28	2-058	3	23.0	N	117	57.0	5	M4	890914	2006	76.9	1	13
29	2-060	2	40.0	N	115	21.0	5	M4	890915	2033	57.5	0	1
30	2-062	2	27.0	N	112	33.0	5	M4	890916	2020	75.7	2	2
31	2-064	2	15.0	N	109	50.0	4	M4	890917	2007	119.9	8	675
32	2-066	2	27.0	N	106	56.0	4	M4	890918	2006	59.1	33	27
33	2-068	2	35.0	N	103	39.0	4	M4	890919	2036	76.2	6	0
34	2-070	2	31.0	N	100	57.0	4	M4	890920	2037	62.6	8	6
35	2-072	2	03.0	N	98	11.0	4	M4	890921	2035	52.4	9	9
36	2-074	0	40.0	N	95	20.0	4	M4	890922	2120	70.3	19	72
37	2-078	3	06.0	S	87	50.0	8	M4	890926	2004	72.8	5	12
38	2-080	5	37.0	S	86	10.0	8	M4	890927	2032	68.1	8	83
39	2-082	4	08.0	S	83	40.0	8	M4	890928	2035	77.4	4	31
40	2-084	2	03.0	S	81	35.0	8	M4	890929	2004	73.9	9	32
41	3-086	3	04.0	S	84	26.0	8	M4	891006	2036	83.8	5	76
42	3-088	3	00.0	S	87	56.0	8	M4	891007	2047	84.8	4	16
43	3-090	2	50.0	S	91	22.0	8	M4	891008	2033	99.8	7	24
44	3-092	2	32.0	S	95	03.0	9	M4	891009	2056	97.6	1	3
45	3-094	2	27.0	S	98	26.0	9	M4	891010	2233	82.9	0	1
46	3-096	2	18.0	S	101	58.0	9	M4	891011	2031	86.1	0	11
47	3-098	2	06.0	S	105	18.0	9	M4	891012	2113	82.9	0	9
48	3-100	1	53.0	S	108	45.0	9	M4	891013	2052	53.7	2	0
49	3-102	1	54.0	S	111	34.0	10	M4	891014	2034	58.3	0	59
50	3-104	2	01.0	S	114	54.0	10	M4	891015	2031	71.2	0	25
51	3-106	1	56.0	S	118	21.0	10	M4	891016	2032	99.4	0	77
52	3-108	1	51.0	S	121	27.0	10	M4	891017	2050	114.0	0	2
53	3-110	2	59.0	S	120	13.0	10	M4	891018	2044	66.8	0	3
54	3-112	3	31.0	S	117	46.0	10	M4	891019	2034	102.9	2	1
55	3-114	3	58.0	S	115	16.0	10	M4	891020	2038	130.1	1	129
56	3-116	4	31.0	S	112	39.0	10	M4	891021	2031	108.9	0	2
57	3-124	6	00.0	S	100	16.0	9	M4	891025	2030	110.3	34	35
58	3-126	5	20.0	S	96	58.0	9	M4	891026	2032	112.0	128	881
59	3-128	4	10.0	S	94	39.0	8	M4	891027	2002	149.0	15	74
60	3-130	2	16.0	S	90	56.0	8	M4	891028	2005	107.9	7	2
61	3-132	1	01.0	S	88	29.0	8	M4	891029	2005	90.2	8	24
62	3-134	2	03.0	N	87	32.0	3	M4	891030	2003	131.8	0	386
63	3-137	6	27.0	N	86	35.0	3	M4	891101	2002	69.3	4	87
64	3-139	8	58.0	N	85	15.0	3	M4	891102	1913	92.0	10	52
65	4-141	9	07.0	N	87	59.0	3	M4	891109	1948	108.1	40	878
66	4-143	7	21.0	N	90	19.0	3	M4	891110	1944	67.1	74	5
67	4-147	2	42.0	N	93	33.0	3	M4	891112	2029	125.2	1	48

Tow Number	CTD Station	Lat. deg.	min.		Long.(W) deg	min.	Region	Ship Code	Tow Date yymmdd	Time (Loc.)	Vol.(m^3) Water Strained	Total Larvae	Total Eggs
68	4-149	0	17.0	S	94	24.0	8	M4	891113	2005	105.9	1	4
69	4-151	3	12.0	S	94	08.0	8	M4	891114	2011	86.7	0	2012
70	4-153	4	56.0	S	95	20.0	9	M4	891115	2005	62.5	8	229
71	4-155	4	04.0	S	98	38.0	9	M4	891116	2030	62.2	1	647
72	4-157	3	02.0	S	101	45.0	9	M4	891117	2012	71.0	0	0
73	4-159	2	08.0	S	104	45.0	9	M4	891118	2011	106.2	0	3
74	4-161	1	09.0	S	108	06.0	9	M4	891119	2013	83.3	2	8
75	4-163	0	13.0	S	111	32.4	10	M4	891120	2015	113.3	0	7
76	4-165	0	23.0	N	113	27.0	5	M4	891121	2047	67.5	0	28
77	4-167	1	51.0	N	119	16.0	5	M4	891122	2034	74.8	26	132
78	4-169	1	58.0	N	122	59.0	5	M4	891123	2002	65.1	1	5
79	4-171	2	18.0	N	125	25.0	6	M4	891124	2007	71.2	0	14
80	4-174	5	51.0	N	122	02.0	5	M4	891126	2002	73.8	2	3
81	4-175	8	14.0	N	124	45.0	5	M4	891127	2005	89.5	0	2
82	4-177	10	07.0	N	124	40.0	5	M4	891128	2001	65.1	0	13
83	4-179	11	57.0	N	122	03.0	5	M4	891129	2005	82.9	10	70
84	4-185	20	42.0	N	120	02.0	2	M4	891202	2003	66.4	5	0
85	4-187	23	26.0	N	117	58.0	2	M4	891203	2005	69.2	0	0
86	4-189	25	51.0	N	116	14.0	2	M4	891204	2029	172.4	0	65

Table 2. Pooled occurrences of fish larvae taken in Manta net tows on *Jordan* cruise 8910JD and *McArthur* cruise 8910M4.

Rank	Taxon	Occurrences
1	*Vinciguerria lucetia*	66
2	*Oxyporhamphus micropterus*	50
3	*Coryphaena equiselis*	35
4	*Auxis* spp.	26
5	*Cubiceps pauciradiatus*	19
6	Scomberesocidae	17
7	*Cheilopogon xenopterus*	16
8	*Lampanyctus* spp.	14
8	*Coryphaena hippurus*	14
10	*Exocoetus* spp.	13
11	*Prognichthys* spp.	10
11	*Nealotus tripes*	10
13	*Thunnus* spp.	9
14	*Hirundichthys marginatus*	8
14	*Diplophos proximus*	8
16	*Naucrates ductor*	7
17	*Myctophum aurolaternatum*	6
18	*Hygophum proximum*	5
18	*Lestidium* spp.	5
20	*Hirundichthys* spp.	4
20	*Lampanyctus parvicauda*	4
20	*Triphoturus* spp.	4
20	*Canthidermis maculatus*	4
20	*Cheilopogon* spp.	4
20	*Howella pammelas*	4
20	*Polydactylus approximans*	4
27	*Scomber japonicus*	3
27	*Bothus* spp.	3
27	*Cyclothone signata*	3
27	*Cheilopogon heterurus*	3
31	*Zu cristatus*	2
31	*Sardinops sagax*	2
31	*Gigantactis* spp.	2
31	*Oneirodes* spp.	2
31	*Lestidiops neles*	2
31	*Trachipterus fukuzakii*	2
31	*Symbolophorus evermanni*	2
31	Melanostomiinae	2
31	*Diaphus* spp.	2
31	*Ceratoscopelus* spp.	2
31	*Cyclothone* spp.	2
31	*Psenes sio*	2
31	Scorpaenidae	2
31	Gerreidae	2
31	*Brama dussumieri*	2
31	*Mugil* spp.	2
31	*Psenes cyanophrys*	2
48	*Chromis punctipinnis*	1
48	*Ostracion meleagris*	1

Table 2. (cont.)

Rank	Taxon	Occurrences
48	Labridae	1
48	*Chiasmodon niger*	1
48	*Stemonosudis macrura*	1
48	*Erotelis armiger*	1
48	Gobiidae	1
48	*Lobianchia gemellarii*	1
48	*Luvarus imperialis*	1
48	Disintegrated fish larvae	1
48	*Argyropelecus sladeni*	1
48	*Gempylus serpens*	1
48	*Istiophorus platypterus*	1
48	*Cyclothone acclinidens*	1
48	*Psenes* spp.	1
48	*Euthynnus lineatus*	1
48	*Opisthonema* spp.	1
48	*Etrumeus teres*	1
48	*Synodus sechurae*	1
48	*Dolopichthys* spp.	1
48	Unidentified fish larvae	1
48	*Ariosoma gilberti*	1
48	Perciformes	1
48	*Monolene* spp.	1
48	*Hemanthias signifer*	1
48	*Caranx caballus*	1
48	*Caranx sexfasciatus*	1
48	*Benthosema panamense*	1
48	*Seriola lalandi*	1
48	*Notoscopelus resplendens*	1
48	*Melanocetus* spp.	1
48	*Myctophum nitidulum*	1
48	*Myctophum lychnobium*	1
48	Haemulidae	1
48	*Hygophum atratum*	1
48	*Sargocentron suborbitalis*	1
48	*Diogenichthys laternatus*	1
48	*Hemiramphus saltator*	1
48	*Centrophryne spinulosa*	1
	Total	451

Table 3. Pooled counts of fish larvae taken in Manta net tows on *Jordan* cruise 8910JD and *McArthur* cruise 8910M4.

Rank	Taxon	Count
1	*Vinciguerria lucetia*	536
2	*Oxyporhamphus micropterus*	393
3	*Auxis* spp.	353
4	Scomberesocidae	242
5	*Etrumeus teres*	155
6	*Sardinops sagax*	90
7	*Prognichthys* spp.	83
8	*Cubiceps pauciradiatus*	62
9	*Coryphaena equiselis*	58
10	*Lampanyctus* spp.	38
10	*Scomber japonicus*	38
12	*Hirundichthys marginatus*	32
12	*Cheilopogon* spp.	32
14	*Mugil* spp.	29
14	*Coryphaena hippurus*	29
16	*Nealotus tripes*	28
17	*Exocoetus* spp.	21
18	*Polydactylus approximans*	20
19	*Cheilopogon xenopterus*	19
20	*Euthynnus lineatus*	17
21	*Myctophum aurolaternatum*	15
21	*Hirundichthys* spp.	15
23	*Thunnus* spp.	13
24	*Naucrates ductor*	10
25	*Diplophos proximus*	9
26	*Cyclothone signata*	7
26	*Lampanyctus parvicauda*	7
28	*Canthidermis maculatus*	6
28	*Chromis punctipinnis*	6
28	*Hygophum proximum*	6
31	*Sargocentron suborbitalis*	5
31	*Lestidium* spp.	5
33	*Howella pammelas*	4
33	*Cheilopogon heterurus*	4
33	*Diaphus* spp.	4
33	*Triphoturus* spp.	4
37	*Symbolophorus evermanni*	3
37	*Hygophum atratum*	3
37	*Ceratoscopelus* spp.	3
37	*Synodus sechurae*	3
37	*Bothus* spp.	3
37	Melanostomiinae	3
37	*Psenes cyanophrys*	3
37	Haemulidae	3
37	*Benthosema panamense*	3
46	*Cyclothone* spp.	2
46	*Notoscopelus resplendens*	2
46	*Zu cristatus*	2

Table 3. (cont.)

Rank	Taxon	Count
46	*Brama dussumieri*	2
46	*Gigantactis* spp.	2
46	Scorpaenidae	2
46	*Gempylus serpens*	2
46	*Ariosoma gilberti*	2
46	*Istiophorus platypterus*	2
46	*Lestidiops neles*	2
46	*Psenes sio*	2
46	*Seriola lalandi*	2
46	*Caranx caballus*	2
46	Gerreidae	2
46	*Oneirodes* spp.	2
46	*Trachipterus fukuzakii*	2
62	Labridae	1
62	Disintegrated fish larvae	1
62	*Stemonosudis macrura*	1
62	*Opisthonema* spp.	1
62	*Melanocetus* spp.	1
62	*Centrophryne spinulosa*	1
62	*Cyclothone acclinidens*	1
62	*Dolopichthys* spp.	1
62	*Monolene* spp.	1
62	*Chiasmodon niger*	1
62	*Argyropelecus sladeni*	1
62	*Erotelis armiger*	1
62	*Luvarus imperialis*	1
62	Unidentified fish larvae	1
62	*Diogenichthys laternatus*	1
62	*Hemiramphus saltator*	1
62	*Myctophum lychnobium*	1
62	*Myctophum nitidulum*	1
62	*Lobianchia gemellarii*	1
62	*Psenes* spp.	1
62	*Ostracion meleagris*	1
62	*Caranx sexfasciatus*	1
62	Perciformes	1
62	*Hemanthias signifer*	1
62	Gobiidae	1
	Total	2479

Table 4. Numbers of fish larvae taken in Manta net tows on *Jordan* cruise 8910JD and *McArthur* cruise 8910M4.

Ariosoma gilberti

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
48	JD	3-098	3	2	2.48

Etrumeus teres

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
1	M4	1-001	2	155	160.29

Opisthonema spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
21	JD	2-042	4	1	1.03

Sardinops sagax

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
1	M4	1-001	2	88	91.00
43	M4	3-090	8	2	2.00

Cyclothone spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
29	JD	2-062	4	1	1.23
43	JD	3-087	3	1	1.26

Cyclothone acclinidens

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
30	JD	2-064	4	1	1.28

Cyclothone signata

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
31	JD	2-066	4	4	4.91
37	JD	2-077	8	1	1.21
70	JD	4-141	4	2	2.42

Diplophos proximus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
1	JD		2	1	0.98
10	JD	1-021	5	1	1.05
13	JD	1-027	5	1	1.28
26	JD		1	1	1.06
57	JD	4-115	4	1	1.07
73	JD	4-147	4	1	1.50

Diplophos proximus (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
80	JD	4-162	1	2	2.50
81	JD	4-163	2	1	1.00

Argyropelecus sladeni

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
41	JD	3-082	3	1	1.23

Vinciguerria lucetia

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
2	M4	1-003	2	1	0.90
8	JD	1-017	4	1	1.15
11	M4	1-019	5	5	11.04
11	JD	1-023	5	22	34.70
12	JD		5	3	3.72
13	JD	1-027	5	17	21.68
15	JD	1-031	4	1	1.04
16	M4	1-034	6	4	3.03
19	JD	1-039	3	1	0.99
24	JD	2-050	4	1	1.50
25	JD	2-052	1	1	1.26
26	M4	2-054	5	1	1.73
29	JD	2-062	4	4	4.94
30	M4	2-062	5	2	2.64
30	JD	2-064	4	4	5.13
31	JD	2-066	4	20	24.57
31	M4	2-064	4	4	3.34
32	JD	2-068	4	5	6.68
32	M4	2-066	4	29	49.07
33	JD	2-070	4	16	23.53
33	M4	2-068	4	6	7.87
34	M4	2-070	4	2	3.19
34	JD	2-072	3	1	1.34
35	M4	2-072	4	8	15.27
36	JD	2-075	3	7	9.10
36	M4	2-074	4	16	22.76
37	JD	2-077	8	26	31.36
37	M4	2-078	8	1	1.37
38	M4	2-080	8	3	4.41

Vinciguerria lucetia (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
39	JD		8	15	15.67
39	M4	2-082	8	2	2.58
40	M4	2-084	8	5	6.77
40	JD	3-080	8	11	12.22
41	JD	3-082	3	25	30.64
41	M4	3-086	8	3	3.58
42	JD	3-085	3	5	6.20
43	JD	3-087	3	13	16.41
44	JD	3-089	3	6	7.56
45	JD	3-091	3	1	1.13
47	JD	3-096	3	3	3.45
48	JD	3-098	3	5	6.21
53	JD	4-109	4	2	1.82
57	JD	4-115	4	1	1.07
58	M4	3-126	9	1	0.89
59	JD	4-119	4	1	1.28
60	JD	4-121	4	1	1.14
61	M4	3-132	8	8	8.87
63	JD	4-127	3	10	11.35
63	M4	3-137	3	1	1.44
67	M4	4-147	3	1	0.80
67	JD	4-135	4	10	14.27
68	JD	4-137	4	1	1.21
69	JD	4-139	4	2	2.53
70	JD	4-141	4	87	105.20
71	JD	4-143	4	1	1.24
71	M4	4-155	9	1	1.61
74	M4	4-161	9	1	1.20
75	JD	4-151	5	2	2.32
76	JD	4-153	5	14	17.41
77	JD	4-157	2	9	10.53
77	M4	4-167	5	24	32.09
78	M4	4-169	5	1	1.54
79	JD	4-161	1	7	6.15
80	JD	4-162	1	33	41.30
83	M4	4-179	5	9	10.86
84	M4	4-185	2	2	3.01

Melanostomiinae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
31	JD	2-066	4	1	1.23

Melanostomiinae (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
37	JD	2-077	8	2	2.41

Synodus sechurae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
39	JD		8	3	3.13

Lestidiops neles

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
37	JD	2-077	8	1	1.21
80	JD	4-162	1	1	1.25

Lestidium spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
10	M4	1-018	4	1	0.99
12	JD		5	1	1.24
29	JD	2-062	4	1	1.23
32	M4	2-066	4	1	1.69
34	M4	2-070	4	1	1.60

Stemonosudis macrura

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
31	JD	2-066	4	1	1.23

Ceratoscopelus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
38	M4	2-080	8	1	1.47
84	M4	4-185	2	2	3.01

Diaphus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
32	JD	2-068	4	3	4.01
80	M4	4-174	5	1	1.36

Lampanyctus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
29	JD	2-062	4	2	2.47
31	JD	2-066	4	5	6.14
32	JD	2-068	4	4	5.35
33	JD	2-070	4	1	1.47
35	JD	2-073	3	1	1.10
36	M4	2-074	4	2	2.84

Lampanyctus spp. (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
36	JD	2-075	3	2	2.60
39	JD		8	2	2.09
40	JD	3-080	8	2	2.22
42	JD	3-085	3	1	1.24
43	JD	3-087	3	3	3.79
65	JD	4-131	3	8	7.97
69	JD	4-139	4	1	1.27
70	JD	4-141	4	4	4.84

Lampanyctus parvicauda

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
32	M4	2-066	4	1	1.69
33	JD	2-070	4	1	1.47
40	JD	3-080	8	2	2.22
63	JD	4-127	3	3	3.41

Lobianchia gemellarii

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
32	M4	2-066	4	1	1.69

Notoscopelus resplendens

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
37	JD	2-077	8	2	2.41

Triphoturus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
32	JD	2-068	4	1	1.34
37	JD	2-077	8	1	1.21
40	JD	3-080	8	1	1.11
41	JD	3-082	3	1	1.23

Benthosema panamense

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
39	JD		8	3	3.13

Diogenichthys laternatus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
37	JD	2-077	8	1	1.21

Hygophum atratum

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
5	JD	1-010	1	3	3.44

Hygophum proximum

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
31	M4	2-064	4	1	0.83
32	M4	2-066	4	1	1.69
34	M4	2-070	4	2	3.19
35	M4	2-072	4	1	1.91
69	JD	4-139	4	1	1.27

Myctophum aurolaternatum

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
31	JD	2-066	4	1	1.23
32	JD	2-068	4	1	1.34
36	M4	2-074	4	1	1.42
37	JD	2-077	8	10	12.06
41	JD	3-082	3	1	1.23
44	JD	3-089	3	1	1.26

Myctophum lychnobium

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
80	M4	4-174	5	1	1.36

Myctophum nitidulum

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
36	JD	2-075	3	1	1.30

Symbolophorus evermanni

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
42	JD	3-085	3	1	1.24
73	JD	4-147	4	2	3.00

Trachipterus fukuzakii

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
68	M4	4-149	8	1	0.94
70	JD	4-141	4	1	1.21

Zu cristatus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
31	M4	2-064	4	1	0.83
70	JD	4-141	4	1	1.21

Melanocetus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
44	JD	3-089	3	1	1.26

Dolopichthys spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
70	JD	4-141	4	1	1.21

Oneirodes spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
33	JD	2-070	4	1	1.47
63	JD	4-127	3	1	1.14

Centrophryne spinulosa

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
12	JD		5	1	1.24

Gigantactis spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
32	JD	2-068	4	1	1.34
69	JD	4-139	4	1	1.27

Scomberesocidae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
1	M4	1-001	2	28	28.96
37	M4	2-078	8	4	5.49
38	M4	2-080	8	3	4.41
39	M4	2-082	8	2	2.58
42	M4	3-088	8	4	4.72
43	M4	3-090	8	5	5.01
48	M4	3-100	9	1	1.86
54	M4	3-112	10	2	1.94
55	M4	3-114	10	1	0.77
57	M4	3-124	9	34	30.83
58	M4	3-126	9	126	112.50
59	M4	3-128	8	15	10.07
60	M4	3-130	8	6	5.56
70	M4	4-153	9	8	12.80
74	M4	4-161	9	1	1.20
77	M4	4-167	5	1	1.34
84	M4	4-185	2	1	1.51

Hemiramphus saltator

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
26	JD		1	1	1.06

Cheilopogon spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
52	JD	4-107	1	2	2.31
61	JD	4-123	4	2	2.06
62	JD	4-125	4	27	31.07
64	JD	4-129	3	1	1.15

Cheilopogon heterurus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
1	M4	1-001	2	1	1.03
15	JD	1-031	4	1	1.04
16	JD	1-033	4	2	1.98

Cheilopogon xenopterus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
2	JD	1-003	2	1	0.96
6	M4	1-010	5	1	0.97
7	JD	1-015	1	1	1.11
7	M4	1-012	5	1	0.89
9	JD	1-019	5	1	1.18
10	JD	1-021	5	1	1.05
12	JD		5	1	1.24
17	JD	1-035	4	1	1.02
21	JD	2-042	4	2	2.07
25	M4	2-052	6	1	1.50
27	JD		4	1	1.01
50	JD	3-102	3	1	1.03
51	JD	3-104	3	1	1.41
62	JD	4-125	4	1	1.15
66	M4	4-143	3	3	4.47
77	JD	4-157	2	1	1.17

Exocoetus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
16	JD	1-033	4	1	0.99
16	M4	1-034	6	1	0.76
17	JD	1-035	4	1	1.02
34	JD	2-072	3	1	1.34
35	JD	2-073	3	1	1.10

Exocoetus spp. (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
37	JD	2-077	8	1	1.21
41	JD	3-082	3	1	1.23
52	JD	4-107	1	2	2.31
58	JD	4-117	4	1	1.00
60	JD	4-121	4	1	1.14
62	JD	4-125	4	3	3.45
66	M4	4-143	3	6	8.94
77	M4	4-167	5	1	1.34

Hirundichthys spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
48	JD	3-098	3	3	3.73
51	JD	3-104	3	6	8.44
64	JD	4-129	3	3	3.45
65	JD	4-131	3	3	2.99

Hirundichthys marginatus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
5	M4	1-008	2	2	1.71
16	JD	1-033	4	4	3.96
61	JD	4-123	4	1	1.03
62	JD	4-125	4	10	11.51
63	M4	3-137	3	1	1.44
66	M4	4-143	3	12	17.88
68	JD	4-137	4	1	1.21
77	JD	4-157	2	1	1.17

Oxyporhamphus micropterus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
2	JD	1-003	2	1	0.96
4	M4	1-006	2	1	1.21
5	JD	1-010	1	5	5.73
7	JD	1-015	1	3	3.32
8	JD	1-017	4	3	3.44
9	JD	1-019	5	1	1.18
11	JD	1-023	5	1	1.58
13	M4	1-026	5	1	1.26
14	M4	1-028	6	1	0.83
15	JD	1-031	4	4	4.18
16	M4	1-034	6	2	1.51

Oxyporhamphus micropterus (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
16	JD	1-033	4	13	12.88
17	JD	1-035	4	13	13.28
18	JD	1-037	4	1	0.98
19	M4	1-040	7	1	1.60
19	JD	1-039	3	1	0.99
23	JD	2-048	4	1	1.21
24	JD	2-050	4	1	1.50
25	JD	2-052	1	4	5.03
26	JD		1	4	4.24
27	JD		4	33	33.23
28	JD	2-056	4	6	6.90
33	JD	2-070	4	1	1.47
34	JD	2-072	3	1	1.34
41	JD	3-082	3	3	3.68
42	JD	3-085	3	2	2.48
43	JD	3-087	3	9	11.36
44	JD	3-089	3	1	1.26
48	JD	3-098	3	3	3.73
50	JD	3-102	3	10	10.32
51	JD	3-104	3	2	2.81
52	JD	4-107	1	7	8.08
53	JD	4-109	4	3	2.74
56	JD	4-113	4	3	3.18
57	JD	4-115	4	10	10.68
58	JD	4-117	4	8	7.96
60	JD	4-121	4	29	33.11
61	JD	4-123	4	18	18.50
62	JD	4-125	4	87	100.12
63	JD	4-127	3	3	3.41
64	JD	4-129	3	5	5.75
64	M4	3-139	3	2	2.17
65	M4	4-141	3	3	2.78
66	JD	4-133	3	11	13.66
66	M4	4-143	3	52	77.50
68	JD	4-137	4	7	8.45
71	JD	4-143	4	1	1.24
76	JD	4-153	5	1	1.24
77	JD	4-157	2	3	3.51
78	JD	4-159	1	7	7.29

Prognichthys spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
18	JD	1-037	4	18	17.56
19	JD	1-039	3	17	16.90
20	JD	2-040	3	3	2.88
21	JD	2-042	4	14	14.46
26	JD		1	14	14.83
27	JD		4	4	4.03
62	JD	4-125	4	5	5.75
64	M4	3-139	3	1	1.09
65	M4	4-141	3	6	5.55
79	JD	4-161	1	1	0.88

Sargocentron suborbitalis

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
26	JD		1	5	5.30

Scorpaenidae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
33	JD	2-070	4	1	1.47
40	M4	2-084	8	1	1.35

Perciformes

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
78	JD	4-159	1	1	1.04

Hemanthias signifer

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
41	M4	3-086	8	1	1.19

Howella pammelas

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
31	JD	2-066	4	1	1.23
33	JD	2-070	4	1	1.47
34	M4	2-070	4	1	1.60
47	JD	3-096	3	1	1.15

Caranx caballus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
21	JD	2-042	4	2	2.07

Caranx sexfasciatus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
79	JD	4-161	1	1	0.88

Naucrates ductor

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
15	M4	1-030	6	1	1.26
16	M4	1-034	6	1	0.76
28	M4	2-058	5	1	1.30
44	M4	3-092	9	1	1.02
46	JD	3-093	3	4	5.10
57	JD	4-115	4	1	1.07
60	M4	3-130	8	1	0.93

Seriola lalandi

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
1	M4	1-001	2	2	2.07

Coryphaena equiselis

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
4	JD	1-008	1	3	2.80
6	JD	1-012	2	2	2.17
7	JD	1-015	1	2	2.21
7	M4	1-012	5	2	1.79
8	M4	1-014	5	1	0.79
11	JD	1-023	5	2	3.15
12	JD		5	1	1.24
13	M4	1-026	5	2	2.52
13	JD	1-027	5	2	2.55
15	JD	1-031	4	1	1.04
16	JD	1-033	4	1	0.99
16	M4	1-034	6	3	2.27
17	JD	1-035	4	1	1.02
18	M4	1-038	7	1	1.20
22	JD	2-044	4	1	0.90
24	JD	2-050	4	1	1.50
25	M4	2-052	6	1	1.50
25	JD	2-052	1	1	1.26
26	JD		1	3	3.18
27	JD		4	2	2.01
31	M4	2-064	4	1	0.83
34	M4	2-070	4	1	1.60
39	JD		8	1	1.04
45	JD	3-091	3	1	1.13
46	JD	3-093	3	2	2.55
48	JD	3-098	3	1	1.24
51	JD	3-104	3	2	2.81

Coryphaena equiselis (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
60	JD	4-121	4	2	2.28
61	JD	4-123	4	2	2.06
64	M4	3-139	3	3	3.26
65	JD	4-131	3	1	1.00
76	JD	4-153	5	1	1.24
77	JD	4-157	2	3	3.51
78	JD	4-159	1	3	3.13
79	JD	4-161	1	1	0.88

Coryphaena hippurus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
6	JD	1-012	2	1	1.09
21	JD	2-042	4	1	1.03
26	JD		1	5	5.30
30	JD	2-064	4	1	1.28
49	JD	3-100	3	4	4.31
50	JD	3-102	3	1	1.03
57	JD	4-115	4	1	1.07
61	JD	4-123	4	1	1.03
62	JD	4-125	4	3	3.45
63	M4	3-137	3	1	1.44
64	M4	3-139	3	4	4.35
64	JD	4-129	3	1	1.15
65	M4	4-141	3	4	3.70
66	M4	4-143	3	1	1.49

Brama dussumieri

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
31	JD	2-066	4	1	1.23
42	JD	3-085	3	1	1.24

Gerreidae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
17	JD	1-035	4	1	1.02
79	JD	4-161	1	1	0.88

Haemulidae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
39	JD		8	3	3.13

Polydactylus approximans

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
18	JD	1-037	4	2	1.95
26	JD		1	8	8.47
50	JD	3-102	3	1	1.03
65	M4	4-141	3	9	8.33

Mugil spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
21	JD	2-042	4	2	2.07
26	JD		1	27	28.60

Chromis punctipinnis

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
1	M4	1-001	2	6	6.20

Labridae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
40	M4	2-084	8	1	1.35

Chiasmodon niger

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
1	JD		2	1	0.98

Erotelis armiger

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
36	JD	2-075	3	1	1.30

Gobiidae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
37	JD	2-077	8	1	1.21

Luvarus imperialis

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
58	M4	3-126	9	1	0.89

Gempylus serpens

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
31	JD	2-066	4	2	2.46

Nealotus tripes

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
37	JD	2-077	8	1	1.21

Nealotus tripes (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
39	JD		8	1	1.04
40	JD	3-080	8	3	3.33
41	JD	3-082	3	14	17.16
42	JD	3-085	3	1	1.24
43	JD	3-087	3	4	5.05
44	JD	3-089	3	1	1.26
45	JD	3-091	3	1	1.13
73	JD	4-147	4	1	1.50
83	M4	4-179	5	1	1.21

Istiophorus platypterus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
26	JD		1	2	2.12

Auxis spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
5	JD	1-010	1	2	2.29
7	JD	1-015	1	5	5.53
14	JD	1-029	4	1	1.12
16	JD	1-033	4	38	37.66
17	JD	1-035	4	1	1.02
18	JD	1-037	4	34	33.17
19	JD	1-039	3	4	3.98
22	JD	2-044	4	1	0.90
24	JD	2-050	4	1	1.50
26	JD		1	22	23.31
27	JD		4	5	5.04
28	JD	2-056	4	1	1.15
33	JD	2-070	4	1	1.47
45	JD	3-091	3	1	1.13
52	JD	4-107	1	2	2.31
54	JD	4-111	4	2	2.02
56	JD	4-113	4	2	2.12
57	JD	4-115	4	8	8.55
58	JD	4-117	4	2	1.99
59	JD	4-119	4	1	1.28
60	JD	4-121	4	8	9.13
62	JD	4-125	4	72	82.85
63	JD	4-127	3	7	7.95
64	JD	4-129	3	4	4.60

Auxis spp. (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
68	JD	4-137	4	1	1.21
79	JD	4-161	1	127	111.60

Euthynnus lineatus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
65	M4	4-141	3	17	15.73

Scomber japonicus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
1	M4	1-001	2	36	37.23
2	M4	1-003	2	1	0.90
38	M4	2-080	8	1	1.47

Thunnus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
5	M4	1-008	2	1	0.86
7	JD	1-015	1	3	3.32
8	JD	1-017	4	1	1.15
19	JD	1-039	3	2	1.99
26	JD		1	2	2.12
29	JD	2-062	4	1	1.23
53	JD	4-109	4	1	0.91
57	JD	4-115	4	1	1.07
68	JD	4-137	4	1	1.21

Cubiceps pauciradiatus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
5	JD	1-010	1	1	1.15
7	JD	1-015	1	1	1.11
8	JD	1-017	4	8	9.18
9	JD	1-019	5	1	1.18
15	M4	1-030	6	1	1.26
16	M4	1-034	6	1	0.76
19	JD	1-039	3	1	0.99
27	JD		4	1	1.01
33	JD	2-070	4	1	1.47
37	JD	2-077	8	1	1.21
48	M4	3-100	9	1	1.86
57	JD	4-115	4	6	6.41
58	JD	4-117	4	6	5.97

Cubiceps pauciradiatus (cont.)

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
60	JD	4-121	4	27	30.82
65	JD	4-131	3	1	1.00
65	M4	4-141	3	1	0.93
75	JD	4-151	5	1	1.16
79	JD	4-161	1	1	0.88
80	JD	4-162	1	1	1.25

Psenes spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
58	JD	4-117	4	1	1.00

Psenes cyanophrys

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
14	M4	1-028	6	2	1.67
34	M4	2-070	4	1	1.60

Psenes sio

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
37	JD	2-077	8	1	1.21
40	M4	2-084	8	1	1.35

Bothus spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
41	M4	3-086	8	1	1.19
68	JD	4-137	4	1	1.21
79	JD	4-161	1	1	0.88

Monolene spp.

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
40	M4	2-084	8	1	1.35

Canthidermis maculatus

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
14	M4	1-028	6	1	0.83
21	JD	2-042	4	2	2.07
26	JD		1	2	2.12
63	M4	3-137	3	1	1.44

Ostracion meleagris

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
29	JD	2-062	4	1	1.23

Disintegrated fish larvae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
26	JD		1	1	1.06

Unidentified fish larvae

Tow Number	Ship Code	CTD Number	Region	Count	Count per 100m³
31	M4	2-064	4	1	0.83

Table 5. Average numbers of larvae (per 100 m³ of water filtered) for each taxon taken in Manta net tows in the regions (Figure 3) occupied on *Jordan* cruise 8910JD and *McArthur* cruise 8910M4.

	Region									
Taxon	1	2	3	4	5	6	7	8	9	10
Ariosoma gilberti	-	-	1.6	-	-	-	-	-	-	-
Etrumeus teres	-	149.9	-	-	-	-	-	-	-	-
Opisthonema spp.	-	-	-	1.0	-	-	-	-	-	-
Sardinops sagax	-	85.1	-	-	-	-	-	2.0	-	-
Cyclothone spp.	-	-	0.8	0.8	-	-	-	-	-	-
Cyclothone acclinidens	-	-	-	0.8	-	-	-	-	-	-
Cyclothone signata	-	-	-	2.5	-	-	-	0.8	-	-
Diplophos proximus	1.3	1.0	-	0.8	0.9	-	-	-	-	-
Argyropelecus sladeni	-	-	0.8	-	-	-	-	-	-	-
Vinciguerria lucetia	11.7	3.4	5.0	7.4	6.6	5.3	-	7.1	0.9	-
Melanostomiinae	-	-	-	0.8	-	-	-	1.7	-	-
Synodus sechurae	-	-	-	-	-	-	-	2.9	-	-
Lestidiops neles	0.8	-	-	-	-	-	-	0.8	-	-
Lestidium spp.	-	-	-	0.8	0.8	-	-	-	-	-
Stemonosudis macrura	-	-	-	0.8	-	-	-	-	-	-
Ceratoscopelus spp.	-	1.3	-	-	-	-	-	0.7	-	-
Diaphus spp.	-	-	-	2.2	0.7	-	-	-	-	-
Lampanyctus spp.	-	-	2.7	2.1	-	-	-	1.9	-	-
Lampanyctus parvicauda	-	-	2.6	0.6	-	-	-	1.8	-	-
Lobianchia gemellarii	-	-	-	0.6	-	-	-	-	-	-
Notoscopelus resplendens	-	-	-	-	-	-	-	1.7	-	-
Triphoturus spp.	-	-	0.8	0.7	-	-	-	0.9	-	-
Benthosema panamense	-	-	-	-	-	-	-	2.9	-	-
Diogenichthys laternatus	-	-	-	-	-	-	-	0.8	-	-
Hygophum atratum	2.6	-	-	-	-	-	-	-	-	-
Hygophum proximum	-	-	-	0.9	-	-	-	-	-	-
Myctophum aurolaternatum	-	-	0.8	0.8	-	-	-	8.3	-	-
Myctophum lychnobium	-	-	-	-	0.7	-	-	-	-	-
Myctophum nitidulum	-	-	0.8	-	-	-	-	-	-	-
Symbolophorus evermanni	-	-	0.8	1.3	-	-	-	-	-	-
Trachipterus fukuzakii	-	-	-	0.8	-	-	-	1.1	-	-
Zu cristatus	-	-	-	1.0	-	-	-	-	-	-
Melanocetus spp.	-	-	0.8	-	-	-	-	-	-	-
Dolopichthys spp.	-	-	-	0.8	-	-	-	-	-	-
Oneirodes spp.	-	-	0.9	0.7	-	-	-	-	-	-
Centrophryne spinulosa	-	-	-	-	0.8	-	-	-	-	-
Gigantactis spp.	-	-	-	0.8	-	-	-	-	-	-
Scomberesocidae	-	13.9	-	-	0.7	-	-	6.2	37.0	1.7
Hemiramphus saltator	0.9	-	-	-	-	-	-	-	-	-
Cheilopogon spp.	1.7	-	0.9	12.7	-	-	-	-	-	-
Cheilopogon heterurus	-	1.0	-	1.5	-	-	-	-	-	-
Cheilopogon xenopterus	0.9	0.9	1.2	1.2	1.0	0.7	-	-	-	-
Exocoetus spp.	1.7	-	1.6	1.3	0.7	1.3	-	0.8	-	-
Hirundichthys spp.	-	-	3.1	-	-	-	-	-	-	-

Taxon	Region 1	2	3	4	5	6	7	8	9	10
Hirundichthys marginatus	-	1.6	4.4	3.6	-	-	-	-	-	-
Oxyporhamphus micropterus	4.5	1.5	5.5	11.7	0.8	1.9	0.6	-	-	-
Prognichthys spp.	7.2	-	6.9	10.1	-	-	-	-	-	-
Sargocentron suborbitalis	4.7	-	-	-	-	-	-	-	-	-
Scorpaenidae	-	-	-	0.7	-	-	-	0.7	-	-
Perciformes	1.0	-	-	-	-	-	-	-	-	-
Hemanthias signifer	-	-	-	-	-	-	-	0.8	-	-
Howella pammelas	-	-	0.9	0.7	-	-	-	-	-	-
Caranx caballus	-	-	-	1.9	-	-	-	-	-	-
Caranx sexfasciatus	1.1	-	-	-	-	-	-	-	-	-
Naucrates ductor	-	-	3.1	0.9	0.8	1.1	-	1.1	1.0	-
Seriola lalandi	-	1.9	-	-	-	-	-	-	-	-
Coryphaena equiselis	2.1	2.2	1.4	1.2	1.4	2.3	0.8	1.0	-	-
Coryphaena hippurus	4.7	0.9	2.1	1.3	-	-	-	-	-	-
Brama dussumieri	-	-	0.8	0.8	-	-	-	-	-	-
Gerreidae	1.1	-	-	1.0	-	-	-	-	-	-
Haemulidae	-	-	-	-	-	-	-	2.9	-	-
Polydactylus approximans	7.6	-	5.3	2.1	-	-	-	-	-	-
Mugil spp.	25.5	-	-	1.9	-	-	-	-	-	-
Chromis punctipinnis	-	5.8	-	-	-	-	-	-	-	-
Labridae	-	-	-	-	-	-	-	0.7	-	-
Chiasmodon niger	-	1.0	-	-	-	-	-	-	-	-
Erotelis armiger	-	-	0.8	-	-	-	-	-	-	-
Gobiidae	-	-	-	-	-	-	-	0.8	-	-
Luvarus imperialis	-	-	-	-	-	-	-	-	1.1	-
Gempylus serpens	-	-	-	1.6	-	-	-	-	-	-
Nealotus tripes	-	-	3.4	0.7	0.8	-	-	1.5	-	-
Istiophorus platypterus	1.9	-	-	-	-	-	-	-	-	-
Auxis spp.	34.7	-	3.6	9.9	-	-	-	-	-	-
Euthynnus lineatus	-	-	18.4	-	-	-	-	-	-	-
Scomber japonicus	-	18.0	-	-	-	-	-	0.7	-	-
Thunnus spp.	2.3	1.2	2.0	0.9	-	-	-	-	-	-
Cubiceps pauciradiatus	0.9	-	1.0	7.3	0.9	1.1	-	0.8	0.5	-
Psenes spp.	-	-	-	1.0	-	-	-	-	-	-
Psenes cyanophrys	-	-	-	0.6	-	2.4	-	-	-	-
Psenes sio	-	-	-	-	-	-	-	0.8	-	-
Bothus spp.	1.1	-	-	0.8	-	-	-	0.8	-	-
Monolene spp.	-	-	-	-	-	-	-	0.7	-	-
Canthidermis maculatus	1.9	-	0.7	1.9	-	1.2	-	-	-	-
Ostracion meleagris	-	-	-	0.8	-	-	-	-	-	-
Disintegrated fish larvae	0.9	-	-	-	-	-	-	-	-	-
Unidentified fish larvae	-	-	-	1.2	-	-	-	-	-	-

Table 6. Numbers (raw counts) and size ranges of juvenile fishes taken in Manta tows on *Jordan* cruise 8910JD and *McArthur* cruise 8910M4. Some larger specimens (e.g., myctophids) may be adults.

STOMIIFORMES

Astronesthidae

Astronesthes gibbsi
M4 82 (1) 37mm.

MYCTOPHIFORMES

Myctophidae

Gonichthys tenuiculus
JD 1 (2) 14-15mm; **JD 14** (1) 21mm; **JD 33** (1) 19mm; **JD 34** (1) 16mm; **JD 35** (3) 15-31mm; **JD 37** (1) 21mm; **JD 39** (2) 25-26mm; **JD 40** (32) 16-27mm; **JD 41** (12) 15-17mm; **JD 42** (1) 38mm; **JD 43** (6) 15-19mm; **JD 48** (1) 20mm; **JD 51** (2) 16-40mm; **JD 68** (3) 20-21mm; **JD 70** (1) 18mm; **JD 71** (6) 16-17mm; **JD 72** (4) 19-25mm; **JD 74** (3) 15-29mm; **JD 75** (2) 15-15mm; **JD 78** (1) 17mm; **JD 81** (2) 18-28mm.

M4 1 (13) 16-46mm; **M4 2** (4) 16-23mm; **M4 3** (2) 22-28mm; **M4 4** (1) 14mm; **M4 7** (27) 17-43mm; **M4 8** (13) 18-37mm; **M4 9** (1) 39mm; **M4 10** (4) 29-43mm; **M4 13** (5) 17-37mm; **M4 14** (11) 17-44mm; **M4 15** (3) 37-42mm; **M4 16** (38) 17-40mm; **M4 17** (50) 18-46mm; **M4 18** (1) 16mm; **M4 20** (2) 35-44mm; **M4 28** (1) 21mm; **M4 30** (1) 22mm; **M4 31** (3) 24-42mm; **M4 35** (5) 15-21mm; **M4 36** (13) 15-33mm; **M4 37** (17)16-46mm; **M4 38** (5) 16-21mm; **M4 39** (17) 15-43mm; **M4 40** (121) 18-44mm; **M4 41** (19) 18-46mm; **M4 42** (12) 18-41mm; **M4 43** (11) 18-37mm; **M4 44** (20) 18-28mm; **M4 45** (7) 18-39mm; **M4 46** (1) 19mm; **M4 52** (2) 19-45mm; **M4 53** (2) 15-22mm; **M4 54** (1) 22mm; **M4 55** (2) 15-19mm; **M4 56** (1) 17mm; **M4 57** (20) 16-47mm; **M4 58** (43) 15-48mm; **M4 60** (55) 15-45mm; **M4 61** (19) 16-39mm; **M4 62** (13) 16-30mm; **M4 63** (18) 16-39mm; **M4 64** (15) 14-18mm; **M4 66** (4) 18-29mm; **M4 67** (1) 19mm; **M4 68** (31) 18-29mm; **M4 69** (17) 28-45mm; **M4 70** (1) 19mm; **M4 71** (1) 19mm; **M4 72** (8) 18-22mm; **M4 73** (47) 15-40mm; **M4 74** (9) 14-42mm; **M4 75** (2) 35-38mm; **M4 76** (9) 15-35mm; **M4 77** (6) 22-40mm; **M4 79** (1) 25mm; **M4 82** (5) 14-17mm; **M4 83** (10) 17-43mm; **M4 85** (1) 24mm; **M4 86** (7) 23-34mm.

Hygophum atratum
JD 6 (4) 14-20mm; **JD 78** (1) 13mm; **JD 81** (127) 12-14mm.
M4 86 (2) 18-25mm.

Hygophum proximum
JD 5 (2) 13-14mm; **JD 6** (3) 21-26mm; **JD 81** (2) 13-18mm.
M4 4 (1) 48mm; **M4 14** (1) 22mm; **M4 52** (1) 55mm; **M4 55** (1) 63mm; **M4 75** (1) 68mm.

Lampanyctus omostigma
M4 9 (1) 47mm**; M4 16** (2) 47-56mm; **M4 17** (3) 45-53mm; **M4 20** (1) 36mm.

Myctophum asperum
JD 73 (1) 14mm.

M4 11 (1) 16mm; **M4 27** (1) 15mm; **M4 31** (2) 16-17mm; **M4 34** (1) 19mm; **M4 76** (1) 14mm; **M4 77** (2) 14-14mm; **M4 78** (6) 14-15mm; **M4 79** (3) 15-18mm; **M4 80** (1) 14mm.

Myctophum aurolaternatum
JD 6 (1) 25mm; **JD 14** (1) 28mm; **JD 16** (1) 32mm; **JD 18** (1) 36mm; **JD 52** (3) 23-27mm; **JD 72** (1) 27mm; **JD 79** (16) 24-27mm.

M4 5 (1) 25mm; **M4 7** (1) 25mm; **M4 8** (1) 26mm; **M4 9** (2) 25-26mm; **M4 37** (1) 26mm.

Myctophum lychnobium
JD 31 (1) 17mm.
M4 10 (1) 18mm; **M4 24** (1) 19mm; **M4 79** (1) 17mm.

Myctophum nitidulum
JD 31 (1) 14mm; **JD 33** (3) 14-19mm; **JD 34** (7) 15-16mm; **JD 35** (2) 16-28mm; **JD 36** (1) 15mm; **JD 37** (22) 13-24mm; **JD 39** (20) 15-48mm; **JD 40** (4) 16-25mm; **JD 41** (2) 15-18mm; **JD 51** (2) 20-22mm; **JD 71** (3) 16-16mm; **JD 72** (10) 15-17mm; **JD 73** (1) 22mm.

M4 10 (21) 19-29mm; **M4 15** (2) 23-23mm; **M4 23** (1) 21mm; **M4 26** (1) 20mm; **M4 30** (2) 19-20mm; **M4 31** (1) 22mm; **M4 33** (1) 24mm; **M4 35** (1) 15mm; **M4 36** (2) 24-24mm; **M4 37** (8) 15-18mm; **M4 39** (3) 15-17mm; **M4 40** (18) 15-50mm; **M4 41** (2) 17-17mm; **M4 44** (4) 18-20mm; **M4 52** (3) 21-31mm; **M4 54** (1) 18mm;**M4 57** (2) 17-26mm; **M4 58** (7) 15-17mm; **M4 60** (6) 18-43mm; **M4 61** (2) 24-25mm; **M4 62** (7) 15-54mm; **M4 74** (1) 34mm; **M4 77** (5) 16-37mm; **M4 78** (9) 16-18mm; **M4 79** (3) 16-18mm; **M4 80** (3) 16-26mm; **M4 84** (1) 22mm; **M4 86** (1) 19mm.

Symbolophorus californiensis
M4 1 (1) 29mm.

Symbolophorus evermanni
JD 31 (1) 19mm; **JD 32** (1) 19mm; **JD 35** (1) 20mm; **JD 71** (1) 20mm; **JD 72** (2) 20-21mm; **JD 74** (5) 19-23mm.
M4 7 (2) 21-30mm; **M4 8** (1) 45mm; **M4 14** (1) 25mm; **M4 17** (1) 23mm; **M4 20** (1) 22mm; **M4 37** (1) 65mm; **M4 58** (1) 22mm; **M4 80** (1) 21mm; **M4 81** (1) 20mm.

BELONIFORMES

Scomberesocidae

Cololabis saira
M4 86 (1) 59mm.

Elassichthys adocetus
M4 54 (1) 35mm; **M4 56** (1) 23mm; **M4 57** (11) 26-43mm**; M4 58** (20) 21-32mm; **M4 59** (9) 22-42mm; **M4 60** (4) 21-26mm; **M4 70** (2) 23-26mm.

Scomberesox saurus
M4 38 (1) 28mm.

Exocoetidae

Cheilopogon pinnatibarbatus
M4 86 (1) 23mm.

Cheilopogon xenopterus
JD 19 (1) 38mm.

Exocoetus monocirrhus
JD 19 (1) 32mm.

M4 67 (1) 24mm.

Exocoetus volitans
JD 12 (1) 52mm.
M4 17 (1) 46mm**; M4 21** (3) 24-26mm.

Prognichthys tringa
JD 79 (1) 37mm.

PERCIFORMES

Carangidae

Naucrates ductor
JD 45 (1) 27mm.

Seriola rivoliana
JD 22 (1) 19mm.

Coryphaenidae

Coryphaena equiselis
JD 6 (1) 19mm; **JD 11** (1) 23mm; **JD 45** (1) 21mm; **JD 46** (1) 26mm; **JD 58** (2) 21-22mm.
M4 17 (2) 28-30mm.

Polynemidae

Polydactylus approximans
JD 24 (1) 25mm; **JD 79** (1) 20mm.

Mullidae

Mulloidichthys dentatus
JD 79 (1) 35mm.

Kyphosidae

JD 48 (1) 16mm.

Mugilidae

Mugil cephalus
M4 43 (1) 21mm; **M4 86** (3) 13-15mm.

Mugil curema
JD 21 (2) 15-21mm; **JD 79** (2) 13-18mm.

Nomeidae

Nomeus gronovii
M4 58 (1) 22mm.

TETRAODONTIFORMES

Ostraciidae

Lactoria diaphana
JD 12 (1) 49mm.

Diodontidae

Diodon eydouxii
M4 83 (1) 53mm.

Diodon hystrix
JD 26 (12) 4-7mm; **JD 77** (1) 12mm.
M4 20 (2) 9-10mm.

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ALPHABETICAL INDEX TO TABLES 4 AND 6

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