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## FISHES COLLECTED BY MIDWATER TRAWLS DURING TWO CRUISES OF THE *DAVID STARR JORDAN* IN THE NORTHEASTERN PACIFIC OCEAN, APRIL-JUNE AND SEPTEMBER-OCTOBER, 1972

John L. Butler  
H. Geoffrey Moser  
William Watson  
David A. Ambrose  
Sharon R. Charter  
Elaine M. Sandknop

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

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H. G. Moser  
Southwest Fisheries Science Center  
P.O. Box 271  
La Jolla, CA 92038-0271





## **NOAA Technical Memorandum NMFS**

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National Marine Fisheries Service, NOAA  
Southwest Fisheries Science Center  
La Jolla Laboratory  
P.O. Box 271  
La Jolla, California 92038-0271

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## **U.S. DEPARTMENT OF COMMERCE**

William M. Daley, Secretary

## **National Oceanic and Atmospheric Administration**

D. James Baker, Under Secretary for Oceans and Atmosphere

## **National Marine Fisheries Service**

Rolland A. Schmitt, Assistant Administrator for Fisheries



## CONTENTS

INTRODUCTION . . . . .	1	Macrouridae . . . . .	29
METHODS AND MATERIALS . . . . .	2	Moridae . . . . .	29
SUMMARY OF RESULTS . . . . .	3	Melanonidae . . . . .	29
LIST OF FISHES . . . . .	3	Bythitidae . . . . .	30
Albulidae . . . . .	4	Linophrynidae . . . . .	30
Chlopsidae . . . . .	4	Scomberesocidae . . . . .	30
Muraenidae . . . . .	4	Exocoetidae . . . . .	30
Ophichthidae . . . . .	4	Radiicephalidae . . . . .	30
Congridae . . . . .	4	Trachipteridae . . . . .	30
Derichthyidae . . . . .	5	Stylephoridae . . . . .	31
Nemichthyidae . . . . .	5	Anoplogastridae . . . . .	31
Serrivomeridae . . . . .	6	Melamphaidae . . . . .	31
Cyematidae . . . . .	6	Cetomimidae . . . . .	33
Eurypharyngidae . . . . .	6	Macrurocyttidae . . . . .	33
Engraulidae . . . . .	7	Centriscidae . . . . .	33
Bathylagidae . . . . .	7	Scorpaenidae . . . . .	33
Microstomatidae . . . . .	7	Carangidae . . . . .	33
Opisthoproctidae . . . . .	8	Coryphaenidae . . . . .	34
Platyroctidae . . . . .	8	Caristiidae . . . . .	34
Gonostomatidae . . . . .	8	Howellidae . . . . .	34
Sternoptychidae . . . . .	10	Labridae . . . . .	34
Phosichthyidae . . . . .	11	Chiasmodontidae . . . . .	35
Chauliodontidae . . . . .	12	Gempylidae . . . . .	35
Stomiidae . . . . .	12	Scombridae . . . . .	35
Astronesthidae . . . . .	12	Trichiuridae . . . . .	35
Melanostomiidae . . . . .	13	Nomeidae . . . . .	35
Malacosteidae . . . . .	14	Paralichthyidae . . . . .	36
Idiacanthidae . . . . .	15	Bothidae . . . . .	36
Scopelarchidae . . . . .	15	Cynoglossidae . . . . .	36
Notosudidae . . . . .	16	Balistidae . . . . .	36
Paralepididae . . . . .	16	Ostraciidae . . . . .	37
Anopteridae . . . . .	17	Molidae . . . . .	37
Evermannellidae . . . . .	17	ACKNOWLEDGEMENTS . . . . .	37
Neoscopelidae . . . . .	18	LITERATURE CITED . . . . .	37
Myctophidae . . . . .	18	TABLES . . . . .	53
Bregmacerotidae . . . . .	29	FIGURES . . . . .	64



Fishes collected by midwater trawls during two cruises of the  
*David Starr Jordan* in the northeastern Pacific Ocean,  
April-June and September-November, 1972.

J. L. Butler, H. G. Moser, W. Watson,  
D. A. Ambrose, S. R. Charter, and E. M. Sandknop

## INTRODUCTION

During the spring and fall of 1972 the Coastal Fisheries Resources Division, Southwest Fisheries Science Center, conducted two multi-vessel ichthyoplankton/midwater trawl surveys (Cruises 7205-JD and 7210-JD) in a region of the eastern Pacific Ocean between 20° and 48° N latitude, from the coast westward to ca. 145° W longitude. Midwater trawling was limited to that part of the sampling pattern occupied by the *David Starr Jordan* between 20° and 31°N latitude. The major purpose of these cruises was to increase our knowledge of the limits of spawning of jack mackerel, *Trachurus symmetricus*, and Pacific saury, *Cololabis saira*. The first results from these cruises were reported by Ahlstrom and Stevens (1976) who compared catches of fish eggs and larvae taken by neuston and oblique plankton nets on 7205-JD. They showed that larvae of some fishes (e.g., Pacific saury, flying fishes) reside almost exclusively near the surface, some (e.g., bathylagid smelts, melamphoids) occur exclusively in the water column below the surface, and others (e.g., jack mackerel) occur in both habitats.

Another goal of Cruises 7205-JD and 7210-JD was to define the physical-biological environment seaward of the standard California Cooperative Oceanic Fisheries Investigations (CalCOFI) sampling pattern and, particularly, to increase our knowledge of the distribution and abundance of fish species in this region. Analysis of the adult and juvenile fishes from the midwater trawl catches is a necessary prerequisite to work on the ichthyoplankton, since the larvae of many groups of fishes in this region are poorly known. The trawl catches provide information on the species composition, relative abundance, and distribution of juveniles and adults and, also, transformation specimens that link larvae and adults and allow the completion of ontogenetic series. This report presents preliminary results of the midwater trawling conducted on these cruises.

Much of what we know about the species composition, relative abundance, and zoogeography of midwater fishes in the northeastern Pacific is derived from midwater trawling surveys conducted in the California Current region and in adjoining water masses. Aron (1962) analyzed catches from >500 midwater trawls taken on three cruises from the Gulf of Alaska to the subarctic-transitional waters of the northern and central California Current region. Percy (1964) and collaborators (Percy and Laurs, 1965; Percy et al., 1977; Willis and Percy, 1982) contributed much information on the distribution and ecology of midwater fishes off the coasts of Oregon and Washington. Berry and Perkins (1966) employed four types of midwater trawls on their surveys that occupied ca. 200 stations in the CalCOFI survey area from San Francisco to southern Baja California. Ebeling et al. (1970) described the composition and distribution of midwater fishes in the deep-water basins off southern California and Paxton (1967) provided a distributional analysis of lanternfishes that occur in these basins. Three studies (Lavenberg and Fitch, 1966; Robison, 1972; Brewer, 1973) characterized the distributions of midwater fish species in the Gulf of California and adjoining waters of the eastern tropical Pacific. Moser et al. (1993, 1994) presented summaries of the distribution and relative abundance of larvae of midwater fishes of the California Current region. Our knowledge of the midwater fishes to the south and to the west of the CalCOFI survey area is derived from numerous surveys, beginning with Garman's (1899) expedition. Subsequent surveys

(Beebe and Vander Pyle, 1944; King and Iverson, 1962; Ahlstrom, 1971, 1972; Barnett, 1983, 1984; Clarke, 1973, 1974, 1983, 1987; Clarke and Wagner, 1976; Hartman and Clarke, 1974; Loeb, 1979, 1980) have expanded our knowledge of the distribution of midwater fishes in these regions. Several broad-scale zoogeographic analyses (Parin, 1961; Ebeling, 1962, 1967; Johnson, 1974, 1982; Willis, 1984; Willis et al., 1988) of north Pacific midwater fishes reveal distinctive faunal boundaries delimiting subarctic, transitional, central, and equatorial faunal groups.

## METHODS AND MATERIALS

Two types of midwater trawls were used on 7205-JD and 7210-JD: a 6-foot (1.8m) Isaacs-Kidd Midwater Trawl (IK) and a 95-foot (30m) Universal Mark II Midwater Trawl (MT). The IK (Isaacs and Kidd, 1953) was fitted with 2 mm mesh throughout. The MT was somewhat modified from the original design (Jurkovich, 1968). The wings and body were made of 5-inch (12.7cm) stretch mesh with No. 21 thread. The cod end was 3.5-inch (8.9cm) stretch mesh with No. 36 thread and lined with 4 mm mesh. The net was towed with 4.5 × 7.5 foot (1.4 × 2.3m) "V" doors.

A total of 32 oblique midwater trawls was taken on 19 stations on 7205-JD, from April 21 to June 3, 1972 (Fig. 1; Table 1). Most of the stations were located on latitudinal transects extending westward from the CalCOFI lines, which generally are oriented at right angles to the coastline. Four stations were within the CalCOFI grid; the numbers for these inshore stations are those of the CalCOFI pattern, with the line number given first, followed by a dot and the station number (Kramer et al., 1972). CalCOFI station numbers for the Gulf of California include a "G" after the survey line number. The numbers for the offshore stations were derived from the latitude and longitude of the station, with the latitude given first, followed by a dot and the longitude. At each trawl station, an IK was taken with a maximum of 600mwo (mwo=m of towing cable payed out). At station 31.145 the shallow IK was made with 650mwo. On 12 of the stations, a deeper tow (1000mwo) was made, either with the IK (4 tows) or the MT (8 tows). All trawls were double oblique tows at a ship speed of 3.5 knots (1.8 m/s). Trawl depth was measured with a time-depth recorder and indicated an average maximum depth of 212.1m (range=190-320m; sd=34.0m) for the 600mwo tows. The time-depth recorder malfunctioned on the deep tows on Cruise 7205.

On 7210-JD, a total of 43 oblique trawls was taken on 24 stations from September 29 to November 17, 1972 (Fig. 1; Table 2). Eight stations were within the CalCOFI grid and 16 were on the extended transect lines. At each trawl station, an IK was taken with 600mwo and on 17 of the stations a MT trawl was made with 1000mwo. Station 22.143 had only a 1000mwo MT trawl and the deep tow on station 27.143 was made with an IK. The deep MT tow at station 24.143 had 1200mwo. Average maximum trawl depth was 227.5m (range=183-283m; sd=34.0m) for the 600mwo tows and 426.9m (range=317-610m; sd=67.7m) for the 1000mwo tows. On both cruises, average fishing time per tow was 43.5 min (range=33-45 min; sd=1.8 min) for the 600 m tows and 74.1 min (range=42-88 min; sd=9.8 min) for the 1000m tows. Trawls were taken at night on both cruises, except for a few trawls taken at dusk.

A number of comprehensive taxonomic papers and guides were helpful in the identification of the specimens from the two survey cruises (Allen and Robertson, 1994; Eschmeyer et al., 1983; Fischer et al., 1995; Fitch and Lavenberg, 1968; Garman, 1899; Masuda et al., 1984; Matarese et al., 1989; Miller and Lea, 1972; Moser, 1996a; Okiyama, 1988; Ozawa, 1986a; Smith and Heemstra, 1986; Whitehead et al., 1984, 1986). In addition to these general works, other more circumscribed taxonomic publications were useful. The pertinent papers for identification of taxa within a particular family are listed under each family heading in the species list. Explanations or remarks referring to unresolved taxonomic problems are placed below each taxon in the species list.



## SUMMARY OF RESULTS

Approximately 224 species of fishes were collected on the two cruises (Table 3). The number cannot be determined exactly because of the uncertain identification of some forms. The family Myctophidae accounted for a fourth of the total number of species with 55 species. Next were the Melanostomiidae with ca. 13 species and the Gonostomatidae with 11 species. Following these were Congridae and Melamphaidae with 9 species, Sternoptychidae and Scopelarchidae with 8, and Paralepididae with 7. The most speciose genera were in the Myctophidae with *Diaphus* represented by at least 12 species and *Lampanyctus* by 8 species.

Approximately 23,930 specimens were collected by 48 IK and 27 MT trawls (Table 3). The family Myctophidae was the most abundant with 12,357 specimens, representing 52% of the total. Next were the Phosichthyidae with 4,848 (20%) and the Gonostomatidae with 4,805 specimens (20%). The next most abundant was the Sternoptychidae with 736 specimens (3%). These four families accounted for 95% of all specimens taken by the trawls. The five most abundant species were *Vinciguerria lucetia* (3,335 specimens), *Cyclothone acclinidens* (2,278), *Ceratoscopelus townsendi* (1,765), *Diogenichthys atlanticus* (1,614), and *Notolychnus valdiviae* (1,377). These five species represented ca. 43% of all specimens collected. The next five most abundant species were: *Vinciguerria nimbaria* (1,155), *Triphoturus mexicanus* (993), *Ceratoscopelus warmingii* (964), *Bolinichthys longipes* (786), and *Diogenichthys laternatus* (639). These 10 top-ranking species contributed ca. 62% of all specimens, while representing only ca. 5% of the total species complement. In contrast, about half (ca. 111) of the species were represented by five or fewer specimens and one-quarter (ca. 53) of the species were represented by a single specimen.

Comparison of the IK and the MT trawls is complicated by the much larger mouth and mesh size of the latter. On 7210-JD, 16 sample pairs were taken. The MT trawls fished to an average depth of 430m and filtered an average of 1,045,500m<sup>3</sup> of water whereas the IK fished to an average depth of 234m and filtered an average of 9,830m<sup>3</sup>. The MT collected an average of 0.74 fish per 10m<sup>3</sup> whereas the IK collected an average of 3.96 fish per 10m<sup>3</sup>. The smaller catch rate of the MT can be attributed to the escapement of small fish through the larger mesh. No relation was found between the number of fish collected by each trawl at the same station. In spite of the lower catch rate per volume of water filtered, the larger samples and larger sizes of fish collected by this net make it a valuable survey tool.

## LIST OF FISHES

The fishes collected on this survey follow in phylogenetic order according to the classification in Eschmeyer (1990). Taxa are listed alphabetically within families. Data for each species are presented in the following order: cruise; station number; type of gear (IK=6-foot Isaacs-Kidd Midwater Trawl; MT=Universal Mark-II Midwater Trawl); the number of specimens, shown in parentheses; and the size range. Specimens captured on the CalCOFI survey pattern are listed first, followed by stations on the offshore transects. The distributions of several species are shown on a single figure to reduce the number of figures. Generally, the sequence of figures follows the sequence of species; however, in many cases, non-sequential species were grouped to reduce the total number of figures. All specimens will be deposited in the Marine Vertebrates Collection of the Scripps Institution of Oceanography.

## ALBULIFORMES

### Albulidae

*Albula* sp. (Fig. 2)

7210, 157G.25, 1K, (1) 45mm; 157G.55, 1K, (1) 45mm.

Reference: Charter and Moser (1996a)

## ANGUILLIFORMES

### Chlopsidae

*Chlopsis* spp. (Fig. 2)

7210, 157G.25, 1K, (10) 33-55mm; 23.108, 1K, (8) 31-58mm.

Reference: Smith (1989a)

### Muraenidae

*Gymnothorax mordax* (Ayres) (Fig. 2)

7210, 23.108, 1K, (2) 30-44mm.

Reference: Charter and Moser (1996b)

### Ophichthidae

*Myrophis vafer* Jordan and Gilbert (Fig. 2)

7210, 157G.25, 1K, (7) 42-77mm; 157G.55, 1K, (7) 56-72mm; 23.108, 1K, (21) 56-77mm.

*Ophichthus zophochir* (Jordan and Gilbert) (Fig. 2)

7210, 157G.25, 1K, (1) 67mm.

Ophichthidae Type A

7210, 23.108, 1K, (3) 72-94mm.

Ophichthidae Type B

7210, 157G.55, 1K, (9) 59-79mm; 23.108, 1K, (12) 55-122mm.

Ophichthidae Type D

7210, 157G. 25, 1K, (1) 80mm.

Ophichthidae Type E

7210, 157G.25, 1K, (1) 80mm; 157G.55, 1K, (1) 61mm.

Ophichthidae Type F

7210, 157G.55, 1K, (1) 62mm.

Reference: Charter (1996a)

### Congridae

*Ariosoma gilberti* (Ogilby) (Fig. 3)

7205, 130.90, MT, (1) 130mm.

**7210, 130.50**, MT, (1) 98mm; **157G.25**, IK, (43) 63-95mm; **157G.55**, IK, (43) 80-105mm; **23.108**, IK, (95) 63-135mm.

*Ariosoma* sp. (Fig. 3)

**7205, 24.145**, MT, (3) 190-270mm.

Note: These leptocephali are likely *A. marginatum* (D. G. Smith, pers. comm.).

*Bathycongrus macrinus* (Gilbert) (Fig. 3)

**7210, 157G.25**, IK, (29) 38-55mm; **157G.55**, IK, (21) 31-47mm; **23.108**, IK, (57) 30-52mm.

*Chilococonger obtusus* (Garman) (Fig. 2)

**7210, 130.50**, MT, (1) 92mm; **157G.25**, IK, (2) 43-45mm.

*Gnathophis cinctus* (Garman) (Fig. 3)

**7205, 130.50**, IK, (3) 84-95mm.

*Heteroconger canabus* (Cowan and Rosenblatt) (Fig. 3)

**7210, 130.90**, MT, (1) ca. 77mm; **157G.25**, IK, (6) 37-46mm; **157G.55**, IK, (11) 40-57mm; **23.108**, IK, (1) 64mm.

*Heteroconger digneti* (Pellegrin) (Fig. 3)

**7210, 157G.25**, IK, (1) 55mm; **157G.55**, IK, (1) 48mm; **23.108**, IK, (2) 44-45mm.

*Paraconger californiensis* Kanazawa (Fig. 4)

**7210, 157G.25**, IK, (1) 53mm; **157G.55**, IK, (1) 50mm; **23.108**, IK, (2) 51-58mm.

*Rhynchoconger nitens* (Jordan and Bollman) (Fig. 4)

**7210, 157G.25**, IK, (5) 45-63mm; **157G.55**, IK, (2) 56-63; **23.108**, IK, (4) 37-72mm.

Reference: Castle (1980), Charter (1996b), Raju (1985)

#### Derichthyidae

*Derichthys serpentinus* Gill (Fig. 4)

**7205, 31.145**, MT, (1) 150mm.

*Nessorhamphus danae* Schmidt (Fig. 4)

**7205, 20.129**, MT, (1) 38mm.

Reference: Charter (1996c), Robins (1989), Smith (1989b)

#### Nemichthyidae

*Avocettina bowersi* (Garman) (Fig. 4)

**7205, 150.70**, IK, (1) 350mm.

*Avocettina infans* (Günther) (Fig. 4)

**7210, 140.120**, MT, (1) 529mm; **20.123**, MT, (2) 425-495mm; **22.143**, MT, (2) 480-510mm.

*Nemichthys scolopaceus* Richardson (Fig. 5)

7205, 20.135, IK, (1) 79mm; 20.145, MT, (3) 98-215mm; 24.133, IK, (2) 45-83mm; 24.145, MT, (4) 135-214mm; 27.145, IK, (2) 43-56mm; 31.135, MT, (8) 91-500mm; 31.145, IK, (5) 130-257mm; 31.145, MT, (31) 84-215mm.

7210, 100.140, IK, (1) 525mm; 100.140, MT, (1) 450mm; 130.90, MT, (1) 1,090mm; 157G.25, IK, (1) 440mm; 27.135, MT, (1) 208mm; 31.135, IK, (1) 574mm; 31.139, MT, (3) 211-432mm.

Reference: Charter (1996d), Nielsen and Smith (1978)

### Serrivomeridae

*Serrivomer* sp. (Fig. 5)

7205, 130.90, MT, (1) 410mm; 20.145, IK, (1) 26mm; 20.145, MT, (1) 33mm.

7210, 130.50, MT, (2) 435-506mm; 130.90, MT, (2) 485mm + fragment; 22.143, MT, (10) 325-488mm; 27.135, MT, (1) 172mm.

Note: Both *Serrivomer sector* and *S. jespersenii* occur in the survey area. Bauchot (1959) separated *Serrivomer* adults based on the morphology of the branchiostegal rays and whether their anterior extensions (if any) extend beyond the margin of the adjacent ceratohyal bone. Our adult *Serrivomer* specimens were variable in branchiostegal ray morphology and could not be identified using Bauchot's (1959) characters. Our larval *Serrivomer* specimens were similar to larvae of *S. sector* from the California Current region; however, they could not be identified with certainty. Taxonomic progress on this genus awaits a critical revision that includes both larvae and adults.

*Stemonidium hypomelas* Gilbert (Fig. 5)

7210, 24.139, MT, (1) 184mm; 27.143, IK, (1) 169mm; 31.139, MT, (1) 315mm.

Reference: Bauchot (1959), Charter (1996e), Tighe (1989a, 1989b)

## SACCOPHARYNGIFORMES

### Cyematidae

*Cyema atrum* Günther (Fig. 5)

7205, 20.129, MT, (2) 32-55mm; 20.145, IK, (1) 12mm; 24.145, MT, (1) 11mm; 27.145, IK, (1) 25mm; 31.135, IK, (1) 18mm; 31.141, IK, (1) 13mm; 31.145, IK, (1) 18mm.

7210, 31.127, MT, (1) 40mm; 31.145, MT, (1) 33mm.

Reference: Charter (1996f)

### Eurypharyngidae

*Eurypharynx pelecanoioides* Vaillant (Fig. 5)

7205, 31.145, IK, (1) 25mm.

Reference: Bertelsen et al. (1989), Charter (1996g)

## CLUPEIFORMES

### Engraulidae

*Engraulis mordax* Girard

7205, 130.50, 1K, (43) 12-33mm.

Reference: Watson and Sandknop (1996a), Whitehead et al. (1988)

## SALMONIFORMES

### Bathylagidae

*Bathylagus bericoides* (Borodin) (Fig. 6)

7205, 24.145, 1K, (1) 19mm; 31.135, MT, (5) 19-27mm.

7210, 31.139, 1K, (1) 25mm.

*Bathylagus longirostris* Maul (Fig. 6)

7210, 20.127, MT, (1) 34mm; 22.143, MT, (2) 31-40mm; 27.135, MT, (1) 31mm; 31.135, MT, (1) 45mm; 31.145, MT, (6) 28-74mm.

*Bathylagus nigrigenys* Parr (Fig. 6)

7210, 157G.25, 1K, (1) 25mm; 157G.55, 1K, (3) 14-50mm.

*Bathylagus wesethi* Bolin (Fig. 6)

7205, 130.90, MT, (2) 31-84mm; 27.125, 1K, (1) 20mm; 31.127, MT, (20) 27-94mm.

7210, 100.140, MT, (1) 24mm; 130.90, MT, (1) 73mm; 31.127, MT, (3) 14-28mm; 31.135, MT, (1) 21mm.

Reference: Cohen (1964), Kobylanskiy (1985), Moser and Ahlstrom (1996a), Rass and Kashkina (1967)

### Microstomatidae

*Microstoma* sp. (Fig. 6)

7205, 24.133, 1K, (1) 31mm.

Note: Historically, this species has been referred to as *M. microstoma*; however, it is clearly a distinct, undescribed species (Moser and Butler 1996).

*Nansenia ahlstromi* Kawaguchi and Butler (Fig. 6)

7205, 24.145, 1K, (1) 31mm.

7210, 24.139, MT, (1) 59mm.

*Nansenia* sp.

7205, 20.145, MT, (1) 13mm; 31.135, MT, (1) 11mm; 31.145, 1K, (1) 17mm.

Reference: Kawaguchi and Butler (1984), Moser and Butler (1996)

## Opisthoproctidae

*Dolichopteryx* sp. (Fig. 7)

7205, 20.129, MT, (1) fragment; 20.145, MT, (1) 28mm.

7210, 20.127, MT, (1) 61mm; 24.139, MT, (1) 44mm.

*Opisthoproctus soleatus* Vaillant (Fig. 7)

7210, 24.131, MT, (1) 21mm; 7210, 31.145, MT, (1) 40mm.

Reference: Cohen (1964), Moser (1996b)

## Platyroctidae

*Sagamichthys abei* Parr (Fig. 7)

7210, 20.127, MT, (2) 17-20mm; 22.143, MT, (8) 12-22mm; 24.129, MT, (1) 137mm.

Reference: Ambrose (1996a)

## STOMIIFORMES

### Gonostomatidae

*Cyclothone acclinidens* Garman (Fig. 8)

7205, 20.121, IK, (2) 26-35mm; 20.129, MT, (39) 25-48mm.

7210, 130.50, MT, (949) 17-45mm; 130.90, MT, (207) 16-42mm; 140.120, MT, (323) 15-28mm; 20.123, MT, (1) 28mm; 20.127, MT, (4), 18-20mm; 22.143, MT, (133) 17-42mm (see *Cyclothone* spp.).

*Cyclothone alba* Brauer (Fig. 8)

7205, 20.145, MT, (4) 25mm; 24.141, IK, (1) 23mm; 24.145, MT, (118) 22-30mm; 31.135, MT, (1) 22mm.

7210, 22.143, MT, (14) 22-25mm (see *Cyclothone* spp.); 24.131, MT, (1) 20mm; 24.139, MT, (142) 17-23mm; 27.131, MT, (3) 17-20mm; 27.135, MT, (43) 17-27mm; 31.145, MT, (152) 17-33mm.

*Cyclothone pallida* Brauer (Fig. 8)

7205, 24.145, MT, (1) 58mm.

7210, 22.143, MT, (7) 16-28mm (see *Cyclothone* spp.).

*Cyclothone pseudopallida* Mukhacheva (Fig. 8)

7205, 27.145, IK, (2) 30-31mm; 31.135, IK, (1) 30mm; 31.135, MT, (1) 30mm; 31.145, MT, (13) 25-35mm.

7210, 20.127, MT, (7) 24-32mm; 22.143, MT, (100) 18-39mm (see *Cyclothone* spp.); 31.139, MT, (1) 32mm.

*Cyclothone signata* Garman (Fig. 8)

7205, 130.90, MT, (40) 17-30mm; 20.129, IK, (54) 15-29mm; 31.127, IK, (8) 19-28mm; 31.127, MT, (5) 18-28mm; 31.135, MT, (1) 27mm.

7210, 100.140, MT, (1) 23mm; 130.50, MT, (31) 22-35mm; 140.120, MT, (3) 22-26mm; 20.123, MT,

(123) 17-28mm; **20.127**, MT, (256) 17-33mm; **22.143**, MT, (61) 16-30mm (see *Cyclothone* spp.); **24.131**, MT, (95) 14-28mm; **27.131**, MT, (1) 29mm.

*Cyclothone* spp.

**7205**, **20.145**, IK, (1) 18mm; **24.133**, IK, (2) 17-21mm; **24.145**, MT, (1) 20mm.

**7210**, **140.120**, MT, (3) 17-32mm; **22.143**, MT, (1998) 14-37mm (mixed species, ca. 31% *C. acclinidens*, 5% *C. alba*, 1% *C. pallida*, 26% *C. pseudopallida*, 23% *C. signata*, and 14% disintegrated); **24.143**, MT, (3) disintegrated; **27.135**, MT, (3) 15-20mm; **31.135**, MT, (1).

*Diplophos proximus* Parr (Fig. 9)

**7210**, **140.120**, MT, (1) 101mm; **157G.55**, MT, (1) 98mm.

*Diplophos taenia* Günther (Fig. 9)

**7205**, **20.129**, MT, (1) 92mm; **20.145**, MT, (1) 133mm; **24.141**, IK, (1) 74mm; **31.145**, MT, (5) 73-123mm.

**7210**, **20.127**, MT, (1) 74mm; **22.143**, MT, (1) 98mm; **24.131**, MT, (3) 45-91mm; **27.131**, MT, (1) 138mm.

*Gonostoma atlanticum* Norman (Fig. 9)

**7205**, **20.129**, MT, (3) 17-28mm; **20.135**, IK, (2) 24-25mm; **20.135**, MT, (3) 22-38mm; **20.145**, IK, (1) 11mm; **20.145**, MT, (1) 59mm; **27.145**, IK, (1) 23mm; **31.135**, IK, (1) 28mm; **31.145**, MT, (12) 16-63mm.

**7210**, **100.140**, MT, (4) 35-57mm; **22.143**, MT, (4) 17-50mm; **24.125**, MT, (1) 50mm; **24.129**, MT, (5) 31-59mm; **24.131**, MT, (2) 21-24mm; **24.139**, MT, (5) 40-56mm; **27.135**, MT, (4) 45-68mm; **27.143**, IK, (1) 18mm; **31.145**, MT, (2) 22-47mm.

*Gonostoma ebelingi* Grey (Fig. 9)

**7205**, **20.135**, IK, (3) 22-90mm; **20.145**, IK, (3) 34-74mm; **20.145**, MT, (16) 41-144mm; **24.125**, IK, (1) 108mm; **24.141**, IK, (2) 23-32; **24.145**, IK, (4) 20-35mm; **24.145**, MT, (8) 15-32mm; **31.135**, MT, (1) 113mm; **31.145**, MT, (2) 125-130mm.

**7210**, **20.127**, MT, (4) 98-134mm; **20.135**, IK, (4) 47-100mm; **22.143**, MT, (7) 78-125mm; **24.125**, MT, (1) 206mm; **24.129**, MT, (7) 54-124mm; **24.139**, MT, (9) 71-148mm; **27.131**, MT, (1) 59mm; **27.135**, MT, (2) 128-135mm; **31.139**, MT, (2) 132-154mm.

*Gonostoma elongatum* Günther (Fig. 9)

**7205**, **20.145**, MT, (1) 10mm.

*Margrethia obtusirostra* Jespersen and Tåning (Fig. 9)

**7205**, **24.145**, MT, (1) 12mm.

**7210**, **22.143**, MT, (1) 17mm; **24.143**, IK, (1) 17mm; **27.143**, IK, (1) 25mm; **31.145**, MT, (1) 27mm.

Reference: Grey (1964), Kawaguchi (1971), Kobayashi (1973), Watson (1996a)

## Sternoptychidae

*Argyropelecus affinis* Garman (Fig. 10)

7205, 130.90, MT, (31) 39-66mm; 24.145, MT, (1) 71mm.

7210, 100.140, MT, (1) 55mm; 130.50, MT, (26) 16-54mm; 130.90, MT, (18) 16-62mm; 20.123, MT, (1) 15mm; 20.127, MT, (7) 12-53mm; 20.129, MT, (1) 9mm; 22.143, MT, (14) 20-67mm.

*Argyropelecus hemigymnus* Cocco (Fig. 10)

7205, 20.135, IK, (1) 27mm; 24.125, IK, (1) 16mm; 24.145, MT, (1) 22mm; 31.127, IK, (3) 22-30mm; 31.127, MT, (50) 16-32mm; 31.135, MT, (5) 17-25mm; 31.145, MT, (7) 14-29mm.

7210, 100.140, MT, (12) 16-27mm; 20.127, MT, (12) 12-23mm; 20.135, IK, (1) 18mm; 22.143, MT, (5) 9-21mm; 24.125, MT, (24) 15-22mm; 24.129, MT, (3) 14-28mm; 24.131, MT, (8) 7-23mm; 24.139, MT, (11) 9-27mm; 27.131, MT, (2) 16-28mm; 27.135, MT, (1) 10mm; 31.127, MT, (6) 21-30mm; 31.135, MT, (1) 20mm; 31.139, IK, (1) 26mm; 31.139, MT, (4) 25-28mm; 31.145, MT, (3) 8-26mm.

*Argyropelecus lychnus* Garman (Fig. 10)

7205, 130.50, IK, (1) 15mm; 130.90, MT, (1) 58mm; 140.120, IK, (1) 15mm; 150.70, IK, (2) 23-33mm; 20.121, IK, (2) 15-34mm; 20.129, MT, (54) 7-17mm.

7210, 130.50, IK, (7) 18-33mm; 130.50, MT, (11) 15-28mm; 130.90, IK, (1) 17mm; 130.90, MT, (16) 14-48mm; 140.120, IK, (1) 17mm; 140.120, MT, (5) 15-45mm; 20.123, MT, (17) 8-49mm; 20.127, MT, (4) 8-58mm.

*Argyropelecus sladeni* Regan (Fig. 10)

7205, 20.135, IK, (3) 23-35mm; 24.145, MT, (2) 16-17mm; 31.127, MT, (1) 32mm; 31.135, MT, (1) 46mm.

7210, 31.127, IK, (1) 15mm; 31.127, MT, (1) 58mm.

*Argyropelecus* spp.

7205, 130.90, MT, (1) disintegrated; 31.127, IK, (1) 6mm; 31.135, MT, (1) 15mm.

*Danaphos oculatus* (Garman) (Fig. 10)

7205, 31.127, IK, (5) 31-36mm; 31.127, MT, (7) 17-37mm.

7210, 20.127, MT, (9) 21-38mm; 22.143, MT, (2) 23-36mm; 24.129, MT, (2) 33-34mm; 24.131, MT, (12) 22-33mm.

*Sternoptyx diaphana* Hermann (Fig. 11)

7205, 20.129, MT, (1) 15mm; 24.145, MT, (1) 7mm; 31.141, IK, (1) 6mm; 31.145, MT, (2) 8-17mm.

7210, 100.140, MT, (1) 19mm; 22.143, MT, (204) 6-39mm; 24.139, MT, (1) 14mm; 24.145, MT, (1) 22mm; 27.135, MT, (4) 7-14mm; 27.143, IK, (1) 17mm; 31.145, MT, (1) 17mm.

*Sternoptyx pseudobscura* Baird (Fig. 11)

7205, 31.145, MT, (1) 50mm.



*Sternoptyx* spp.

7205, 24.145, MT, (1) 6mm; 31.127, MT, (1) 6mm.

7210, 20.127, MT, (1) 9mm; 24.131, MT, (1) 9mm; 31.145, MT, (3) 9-10mm.

*Valenciemellus tripunctulatus* (Esmark) (Fig. 11)

7205, 20.135, IK, (3) 16-23mm; 20.135, IK, (2) 19-20mm; 20.145, IK, (1) 14mm; 24.141, IK, (1) 19mm; 24.145, IK, (2) 16-18mm; 24.145, MT, (7) 12-26mm; 31.135, MT, (8) 13-28mm; 31.145, IK, (1) 27mm; 31.145, MT, (6) 11-28mm.

7210, 100.140, IK, (1) 20mm; 100.140, MT, (1) 22mm; 130.50, IK, (1) 20mm; 22.143, MT, (3) 22-27mm; 24.125, MT, (2) 24-25mm; 24.131, MT, (2) 23mm; 24.139, IK, (2) 15-24mm; 24.139, MT, (12) 27-30mm; 27.131, MT, (3) 19-28mm; 27.135, MT, (3) 21-27mm; 27.143, IK, (1) 11mm; 27.143, IK, (1) 14mm; 31.127, MT, (5) 13-27mm; 31.135, IK, (2) 23-34mm; 31.135, MT, (6) 14-28mm; 31.139, MT, (4) 22-27mm; 31.145, IK, (2) 20-23mm; 31.145, MT, (4) 14-27mm.

Reference: Baird (1971, 1986), Grey (1964), Watson (1996b)

#### Phosichthyidae

*Ichthyococcus irregularis* Rehnitz and Böhlke (Fig. 11)

7205, 20.129, MT, (1) 61mm.

*Ichthyococcus ovatus* (Cocco) (Fig. 11)

7205, 20.145, MT, (3) 9-12mm; 24.145, MT, (1) 21mm.

7210, 22.143, MT, (1) 30mm.

*Vinciguerrria lucetia* (Garman) (Fig. 12)

7205, 130.50, IK, (95) 13-50mm; 130.90, IK, (4) 13-38mm; 130.90, MT, (53) 13-59mm; 140.120, IK, (46) 13-34mm; 140.120, IK, (48) 11-29mm; 150.70, IK, (33) 11-56mm; 150.70, IK, (23) 17-40mm; 20.121, IK, (135) 8-31mm; 20.121, IK, (80) 13-21mm; 24.125, IK, (55) 8-26mm; 24.125, IK, (10) 16-35mm; 27.125, IK, (3) 20-32mm; 31.127, MT, (518) 17-45 mm; 31.127, IK, (2) 31-33mm.

7210, 100.140, IK, (16) 15-21mm; 100.140, MT, (45) 11-45mm; 130.50, IK, (52) 12-45mm; 130.50, MT, (506) 12-58mm; 130.90, IK, (14) 13-33mm; 130.90, MT, (789) 15-50mm; 140.120, IK, (8) 20-50mm; 140.120, MT, (226) 19-54mm; 150.70, IK, (42) 15-54mm; 157G. 25, IK, (112) 11-33mm; 157G.55, IK, (124) 12-32mm; 20.123, IK, (8) 16-37mm; 20.123, MT, (32) 15-36mm; 23.108, IK, (197) 11-44mm; 24.125, IK, (2) 24-33mm; 24.125, MT, (34) 13-32mm; 31.127, MT, (23) 13-18 mm.

*Vinciguerrria nimbaria* (Jordan and Williams) (Fig. 12)

7205, 20.129, IK, (34) 16-38mm; 20.129, MT, (535) 11-51mm; 20.135, IK, (7) 16-24mm; 20.135, IK, (9) 15-54mm; 20.145, IK, (10) 8-26mm; 20.145, MT, (73) 15-34mm; 24.133, IK, (8) 13-34mm; 24.141, IK, (6) 15-23 mm; 24.145, IK, (7) 14-34mm; 24.145, MT, (42) 12-36mm; 27.145, IK, (3) 15-25mm; 27.145, IK, (1) 18mm; 31.127, MT, (13) 12-47mm; 31.135, IK, (1) 15mm; 31.135, MT, (46) 13-37mm; 31.141, IK, (4) 17-19mm; 31.145, IK, (5) 12-23mm; 31.145, MT, (79) 14-50mm.

7210, 20.127, IK, (3) 29-37mm; 20.127, MT, (117) 15-46mm; 20.135, IK, (2) 19-20mm; 20.135, MT, (2) 20-22mm; 22.143, MT, (41) 12-51mm; 24.129, IK, (6) 13-27mm; 24.129, MT, (8) 16-33mm; 24.131, MT, (22) 15-42mm; 24.139, IK, (3) 17-27mm; 24.139, MT, (10) 13-40mm; 24.143, IK, (5) 18-23mm;

27.131, IK, (4) 16-26mm; 27.131, MT, (4) 15-20mm; 27.135, IK, (1) 17mm; 27.135, MT, (3) 13-21mm; 27.143, IK, (23) 18-32mm; 27.143, IK, (2) 14-25mm; 31.135, IK, (4) 14-17mm; 31.135, MT, (4) 16-18mm; 31.139, IK, (1) 16mm; 31.139, MT, (2) 20-33mm; 31.145, IK, (2) 11-27mm; 31.145, MT, (3) 13-27mm.

*Vinciguerria poweriae* (Cocco) (Fig. 12)

7205, 20.129, MT, (14) 16-21mm; 20.135, IK, (2) 16-23mm; 20.135, IK, (2) 15-25mm; 20.145, IK, (1) 9mm; 20.145, MT, (4) 16-17mm; 24.133, IK, (3) 17-33mm; 24.141, IK, (3) 16-18mm; 24.145, IK, (2) 18-20mm; 24.145, MT, (21) 16-33 mm; 27.135, IK, (1) 17mm; 27.145, IK, (1) 23mm; 27.145, IK, (2) 20-21mm; 31.127, IK, (2) 18-22mm; 31.127, MT, (5) 28-34mm; 31.135, MT, (43) 14-31mm; 31.145, IK, (1) 12mm; 31.145, MT, (14) 16-33mm.

7210, 100.140, IK, (2) 21-28mm; 100.140, MT, (6) 16-30 mm; 20.127, MT, (3) 32-34mm; 22.143, MT, (8) 16-31mm; 24.129, MT, (9) 23-30mm; 24.131, IK, (2) 18-28mm; 24.131, MT, (18) 19-32mm; 24.139, IK, (1) 19mm; 24.139, MT, (21) 16-33mm; 27.131, MT, (62) 15-30mm; 27.135, IK, (1) 33mm; 27.135, MT, (15) 16-32mm; 31.127, IK, (3) 14-23mm; 31.127, MT, (25) 15-37mm; 31.135, IK, (2) 13-32mm; 31.135, MT, (7) 25-34mm; 31.139, IK, (2) 17-31mm; 31.139, MT, (23) 23-31mm; 31.145, IK, (1) 28mm; 31.145, MT, (21) 20-37mm.

*Vinciguerria* spp.

7205, 20.129, MT, (15) disintegrated; 20.129, IK, (4) disintegrated; 20.145, MT, (3) disintegrated; 31.135, MT, (9) disintegrated; 31.145, MT, (5) disintegrated.

Reference: Ahlstrom and Counts (1958), Grey (1964), Rechnitzer and Böhlke (1958), Watson (1996c)

#### Chauliodontidae

*Chauliodus sloani* Bloch and Schneider (Fig. 13)

7205, 24.141, IK, (1) 33mm; 24.145, MT, (1) 20mm; 31.145, MT, (1) 30mm.

7210, 24.139, MT, (1) 160mm; 31.145, MT, (1) 24mm.

Reference: Belyanina (1977), Morrow (1964a), Parin and Novikova (1974).

#### Stomiidae

*Stomias atriventer* Garman (Fig. 13)

7205, 130.90, MT, (1) 205mm; 150.70, IK, (1) 215mm.

7210, 130.50, MT, (3) 174-199mm; 130.90, MT, (3) 44-112mm; 140.120, MT, (3) 76-201mm; 157G.55, IK, (2) 30-44mm; 20.123, MT, (2) 122-185mm.

Reference: Gibbs (1969)

#### Astronesthidae

*Astronesthes* sp. (Fig. 13)

7210, 24.139, MT, (1) 59mm.

Note: Similar to *A. trifibulatus*; differs in lacking filaments on the barbel bulb (C. Klepadlo, pers. comm.)

*Astronesthes splendidus* Brauer (Fig. 13)

7205, 20.145, MT, (1) 53mm.

*Borostomias panamensis* Regan and Trewavas (Fig. 13)

7210, 22.143, MT, (4) 32-37mm.

Reference: Gibbs (1964a), Gibbs et al. (1984); Regan and Trewavas (1929)

#### Melanostomiidae

*Bathophilus brevis* Regan and Trewavas (Fig. 14)

7210, 24.131, MT, (1) 32mm.

*Bathophilus filifer* (Garman) (Fig. 14)

7210, 140.120, MT, (1) 34mm; 157G.25, IK, (1) 67mm; 20.123, MT, (1) 82mm; 23.108, IK, (1) 85mm.

*Bathophilus flemingi* Aron and McCrery (Fig. 14)

7205, 31.127, MT, (2) 83-89mm; 31.135, MT, (2) 71-140mm.

7210, 100.140, MT, (1) 57mm; 24.129, MT, (1) 67mm; 27.131, MT, (4) 34-50mm; 31.127, IK, (1) 48mm; 31.127, MT, (1) 51mm; 31.135, MT, (2) 46-48 mm.

*Bathophilus kingi* Barnett and Gibbs (Fig. 14)

7205, 24.145, IK, (1) 54mm.

7210, 22.143, MT, (1) 104mm.

*Bathophilus nigerrimus* Giglioli (Fig. 14)

7210, 20.127, MT, (1) 40mm; 22.143, MT, (1) 44mm.

*Bathophilus* spp.

7205, 31.135, MT, (3) 15-23 mm; 31.145, MT, (1) 22mm.

*Eustomias bifilis* Gibbs (Fig. 15)

7205, 24.133, IK, (1) 60mm.

7210, 20.123, MT, (2) 104-109mm; 20.127, MT, (1) 78mm; 24.129, MT, (1) 122mm; 27.131, IK, (1) 114mm.

*Eustomias melanostigma* Regan and Trewavas (Fig. 15)

7210, 24.143, IK, (1) 113mm.

*Eustomias schmidti* Regan and Trewavas (Fig. 15)

7210, 27.135, MT, (1) 96mm; 31.127, MT, (1) 107mm; 31.135, MT, (2) 167-184mm.

*Eustomias* spp.

7205, 20.145, MT, (1) 67mm; 24.145, MT, (1) 92mm.

7210, 20.135, IK, (1) 122mm; 22.143, MT, (1) 73mm; 31.135, MT, (1) 142mm.

*Leptostomias* spp. (Fig. 15)

7205, 27.145, MT, (1) 65mm; 31.141, IK, (1) 63mm; 31.145, MT, (2) 60-67mm.

7210, 22.143, MT, (2) 22-400mm; 24.125, IK, (1) 24mm; 27.143, IK, (1) 70mm; 31.127, MT, (1) 237mm; 31.135, MT, (2) 83-147mm; 31.145, IK, (1) 23mm; 31.145, MT, (1) 94mm.

Note: Species were not determined because barbels were damaged on all specimens.

*Melanostomias melanops* Brauer (Fig. 15)

7205, 31.145, MT, (1) 98mm.

*Photonectes intermedius* Parr (Fig. 16)

7205, 31.145, MT, (1) 57mm.

*Photonectes margarita* (Goode and Bean) (Fig. 16)

7210, 31.127, MT, (1) 214mm.

*Photonectes parvimanus* Regan and Trewavas (Fig. 16)

7205, 24.133, IK, (1) 57mm.

*Photonectes* spp.

7205, 31.135, MT, (4) 20-25mm.

7210, 31.135, IK, (1) 41mm; 31.135, MT, (1) 48mm.

Melanostomiidae

7205, 130.90, MT, (1) 235mm; 20.145, MT, (1) 23mm; 24.141, IK, (1) 63mm; 31.135, MT, (1) 30mm; 31.145, MT, (2) 17-22mm.

Reference: Barnett and Gibbs (1968), Gibbs et al. (1983), Gomon and Gibbs (1985), Morrow and Gibbs (1964), Moser (1996c), Parin and Pokhilskaya (1974), Regan and Trewavas (1930)

#### Malacosteidae

*Aristostomias polydactylus* Regan and Trewavas (Fig. 16)

7210, 22.143, MT, (1) 68mm.

*Aristostomias scintillans* Gilbert (Fig. 16)

7205, 31.127, IK, (1) 56mm.

7210, 100.140, IK, (1) 44mm; 100.140, MT, (1) 57mm; 31.127, MT, (2) 42-45mm; 31.135, IK, (1) 46mm; 31.135, MT, (5) 42-46mm; 31.139, MT, (7) 45-47mm.

*Malacosteus niger* Ayres (Fig. 16)

7210, 22.143, MT, (2) 69-127mm.

*Photostomias* sp. (Fig. 17)

7205, 31.145, MT, (1) 122mm.

Reference: Gilbert (1915), Morrow (1964b), Regan and Trewavas (1930)

## Idiacanthidae

*Idiacanthus antrostomus* Gilbert (Fig. 17)

7205, 150.70, IK, (1) 239mm; 31.127, MT, (2) 64-304mm; 31.135, MT, (1) 320mm.

7210, 130.50, MT, (1) 193mm; 140.120, MT, (1) 272mm; 20.123, IK, (1) 126mm; 20.123, MT, (4) 50-250mm; 20.127, MT, (7) 132-307mm; 31.127, IK, (1) 55mm; 31.127, MT, (2) 46-281mm; 31.135, IK, (1) 85mm; 31.135, MT, (2) 78-85mm; 31.139, IK, (1) 225mm; 31.139, MT, (1) 80mm.

*Idiacanthus fasciola* Peters (Fig. 17)

7205, 24.141, IK, (1) 148-250mm; 24.145, IK, (2) 44-45mm; 24.145, MT, (8) 37-275mm; 27.145, IK, (1) 95mm; 27.145, MT, (3) 42-80mm; 31.145, IK, (1) 41mm.

7210, 22.143, MT, (1) 95mm; 24.139, MT, (2) 217-259mm.

*Idiacanthus* spp.

7205, 20.129, MT, (1) 23mm; 24.125, IK, (2) 78-98mm; 24.133, IK, (2) 34-88mm.

7210, 24.129, IK, (1) 51mm; 24.143, MT, (1) fragment; 27.131, MT, (1) 115mm.

Reference: Gibbs (1964b), Novikova (1967), Regan and Trewavas (1930)

## AULOPIFORMES

### Scopelarchidae

*Benthalbella infans* Zugmayer (Fig. 17)

7205, 24.145, MT, (1) 23mm.

*Rosenblattichthys hubbsi* Johnson (Fig. 17)

7205, 24.145, MT, (1) 22mm.

*Rosenblattichthys volucris* (Rofen) (Fig. 17)

7210, 130.50, IK, (1) 38mm.

*Scopelarchus analis* (Brauer) (Fig. 18)

7205, 20.129, MT, (4) 16-23mm; 20.145, IK, (4) 15-16mm; 20.145, MT, (1) 20mm; 24.133, IK, (2) 21-22mm; 24.145, MT, (2) 23-24mm.

7210, 22.143, MT, (2) 17-18mm; 27.131, IK, (1) 22mm; 27.131, MT, (2) 20-34mm; 27.135, IK, (1) 18mm; 31.127, MT, (4) 22-27mm; 31.139, IK, (2) 27-28mm.

*Scopelarchus guentheri* Alcock (Fig. 18)

7205, 130.90, MT, (2) 81-82mm; 140.120, IK, (1) 23mm; 20.121, IK, (1) 29mm; 20.129, MT, (1) 29mm; 20.145, MT, (3) 29-83mm; 24.141, IK, (2) 18-32mm; 24.145, MT, (3) 18-25mm; 31.135, MT, (3) 29-78mm; 31.145, IK, (5) 20-78mm; 31.145, MT, (2) 18-22mm.

7210, 100.140, MT, (2) 23-38mm; 130.50, MT, (3) 28-41mm; 130.90, MT, (7) 14-43mm; 140.120, MT, (2) 50-51mm; 20.123, MT, (3) 16-25mm; 20.127, MT, (2) 21-99mm; 24.139, IK, (3) 20-30mm; 24.139, MT, (5) 19-48mm; 27.131, MT, (1) 33mm; 27.135, IK, (2) 22-24mm; 27.135, MT, (1) 25mm; 27.143, IK, (2) 19-42mm; 31.127, IK, (1) 30mm; 31.135, IK, (5) 22-40mm; 31.135, MT, (8) 18-35mm; 31.139,

IK, (3) 15-38mm: **31.139**, MT, (6) 31-44mm: **31.145**, IK, (3) 22-50mm: **31.145**, MT, (6) 16-40mm.

*Scopelarchus michaelisarsi* Koefoed (Fig. 18)

**7205**, **20.145**, IK, (1) 28mm; **20.145**, MT, (3) 15-49mm; **24.145**, MT, (3) 16-42mm.

**7210**, **20.127**, MT, (1) 18mm; **22.143**, MT, (3) 14-17mm; **24.139**, MT, (1) 27mm; **27.131**, MT, (2) 15-29mm; **27.135**, MT, (3) 20-24mm; **27.143**, IK, (1) 18mm.

*Scopelarchus stephensi* Johnson (Fig. 18)

**7205**, **24.133**, IK, (1) 17mm; **31.127**, MT, (3) 23-30mm; **31.135**, IK, (3) 15-18mm; **31.135**, MT, (25) 16-29mm; **31.145**, MT, (8) 26-40mm.

**7210**, **31.135**, MT, (2) 57-58mm.

*Scopelarchus* spp.

**7205**, **20.145**, MT, (1) 15mm; **24.145**, MT, (1) 16mm; **27.145**, MT, (2) 16-18mm; **31.135**, IK, (1) 19mm; **31.145**, MT, (1) 17mm.

*Scopelarchoides nicholsi* (Parr) (Fig. 18)

**7210**, **23.108**, IK, (4) 10-26mm.

Reference: Johnson (1974), Johnson (1984), Watson and Sandknop (1996b)

#### Notosudidae

*Ahliesaurus brevis* Bertelsen, Krefft and Marshall (Fig. 19)

**7205**, **24.141**, IK, (1) 42mm.

*Scopelosaurus hoedti* Bleeker (Fig. 19)

**7205**, **20.145**, IK, (3) 27-49mm; **20.145**, IK, (1) 28mm; **27.145**, IK, (1) 32mm.

**7210**, **24.131**, MT, (1) 108mm; **24.143**, MT, (1) 39mm.

Reference: Bertelsen et al. (1976)

#### Paralepididae

*Arctozemus risso* (Bonaparte) (Fig. 19)

**7205**, **20.145**, MT, (2) 42-63mm; **31.127**, MT, (6) 18-35mm; **31.135**, MT, (1) 88mm.

**7210**, **31.127**, IK, (1) 27mm; **31.127**, MT, (6) 19-39mm.

*Lestidiops* sp. (Fig. 19)

**7205**, **20.129**, IK, (1 + 2 damaged) 32mm; **20.129**, MT, (2) 34-47mm; **20.135**, IK, (1) 41mm; **24.141**, IK, (2) 36-41mm; **20.145**, IK, (1) 58mm; **20.145**, MT, (6) 26-53mm; **24.145**, MT, (1) 23mm; **31.127**, MT, (2) 41-42mm; **31.135**, MT, (5) 19-40mm; **31.145**, MT, (18) 28-67mm.

**7210**, **27.131**, MT, (1) 29mm; **27.135**, MT, (2) 82-102mm; **31.127**, MT, (1) 41mm.

*Magnisudis atlantica* (Kroyer) (Fig. 20)

**7205**, **20.145**, IK, (1) 58mm.

7210, 100.140, MT, (1) 44mm; 20.127, MT, (2) 56-60mm; 22.143, MT, (3) 35-49mm.

*Stemonosudis macrura* (Ege) (Fig. 20)

7205, 20.129, MT, (11) 41-81mm; 24.145, MT, (3) 70-98mm; 31.135, MT, (4) 74-91mm; 31.145, MT, (10) 69-76mm.

7210, 140.120, MT, (2) 146-152mm; 20.123, MT, (1) 25mm; 22.143, MT, (3) 48-124mm; 23.108, IK, (1) 32mm; 27.131, MT, (1) 60mm.

*Sudis atrox* Rofen (Fig. 20)

7205, 20.129, MT, (4) 11-20mm; 20.145, IK, (1) 33mm; 20.145, MT, (10) 14-50mm; 24.133, IK, (1) 18mm; 24.141, IK, (2) 23-26mm; 24.145, MT, (2) 15-51mm; 31.145, MT, (4) 41-85mm.

7210, 22.143, MT, (4) 19-49mm; 24.125, MT, (1) 21mm; 24.131, IK, (1) 13mm.

*Uncisudis advena* (Rofen) (Fig. 20)

7205, 31.145, MT, (1) 39mm.

Paralepididae

7205, 20.121, IK, (1) 72mm.

Note: This specimen has paired photophores on the ventral surface and could not be assigned to a genus or species.

Reference: Ambrose (1996b), Berry and Perkins (1966), Ege (1930, 1953, 1957), Fowler (1944), Graae (1967), Harry (1953), Ozawa (1986d, 1988b), Post (1987), Rofen (1966a)

#### Anotopteridae

*Anotopterus pharao* Zugmayer (Fig. 21)

7210, 24.129, IK, (1) 22mm.

Reference: Okiyama (1984), Rofen (1966b)

#### Evermannellidae

*Coccorella atlantica* (Parr) (Fig. 21)

7205, 24.133, IK, (1) 35mm; 24.145, MT, (2) 28-62mm; 31.145, MT, (1) 61mm.

*Coccorella atrata* Alcock (Fig. 21)

7205, 20.145, MT, (1) 94mm.

*Evermannella ahlstromi* Johnson and Glodek (Fig. 21)

7205, 20.129, MT, (4) 27-68mm.

7210, 20.123, MT, (1) 61mm.

*Evermannella indica* Brauer (Fig. 21)

7205, 20.135, IK, (1) 24mm; 31.145, MT, (1) 72mm.

7210, 22.143, MT, (2) 42-50mm; 27.135, MT, (1) 71mm; 31.127, MT, (1) 61mm.

*Odontostomops normalops* (Parr) (Fig. 21)  
7205, 20.145, MT, (2) 50-66mm; 24.145, MT, (1) 50mm.

7210, 31.139, MT, (1) 95mm.

Reference: Johnson (1982), Johnson and Glodek (1975), Ozawa (1986c), Rofen (1966c)

## MYCTOPHIFORMES

### Neoscopefidae

*Scopelengys clarkei* Butler and Ahlstrom (Fig. 22)

7210, 24.139, MT, (1) 139mm.

*Scopelengys tristis* Alcock (Fig. 22)

7210, 130.50, MT, (2) 129-158mm.

Reference: Butler and Ahlstrom (1976)

### Myctophidae

*Benthosema panamense* (Taning) (Fig. 22)

7205, 150.70, IK, (2) 14-23mm.

*Benthosema suborbitale* (Gilbert) (Fig. 22)

7205, 20.145, MT, (1) 22mm; 24.141, IK, (1) 31mm; 24.145, IK, (1) 17mm; 24.145, MT, (6) 13-31mm; 27.145, IK, (1) 29mm; 31.135, MT, (1) 14mm; 31.141, IK, (1) 14mm; 31.145, IK, (4) 14-32mm; 31.145, MT, (18) 15-32mm.

7210, 22.143, MT, (4) 23-29mm; 24.129, IK, (1) 10mm; 24.139, IK, (1) 27mm; 24.139, MT, (8) 23-31mm; 24.143, IK, (1) 30mm; 27.135, MT, (8) 23-31mm; 27.143, IK, (2) 14-31mm; 27.143, MT, (1) 17mm; 31.135, IK, (2) 25-32mm; 31.135, MT, (10) 24-32mm; 31.139, MT, (2) 14-19mm; 31.145, IK, (1) 14mm; 31.145, MT, (21) 15-30mm.

*Bolinichthys distofax* Johnson (Fig. 22)

7210, 22.143, MT, (1) 80mm.

Note: This species was described from the western and central north Pacific (Johnson 1975). This specimen represents an eastward extension of ca. 12° longitude of its known range.

*Bolinichthys longipes* (Brauer) (Fig. 22)

7205, 130.90, MT, (1) 34mm; 140.120, IK, (3) 15-38mm; 140.120, IK, (6) 19-31mm; 150.70, IK, (3) 30-31mm; 150.70, IK, (1) 34mm; 20.121, IK, (3) 16-30mm; 20.121, IK, (1) 36mm; 20.129, MT, (54) 13-46mm; 20.135, IK, (2) 14-17mm; 20.135, IK, (11) 16-29mm; 20.145, IK, (2) 15-16mm; 20.145, MT, (30) 17-49mm; 24.133, MT, (2) 16-17mm; 24.141, IK, (1) 15mm; 24.145, IK, (1) 17mm; 24.145, MT, (14) 16-49mm; 27.145, IK, (1) 11mm; 31.127, MT, (17) 25-40mm; 31.135, MT, (7) 25-44mm; 31.145, MT, (12) 29-48mm.

7210, 100.140, MT, (49) 24-44mm; 130.90, IK, (1) 19mm; 130.90, MT, (5) 31-39mm; 140.120, IK, (2) 14-32mm; 140.120, MT, (26) 18-25mm; 150.70, IK, (2) 23-25mm; 20.123, IK, (7) 13-22mm; 20.123, MT, (4) 16-26mm; 20.127, IK, (8) 19-42mm; 20.127, MT, (121) 21-46mm; 20.135, IK, (2) 15-20mm;



**22.143**, MT, (15) 14-46mm; **24.125**, MT, (25) 21-44mm; **24.129**, IK, (1) 19mm; **24.129**, MT, (62) 8-42mm; **24.131**, IK, (1) 26mm; **24.131**, MT, (63) 17-43mm; **24.139**, MT, (42) 17-53mm; **24.143**, IK, (1) 45mm; **24.143**, MT, (3) 21-33mm; **27.131**, MT, (71) 16-46mm; **27.135**, IK, (2) 17-21mm; **27.135**, MT, (7) 15-44mm; **27.143**, IK, (3) 14-21mm; **27.143**, MT, (2) 19-21mm; **31.127**, MT, (11) 35-39mm; **31.135**, IK, (4) 19-42mm; **31.135**, MT, (20) 25-49mm; **31.139**, MT, (22) 25-47mm; **31.145**, IK, (2) 15-16mm; **31.145**, MT, (30) 16-48mm.

*Centrobranchus nigroocellatus* Günther (Fig. 23)

**7205**, **31.145**, MT, (1) 23mm.

**7210**, **24.125**, MT, (1) 29mm; **24.131**, MT, (1) 31mm; **24.139**, MT, (1) 6mm; **27.131**, IK, (1) 11mm; **31.127**, MT, (1) 38mm; **31.135**, MT, (1) 34mm; **31.139**, MT, (1) 39mm.

Note: Gago and Lavenberg (1992) analyzed character variation of *Centrobranchus* worldwide and determined that *C. choerocephalus* and *C. brevisrostris*, two species formerly recognized in the northeast Pacific (Wisner 1976), could not be distinguished from *C. nigroocellatus*.

*Ceratoscopelus townsendi* (Eigenmann and Eigenmann) (Fig. 23)

**7205**, **130.90**, MT, (17) 14-34mm; **140.120**, IK, (1) 51mm; **20.129**, MT, (241) 10-64mm; **27.125**, IK, (9) 14-43mm; **31.127**, MT, (106) 20-74mm; **31.135**, IK, (1) 22mm; **31.135**, MT, (103) 23-52mm.

**7210**, **100.140**, IK, (2) 7-17mm; **100.140**, MT, (110) 10-52mm; **130.50**, MT, (2) 30-35mm; **130.90**, MT, (4) 28-38mm; **140.120**, IK, (2) 27-32mm; **140.120**, MT, (26) 24-50mm; **20.123**, MT, (1) 45mm; **20.127**, MT, (54) 28-47mm; **24.125**, IK, (6) 29-47mm; **24.125**, MT, (518) 25-51mm; **24.129**, IK, (3) 25-30mm; **24.129**, MT, (23) 27-49mm; **24.131**, MT, (15) 24-28mm; **27.131**, IK, (1) 37mm; **27.131**, MT, (76) 28-57mm; **27.135**, MT, (7) 33-39mm; **31.127**, IK, (3) 32-55mm; **31.127**, MT, (367) 23-61mm; **31.135**, IK, (2) 29-59mm; **31.135**, MT, (23) 31-55mm; **31.139**, IK, (1) 36mm; **31.139**, MT, (41) 33-46mm.

*Ceratoscopelus warmingii* (Lowe) (Fig. 23)

**7205**, **20.135**, IK, (7) 25-42mm; **20.135**, IK, (5) 22-64mm; **20.145**, IK, (3) 19-22mm; **20.145**, MT, (5) 18-62mm; **24.133**, IK, (11) 16-57mm; **24.141**, IK, (39) 20-34mm; **24.145**, IK, (11) 19-42mm; **24.145**, MT, (157) 21-51mm; **27.145**, IK, (4) 22-23mm; **27.145**, MT, (1) 24mm; **31.145**, IK, (6) 22-27mm; **31.145**, MT, (119) 21-61mm.

**7210**, **20.127**, IK, (8) 27-58mm; **20.127**, MT, (23) 37-64mm; **20.135**, IK, (3) 47-58mm; **20.135**, IK, (4) 48-62mm; **22.143**, MT, (46) 23-58mm; **24.131**, IK, (1) 35mm; **24.131**, MT, (70) 31-61mm; **24.139**, IK, (2) 44-48mm; **24.139**, MT, (149) 19-61mm; **24.143**, MT, (21) 25-61mm; **27.131**, MT, (8) 46-58mm; **27.135**, IK, (6) 18-50mm; **27.135**, MT, (78) 27-58mm; **27.143**, IK, (5) 19-60mm; **27.143**, MT, (2) 51-62mm; **31.135**, MT, (39) 35-52mm; **31.139**, IK, (3) 47-51mm; **31.139**, MT, (49) 35-55mm; **31.145**, IK, (2) 51-52mm; **31.145**, MT, (77) 42-60mm.

Note: Badcock and Araujo (1988) synonymized Pacific *C. warmingii* with *Ceratoscopelus townsendi* based on a worldwide study of *C. warmingii*. The two species differ in the arrangement of luminous tissue. Principally, *C. warmingii* lacks the extensive supraorbital luminous tissue that is characteristic of adult eastern Pacific *C. townsendi*. Also, the supra- and infracaudal series of luminous patches extends farther posteriad in *C. warmingii* compared with *C. townsendi*. In this survey the specific distinction of the two forms is maintained to show how they are delimited geographically, with a relatively narrow zone of overlap (Fig. 23).

*Ceratoscopelus* spp.

**7205, 20.129**, MT, (4) 10-13mm; **20.145**, IK, (2) 10-14mm; **20.145**, MT, (12) 14-16mm; **24.125**, IK, (6) 19-24mm; **24.145**, MT, (2) 10-14mm; **27.125**, IK, (1) 18mm; **27.145**, IK, (11) 15-16mm; **27.145**, IK, (11) 14-19mm; **31.127**, MT, (21) 9-16mm; **31.135**, MT, (40) 10-18mm; **31.141**, IK, (1) 18mm; **31.145**, IK, (2) 10-19mm; **31.145**, MT, (24) 11-17mm.

**7210, 100.140**, IK, (1) 7mm; **100.140**, MT, (2) 10mm; **20.127**, MT, (86) 21-62mm; **24.131**, MT, (154) 21-61mm; **24.139**, MT, (1) 9mm; **24.143**, MT, (1) 14mm; **27.131**, IK, (3) 17-50mm; **27.131**, MT, (18) 19-49mm; **27.135**, MT, (37) 15-61mm; **31.127**, IK, (1) 9mm; **31.127**, MT, (1) 9mm; **31.135**, MT, (3) 12-19mm; **31.139**, MT, (2) 17-18mm.

*Diaphus anderseni* Tåning (Fig. 23)

**7205, 20.129**, MT, (6) 14-19mm; **24.125**, IK, (5) 24-29mm; **24.125**, IK, (2) 30-31mm; **24.133**, IK, (2) 16-23mm; **24.141**, IK, (1) 10mm; **24.145**, MT, (2) 20-27mm; **27.125**, IK, (1) 30mm; **31.127**, IK, (2) 27-33mm; **31.127**, MT, (37) 22-30mm; **31.135**, IK, (1) 27mm; **31.135**, MT, (12) 23-29mm; **31.145**, IK, (2) 21-22mm; **31.145**, MT, (1) 21mm.

**7210, 100.140**, MT, (4) 25-28mm; **20.127**, IK, (3) 14-31mm; **20.127**, MT, (9) 23-31mm; **24.125**, IK, (2) 25-30mm; **24.125**, MT, (25) 23-30mm; **24.129**, MT, (6) 27-31mm; **24.131**, MT, (2) 18-27mm; **24.139**, MT, (1) 27mm; **27.131**, IK, (2) 20mm; **27.131**, MT, (6) 13-30mm; **27.135**, IK, (1) 19mm; **27.135**, MT, (3) 24-33mm; **27.143**, IK, (1) 27mm; **31.127**, IK, (2) 28-30mm; **31.127**, MT, (8) 25-28mm; **31.135**, MT, (1) 29mm; **31.139**, IK, (1) 24mm; **31.145**, IK, (1) 27mm; **31.145**, MT, (2) 17-24mm.

*Diaphus bertelseni* Nafpaktitis (Fig. 23)

**7205, 20.145**, MT, (30) 19-21mm; **24.145**, MT, (5) 17-38mm.

**7210, 20.127**, MT, (1) 42mm; **27.131**, MT, (1) 49mm; **27.135**, MT, (1) 39mm.

Note: Previous records of this species in the northeastern Pacific are from the Hawaiian Island region; this survey extends the range eastward ca. 27° longitude.

*Diaphus brachycephalus* Tåning (Fig. 23)

**7205, 20.129**, MT, (12) 45-55mm; **20.135**, MT, (2) 35-47mm; **20.145**, MT, (12) 12-40mm; **24.141**, IK, (1) 42mm; **31.145**, MT, (3) 28-34mm.

**7210, 20.127**, MT, (1) 19mm; **22.143**, MT, (4) 19-22mm; **24.139**, MT, (1) 41mm; **24.143**, MT, (1) 20mm; **31.135**, MT, (1) 14mm.

Note: Previous records of this species in the northeastern Pacific are from the Hawaiian Island region; this survey extends the range eastward ca. 27° longitude.

*Diaphus clucens* Brauer (Fig. 24)

**7210, 31.145**, MT, (1) 48mm.

Note: Previous records of this species in the eastern Pacific are from the Hawaiian Island region (Wisner 1976).

*Diaphus mollis* Tåning (Fig. 24)

**7205, 20.135**, IK, (2) 19-23mm; **20.145**, MT, (3) 25-54mm; **20.145**, IK, (1) 25mm; **24.125**, IK, (1)

39mm; **24.141**, IK, (2) 13-35mm; **24.145**, MT, (1) 27mm; **27.145**, IK, (1) 52mm; **31.127**, MT, (2) 40-46mm; **31.135**, MT, (11) 33-48mm; **31.145**, IK, (1) 29mm; **31.145**, MT, (45) 21-47mm.

**7210**, **100.140**, MT, (3) 37-41mm; **20.123**, MT, (1) 40mm; **20.127**, IK, (1) 37mm; **20.127**, MT, (14) 23-44mm; **20.135**, IK, (2) 18-24mm; **20.135**, IK, (1) 21mm; **22.143**, MT, (8) 19-57mm; **24.125**, MT, (14) 31-42mm; **24.129**, MT, (16) 12-45mm; **24.131**, MT, (24) 21-42mm; **24.139**, IK, (1) 57mm; **24.139**, MT, (9) 19-56mm; **27.131**, MT, (8) 36-43mm; **27.135**, MT, (16) 37-50mm; **27.143**, MT, (3) 35-48mm; **27.143**, IK, (1) 55mm; **31.127**, MT, (3) 35-38mm; **31.135**, MT, (10) 36-44mm; **31.139**, IK, (1) 44mm; **31.139**, MT, (15) 36-46mm; **31.145**, IK, (2) 21-40mm; **31.145**, MT, (7) 34-46mm.

Note: This complex includes several nominal species, including *D. fulgeus* and *D. rafinesquii* (Wisner, 1976; Moser and Ahlstrom, 1996).

*Diaphus pacificus* Parr (Fig. 24)

**7205**, **20.121**, IK, (3) 19-28mm; **20.129**, MT, (3) 20-24mm.

**7210**, **130.50**, MT, (1) 28mm; **130.90**, MT, (1) 29mm; **150.70**, IK, (1) 29mm; **157G.25**, IK, (71) 7-31mm; **157G.55**, IK, (62) 9-33mm; **20.123**, IK, (1) 33mm; **23.108**, IK, (63) 11-33mm.

*Diaphus parvi* Tåning (Fig. 24)

**7205**, **20.129**, MT, (34) 11-50mm.

**7210**, **20.127**, MT, (3) 38-44mm.

*Diaphus phillipsi* Fowler (Fig. 24)

**7205**, **20.135**, IK, (1) 49mm; **24.133**, IK, (1) 37mm; **24.141**, IK, (2) 48-54mm; **27.145**, IK, (1) 48mm.

**7210**, **20.127**, MT, (1) 35mm; **22.143**, MT, (2) 16-58mm; **24.125**, MT, (3) 36-48mm; **24.139**, MT, (1) 23mm; **24.143**, IK, (1) 33mm; **24.143**, MT, (3) 23-31mm; **27.131**, MT, (2) 47-52mm; **27.135**, IK, (1) 48mm; **27.135**, MT, (1) 46mm; **27.143**, IK, (2) 20-50mm; **31.145**, IK, (1) 57mm.

*Diaphus schmidti* Tåning (Fig. 24)

**7205**, **20.145**, MT, (6) 34-41mm; **24.141**, IK, (1) 39mm; **24.145**, MT, (1) 34mm.

**7210**, **22.143**, MT, (1) 27mm.

*Diaphus splendidus* (Brauer) (Fig. 25)

**7205**, **20.145**, MT, (1) 54mm.

*Diaphus trachops* Wisner (Fig. 25)

**7205**, **20.145**, MT, (2) 68-70mm.

*Diaphus* sp. A (Fig. 25)

**7205**, **20.135**, IK, (1) 31mm; **20.145**, IK, (2) 23-33mm; **20.145**, MT, (2) 40-44mm.

**7210**, **20.127**, MT, (2) 34-36mm; **24.129**, MT, (4) 30-42mm; **24.131**, MT, (1) 32mm.

Note: These specimens, representing an undescribed species, were sent to Dr. Basil G. Nafpaktitis.

*Diaphus* spp.

**7205, 20.121**, IK, (1) 19mm; **20.129**, MT, (1) 20mm; **20.135**, IK, (4) 10-42mm; **20.145**, MT, (4) 9-22mm.

**7210, 20.123**, MT, (1) 15mm; **22.143**, MT, (1) 19mm; **31.127**, IK, (1) 12mm.

*Diogenichthys atlanticus* (Tåning) (Fig. 25)

**7205, 20.129**, MT, (59) 10-20mm; **20.135**, IK, (5) 16-20mm; **20.135**, IK, (3) 17-20mm; **20.145**, IK, (4) 13-19mm; **20.145**, MT, (46) 12-20mm; **24.125**, IK, (2) 19-20mm; **24.125**, IK, (4) 19mm; **24.133**, IK, (7) 14-19mm; **24.145**, MT, (12) 10-19mm; **27.125**, IK, (8) 21-24mm; **27.145**, IK, (1) 15mm; **31.127**, IK, (2) 21-23mm; **31.127**, MT, (81) 18-27mm; **31.135**, IK, (1) 18mm; **31.135**, MT, (53) 10-22mm; **31.141**, IK, (2) 18mm; **31.145**, IK, (2) 17mm; **31.145**, MT, (21) 15-19mm.

**7210, 100.140**, IK, (4) 16-24mm; **100.140**, MT, (28) 15-23mm; **20.123**, MT, (1) 15mm; **20.127**, IK, (7) 12-20mm; **20.127**, MT, (265) 14-24mm; **20.135**, IK, (2) 21-23mm; **20.135**, IK, (3) 16-18mm; **22.143**, MT, (3-4) 9-23mm; **24.125**, IK, (8) 17-20mm; **24.125**, MT, (143) 18-21mm; **24.129**, IK, (23) 14-22mm; **24.129**, MT, (89) 19-22mm; **24.131**, IK, (2) 20-21mm; **24.131**, MT, (141) 10-21mm; **24.139**, IK, (1) 22mm; **24.139**, MT, (29) 11-22mm; **24.143**, IK, (2) 17-21mm; **24.143**, MT, (3) 19-21mm; **27.131**, IK, (9) 12-20mm; **27.131**, MT, (213) 10-24mm; **27.135**, MT, (21) 13-23mm; **27.143**, IK, (1) 14mm; **31.127**, IK, (5) 19-22mm; **31.127**, MT, (207) 16-23mm; **31.135**, IK, (4) 11-20mm; **31.135**, MT, (32) 11-25mm; **31.139**, IK, (2) 13-14mm; **31.139**, MT, (13) 20-23mm; **31.145**, IK, (2) 15-22mm; **31.145**, MT, (7) 14-21mm.

*Diogenichthys laternatus* (Garman) (Fig. 25)

**7205, 130.50**, IK, (9) 11-27mm; **140.120**, IK, (23) 16-25mm; **140.120**, IK, (6) 17-26mm; **150.70**, IK, (6) 16-28mm; **150.70**, IK, (5) 16-26mm; **20.121**, IK, (8) 23-27mm; **20.121**, IK, (13) 17-26mm; **20.129**, MT, (25) 12-25mm; **20.135**, IK, (5) 10-12mm; **20.135**, IK, (5) 12-17mm; **20.145**, MT, (1) 11mm.

**7210, 130.50**, IK, (13) 17-26mm; **130.50**, MT, (119) 13-29mm; **130.90**, IK, (6) 15-27mm; **130.90**, MT, (25) 12-27mm; **140.120**, IK, (11) 14-24mm; **140.120**, MT, (153) 13-27mm; **150.70**, IK, (5) 17-23mm; **157G.25**, IK, (41) 9-23mm; **157G.55**, IK, (71) 11-28mm; **20.123**, IK, (11) 16-25mm; **20.123**, MT, (36) 10-27mm; **23.108**, IK, (42) 11-23mm.

*Electrona risso* (Cocco) (Fig. 25)

**7205, 31.127**, MT, (1) 26mm.

**7210, 100.140**, MT, (1) 38mm.

*Gonichthys tenuiculus* (Garman) (Fig. 26)

**7205, 130.90**, IK, (1) 54mm; **130.90**, MT, (3) 43-55mm; **150.70**, IK, (1) 53mm.

**7210, 130.50**, MT, (6) 34-55mm; **130.90**, MT, (1) 24mm; **140.120**, MT, (1) 45mm; **150.70**, IK, (1) 55mm.

*Hygophum atratum* (Garman) (Fig. 26)

**7205, 130.90**, MT, (16) 31-62mm; **150.70**, IK, (2) 31-59mm; **150.70**, IK, (2) 57-60mm.

**7210, 130.50**, MT, (4) 47-57mm; **130.90**, MT, (4) 15-25mm; **140.120**, MT, (30) 23-59mm; **150.70**, IK, (1) 48mm; **23.108**, IK, (1) 51mm.

*Hygophum proximum* Becker (Fig. 26)

7205, 20.129, MT, (32) 19-46mm; 20.145, IK, (1) 11mm; 20.145, MT, (23) 10-47mm; 24.145, MT, (8) 14-45mm.

7210, 20.123, IK, (1) 19mm; 20.123, MT, (4) 11-44mm; 20.127, MT, (3) 26-38mm; 20.135, IK, (1) 32mm; 22.143, MT, (57) 10-46mm; 24.143, IK, (1) 33mm; 24.143, MT, (2) 18-22mm.

*Hygophum reinhardtii* (Lütken) (Fig. 26)

7205, 20.129, MT, (2) 18-50mm; 20.145, MT, (1) 14mm; 24.133, IK, (2) 34-40mm; 27.145, IK, (1) 18mm; 31.127, MT, (11) 15-41mm; 31.135, MT, (35) 16-51mm; 31.145, IK, (1) 35mm; 31.145, MT, (40) 18-49mm.

7210, 100.140, MT, (34) 21-57mm; 20.127, MT, (5) 30-45mm; 22.143, MT, (8) 17-43mm; 24.125, IK, (1) 35mm; 24.125, MT, (12) 20-58mm; 24.129, IK, (1) 14mm; 24.129, MT, (18) 21-48mm; 24.131, MT, (17) 15-47mm; 24.139, MT, (18) 17-52mm; 24.143, MT, (1) 37mm; 27.131, IK, (3) 37-48mm; 27.131, MT, (20) 25-50mm; 27.135, MT, (12) 35-50mm; 27.143, IK, (1) 17mm; 31.127, MT, (1) 37mm; 31.135, MT, (13) 31-51mm; 31.139, MT, (15) 18-55mm; 31.145, MT, (15) 18-50mm.

*Lampadena anomala* Parr (Fig. 26)

7210, 22.143, MT, (3) 49-83mm.

Note: This specimen represents an eastward extension (ca. 17° longitude) of the reported range of *L. anomala* in the eastern north Pacific (Bekker 1983).

*Lampadena urophaos* Paxton (Fig. 26)

7205, 140.120, IK, (1) 33mm; 20.135, IK, (1) 36mm; 20.145, MT, (6) 12-27mm; 22.143, MT, (1) 53mm; 24.133, IK, (4) 19-21mm; 24.141, IK, (2) 29-30mm; 24.145, MT, (10) 16-21mm; 27.145, IK, (3) 19-28mm; 27.145, IK, (3) 11-22mm; 31.135, MT, (1) 23mm; 31.141, IK, (1) 14mm; 31.145, IK, (2) 17-20mm; 31.145, MT, (2) 11-19mm.

7210, 100.140, MT, (3) 20-35mm; 140.120, MT, (1) 28mm; 22.143, MT, (1) 53mm; 24.131, MT, (4) 39-79mm; 24.139, MT, (3) 40-51mm; 27.131, IK, (1) 39mm; 27.131, MT, (4) 34-73mm; 31.135, MT, (2) 32-37mm; 31.139, MT, (3) 35-68mm; 31.145, MT, (1) 38mm.

*Lampanyctus acanthurus* Wisner (Fig. 27)

7205, 27.145, IK, (2) 11-28mm; 31.135, MT, (9) 7-31mm; 31.145, MT, (1) 10mm.

7210, 100.140, MT, (1) 58mm; 24.139, IK, (1) 46mm; 27.131, MT, (7) 30-64mm; 27.135, MT, (4) 39-50mm; 31.127, IK, (1) 41mm; 31.127, MT, (2) 13-43mm; 31.135, IK, (2) 38-40mm; 31.135, MT, (5) 31-48mm; 31.139, IK, (2) 43-44mm; 31.139, MT, (13) 36-47mm; 31.145, MT, (5) 46-50mm.

Note: This survey extends the range of the species considerably southward and eastward (see Wisner 1976).

*Lampanyctus idostigma* Parr (Fig. 27)

7205, 130.50, IK, (9) 28-67mm; 130.90, IK, (2) 36-65mm; 130.90, MT, (13) 54-83mm; 140.120, IK, (2) 38-40mm; 140.120, IK, (3) 55-78mm; 150.70, IK, (2) 60-68mm; 20.121, IK, (1) 58mm; 20.129, MT, (13) 23-78mm.

**7210, 130.50**, MT, (20) 30-72mm; **130.90**, IK, (3) 24-38mm; **130.90**, MT, (22) 29-79mm; **140.120**, IK, (7) 22-67mm; **140.120**, MT, (77) 28-83mm; **150.70**, IK, (2) 30-67mm; **157G.25**, IK, (1) 48mm; **157G.55**, IK, (4) 32-68mm; **20.123**, MT, (2) 69-70 mm; **23.108**, IK, (8) 30-51mm; **24.125**, MT, (6) 23-57mm; **24.139**, MT, (1) 57mm.

Note: Zahuranec (in press) revised *Lampanyctus* species with reduced or absent pectoral fins and placed 17 species in Günther's genus *Nannobranchium*. Larvae of four of Zahuranec's *Nannobranchium* (*Lampanyctus* "niger", *Lampanyctus* "no pectorals", *L. idostigma*, and *L. ritteri*) were taken on this survey.

*Lampanyctus* "niger" (Fig. 27)

**7205, 20.129**, MT, (2) 6-7mm; **20.135**, IK, (1) 9mm; **20.145**, IK, (2) 37-38mm; **20.145**, MT, (2) 6-8mm; **24.125**, IK, (2) 31-109mm; **24.133**, IK, (1) 11mm; **31.127**, MT, (7) 23-85mm; **31.135**, MT, (3) 45-107mm; **31.145**, IK, (1) 15mm; **31.145**, MT, (5) 8-13mm.

**7210, 100.140**, IK, (1) 76mm; **100.140**, MT, (4) 33-89mm; **20.127**, MT, (3) 40-58mm; **22.143**, MT, (1) 42mm; **24.129**, MT, (4) 55-69mm; **24.131**, MT, (3) 64-116mm; **24.139**, MT, (11) 35-117mm; **27.131**, MT, (1) 95mm; **27.135**, IK, (1) 36mm; **27.135**, MT, (4) 35-66mm; **27.143**, MT, (2) 68-89mm; **31.127**, MT, (17) 7-115mm; **31.135**, IK, (1) 36mm; **31.135**, MT, (9) 33-100mm; **31.139**, IK, (4) 27-38mm; **31.139**, MT, (9) 31-106mm; **31.145**, MT, (1) 46mm.

Note: See note for *L. idostigma*.

*Lampanyctus nobilis* Tåning (Fig. 27)

**7205, 20.121**, IK, (1) 54mm; **20.129**, MT, (23) 23-112mm; **20.135**, MT, (2) 27-29mm; **20.145**, IK, (1) 9mm; **20.145**, MT, (8) 32-112mm; **24.133**, IK, (1) 63mm; **24.141**, IK, (2) 41-46mm; **24.145**, MT, (6) 40-125mm.

**7210, 20.123**, MT, (2) 71-76mm; **20.127**, IK, (3) 62-75mm; **20.127**, MT, (44) 31-80mm; **20.135**, MT, (2) 21-32mm; **22.143**, MT, (3) 26-102mm; **24.131**, MT, (8) 27-63mm; **24.139**, MT, (3) 38-82mm; **24.143**, MT, (1) 40mm; **27.131**, MT, (1) 72mm; **27.135**, IK, (1) 67mm; **27.135**, MT, (1) 73mm.

Note: This survey extends the range of *L. nobilis* considerably northeastward of that shown in Bekker (1983).

*Lampanyctus* "no pectorals" (Fig. 28)

**7205, 20.121**, IK, (3) 20-37mm; **20.135**, IK, (6) 22-62mm; **20.145**, MT, (38) 44-115mm; **24.125**, IK, (1) 49mm; **24.133**, IK, (9) 39-66mm; **24.141**, IK, (1) 45mm; **24.145**, IK, (3) 23-64mm; **24.145**, MT, (18) 23-71mm; **27.145**, IK, (1) 11mm; **31.127**, MT, (3) 46-53mm; **31.135**, IK, (1) 9mm; **31.135**, MT, (11) 11-61mm; **31.145**, MT, (12) 9-57mm.

**7210, 100.140**, MT, (19) 28-62mm; **20.127**, IK, (1) 54mm; **20.127**, MT, (32) 27-73mm; **20.135**, IK, (2) 61-65mm; **20.135**, MT, (2) 30-59mm; **22.143**, MT, (28) 25-74mm; **24.129**, IK, (1) 57mm; **24.129**, MT, (7) 8-64mm; **24.131**, IK, (2) 21-30mm; **24.131**, MT, (29) 23-88mm; **24.139**, IK, (1) 68mm; **24.139**, MT, (49) 35-67mm; **24.143**, IK, (1) 21mm; **27.131**, IK, (2) 50-58mm; **27.131**, MT, (21) 29-65mm; **27.135**, IK, (8) 25-88mm; **27.135**, MT, (20) 18-68mm; **27.143**, IK, (1) 34mm; **27.143**, MT, (3) 44-62mm; **31.127**, MT, (7) 35-62mm; **31.135**, IK, (3) 42-68mm; **31.135**, MT, (50) 20-65mm; **31.139**, MT, (43) 9-68mm; **31.145**, IK, (2) 19-52mm; **31.145**, MT, (35) 40-66mm.

Note: See note for *L. idostigma*.

*Lampanyctus parvicauda* Parr (Fig. 27)

7205, 150.70, IK, (1) 80mm; 20.135, IK, (1) 7mm.

7210, 140.120, MT, (2) 43-81mm; 150.70, IK, (1) 78mm; 157G.25, IK, (3) 21-38mm; 157G.55, IK, (2) 23-67mm; 23.108, IK, (2) 9-57mm.

*Lampanyctus ritteri* (Gilbert) (Fig. 27)

7205, 31.127, MT, (4) 33-40mm.

7210, 130.50, IK, (1) 34mm; 130.50, MT, (3) 25-33mm; 31.127, IK, (2) 19-23mm; 31.127, MT, (3) 20-35mm.

Note: See note for *L. idostigma*.

*Lampanyctus steinbecki* Bolin (Fig. 28)

7205, 20.129, MT, (41) 18-52mm; 20.135, IK, (3) 23-51mm; 20.135, IK, (11) 21-55mm; 20.145, IK, (4) 41-53mm; 20.145, MT, (61) 20-53mm; 24.125, IK, (2) 28-52mm; 24.133, IK, (4) 25-53mm; 24.141, IK, (7) 24-52mm; 24.145, IK, (2) 29-50mm; 24.145, MT, (26) 25-53mm; 27.145, IK, (1) 27mm; 27.145, MT, (1) 28mm; 31.127, IK, (1) 48mm; 31.127, MT, (15) 22-48mm; 31.135, MT, (25) 31-51mm; 31.141, IK, (1) 28mm; 31.145, IK, (1) 29mm; 31.145, MT, (11) 24-57mm.

7210, 100.140, IK, (1) 31mm; 100.140, MT, (8) 28-54mm; 20.123, MT, (2) 23-49mm; 20.127, IK, (5) 28-51mm; 20.127, MT, (53) 23-55mm; 20.135, IK, (1) 49mm; 22.143, MT, (46) 16-54mm; 24.125, MT, (7) 47-56mm; 24.129, IK, (2) 34-50mm; 24.129, MT, (27) 23-53mm; 24.131, IK, (3) 36-54mm; 24.131, MT, (26) 21-53mm; 24.139, IK, (1) 29mm; 24.139, MT, (25) 17-57mm; 24.143, IK, (5) 16-48mm; 24.143, MT, (4) 23-51mm; 27.131, MT, (24) 28-52mm; 27.135, IK, (2) 31-45mm; 27.135, MT, (15) 29-54mm; 27.143, IK, (2) 17-48mm; 31.127, IK, (2) 30-41mm; 31.127, MT, (9) 46-51mm; 31.135, MT, (13) 29-52mm; 31.139, IK, (8) 40-50mm; 31.139, MT, (50) 32-51mm.

Note: This species is closely related to *L. tenuiformis* and *L. festivus*, with which it may be confused. The taxonomy of this species complex is not fully resolved and identifications of *L. steinbecki* in this survey should be considered tentative.

*Lampanyctus* spp.

7205, 20.135, IK, (1) 55mm; 27.145, IK, (1) 10mm; 31.141, IK, (1) 25mm; 31.145, MT, (2) 7-8mm.

7210, 130.90, MT, (1) 32mm; 150.70, IK, (9) 27-45mm; 20.123, IK, (2) 22-67mm; 20.135, IK, (1) 62mm; 20.135, IK, (13) 35-43mm; 24.131, MT, (1) 22mm; 27.143, MT, (2) 34-44mm; 31.127, MT, (2) 36-37mm.

*Lobianchia gemellarii* (Cocco) (Fig. 28)

7205, 20.145, MT, (2) 10-41mm; 24.133, IK, (1) 57mm; 24.145, MT, (6) 17-50mm; 27.145, MT, (2) 9-43mm; 31.127, MT, (4) 47-48mm; 31.135, MT, (2) 54-64mm; 31.145, MT, (36) 18-64mm.

7210, 100.140, MT, (2) 31-35mm; 22.143, MT, (4) 16-50mm; 24.129, MT, (4) 35-66mm; 24.131, IK, (1) 61mm; 24.131, MT, (8) 28-60mm; 24.139, MT, (10) 22-64mm; 24.143, IK, (1) 51mm; 24.143, MT, (1) 31mm; 27.131, MT, (11) 31-65mm; 27.135, MT, (9) 20-66mm; 27.143, IK, (2) 21-27mm; 27.143, MT, (2) 20-26mm; 31.127, MT, (2) 54-55mm; 31.135, MT, (2) 23-58mm; 31.139, MT, (13) 25-69mm; 31.145, IK, (1) 31mm; 31.145, MT, (4) 31-39mm.

*Loweina rara* (Lütken) (Fig. 28)

7205, 20.129, MT, (1) 32mm; 20.145, IK, (1) 16mm; 20.145, MT, (1) 34mm.

7210, 130.90, IK, (1) 24mm; 140.120, MT, (1) 27mm; 20.127, IK, (1) 21mm; 20.135, IK, (1) 23mm;  
24.125, MT, (1) 23mm; 24.131, MT, (1) 23mm.

Note: *L. rara* is broadly distributed in the tropical Atlantic and Indian Oceans (Nafpaktitis et al. 1977). The species was first recorded from the tropical eastern Pacific by Beebe and Vander Pyle (1944); subsequently, Wisner (1971) determined the *Loweina* species in the eastern tropical Pacific to be distinct from *L. rara*, and named it *L. laurae*. According to Wisner (1971), "*L. laurae* is basically quite similar to *L. rara* (Lütken, 1892), differing primarily in the distinctly longer head, 29.0% of SL (27.3-30.7) vs about 25.7%. The eye is also somewhat smaller (sic), averaging about 8% of SL (7.1-8.8) vs about 6% (5.9-6.0) for *L. rara*." Measurements of 8 specimens from this survey, 14 specimens from the Atlantic, and 10 paratypes of *L. laurae*, indicate almost complete overlap for both head length and eye size. Average head length was 28.7% SL (range 26.5-30.8) for specimens from this survey, 28.0% (range 26.3-31.5) for the Atlantic material, and 29.4 (range 28.1-31.6) for the paratypes of *L. laurae*. Eye size averaged 7.1% (range 6.5-7.4) for specimens from this survey, 7.4% (range 5.9-9.0) for Atlantic material, and 6.8% (range 6.4-7.4) for *L. laurae* paratypes. Following Paxton et al. (1995), we use the name *L. rara* for the eastern tropical Pacific population of *Loweina*.

*Loweina terminata* Bekker (Fig. 28)

7205, 31.135, MT, (4) 10-18mm.

7210, 31.135, IK, (1) 38mm.

*Myctophum aurolaternatum* Garman (Fig. 29)

7210, 157G.25, IK, (1) 64mm; 157G.55, IK, (1) 23mm.

*Myctophum lychmobium* Bolin (Fig. 29)

7205, 20.145, MT, (1) 21mm; 24.145, MT, (2) 15-16mm.

7210, 20.127, MT, (2) 32-35mm; 27.131, MT, (1) 19mm.

*Myctophum nitidulum* Garman (Fig. 29)

7205, 20.145, MT, (7) 12-63mm; 24.125, IK, (2) 9-62mm; 24.141, IK, (1) 28mm; 24.145, MT, (1) 40mm;  
31.135, MT, (1) 37mm.

7210, 24.125, MT, (1) 69mm; 27.131, MT, (1) 62mm.

*Myctophum obtusirostre* Tåning (Fig. 29)

7205, 20.145, MT, (3) 13-66mm; 24.141, IK, (1) 9mm; 24.145, MT, (1) 10mm.

7210, 22.143, MT, (1) 34mm.

*Myctophum selenops* Tåning (Fig. 29)

7205, 20.145, IK, (1) 13mm; 31.145, MT, (2) 11-23mm.

7210, 20.127, MT, (1) 42mm; 22.143, MT, (1) 12mm.



*Notolychnus valdiviae* (Brauer) (Fig. 29)

**7205, 140.120**, IK, (1) 22mm; **150.70**, IK, (1) 23mm; **20.129**, MT, (66) 15-24mm; **20.145**, IK, (6) 19-23mm; **20.145**, MT, (15) 16-22mm; **24.125**, IK, (30) 17-25mm; **24.125**, IK, (30) 18-23mm; **24.133**, IK, (26) 13-23mm; **24.141**, IK, (8) 15-23mm; **24.145**, IK, (2) 13-23mm; **24.145**, MT, (22) 17-24mm; **27.125**, IK, (1) 24mm; **27.145**, MT, (6) 18-23mm; **31.127**, MT, (13) 16-25mm; **31.135**, IK, (9) 19-25mm; **31.135**, MT, (63) 14-24mm; **31.141**, IK, (2) 21-23mm; **31.145**, IK, (3) 11-23mm; **31.145**, MT, (60) 17-23mm.

**7210, 100.140**, IK, (28) 18-24mm; **100.140**, MT, (112) 11-24mm; **140.120**, MT, (3) 18-24mm; **20.127**, MT, (108) 16-23mm; **20.127**, IK, (9) 14-20mm; **20.135**, IK, (7) 19-23mm; **20.135**, IK, (1) 19mm; **22.143**, MT, (31) 10-22mm; **24.125**, IK, (5) 18-24mm; **24.125**, MT, (36) 17-23mm; **24.129**, IK, (13) 20-23mm; **24.129**, MT, (38) 17-23mm; **24.131**, IK, (10) 19-24mm; **24.131**, MT, (115) 17-23mm; **24.139**, IK, (10) 11-23mm; **24.139**, MT, (25) 16-23mm; **24.143**, IK, (9) 16-24mm; **24.143**, MT, (1) 22mm; **27.131**, IK, (17) 17-23mm; **27.131**, MT, (101) 16-23mm; **27.135**, IK, (8) 18-23mm; **27.135**, MT, (71) 16-23mm; **27.143**, IK, (4) 22-23mm; **27.143**, MT, (2) 14-18mm; **31.127**, IK, (2) 18-24mm; **31.127**, MT, (55) 16-23mm; **31.135**, IK, (4) 21-23mm; **31.135**, MT, (43) 18-23mm; **31.139**, IK, (10) 21-23mm; **31.139**, MT, (69) 17-23mm; **31.145**, IK, (5) 21-23mm; **31.145**, MT, (61) 13-23mm.

*Notoscopehus resplendens* (Richardson) (Fig. 30)

**7205, 130.90**, MT, (2) 38-50mm; **20.129**, MT, (39) 12-70mm; **20.135**, IK, (3) 24-33mm; **24.133**, IK, (2) 22-25mm; **24.145**, MT, (1) 29mm; **27.125**, IK, (1) 28mm; **31.127**, IK, (1) 18mm; **31.127**, MT, (10) 41-66mm; **31.135**, MT, (42) 10-62mm; **31.141**, IK, (1) 17mm; **31.145**, MT, (47) 8-63mm.

**7210, 100.140**, MT, (12) 11-69mm; **130.50**, MT, (1) 15mm; **130.90**, MT, (3) 46-76mm; **140.120**, IK, (1) 66mm; **140.120**, MT, (8) 51-61mm; **20.127**, MT, (7) 50-74mm; **24.125**, MT, (19) 43-70mm; **24.129**, MT, (7) 49-56mm; **24.131**, MT, (7) 40-70mm; **27.131**, MT, (12) 45-65mm; **27.135**, MT, (3) 46-48mm; **31.127**, IK, (1) 43mm; **31.127**, MT, (40) 14-68mm; **31.135**, IK, (1) 14mm; **31.135**, MT, (4) 33-48mm; **31.139**, MT, (8) 46-61mm; **31.145**, MT, (1) 32mm.

*Parvilux boschmai* Hubbs and Wisner (Fig. 30)

**7205, 20.129**, MT, (1) 130mm.

*Parvilux ingens* Hubbs and Wisner (Fig. 30)

**7205, 31.127**, MT, (1) 17mm; **31.135**, MT, (2) 10-17mm.

*Protomyctophum beckeri* Wisner (Fig. 30)

**7205, 20.135**, IK, (1) 21mm; **20.145**, MT, (1) 21mm; **31.145**, MT, (1) 28mm.

*Protomyctophum crockeri* (Bolin) (Fig. 30)

**7205, 31.127**, MT, (12) 11-38mm; **31.135**, MT, (5) 22-35mm.

**7210, 100.140**, MT, (13) 15-38mm; **20.127**, MT, (10) 18-48mm; **24.125**, MT, (6) 13-45mm; **24.129**, MT, (1) 14mm; **24.131**, MT, (1) 37mm; **27.131**, MT, (2) 14-31mm; **31.127**, MT, (5) 14-42mm; **31.135**, MT, (1) 32mm.

*Symbolophorus californensis* (Eigenmann and Eigenmann) (Fig. 31)

**7205, 31.127**, MT, (2) 13-16mm.

**7210, 31.127**, MT, (1) 36mm.

*Symbolophorus evermanni* (Gilbert) (Fig. 31)

7205, 20.129, MT, (13) 14-66mm; 20.135, IK, (2) 25-26mm; 20.135, IK, (1) 23mm; 20.145, MT, (2) 12-15mm; 24.133, IK, (2) 23-38mm; 24.145, MT, (2) 23-80mm; 27.145, IK, (1) 28mm; 31.135, MT, (10) 14-21mm; 31.145, MT, (2) 14-34mm.

7210, 20.127, MT, (1) 72mm; 22.143, MT, (4) 19-73mm; 24.131, MT, (1) 50mm; 24.143, MT, (1) 34mm; 31.139, MT, (1) 68mm; 31.145, MT, (1) 23mm.

*Taaningichthys minimus* (Tåning) (Fig. 31)

7205, 20.129, MT, (7) 13-48mm; 20.145, MT, (4) 48-56mm; 24.141, IK, (1) 24mm; 24.145, MT, (1) 22mm; 27.145, IK, (1) 15mm; 31.127, MT, (1) 47mm; 31.135, MT, (2) 32-51mm.

7210, 20.135, IK, (1) 41mm; 22.143, MT, (3) 26-62mm; 24.125, MT, (2) 40mm; 24.129, MT, (3) 23-49mm; 24.131, MT, (3) 46-52mm; 24.139, MT, (2) 42-49mm; 27.131, MT, (2) 49-54mm; 31.139, MT, (1) 43mm.

*Triphoturus mexicanus* (Gilbert) (Fig. 31)

7205, 130.50, IK, (54) 25-61mm; 130.90, IK, (13) 30-69mm; 130.90, MT, (270) 29-75mm; 140.120, IK, (1) 57mm; 150.70, IK, (1) 55mm; 150.70, IK, (1) 59mm; 24.125, IK, (2) 24-56mm; 27.125, IK, (1) 45mm; 31.127, MT, (12) 40-63mm; 31.135, MT, (3) 27-38mm.

7210, 100.140, MT, (1) 21mm; 130.50, IK, (53) 20-64mm; 130.50, MT, (401) 12-67mm; 130.90, IK, (4) 33-52mm; 130.90, MT, (119) 25-72mm; 140.120, IK, (2) 58-59mm; 140.120, MT, (44) 22-68mm; 150.70, IK, (4) 44-58mm; 157G.25, IK, (1) 52mm; 157G.55, IK, (2) 18-20mm; 23.108, IK, (2) 39-47mm; 24.125, MT, (1) 58mm; 31.139, MT, (1) 47mm.

*Triphoturus nigrescens* (Brauer) (Fig. 31)

7205, 20.129, MT, (1) 28mm; 20.135, IK, (1) 32mm; 24.145, MT, (11) 29-34mm; 27.145, IK, (1) 28mm; 27.145, MT, (1) 11mm; 31.141, IK, (2) 24-28mm; 31.145, IK, (1) 29mm; 31.145, MT, (17) 23-39mm.

7210, 22.143, MT, (13) 18-31mm; 24.131, MT, (5) 23-36mm; 24.139, MT, (5) 21-36mm; 24.143, IK, (5) 23-37mm; 24.143, MT, (9) 21-36mm; 27.135, IK, (1) 33mm; 27.135, MT, (1) 29mm; 31.135, IK, (2) 35-36mm; 31.135, MT, (12) 33-36mm; 31.139, MT, (2) 34-35mm; 31.145, IK, (2) 18-37mm; 31.145, MT, (7) 30-39mm.

Myctophidae (most specimens are disintegrated)

7205, 130.90, IK, (1); 130.90, MT, (2); 140.120, IK, (1); 150.70, IK, (2); 20.121, IK, (2); 20.129, IK, (1); 20.129, MT, (2); 20.135, IK, (2); 20.145, MT, (4); 24.125, IK, (3); 24.145, MT, (15); 31.145, MT, (3).

7210, 20.135, IK, (13); 24.143, MT, (9); 27.131, IK, (3); 27.135, IK, (1); 27.143, IK, (2); 31.127, IK, (1); 31.135, IK, (2); 31.135, MT, (4).

Reference: Bekker (1983), Moser and Ahlstrom (1970, 1996b), Nafpaktitis et al. (1977), Ozawa (1986b, 1988a), Paxton et al. (1995), Wisner (1976)

## GADIFORMES

### Bregmacerotidae

*Bregmaceros* sp. A (Fig. 32)

**7205, 20.121**, IK, (1) 26mm; **20.129**, MT, (34) 21-57mm; **20.135**, IK, (1) 27mm; **20.145**, MT, (5) 27-46mm; **24.145**, MT, (3) 26-40mm; **31.145**, MT, (7) 23-49mm.

**7210, 140.120**, MT, (2) 46-48mm; **20.123**, MT, (1) 51mm; **22.143**, MT, (1) 53mm; **24.131**, MT, (6) 25-52mm; **24.139**, MT, (7) 29-50mm; **27.131**, MT, (2) 38-43mm; **27.135**, MT, (2) 42-50mm; **31.135**, MT, (6) 33-46mm; **31.139**, MT, (1) 54mm; **31.145**, IK, (1) 15mm; **31.145**, MT, (6) 33-46mm.

Note: These specimens represent an undescribed species (Stevens and Moser, 1996).

*Bregmaceros* sp. B (Fig. 32)

**7205, 20.129**, MT, (11) 29-43mm; **20.145**, MT, (11) 27-58mm.

**7210, 20.123**, MT, (1) 68mm; **20.127**, MT, (4) 59-66mm; **22.143**, MT, (9) 17-77mm; **24.131**, MT, (2) 67-68mm; **24.139**, IK, (1) 25mm; **24.139**, MT, (1) 80mm; **27.143**, IK, (1) 33mm.

Note: These specimens represent an undescribed species similar to *B. maccellelandi*.

*Bregmaceros bathymaster* Jordan and Bollman (Fig. 32)

**7210, 157G.25**, IK, (10) 16-23mm; **157G.55**, IK, (10) 15-56mm; **23.108**, IK, (2) 26-44mm.

*Bregmaceros* spp.

**7205, 20.129**, MT, (57) 25-59mm; **20.135**, IK, (1) 23mm; **20.145**, IK, (1) 18mm; **24.133**, IK, (1) 20mm; **24.141**, IK, (6) 18-41mm; **24.145**, IK, (2) 21-22mm; **27.145**, IK, (1) 21mm.

**7210, 20.127**, IK, (1) 12mm; **20.135**, IK, (1) 31mm; **24.129**, MT, (3) 32-57mm; **27.143**, IK, (1) 31mm.

Reference: D'Ancona and Cavinato (1965), Houde (1984), Stevens and Moser (1996)

### Maerouridae

*Mesobius berryi* Hubbs and Iwamoto (Fig. 32)

**7205, 31.145**, MT, (1) 65mm.

Reference: Ambrose (1996c)

### Moridae (Fig. 32)

Unidentified Moridae

**7205, 31.145**, IK, (1) 6mm.

Reference: Ambrose (1996d), Fahay and Markle (1984)

### Melanonidae

*Melanonus zugmayeri* Norman (Fig. 32)

**7210, 27.135**, MT, (1) 27mm; **27.143**, MT, (1) 84mm; **31.135**, MT, (1) 14mm.

Reference: Cohen et al. (1990), Eschmeyer et al. (1983), Fitch and Lavenberg (1968)

## OPHIDIIFORMES

### Bythitidae

*Brotulataenia nielsenii* Cohen (Fig. 33)  
7205, 31.127, IK, (1) 254mm.

Reference: Cohen (1974)

## LOPHIIFORMES

### Linophrynidae

*Linophryne* sp. (Fig. 33)  
7205, 20.145, MT, (1) 7mm; 24.145, MT, (2) 12-13mm.

Reference: Bertelsen (1951)

## BELONIFORMES

### Scomberesocidae

*Cololabis saira* (Brevoort)  
7205, 31.135, IK, (1) 31mm.

Reference: Hubbs and Wisner (1980)

### Exocoetidae

*Exocoetus volitans* Linnaeus  
7210, 20.127, IK, (1) 10mm.

*Oxyporhamphus micropterus* (Valenciennes)  
7210, 157G.25, IK, (1) 12mm; 23.108, IK, (1) 19mm.

Reference: Parin (1995a), Watson (1996d)

## LAMPRIDIFORMES

### Radiicephalidae

*Radiicephalus elongatus* Osorio (Fig. 33)  
7205, 27.145, IK, (1) 20mm.

Reference: Charter and Moser (1996c)

### Trachipteridae

*Trachipterus altivelis* Kner (Fig. 33)  
7205, 27.125, IK, (1) 20mm.

*Trachipterus fukuzakii* Fitch (Fig. 33)  
7210, 130.50, MF, (1) 1100mm.

Reference: Charter and Moser (1996d), Fitch (1964)

## Stylephoridae

*Stylephorus chordatus* Shaw (Fig. 34)

7205, 24.145, MT, (1) 236mm; 31.145, MT, (2) 17-54mm.

7210, 24.129, MT, (1) 133mm; 31.145, MT, (1) 145mm.

Reference: Olney (1984)

## BERYCIFORMES

### Anoplogastridae

*Anoplogaster cornuta* (Valenciennes) (Fig. 34)

7210, 22.143, MT, (1) 103mm; 27.135, MT, (1) 100mm.

Reference: Kotlyar (1986)

### Melamphaidae

*Melamphaes eulepis* Ebeling (Fig. 34)

7205, 20.145, MT, (3) 31-37mm.

7210, 20.127, MT, (1) 45mm; 22.143, MT, (1) 37mm.

*Melamphaes parvus* Ebeling (Fig. 34)

7205, 130.90, MT, (2) 30-31mm; 31.127, MT, (4) 39-44mm.

7210, 100.140, MT, (1) 32mm; 130.50, MT, (1) 31mm; 130.90, MT, (10) 22-43mm; 31.127, MT, (7) 16-39mm.

*Melamphaes simus* Ebeling (Fig. 34)

7205, 20.129, MT, (4) 16-40mm; 20.135, IK, (1) 22mm; 24.133, IK, (1) 23mm; 24.141, IK, (1) 21mm; 27.125, IK, (2) 23-25mm; 27.145, MT, (4) 14-28mm; 31.135, MT, (21) 16-26mm; 31.145, MT, (10) 14-26mm.

7210, 20.127, MT, (3) 23-26mm; 24.129, MT, (4) 23-27mm; 24.131, MT, (2) 22-26mm; 27.131, MT, (4) 13-26mm; 27.135, MT, (5) 27-32mm; 31.135, MT, (11) 16-29mm; 31.139, MT, (5) 16-27mm; 31.145, IK, (1) 25mm; 31.145, MT, (9) 23-28mm.

*Melamphaes* spp.

7205, 140.120, IK, (1) 20mm; 20.145, IK, (1) 11mm; 24.145, IK, (2) 10-11mm; 24.145, MT, (1) 14mm; 31.127, MT, (1) 14mm; 31.135, IK, (1) 10mm; 31.135, MT, (8) 9-19mm; 31.145, IK, (3) 9-14mm; 31.145, MT, (12) 11-30mm.

7210, 157G.55, IK, (1) 10mm; 24.139, MT, (1) 18mm; 24.143, MT, (2) 16-18mm; 31.135, MT, (2) 9-10mm; 31.139, MT, (1) 13mm.

Note: Most of these specimens are larvae that could not be identified because of their poor condition or because complete ontogenetic series linking them to adults are not available.

*Poromitra crassiceps* (Günther) (Fig. 35)

7205, 20.145, MT, (5), 20-22mm; 31.135, MT, (1) 91mm.

7210, 22.143, MT, (2) 87-135mm; 24.139, MT, (2) 88-89mm; 31.145, MT, (4) 87-113mm.

*Poromitra megalops* (Lütken) (Fig. 35)

7210, 157G.55, IK, (2) 24-27mm.

*Poromitra* sp. (Fig. 35)

7205, 20.129, MT, (1) 10mm; 20.145, IK, (1) 8mm; 20.145, MT, (2) 9-10mm; 24.141, IK, (6) 9-10mm; 24.145, MT, (7) 9-16mm; 27.145, IK, (1) 12mm.

Note: These are late larvae of a single species that closely resembles the *Poromitra* sp. larvae described by Belyanina (1987). Parin and Borodulina (1989) subsequently identified Belyanina's larvae as *P. gibbsi*. If the larvae reported here indeed are conspecific with *P. gibbsi*, this would represent a significant range extension from the southeastern Pacific to the north Pacific.

*Poromitra* spp.

7210, 24.141, IK, (3) 9-10mm.

7210, 22.143, MT, (1) 37mm; 31.145, MT, (1) 53mm.

*Scopeloberyx robustus* (Günther) (Fig. 35)

7205, 24.145, MT, (1) 12mm; 27.145, IK, (5) 9-11mm; 31.145, IK, (2) 9-10mm.

7210, 31.135, IK, (1) 8mm.

*Scopelogadus bispinosus* (Gilbert) (Fig. 36)

7205, 130.90, MT, (4) 41-75mm; 150.70, IK, (1) 35mm; 20.121, IK, (3) 35-45mm; 20.135, IK, (1) 59mm; 31.127, MT, (6) 36-77mm.

7210, 100.140, IK, (1) 38mm; 100.140, MT, (2) 32-49mm; 130.50, MT, (1) 78mm; 130.90, MT, (2) 27-49mm; 140.120, MT, (7) 33-60mm; 157G.55, IK, (1) 48mm; 20.123, IK, (2) 32-41mm; 24.125, MT, (1) 87mm; 24.129, MT, (2) 42-48mm; 31.127, MT, (2) 34-55mm.

Note: We follow Hubbs et al. (1979) in recognizing *S. bispinosus* as a species rather than as a subspecies of *S. mizolepis*. Larvae of the two species have distinctly different pigmentation.

*Scopelogadus mizolepis* (Günther) (Fig. 36)

7205, 20.129, MT, (10) 22-65mm; 20.145, MT, (7) 56-65mm; 24.145, MT, (3) 31-78mm.

7210, 20.127, IK, (2) 28-30mm; 20.127, MT, (12) 23-63mm; 20.135, IK, (1) 55mm; 24.131, MT, (10) 50-55mm; 24.139, IK, (1) 23mm; 24.139, MT, (11) 32-70; 27.135, IK, (1) 27mm; 27.135, MT, (1) 47mm; 31.139, MT, (1) 60mm; 31.145, MT, (2) 48-50mm.

*Scopelogadus* spp.

7205, 24.141, IK, (2) 12-15mm; 24.145, MT, (1) 11mm; 31.135, MT, (1) 12mm.

Reference: Belyanina (1987), Ebeling (1962, 1975), Ebeling and Weed (1963, 1973), Parin and Borodulina

(1989), Sandknop and Watson (1996a)

## CETOMIMIFORMES

### Cetomimidae

*Cetostoma regani* (Zugmayer) (Fig. 36)

7210, 24.139, MT, (1) 167mm; 27.131, MT, (1) 131mm.

Reference: Paxton (1986)

## ZEIFORMES

### Macrurocyttidae

*Zenion* sp. (Fig. 36)

7205, 24.145, MT, (3) 14-20mm.

7210, 22.143, MT, (1) 6mm.

Reference: Heemstra (1980), Machida (1984)

## SYNGNATHIFORMES

### Centriscidae

*Macroramphosus gracilis* (Lowe)

7205, 130.90, 1K, (1) 11mm.

Reference: Miller and Lea (1972)

## SCORPAENIFORMES

### Scorpaenidae

*Scorpaenodes xyris* (Jordan and Gilbert) (Fig. 36)

7210, 157G.25, 1K, (1) 7mm; 157G.55, 1K, (1) 13mm; 23.108, 1K, (4) 9-12mm.

*Sebastes* sp.

7205, 130.50, 1K, (1) 11mm.

Reference: Moser (1996d)

## PERCIFORMES

### Carangidae

*Decapterus* sp. (Fig. 37)

7205, 130.90, 1K, (1) 38mm.

*Naucrates ductor* (Linnaeus) (Fig. 37)

7210, 157G.55, 1K, (1) 12mm.

*Seriola lalandi* Valenciennes (Fig. 37)

7205, 130.90, IK, (1) 11mm.

7210, 31.127, MT, (1) 51mm.

*Trachurus symmetricus* (Ayres) (Fig. 37)

7205, 130.90, MT, (2) 48-55mm; 27.125, IK, (2) 10-20mm.

Reference: Smith-Vaniz (1995), Watson et al. (1996)

#### Coryphaenidae

*Coryphaena equiselis* Linnaeus

7210, 23.108, IK, (1) 9mm.

Reference: Ambrose (1996e), Ditty et al. (1994)

#### Caristiidae

*Caristius maderensis* Maul (Fig. 36)

7210, 20.123, MT, (1) 165mm; 31.145, MT, (1) 7mm.

Reference: Moser (1996e)

#### Howellidae

*Howella zina* Fedoryako (Fig. 37)

7210, 24.131, MT, (1) 65mm.

Note: This occurrence of *H. zina* is a range extension from its previously westernmost known occurrence near Hawaii (Boehlert and Mundy 1992).

*Howella* sp. (Fig. 37)

7205, 24.133, IK, (1) 14mm; 24.145, MT, (1) 19mm; 31.127, MT, (1) 52mm.

7210, 20.127, IK, (1) 67mm; 31.127, MT, (1) 26mm; 31.139, MT, (1) 25mm.

Note: Specimens from this survey appear to represent a single species; whether this species should be referred to as *H. brodiei* or *H. sherrhorni* has not been resolved (see discussion in Sandknop and Watson 1996b). It is possible that the smaller specimens ( $\leq 26$ mm) are juvenile *H. zina* that have not yet developed the diagnostic scale character (Fedoryako 1976).

Reference: Fedoryako (1976), Sandknop and Watson (1996b)

#### Labridae

*Nyriichthys mundiceps* Gill (Fig. 38)

7210, 157G.25, IK, (2) 15-16mm; 157G.55, IK, (1) 15mm; 23.108, IK, (10) 13-17mm.

Reference: Bussing (1985), Gomon (1995), Thomson et al. (1979), Watson (1996e)



### Chiasmodontidae

*Chiasmodon niger* Johnson (Fig. 38)

**7205, 20.145**, MT, (1) 41mm; **24.145**, MT, (1) 61mm; **27.145**, IK, (1) 14mm (specimen on loan to Natural History Museum of Los Angeles County).

**7210, 24.139**, MT, (1) 75mm; **27.135**, MT, (1) 73mm.

*Kali normani* (Parr) (Fig. 38)

**7210, 140.120**, MT, (2) 129-141mm; **24.131**, MT, (1) 140mm.

*Pseudoscopelus scriptus* Lütken (Fig. 38)

**7205, 20.129**, MT, (1) 86mm.

Reference: Johnson (1969), Johnson and Cohen (1974), Norman (1929), Watson and Sandknop (1996c)

### Gempylidae

*Diplospinus multistriatus* Maul (Fig. 38)

**7205, 20.145**, MT, (1) 72mm; **24.133**, IK, (2) 11-12; **24.141**, IK, (4) 12-112mm; **24.145**, MT, (1) 11mm; **27.135**, IK, (2) 11-12mm; **27.145**, IK, (4) 11-60mm; **27.145**, MT, (3) 8-19mm; **31.135**, IK, (1) 6mm; **31.135**, MT, (1) 10mm; **31.145**, IK, (1) 33mm; **31.145**, MT, (6) 10-71mm.

**7210, 24.139**, MT, (1) 188mm; **31.135**, IK, (1) 13mm.

*Gempylus serpens* Cuvier (Fig. 38)

**7210, 31.145**, MT, (1) 21mm.

*Nealotus tripes* Johnson (Fig. 39)

**7205, 20.135**, IK, (1) 10mm; **20.145**, IK, (1) 11mm; **20.145**, MT, (3) 26-29mm.

Reference: Ambrose (1996f), Nishikawa (1987, 1988b), Ozawa (1986e), Richards (1989)

### Scombridae

*Thunnus albacares* (Bonnaterre)

**7210, 157G.25**, IK, (1) 7mm.

Reference: Ambrose (1996g), Nishikawa (1988a), Richards (1989), Wild (1994)

### Trichiuridae

*Benthodesmus pacificus* (Günther) (Fig. 39)

**7205, 27.145**, IK, (1) 33mm.

Reference: Nakamura and Parin (1993), Ozawa (1988c), Parin (1995b), Rosenblatt and Wilson (1987), Sandknop and Watson (1996c)

### Nomeidae

*Cubiceps baxteri* Regan (Fig. 39)

**7205, 20.129**, MT, (6) 9-22mm; **20.135**, IK, (1) 10mm; **24.141**, IK, (1) 11mm; **24.145**, IK, (2) 13-23mm; **27.125**, IK, (2) 15-16mm.

7210, 20.123, MT, (11) 7-19mm; 20.123, IK, (2) 9-11mm; 24.131, MT, (2) 9-16mm; 27.143, IK, (1) 11mm; 31.135, MT, (1) 17mm.

*Cubiceps pauciradiatus* Günther (Fig. 39)  
7210, 20.123, MT, (1) 21mm.

*Cubiceps paradoxus* (Fig. 39)  
7210, 31.145, MT, (1) 12mm.

*Psenes maculatus* Lütken (Fig. 39)  
7210, 24.143, IK, (1) 12mm.

Reference: Ahlstrom et al. (1976), Butler (1979), Haedrich (1967), Watson (1996f)

## PLEURONECTIFORMES

### Paralichthyidae

*Citharichthys* sp.  
7210, 157G.25, IK, (1) 6mm.

*Syacium ovale* (Günther) (Fig. 40)  
7210, 157G.25, IK, (2) 6-10mm; 157G.55, IK, (3) 9-10mm; 23.108, IK, (1) 5mm.

Reference: Moser and Sumida (1996)

### Bothidae

*Bothus leopardinus* Günther (Fig. 40)  
7205, 130.90, IK, (2) 15-17mm.

7210, 157G.25, IK, (1) 13mm; 157G.55, IK, (2) 14-21mm; 23.108, IK, (1) 13mm.

Reference: Moser and Charter (1996)

### Cynoglossidae

*Symphurus* spp. (Fig. 40)  
7210, 157G.55, IK, (1) 7mm; 23.108, IK, (1) 16mm.

Reference: Charter and Moser (1996e), Munroe (1992), Munroe et al. (1995)

## TETRAODONTIFORMES

### Balistidae

*Canthidermis maculatus* (Bloch) (Fig. 40)  
7210, 157G.25, IK, (2) 7-23mm.

Reference: Berry and Baldwin (1966), Watson (1996g)

### Ostraciidae

*Lactoria diaphana* Bloch and Schneider (Fig. 40)

7205, 20.121, 1K, (1) 18mm.

Reference: Tyler (1980), Watson (1996h)

### Molidae

*Ranzania laevis* (Pennant) (Fig. 40)

7205, 24.145, 1K, (41) 104-164mm.

7210, 20.127, MT, (3) 132-140mm; 24.139, MT, (4) 118-138mm; 24.143, MT, (18) 118-132mm; 27.131, MT, (3) 135-137mm; 27.135, MT, (1) 125mm; 31.139, MT, (12) 119-125mm; 31.145, MT, (3) 140-165mm.

Reference: Scott (1995), Watson (1996i)

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Table 1. Station data for *David Starr Jordan* Cruise 7205-JD.

Station	Lat. North	Long. West	Date	Start time	End time	Bottom depth (m)	Wire out (m)	Haul depth (m)	Net
31.127	31° 00'	127° 00'	4/21	0010	0055	4600	600		IK
31.127	31 00	127 00	4/21	0130	0247	4600	1000		MT
31.135	31 00	135 00	4/23	0147	0231	4600	600		IK
31.135	31 00	135 00	4/23	0253	0410	4600	1000		MT
31.141	31 00	141 00	4/24	0247	0331	4700	600	320	IK
31.145	31 00	145 00	4/25	2037	2205	5700	1000		MT
31.145	31 00	145 00	4/26	0125	0216	5700	650	260	IK
27.145	27 00	144 58	4/27	0118	0203	4900	600	240	IK
27.145	27 00	144 58	4/27	0220	0322	4900	1000		IK
27.135	27 00	135 00	4/29	1837	1920	4500	600		IK
27.135	27 00	135 00	5/2	0428	0512	4500	600	210	IK
130.50	25 50	114 47	5/13	2157	2240	3600	600	200	IK
130.90	24 26	117 17	5/14	2210	2253	3800	600	190	IK
130.90	24 26	117 17	5/15	0228	0346	3800	1000		MT
24.125	24 00	125 00	5/16	2352	0035	4200	600	190	IK
24.125	24 00	125 00	5/17	0138	0240	4200	1000		IK
24.133	24 00	133 00	5/18	2227	2310	4400	600	200	IK
24.141	24 00	141 00	5/20	2334	0017	4400	600	210	IK
24.145	24 00	145 00	5/21	2348	0031	5300	600	220	IK
24.145	24 00	145 00	5/22	0344	0440	5300	1000		MT
20.145	20 00	145 00	5/23	0421	0504	4800	600	190	IK
20.145	20 00	145 00	5/23	0533	0652	4800	1000		MT
20.135	20 00	135 00	5/26	0312	0345	4700	600	200	IK
20.135	20 00	135 00	5/26	0359	0501	4700	1000		IK
20.129	20 00	129 00	5/27	1653	1736	4800	600	210	IK
20.129	20 00	129 00	5/27	2103	2222	4800	1000		MT
20.121	20 00	121 00	5/29	2348	0031	4200	600	190	IK
20.121	20 00	121 00	5/30	0042	0143	4200	1000		MT
140.120	21 45	118 01	5/31	0142	0225	4000	600	200	IK
140.120	21 45	118 01	5/31	0236	0337	4000	1000		IK
150.70	21 41	113 48	6/3	2250	2333	3800	600		IK
150.70	21 41	113 48	6/3	2336	0018	3800	1000		IK

Table 2. Station data for *David Starr Jordan* Cruise 7210-JD.

Station	Lat. North	Long. West	Date	Start time	End time	Bottom depth (m)	Wire out (m)	Haul depth (m)	Net
31.127	31° 00'	127° 00'	9/29	0039	0123	4600	600	220	IK
31.127	31 00	127 00	9/29	0208	0326	4600	1000		MT
31.135	31 00	135 00	10/1	0008	0052	4600	600	230	IK
31.135	31 00	135 00	10/1	0115	0234	4600	1000		MT
31.139	31 00	139 00	10/2	0120	0204	4600	600	230	IK
31.139	31 00	139 00	10/2	0224	0343	4600	1000	317	MT
31.145	31 00	145 00	10/4	2025	2110	5700	600	210	IK
31.145	31 00	145 00	10/5	0300	0419	5700	1000	470	MT
27.143	26 56	143 00	10/6	0020	0132	4800	1000	384	IK
27.143	26 56	143 00	10/6	0140	0221	4800	600	220	IK
27.135	27 00	135 00	10/8	0131	0250	4500	1000	443	MT
27.135	27 00	135 00	10/8	0024	0108	4500	600	226	IK
27.131	27 00	131 00	10/9	0321	0405	4400	600	228	IK
27.131	27 00	131 00	10/9	0429	0550	4400	1000	400	MT
100.140	28 00	124 04	10/11	0059	0143	4200	600	206	IK
100.140	28 00	124 04	10/11	0200	0319	4200	1000		MT
130.50	25 49	114 45	10/21	2224	2341	3700	1000	610	MT
130.50	25 49	114 45	10/21	2125	2209	3700	600	236	IK
130.90	24 00	117 18	10/23	0023	0144	4000	1000	420	MT
130.90	24 29	117 18	10/23	0212	0256	4000	600	248	IK
24.125	24 00	125 00	10/25	0318	0402	3800	600	241	IK
24.125	24 00	125 00	10/25	0421	0540	3800	1000	361	MT
24.129	24 00	128 58	10/26	0156	0240	4000	600	283	IK
24.129	24 00	128 58	10/26	0256	0415	4000	1000		MT
24.131	24 00	131 00	10/26	1917	2036	4800	1000	442	MT
24.131	24 00	131 00	10/26	2054	2138	4800	600	243	IK
24.139	24 00	139 00	10/28	2338	0022	3800	600	256	IK
24.139	24 00	139 00	10/29	0040	0159	3800	1000	494	MT
24.143	24 00	142 50	10/29	2238	2357	4900	1000	411	MT
24.143	24 00	142 50	10/30	0339	0423	4900	600	221	IK
22.143	21 47	142 48	10/30	2055	2340	5200	1200	570	MT

Table 2. Continued.

Station	Lat. North	Long. West	Date	Start time	End time	Bottom depth (m)	Wire out (m)	Haul depth (m)	Net
20.135	20° 00'	135° 00'	11/2	2134	2218	3700	600	226	IK
20.135	20 00	135 00	11/2	2225	2336	3700	1000	376	MT
20.127	20 00	127 00	11/5	0344	0503	4900	1000	443	MT
20.127	20 00	127 00	11/5	0244	0328	4900	600	220	IK
20.123	20 00	123 06	11/6	0209	0332	4200	1000	389	MT
20.123	20 00	123 06	11/6	0354	0438	4200	600	250	IK
140.120	21 45	118 00	11/8	0202	0321	4000	1000	443	MT
140.120	21 45	118 00	11/8	0101	0145	4000	600	227	IK
150.70	21 41	113 48	11/11	2011	2055	3800	600	222	IK
157G.25	22 40	109 09	11/14	2022	2106	2900	600	200	IK
157G.55	22 54	108 40	11/15	0138	0222	3100	600	207	IK
23.108	23 06	108 35	11/17	1806	1850	2600	600	183	IK

Table 3. Occurrences (Occ.) and numbers of specimens (No.) of identified fish taxa captured by 6-foot Isaacs-Kidd (IK) and Universal Mark II (MT) midwater trawls on Cruises 7205-JD and 7210-JD. Unidentifiable species categories ("spp.") not included in table, except in cases where a genus or family is represented solely by an unidentifiable species category.

Taxon	Cruise 7205-JD				Cruise 7210-JD				Total	
	IK		MT		IK		MT		Occ.	No.
	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.		
<b>Albulidae</b>										
<i>Albula</i> sp.	0	0	0	0	2	2	0	0	2	2
<b>Chlopsidae</b>										
<i>Chlopsis</i> spp.	0	0	0	0	2	18	0	0	2	18
<b>Muraenidae</b>										
<i>Cymnothorax mordax</i>	0	0	0	0	1	2	0	0	1	2
<b>Ophichthidae</b>										
<i>Myrophis vafer</i>	0	0	0	0	3	35	0	0	3	35
<i>Ophichthus zophochir</i>	0	0	0	0	1	1	0	0	1	1
Ophichthidae A	0	0	0	0	1	3	0	0	1	3
Ophichthidae B	0	0	0	0	2	21	0	0	2	21
Ophichthidae D	0	0	0	0	1	1	0	0	1	1
Ophichthidae E	0	0	0	0	2	2	0	0	2	2
Ophichthidae F	0	0	0	0	1	1	0	0	1	1
<b>Congridae</b>										
<i>Ariosoma gilberti</i>	0	0	1	1	3	181	1	1	5	183
<i>Ariosoma</i> sp.	0	0	1	3	0	0	0	0	1	3
<i>Bathycongrus macrurus</i>	0	0	0	0	3	107	0	0	3	107
<i>Chiloconger obtusus</i>	0	0	0	0	1	2	1	1	2	3
<i>Gnathophis cinctus</i>	1	3	0	0	0	0	0	0	1	3
<i>Heteroconger canabus</i>	0	0	0	0	3	18	1	1	4	19
<i>Heteroconger digueti</i>	0	0	0	0	3	4	0	0	3	4
<i>Paraconger californiensis</i>	0	0	0	0	3	4	0	0	3	4
<i>Rhynchoconger nitens</i>	0	0	0	0	3	11	0	0	3	11
<b>Derichthyidae</b>										
<i>Derichthys serpentinus</i>	0	0	1	1	0	0	0	0	1	1
<i>Nessorhamphus danae</i>	0	0	1	1	0	0	0	0	1	1
<b>Nemichthyidae</b>										
<i>Avocettina howersi</i>	1	1	0	0	0	0	0	0	1	1
<i>Avocettina infans</i>	0	0	0	0	0	0	3	5	3	5
<i>Nemichthys scolopaceus</i>	4	10	4	46	3	3	4	6	15	65
<b>Serrivomeridae</b>										
<i>Serrivomer</i> sp.	1	1	2	2	0	0	4	15	7	18
<i>Stemonidium hypomelas</i>	0	0	0	0	1	1	2	2	3	3
<b>Cyematidae</b>										
<i>Cyema atrum</i>	5	5	2	3	0	0	2	2	9	10

Table 3. Cont.

Taxa	Cruise 7205-JD				Cruise 7210-JD				Total	
	IK		MT		IK		MT		Occ.	No.
	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.		
<b>Eurypharyngidae</b>										
<i>Eurypharynx pelecyanoides</i>	1	1	0	0	0	0	0	0	1	1
<b>Engraulidae</b>										
<i>Engraulis mordax</i>	1	43	0	0	0	0	0	0	1	43
<b>Bathylagidae</b>										
<i>Bathylagus bericoides</i>	1	1	1	5	1	1	0	0	3	7
<i>Bathylagus longirostris</i>	0	0	0	0	0	0	5	11	5	11
<i>Bathylagus nigrigenys</i>	0	0	0	0	2	4	0	0	2	4
<i>Bathylagus wesethi</i>	1	1	2	22	0	0	4	6	7	29
<b>Microstomatidae</b>										
<i>Microstoma</i> sp.	1	1	0	0	0	0	0	0	1	1
<i>Nansenia ahlstromi</i>	1	1	0	0	0	0	1	1	2	2
<i>Nansenia</i> sp.	1	1	2	2	0	0	0	0	3	3
<b>Opisthoproctidae</b>										
<i>Dolichopteryx</i> sp.	0	0	2	2	0	0	2	2	4	4
<i>Opisthoproctus soleatus</i>	0	0	0	0	0	0	2	2	2	2
<b>Platyroctidae</b>										
<i>Sagamichthys abei</i>	0	0	0	0	0	0	3	10	3	10
<b>Gonostomatidae</b>										
<i>Cyclothone acclinidens</i>	1	2	1	39	0	0	6	2237	8	2278
<i>Cyclothone alba</i>	1	1	3	123	0	0	6	454	10	578
<i>Cyclothone pallida</i>	0	0	1	1	0	0	1	23	2	24
<i>Cyclothone pseudopallida</i>	2	3	2	14	0	0	3	619	7	636
<i>Cyclothone signata</i>	2	62	3	46	0	0	8	1030	13	1138
<i>Diplophos proximus</i>	0	0	0	0	0	0	2	2	2	2
<i>Diplophos taenia</i>	1	1	3	7	0	0	4	6	8	14
<i>Gonostoma atlanticum</i>	4	5	4	19	1	1	8	27	17	52
<i>Gonostoma ebelingi</i>	5	13	4	27	1	4	8	33	18	77
<i>Gonostoma elongatum</i>	0	0	1	1	0	0	0	0	1	1
<i>Margrethia obtusirostra</i>	0	0	1	1	2	2	2	2	5	5
<b>Sternoptychidae</b>										
<i>Argyrolepecus affinis</i>	0	0	2	32	0	0	7	68	9	100
<i>Argyrolepecus hemigymmus</i>	3	5	4	63	2	2	13	92	22	162
<i>Argyrolepecus lychnus</i>	4	6	2	55	3	9	5	53	14	123
<i>Argyrolepecus sladeni</i>	1	3	3	4	1	1	1	1	6	9
<i>Danaphos oculatus</i>	1	5	1	7	0	0	4	25	6	37
<i>Sternoptyx diaphana</i>	1	1	3	4	1	1	6	212	11	218
<i>Sternoptyx pseudobscura</i>	0	0	1	1	0	0	0	0	1	1
<i>Valenciennellus tripunctulatus</i>	5	9	3	21	7	10	11	45	26	85

Table 3. Cont.

Taxa	Cruise 7205-JD				Cruise 7210-JD				Total	
	IK		MT		IK		MT		Occ.	No.
	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.		
<b>Phosichthyidae</b>										
<i>Ichthyococcus irregularis</i>	0	0	1	1	0	0	0	0	1	1
<i>Ichthyococcus ovatus</i>	0	0	2	4	0	0	1	1	3	5
<i>Vinciguerria lucetia</i>	12	534	2	571	10	575	7	1655	31	3335
<i>Vinciguerria nimbaria</i>	12	95	6	788	12	56	11	216	41	1155
<i>Vinciguerria poweriae</i>	11	20	6	101	8	14	12	218	37	353
<b>Chauliodontidae</b>										
<i>Chauliodus sloani</i>	1	1	2	2	0	0	2	2	5	5
<b>Stomiidae</b>										
<i>Stomias atriventer</i>	1	1	1	1	1	2	4	11	7	15
<b>Astronesthidae</b>										
<i>Astronesthes</i> sp.	0	0	0	0	0	0	1	1	1	1
<i>Astronesthes splendidus</i>	0	0	1	1	0	0	0	0	1	1
<i>Borostomias panamensis</i>	0	0	0	0	0	0	1	4	1	4
<b>Melanostomiidae</b>										
<i>Bathophilus brevis</i>	0	0	0	0	0	0	1	1	1	1
<i>Bathophilus filifer</i>	0	0	0	0	2	2	2	2	4	4
<i>Bathophilus flemingi</i>	0	0	2	4	1	1	5	9	8	14
<i>Bathophilus kingi</i>	1	1	0	0	0	0	1	1	2	2
<i>Bathophilus nigerrimus</i>	0	0	0	0	0	0	2	2	2	2
<i>Eustomias bifilis</i>	1	1	0	0	1	1	3	4	5	6
<i>Eustomias melanostigma</i>	0	0	0	0	1	1	0	0	1	1
<i>Eustomias schmidti</i>	0	0	0	0	0	0	3	4	3	4
<i>Leptostomias</i> spp.	1	1	2	3	3	3	4	6	10	13
<i>Melanostomias melanops</i>	0	0	1	1	0	0	0	0	1	1
<i>Photonectes intermedius</i>	0	0	1	1	0	0	0	0	1	1
<i>Photonectes margarita</i>	0	0	0	0	0	0	1	1	1	1
<i>Photonectes parvimanus</i>	1	1	0	0	0	0	0	0	1	1
<b>Malacosteidae</b>										
<i>Aristostomias polydactylus</i>	0	0	0	0	0	0	1	1	1	1
<i>Aristostomias scintillans</i>	1	1	0	0	2	2	4	14	7	17
<i>Malacosteus niger</i>	0	0	0	0	0	0	1	2	1	2
<i>Photostomias</i> sp.	0	0	1	1	0	0	0	0	1	1
<b>Idiacanthidae</b>										
<i>Idiacanthus antrostomus</i>	1	1	2	3	4	4	9	20	16	28
<i>Idiacanthus fasciola</i>	3	4	2	10	0	0	1	1	6	15



Table 3. Cont.

Taxa	Cruise 7205-JD				Cruise 7210-JD				Total	
	IK		MT		IK		MT		Occ.	No.
	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.		
<b>Scopelarehidae</b>										
<i>Benthalbella infans</i>	0	0	1	1	0	0	0	0	1	1
<i>Rosenblattichthys hubbsi</i>	0	0	1	2	0	0	0	0	1	2
<i>Rosenblattichthys volucris</i>	0	0	0	0	1	1	0	0	1	1
<i>Scopelarchus analis</i>	2	6	3	7	3	4	3	8	11	25
<i>Scopelarchus guentheri</i>	4	9	6	14	7	19	12	46	29	88
<i>Scopelarchus michaelsarsi</i>	1	1	2	6	1	1	5	10	9	18
<i>Scopelarchus stephensi</i>	2	4	3	36	0	0	1	2	6	42
<i>Scopelarehoides nicholsi</i>	0	0	0	0	1	4	0	0	1	4
<b>Notosudidae</b>										
<i>Ahliesaurus brevis</i>	1	1	0	0	0	0	0	0	1	1
<i>Scopelosaurus hoedti</i>	3	5	0	0	0	0	2	2	5	7
<b>Paralepididae</b>										
<i>Arctozemus risso</i>	0	0	3	9	1	1	1	6	5	16
<i>Lestidiops</i> sp.	4	7	6	34	0	0	3	4	13	38
<i>Magnisudis atlantica</i>	1	1	0	0	0	0	3	6	4	7
<i>Stemonosudis macrura</i>	0	0	4	28	1	1	4	6	9	35
<i>Sudis atrox</i>	3	4	4	20	1	1	2	5	10	30
<i>Uncisudis advena</i>	0	0	1	1	0	0	0	0	1	1
<b>Anotopteridae</b>										
<i>Anotopterus pharao</i>	1	1	0	0	0	0	0	0	1	1
<b>Evermannellidae</b>										
<i>Coccorella atlantica</i>	1	1	2	3	0	0	0	0	3	4
<i>Coccorella atrata</i>	0	0	1	1	0	0	0	0	1	1
<i>Evermannella ahlstromi</i>	0	0	1	4	0	0	1	1	2	5
<i>Evermannella indica</i>	1	1	1	1	0	0	3	4	5	6
<i>Odontostomops normalops</i>	0	0	2	3	0	0	1	1	3	4
<b>Neoscopelidae</b>										
<i>Scopelengys clarkei</i>	0	0	0	0	0	0	1	1	1	1
<i>Scopelengys tristis</i>	0	0	0	0	0	0	1	2	1	2
<b>Myctophidae</b>										
<i>Benthoosema panamense</i>	1	2	0	0	0	0	0	0	1	2
<i>Benthoosema suborbitale</i>	5	8	4	26	6	8	7	54	22	96
<i>Bolinichthys distofax</i>	0	0	0	0	0	0	1	1	1	1
<i>Bolinichthys longipes</i>	12	35	8	137	13	36	18	578	51	786
<i>Centrobranchus nigroocellatus</i>	0	0	1	1	1	1	6	6	8	8
<i>Ceratoscopelus townsendi</i>	3	11	4	467	8	20	14	1267	29	1765
<i>Ceratoscopelus warmingii</i>	8	86	4	282	9	34	11	562	32	964

Table 3. Cont.

Taxa	Cruise 7205-JD				Cruise 7210-JD				Total	
	IK		MT		IK		MT			
	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.
<b>Myctophidae (cont.)</b>										
<i>Diaphus anderseni</i>	8	16	5	58	8	13	11	67	32	154
<i>Diaphus bertelseni</i>	0	0	2	35	0	0	3	3	5	38
<i>Diaphus brachycephalus</i>	1	1	4	29	0	0	5	8	10	38
<i>Diaphus elucens</i>	0	0	0	0	0	0	1	1	1	1
<i>Diaphus mollis</i>	6	8	5	62	7	9	15	151	33	230
<i>Diaphus pacificus</i>	1	3	1	3	5	198	2	2	9	206
<i>Diaphus parri</i>	0	0	1	34	0	0	1	3	2	37
<i>Diaphus phillipsi</i>	4	5	0	0	4	5	7	13	15	23
<i>Diaphus schmidti</i>	1	1	2	7	0	0	1	1	4	9
<i>Diaphus splendidus</i>	0	0	1	1	0	0	0	0	1	1
<i>Diaphus trachops</i>	0	0	1	2	0	0	0	0	1	2
<i>Diaphus</i> sp. A	2	3	1	2	0	0	3	7	6	12
<i>Diogenichthys atlanticus</i>	12	41	6	272	15	75	15	1226	48	1614
<i>Diogenichthys laternatus</i>	9	80	2	26	8	200	4	333	23	639
<i>Electrona risso</i>	0	0	1	1	0	0	1	1	2	2
<i>Gonichthys tenuiculus</i>	2	2	1	3	1	1	3	8	7	14
<i>Hygophum atratum</i>	2	4	1	16	2	2	3	38	8	60
<i>Hygophum proximum</i>	1	1	3	63	3	3	4	66	11	133
<i>Hygophum reinhardtii</i>	3	4	5	89	4	6	14	189	26	288
<i>Lampadena anomala</i>	0	0	0	0	0	0	1	3	1	3
<i>Lampadena urophaos</i>	8	17	5	20	1	1	9	22	22	60
<i>Lampanyctus acanthurus</i>	1	2	2	10	4	6	7	37	14	55
<i>Lampanyctus idostigma</i>	6	19	2	26	6	25	6	128	20	198
<i>Lampanyctus "niger"</i>	5	7	5	19	4	7	13	69	27	102
<i>Lampanyctus nobilis</i>	4	5	4	39	2	4	9	65	19	113
<i>Lampanyctus "no pectorals"</i>	8	25	5	82	11	24	14	345	38	476
<i>Lampanyctus parvicauda</i>	2	2	0	0	4	8	1	2	7	12
<i>Lampanyctus ritteri</i>	0	0	1	4	2	3	2	6	5	13
<i>Lampanyctus steinbecki</i>	11	37	7	180	11	32	14	309	43	558
<i>Lobianchia gemellarii</i>	1	1	6	52	4	5	13	72	24	130
<i>Lowema rara</i>	1	1	2	2	3	3	3	3	9	9
<i>Lowema terminata</i>	0	0	1	4	1	1	0	0	2	5
<i>Myctophum aurolaternatum</i>	0	0	0	0	2	2	0	0	2	2
<i>Myctophum lychnobium</i>	0	0	2	3	0	0	2	3	4	6
<i>Myctophum nitidulum</i>	2	3	2	9	0	0	2	2	6	14
<i>Myctophum obtusirostre</i>	1	1	2	4	0	0	1	1	4	6
<i>Myctophum selenops</i>	1	1	1	2	0	0	2	2	4	5
<i>Notolychnus valdiviae</i>	12	119	7	245	16	142	16	871	51	1377
<i>Notoscopelus resplendens</i>	5	24	6	141	3	3	14	132	28	300
<i>Parvilux boschmai</i>	0	0	1	1	0	0	0	0	1	1
<i>Parvilux ingens</i>	0	0	2	3	0	0	0	0	2	3

Table 3. Cont.

Taxa	Cruise 7205-JD				Cruise 7210-JD				Total	
	IK		MT		IK		MT		Occ.	No.
	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.		
<b>Myctophidae (cont.)</b>										
<i>Protomyctophum beckeri</i>	1	1	2	2	0	0	0	0	3	3
<i>Protomyctophum crockeri</i>	0	0	2	17	0	0	8	39	10	56
<i>Symbolophorus californiensis</i>	0	0	1	2	0	0	1	1	2	3
<i>Symbolophorus evermanni</i>	4	6	5	29	0	0	6	9	16	44
<i>Taaningichthys minimus</i>	2	2	5	15	1	1	7	16	15	34
<i>Triphoturus mexicanus</i>	7	73	3	285	7	68	6	567	23	993
<i>Triphoturus nigrescens</i>	4	5	4	30	4	10	8	54	20	99
<b>Bregmacerotidae</b>										
<i>Bregmaceros</i> sp. A	2	2	4	49	1	1	10	34	17	86
<i>Bregmaceros</i> sp. B	0	0	2	22	2	2	5	17	9	41
<i>Bregmaceros bathymaster</i>	0	0	0	0	3	22	0	0	3	22
<b>Macrouridae</b>										
<i>Mesobius berryi</i>	0	0	1	1	0	0	0	0	1	1
<b>Moridae</b>										
Moridae larvae	1	1	0	0	0	0	0	0	1	1
<b>Melanonidae</b>										
<i>Melanomus zugmayeri</i>	0	0	0	0	0	0	3	3	3	3
<b>Bythitidae</b>										
<i>Brotulataenia nielsenii</i>	1	1	0	0	0	0	0	0	1	1
<b>Linophryinidae</b>										
<i>Linophryne</i> sp.	0	0	2	3	0	0	0	0	2	3
<b>Scomberesocidae</b>										
<i>Cololabis saira</i>	1	1	0	0	0	0	0	0	1	1
<b>Exocoetidae</b>										
<i>Exocoetus volitans</i>	0	0	0	0	2	2	0	0	2	2
<i>Oxyporhamphus micropterus</i>	0	0	0	0	1	1	0	0	1	1
<b>Radiicephalidae</b>										
<i>Radiicephalus elongatus</i>	1	1	0	0	0	0	0	0	1	1
<b>Trachipteridae</b>										
<i>Trachipterus altivelis</i>	1	1	0	0	0	0	0	0	1	1
<i>Trachipterus fukuzakii</i>	0	0	0	0	0	0	1	1	1	1
<b>Stylephoridae</b>										
<i>Stylephorus chordatus</i>	0	0	2	3	0	0	2	2	4	5

Table 3. Cont.

Taxa	Cruise 7205-JD				Cruise 7210-JD				Total	
	IK		MT		IK		MT		Occ.	No.
	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.		
<b>Anoplogastridae</b>										
<i>Anoplogaster cornuta</i>	0	0	0	0	0	0	2	2	2	2
<b>Melamphaidae</b>										
<i>Melamphaes eulepis</i>	0	0	1	3	0	0	2	2	3	5
<i>Melamphaes parvus</i>	0	0	2	6	0	0	4	19	6	25
<i>Melamphaes simus</i>	4	5	4	39	1	1	8	43	17	88
<i>Poromitra crassiceps</i>	0	0	2	6	0	0	3	8	5	14
<i>Poromitra megalops</i>	0	0	0	0	1	2	0	0	1	2
<i>Poromitra</i> sp.	3	8	3	10	0	0	0	0	6	18
<i>Scopeloberyx robustus</i>	2	7	1	1	1	1	0	0	4	9
<i>Scopelogadus bispinosus</i>	3	5	2	10	3	4	7	17	15	36
<i>Scopelogadus mizolepis</i>	0	0	3	20	4	5	6	37	13	62
<b>Cetomimidae</b>										
<i>Cetostoma regani</i>	0	0	0	0	0	0	2	2	2	2
<b>Macrurocyttidae</b>										
<i>Zenion</i> sp.	0	0	1	3	0	0	1	1	2	4
<b>Centriscidae</b>										
<i>Macroramphosus gracilis</i>	1	1	0	0	0	0	0	0	1	1
<b>Scorpaenidae</b>										
<i>Scorpaenodes xyris</i>	0	0	0	0	3	6	0	0	3	6
<i>Sebastes</i> sp.	1	1	0	0	0	0	0	0	1	1
<b>Carangidae</b>										
<i>Decapterus</i> sp.	1	1	0	0	0	0	0	0	1	1
<i>Naucrates diCTOR</i>	0	0	0	0	1	1	0	0	1	1
<i>Seriola lalandi</i>	1	1	0	0	0	0	1	1	2	2
<i>Trachurus symmetricus</i>	1	1	1	1	0	0	0	0	2	2
<b>Coryphaenidae</b>										
<i>Coryphaena equiselis</i>	0	0	0	0	1	1	0	0	1	1
<b>Caristiidae</b>										
<i>Caristus maderensis</i>	0	0	0	0	0	0	2	2	2	2
<b>Howellidae</b>										
<i>Howella zina</i>	0	0	0	0	0	0	1	1	1	1
<i>Howella</i> sp.	1	1	2	2	1	1	2	2	6	6
<b>Labridae</b>										
<i>Xyrichtys mundiceps</i>	0	0	0	0	3	13	0	0	3	13

Table 3. Cont.

Taxa	Cruise 7205-JD				Cruise 7210-JD				Total	
	IK		MT		IK		MT		Occ.	No.
	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.		
<b>Chiasmodontidae</b>										
<i>Chiasmodon niger</i>	1	1	2	2	0	0	2	2	5	5
<i>Kali normani</i>	0	0	0	0	0	0	2	3	2	3
<i>Pseudoscopelus scriptus</i>	0	0	1	1	0	0	0	0	1	1
<b>Gempylidae</b>										
<i>Diplospinus multistriatus</i>	6	14	5	12	1	1	1	1	13	28
<i>Gempylus serpens</i>	0	0	0	0	0	0	1	1	1	1
<i>Nealotus tripes</i>	2	2	1	3	0	0	0	0	3	5
<b>Scombridae</b>										
<i>Thunnus albacares</i>	0	0	0	0	1	1	0	0	1	1
<b>Trichiuridae</b>										
<i>Benthodesmus pacificus</i>	1	1	0	0	0	0	0	0	1	1
<b>Nomeidae</b>										
<i>Cubiceps baxteri</i>	4	6	1	6	2	3	3	14	10	29
<i>Cubiceps pauciradiatus</i>	0	0	0	0	0	0	1	1	1	1
<i>Cubiceps paradoxus</i>	0	0	0	0	0	0	1	1	1	1
<i>Psenes maculatus</i>	0	0	0	0	1	1	0	0	1	1
<b>Paralichthyidae</b>										
<i>Citharichthys</i> sp.	0	0	0	0	1	1	0	0	1	1
<i>Syacium ovale</i>	0	0	0	0	3	6	0	0	3	6
<b>Bothidae</b>										
<i>Bothus leopardinus</i>	1	2	0	0	3	4	0	0	4	6
<b>Cyuglossidae</b>										
<i>Symphurus</i> spp.	0	0	0	0	2	2	0	0	2	2
<b>Balistidae</b>										
<i>Canthidermis maculatus</i>	0	0	0	0	1	2	0	0	1	2
<b>Ostraciidae</b>										
<i>Lactoria diaphana</i>	1	1	0	0	0	0	0	0	1	1
<b>Molidae</b>										
<i>Ranzania laevis</i>	1	41	0	0	0	0	7	44	8	85

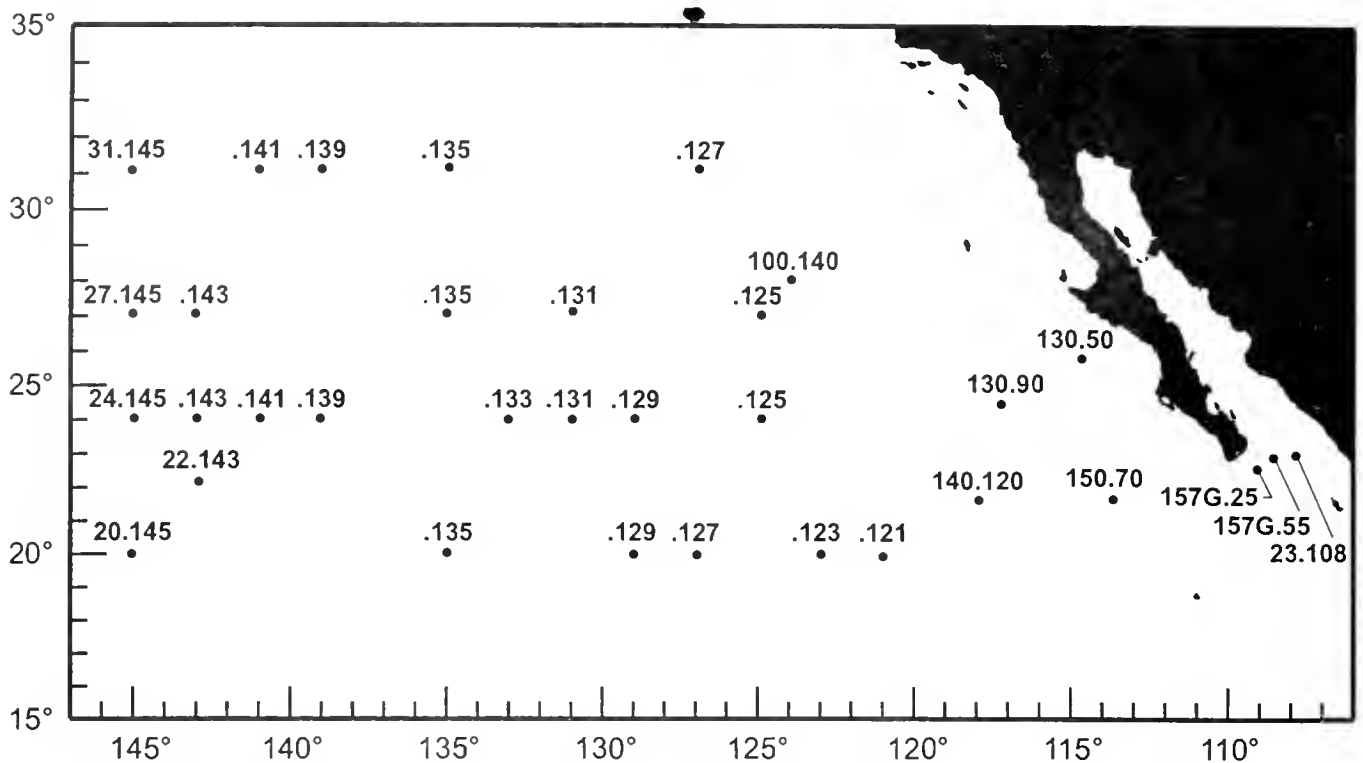


Figure 1. Station pattern for midwater trawls taken on 7205-JD and 7210-JD.

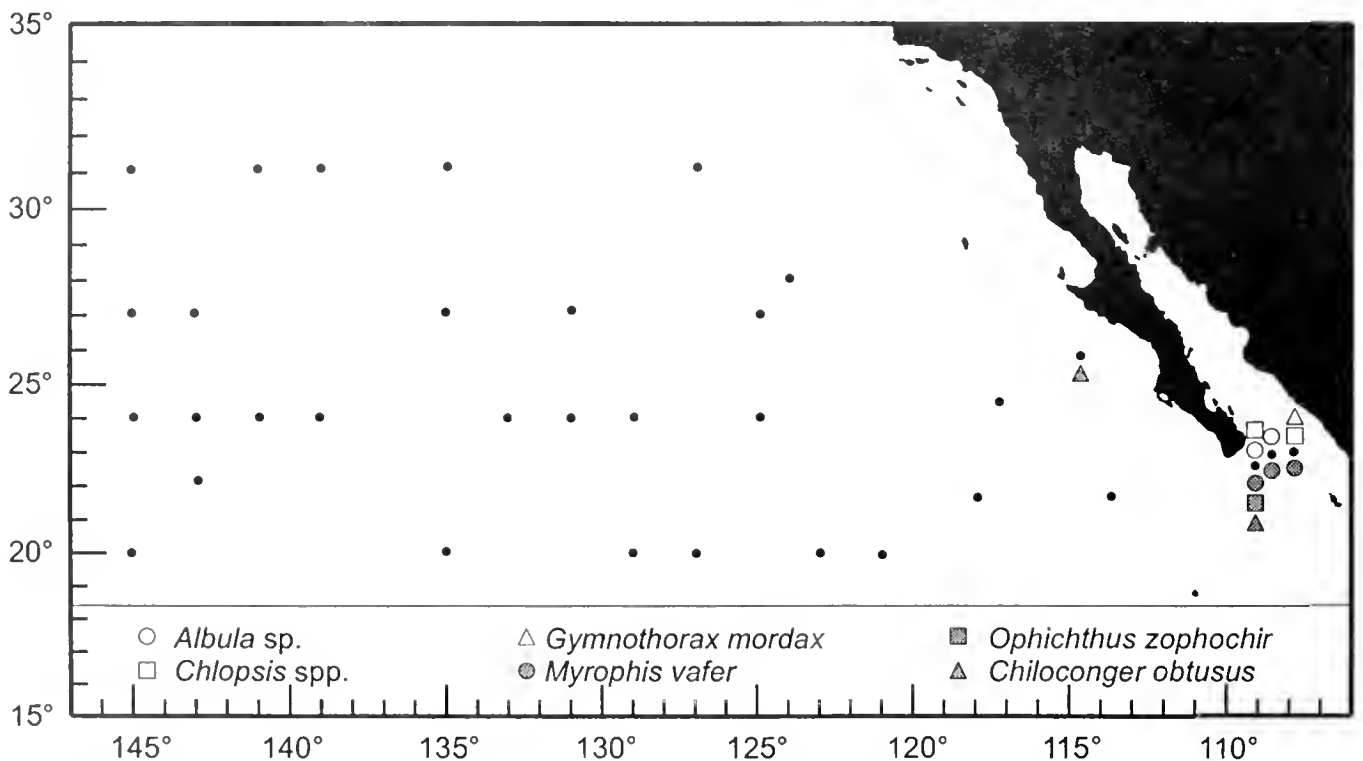


Figure 2. Localities of capture for species taken on cruises 7205-JD and 7210-JD. Species and their symbols given in the legend. Open symbols are above the station dot and solid symbols are below the dot in this and subsequent figures.

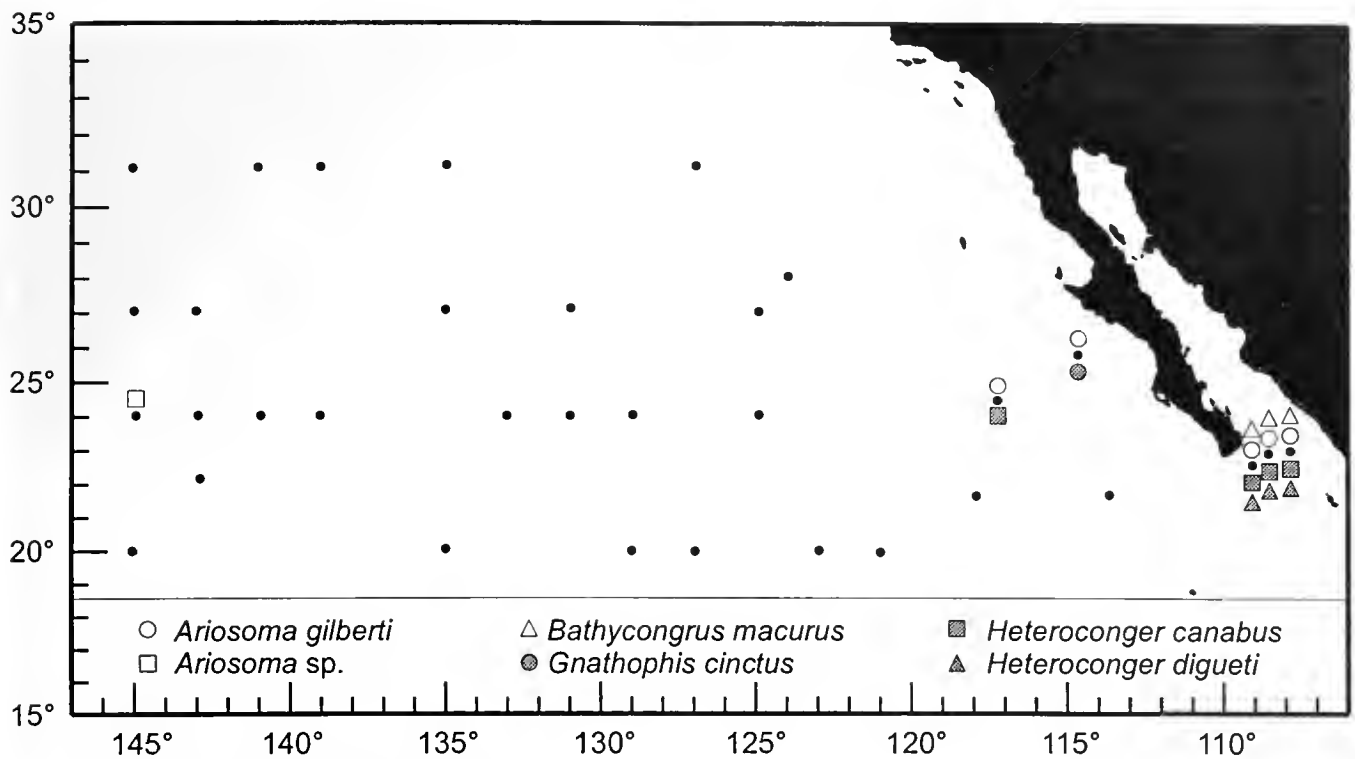


Figure 3. See caption for figure 2.

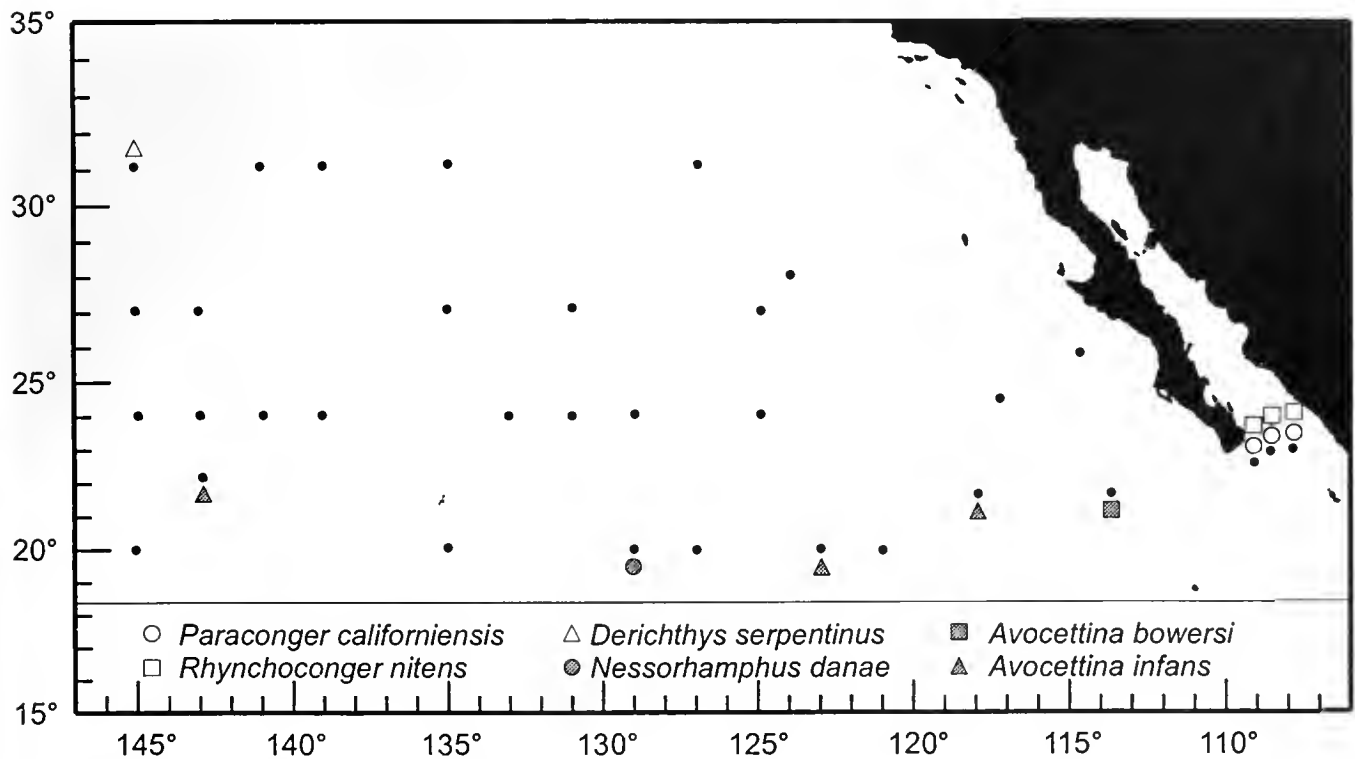


Figure 4. See caption for figure 2.

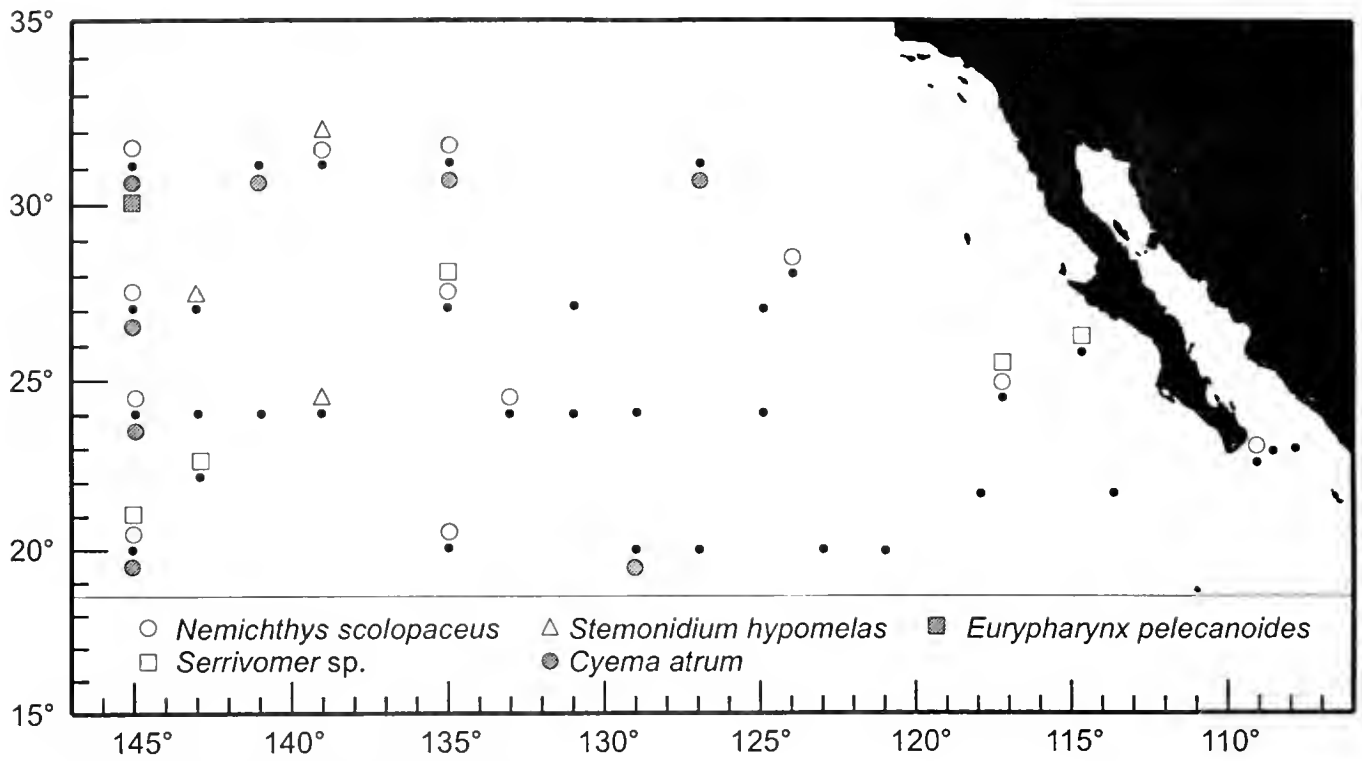


Figure 5. See caption for figure 2.

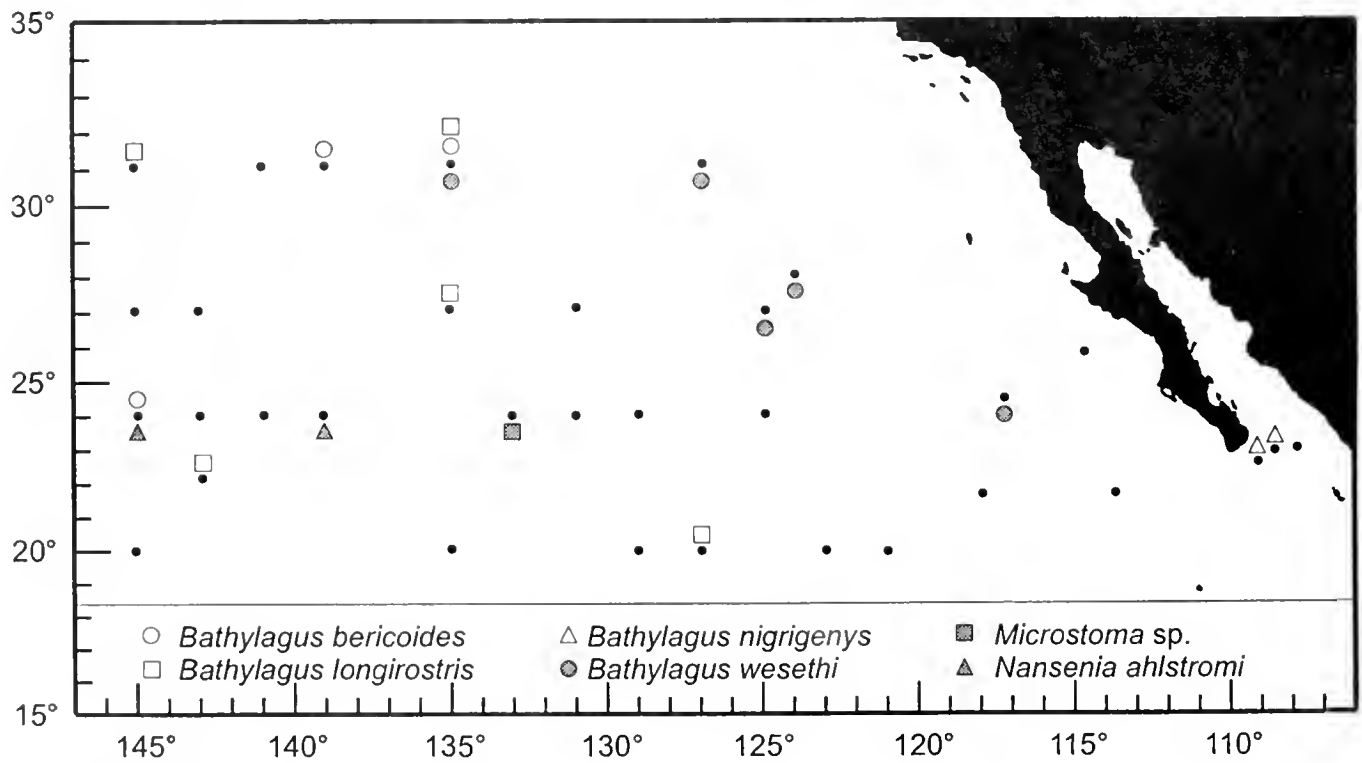


Figure 6. See caption for figure 2.



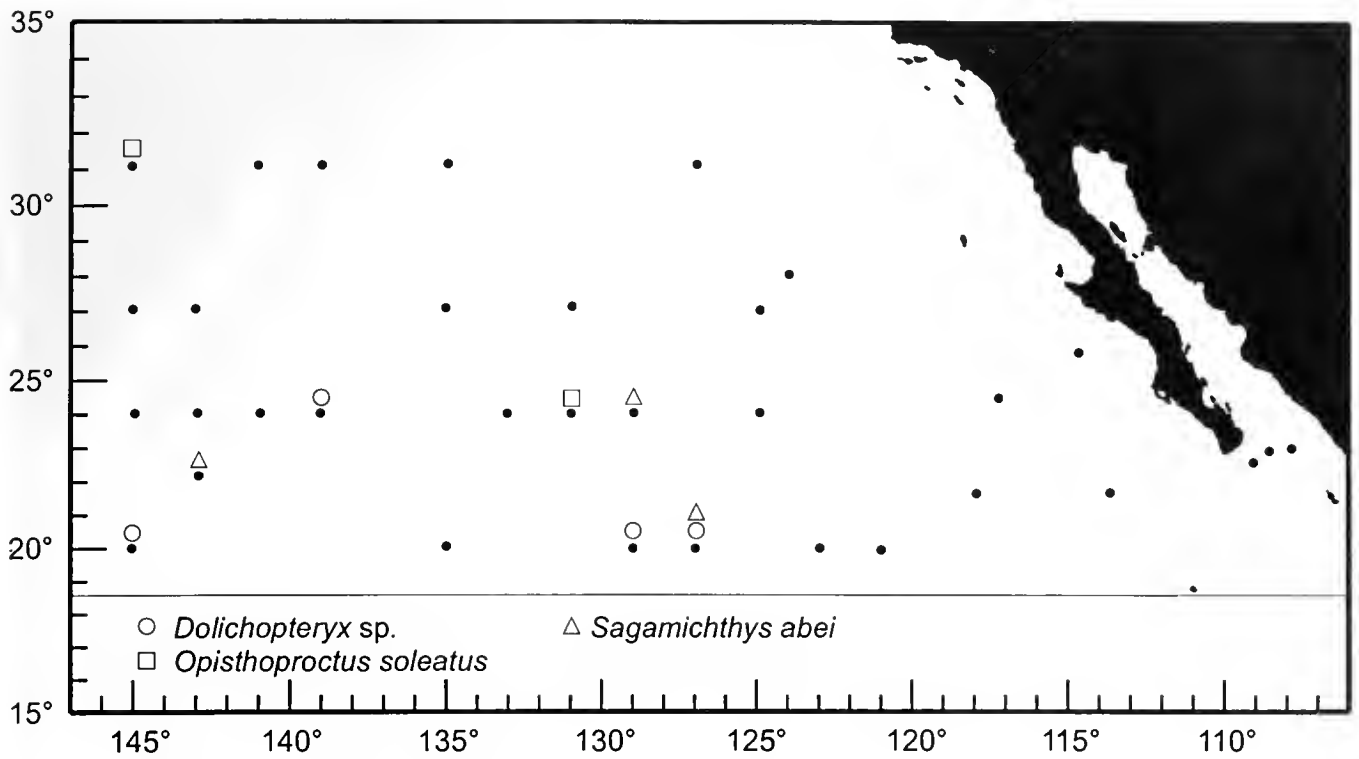


Figure 7. See caption for figure 2.

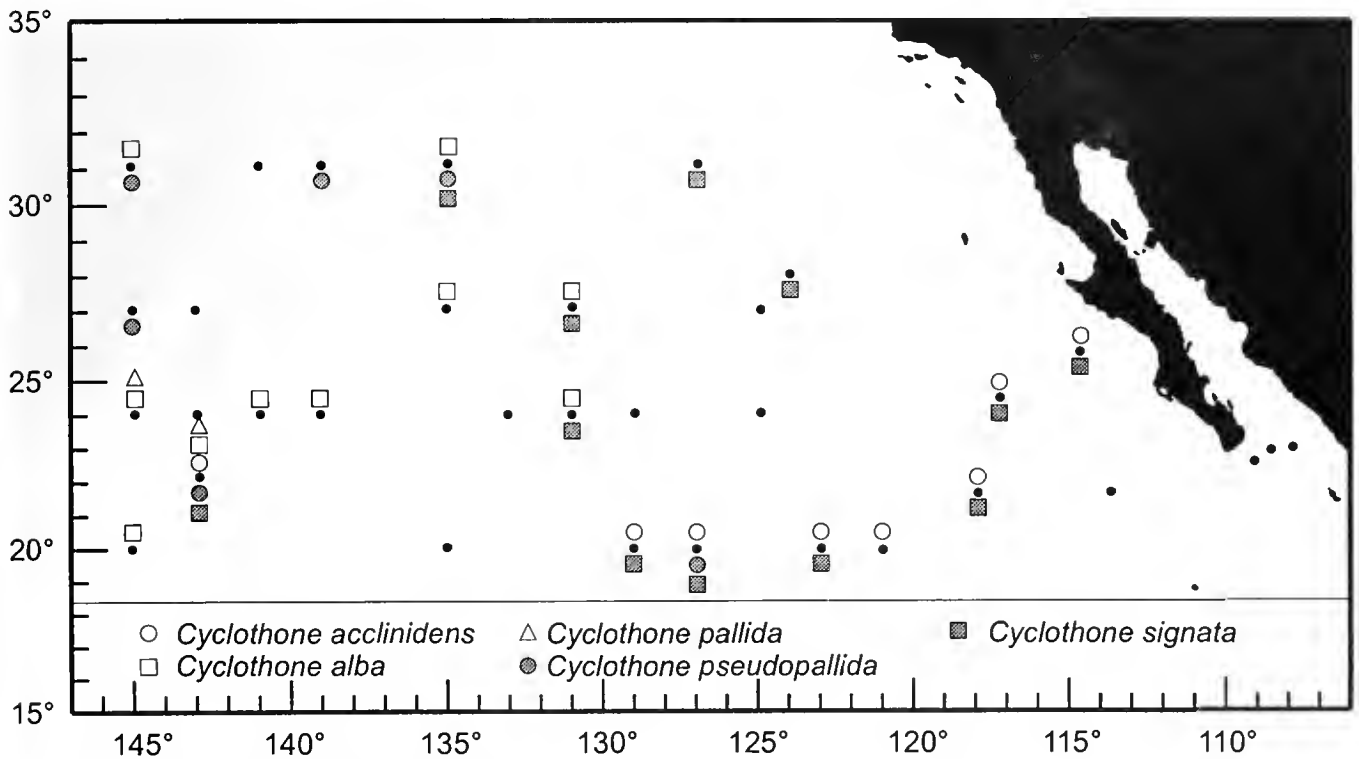


Figure 8. See caption for figure 2.

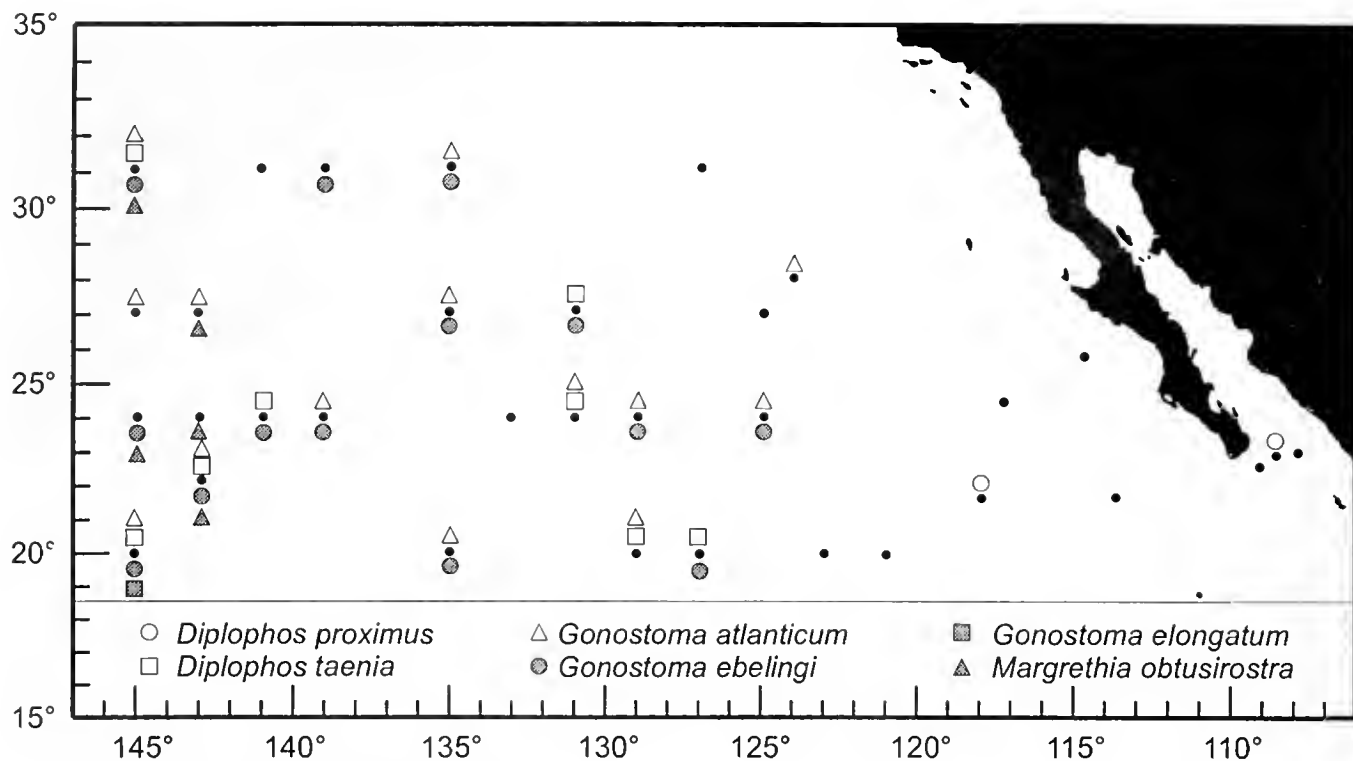


Figure 9. See caption for figure 2.

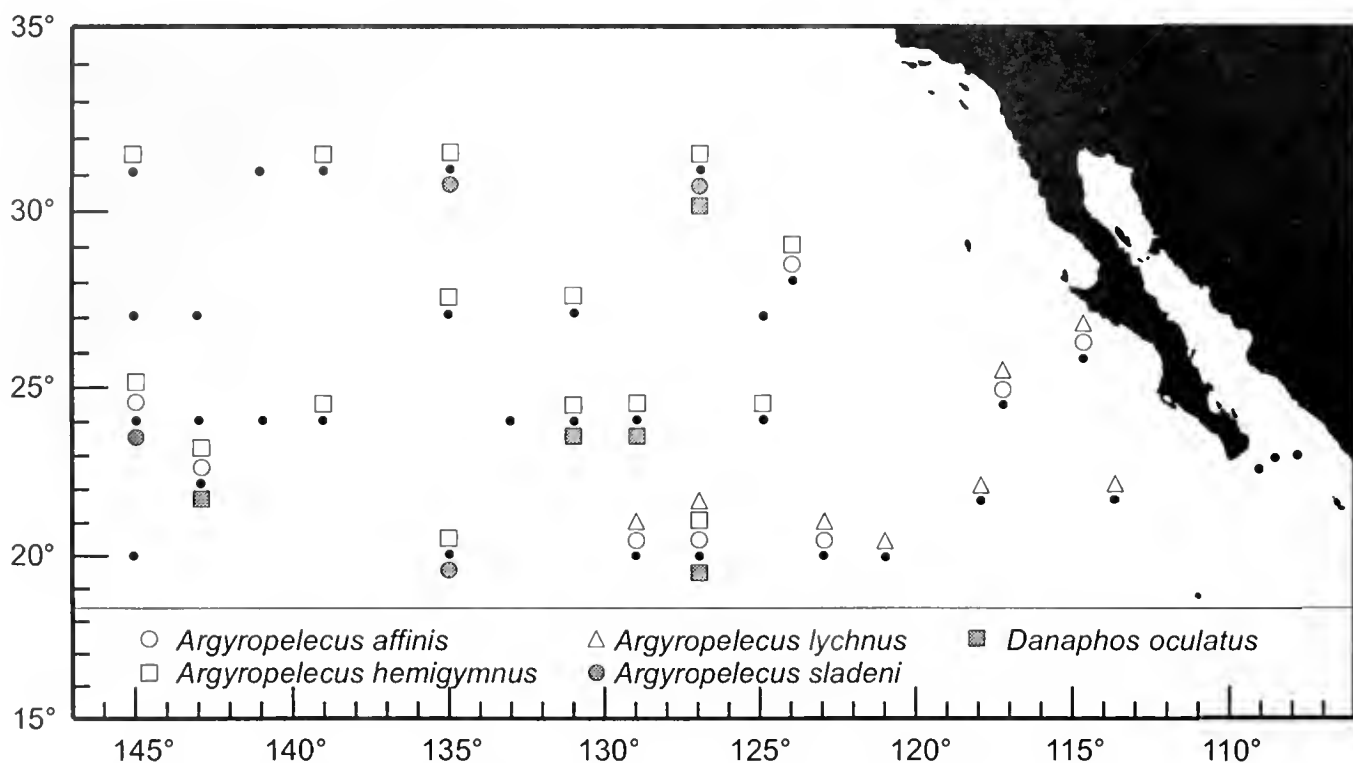


Figure 10. See caption for figure 2.

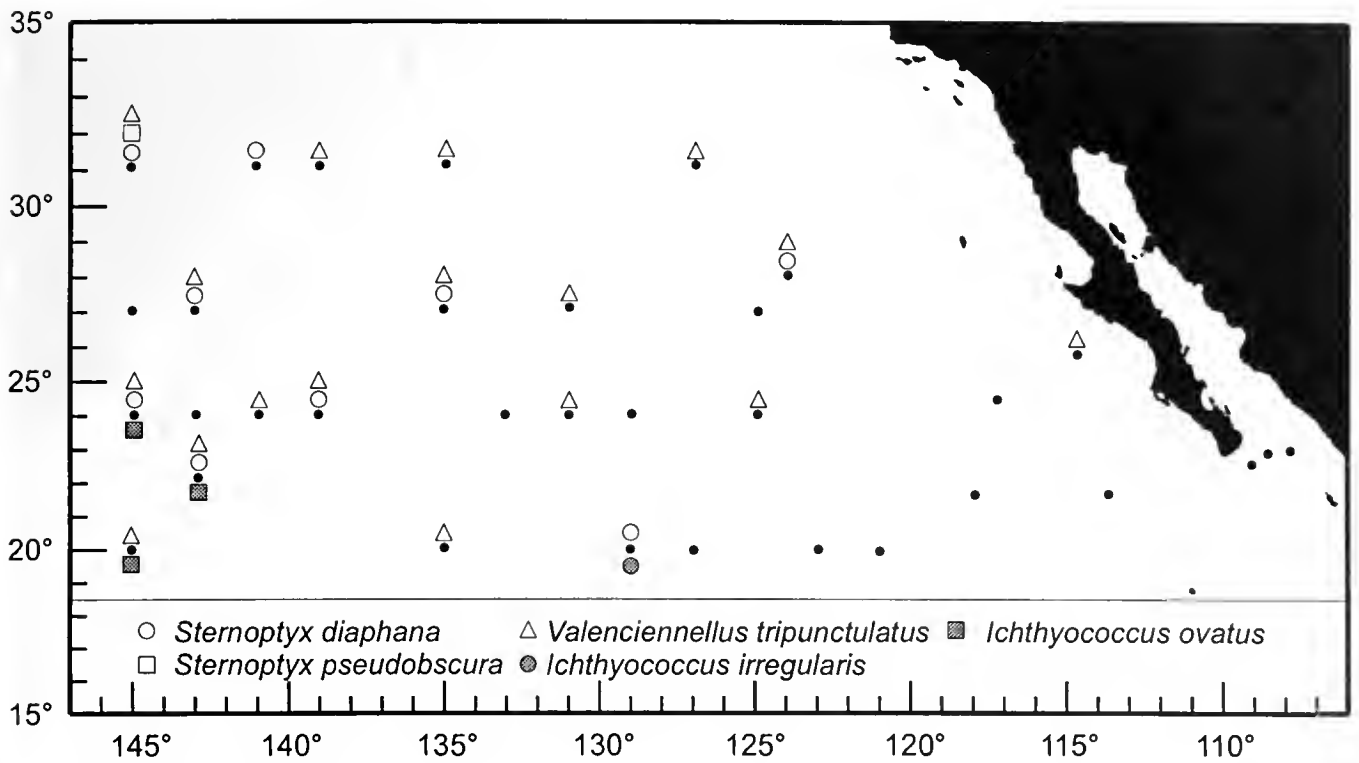


Figure 11. See caption for figure 2.

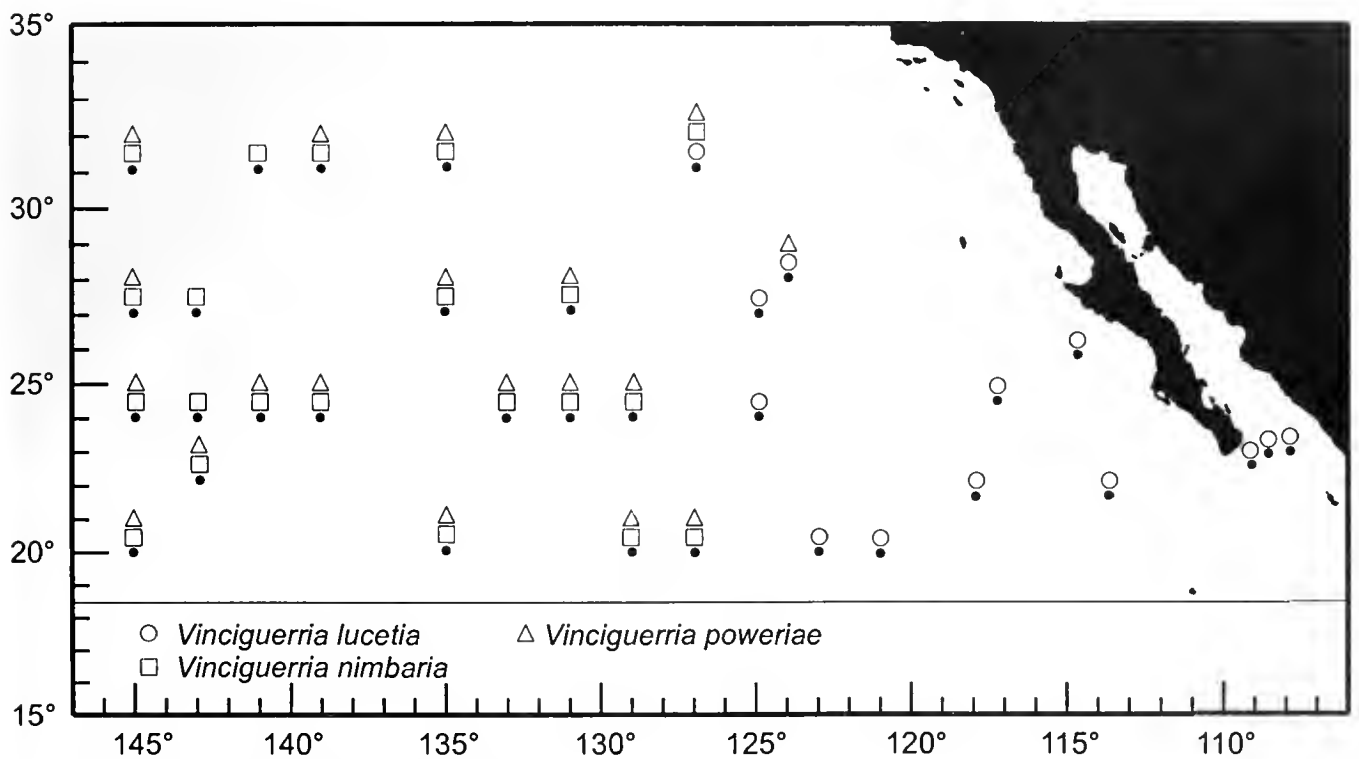


Figure 12. See caption for figure 2.

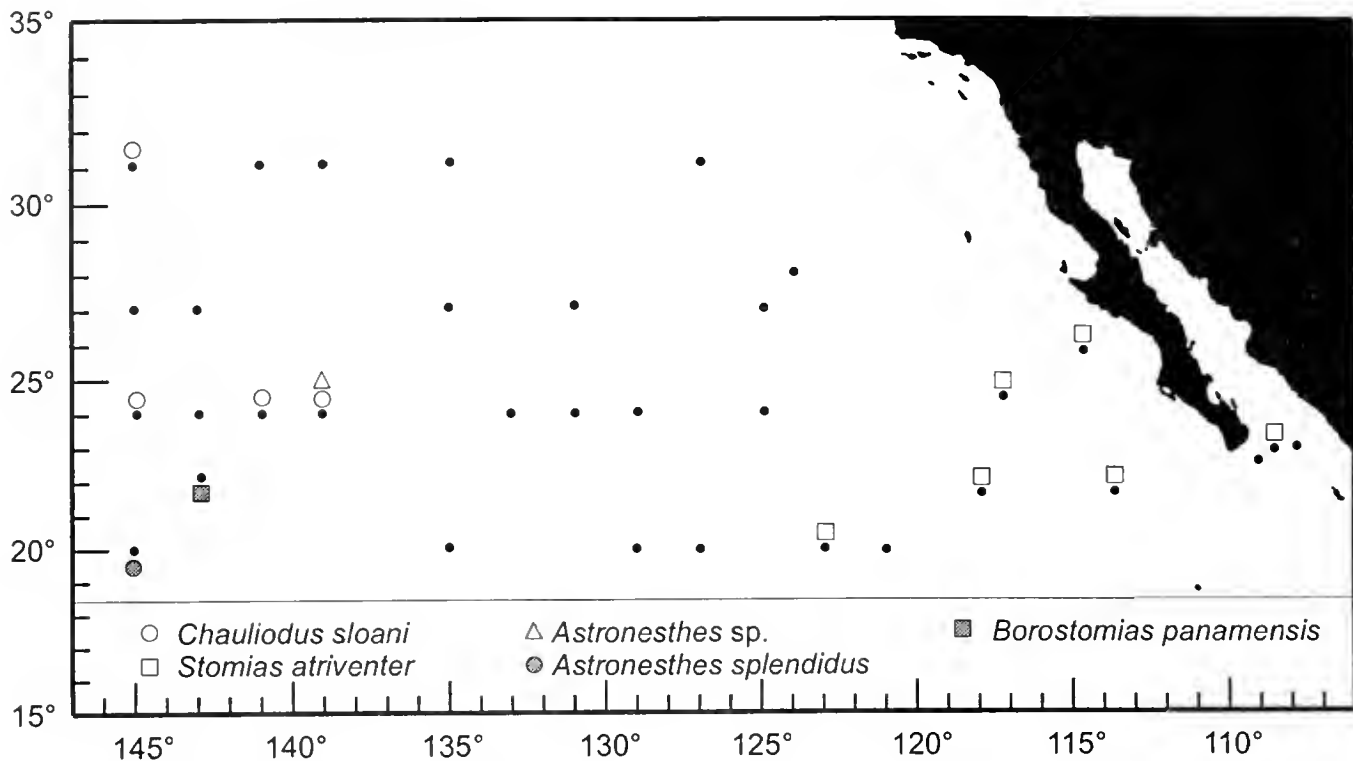


Figure 13. See caption for figure 2.

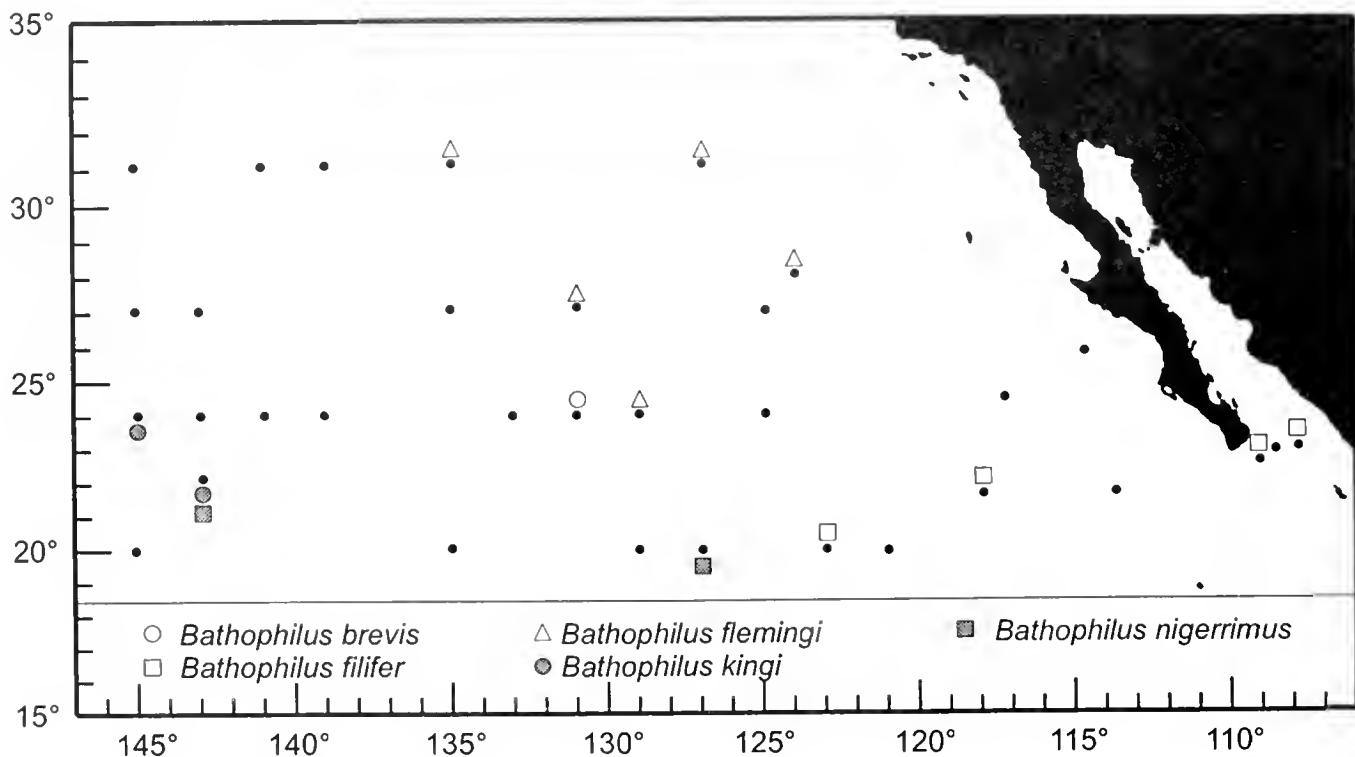


Figure 14. See caption for figure 2.

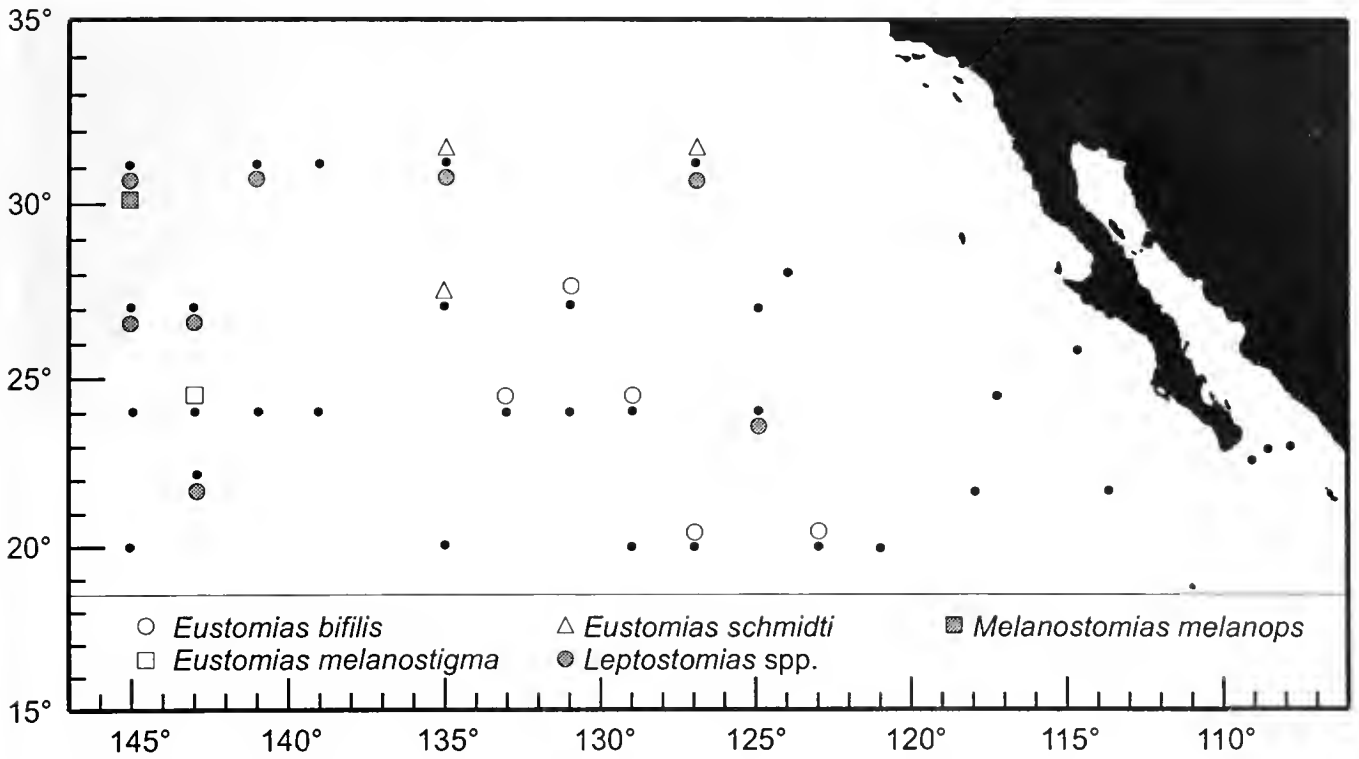


Figure 15. See caption for figure 2.

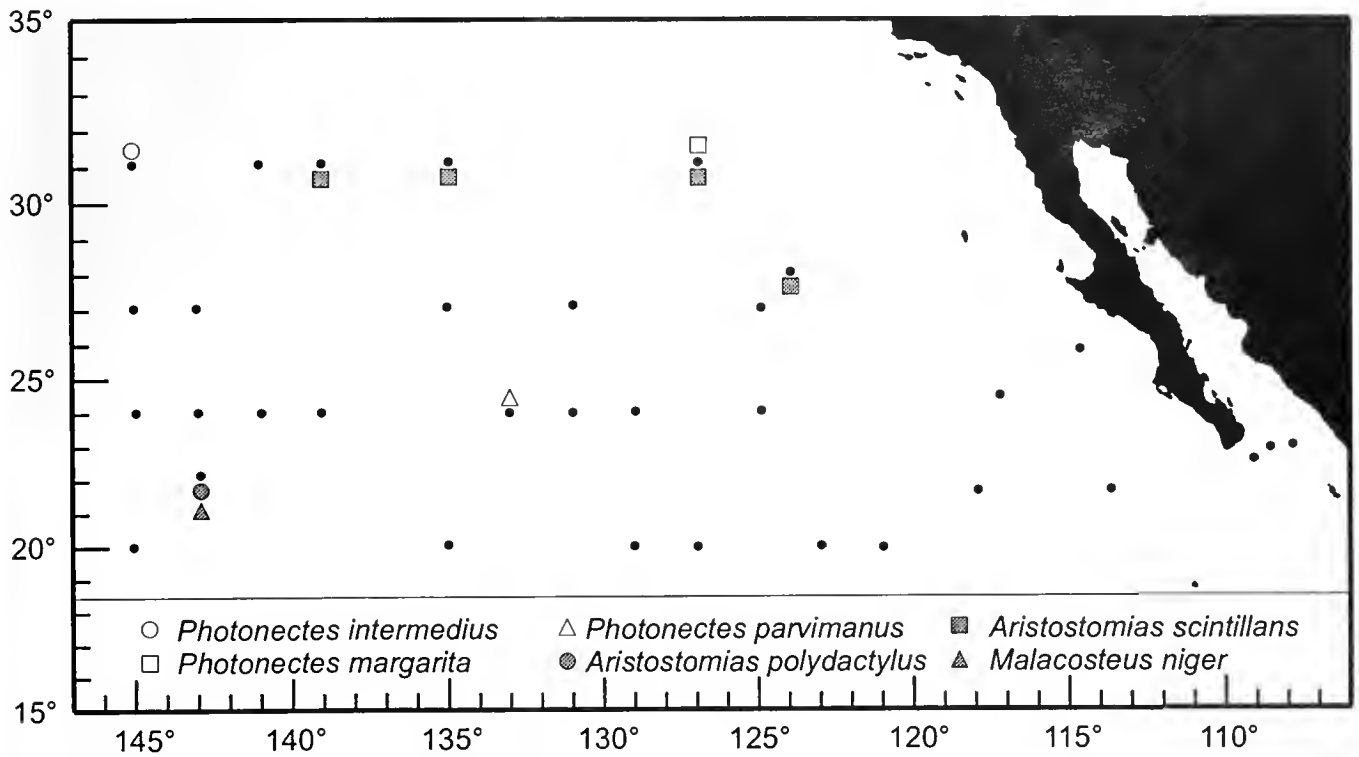


Figure 16. See caption for figure 2.

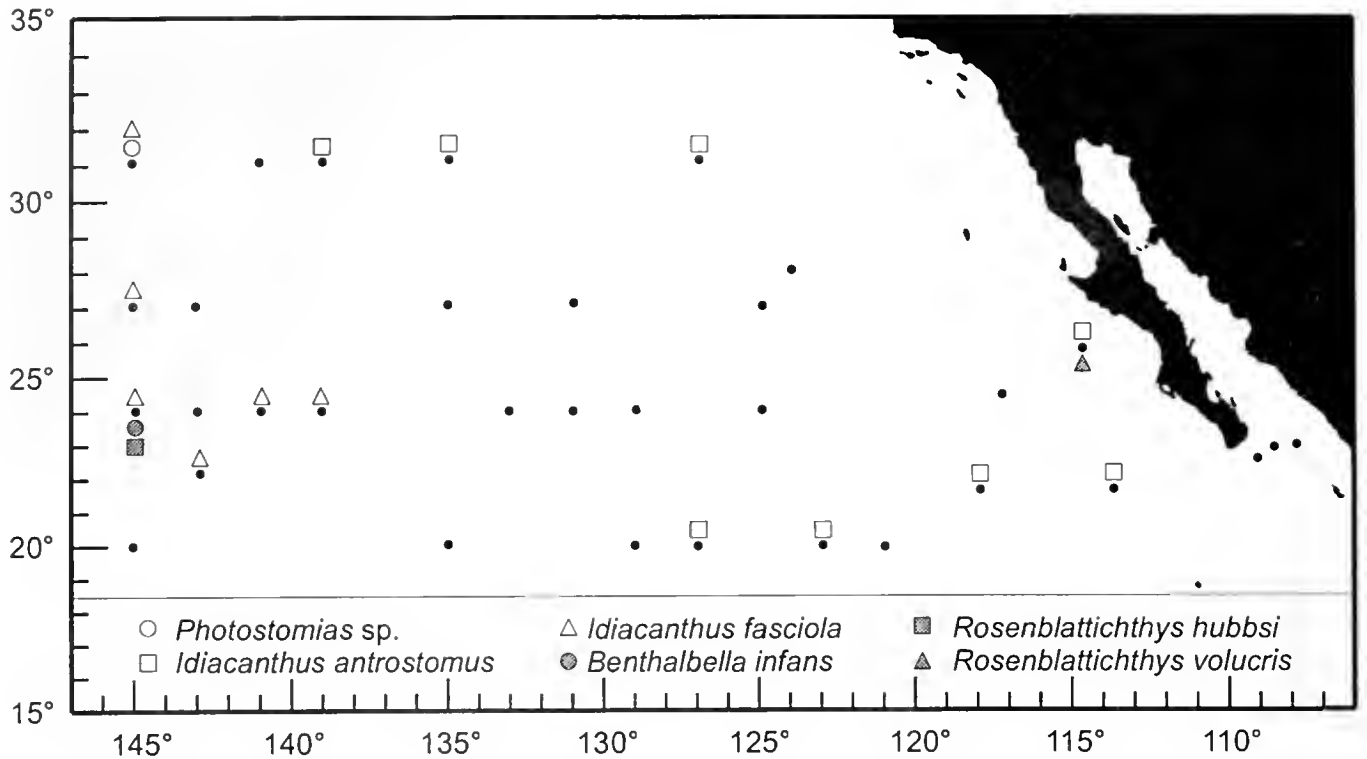


Figure 17. See caption for figure 2.

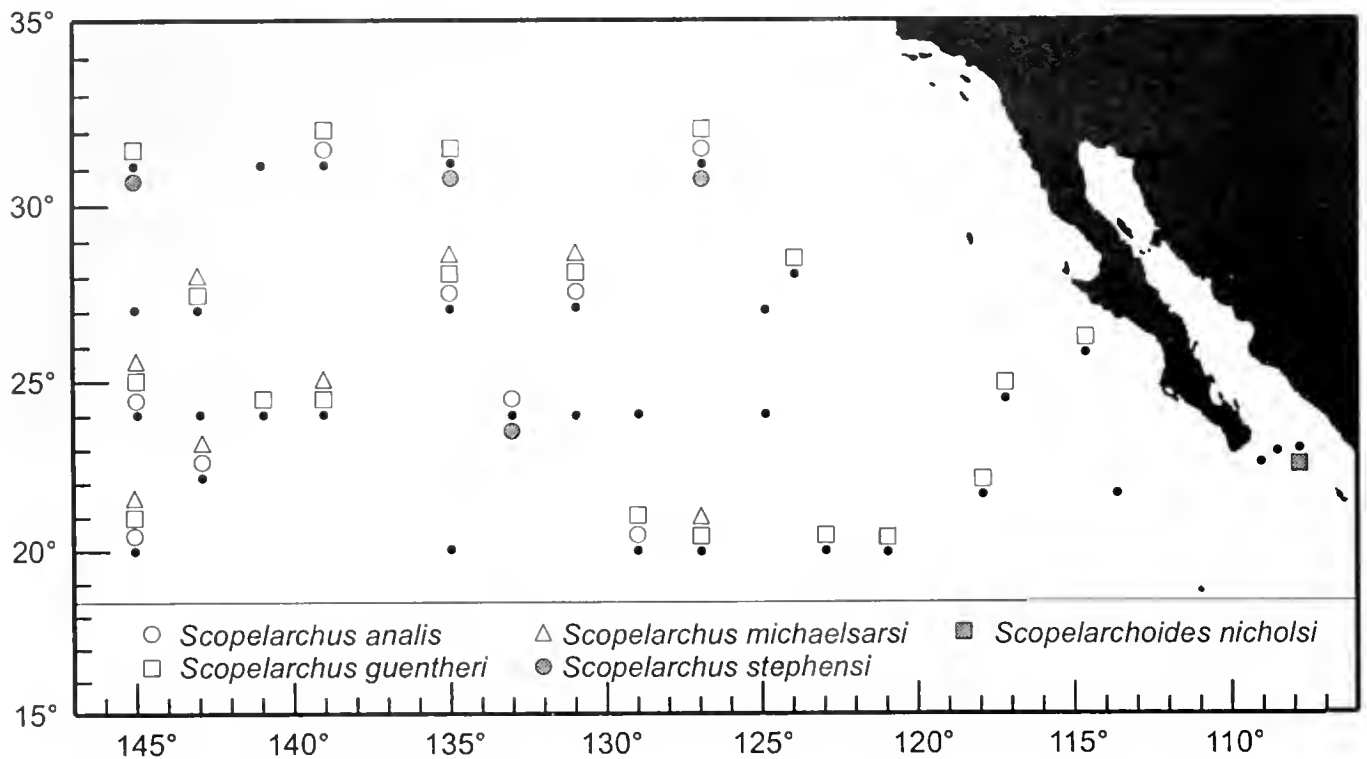


Figure 18. See caption for figure 2.

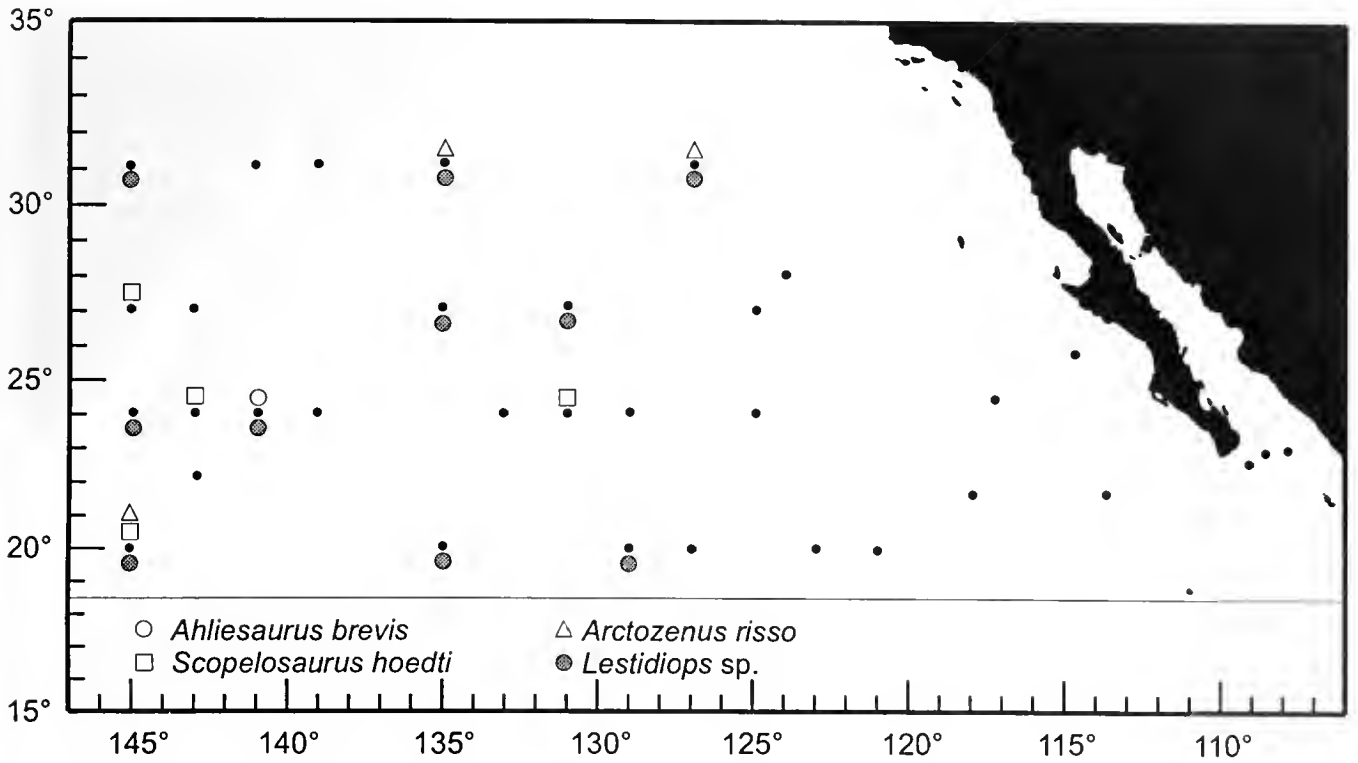


Figure 19. See caption for figure 2.

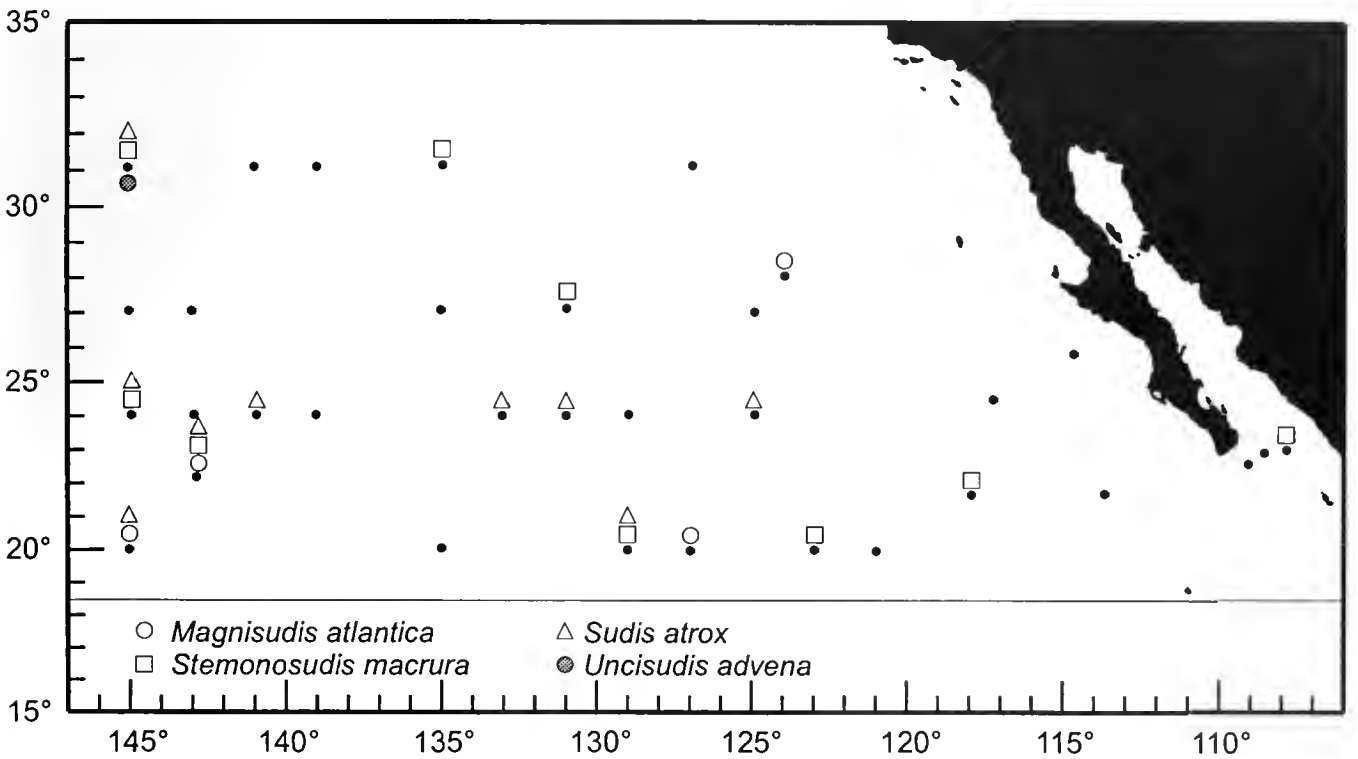


Figure 20. See caption for figure 2.

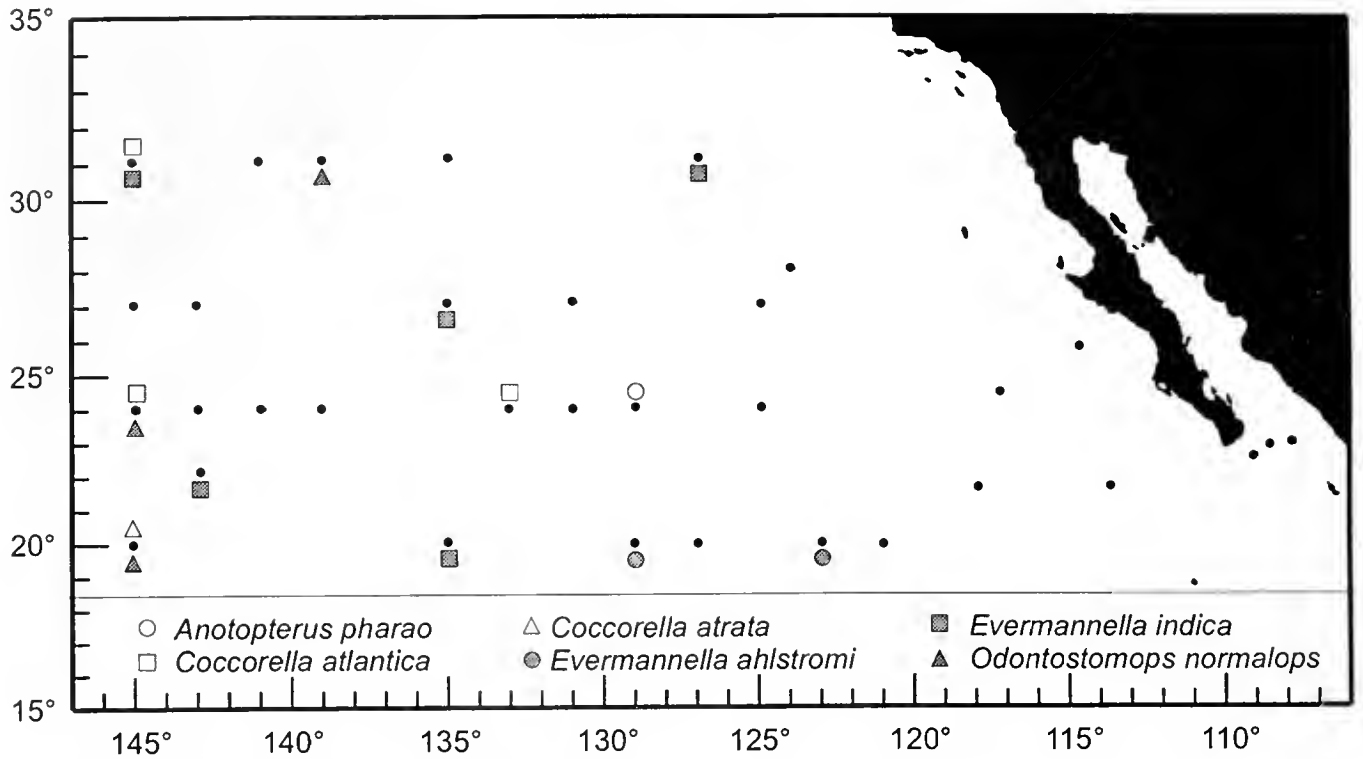


Figure 21. See caption for figure 2.

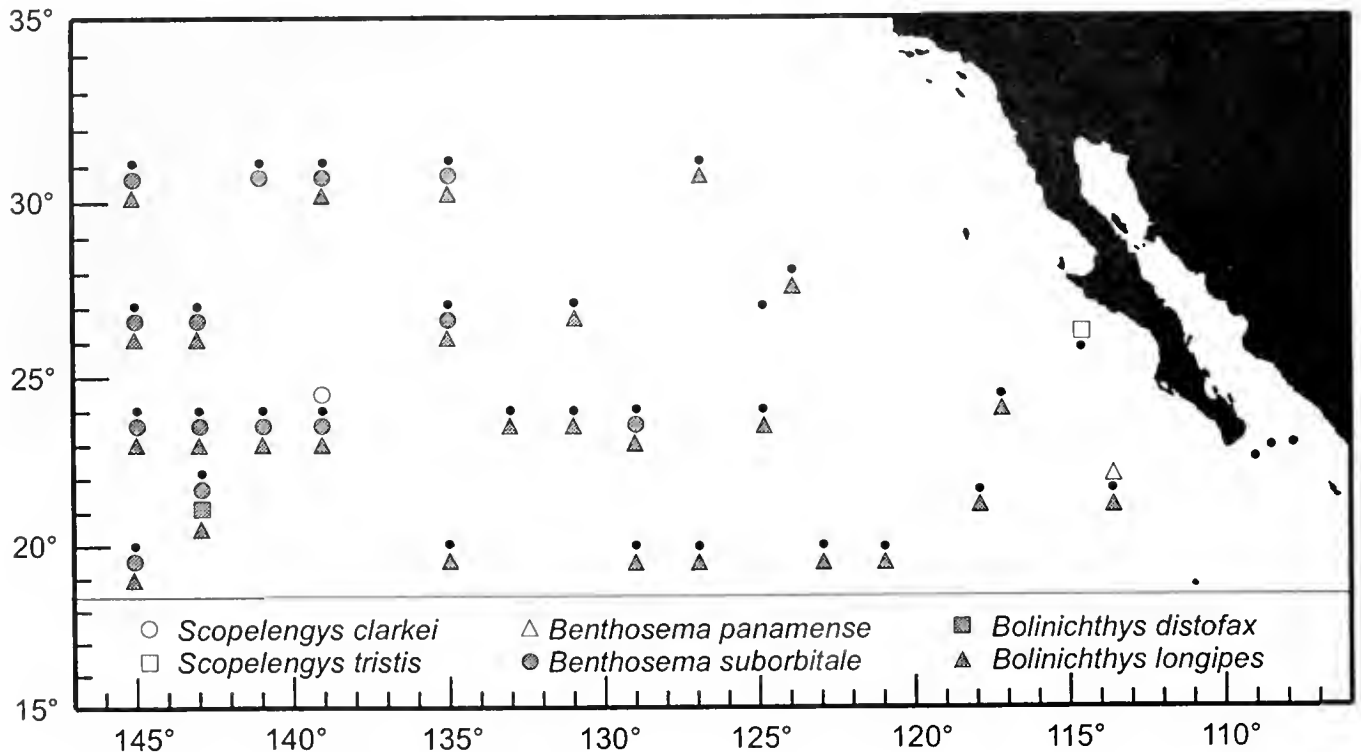


Figure 22. See caption for figure 2.



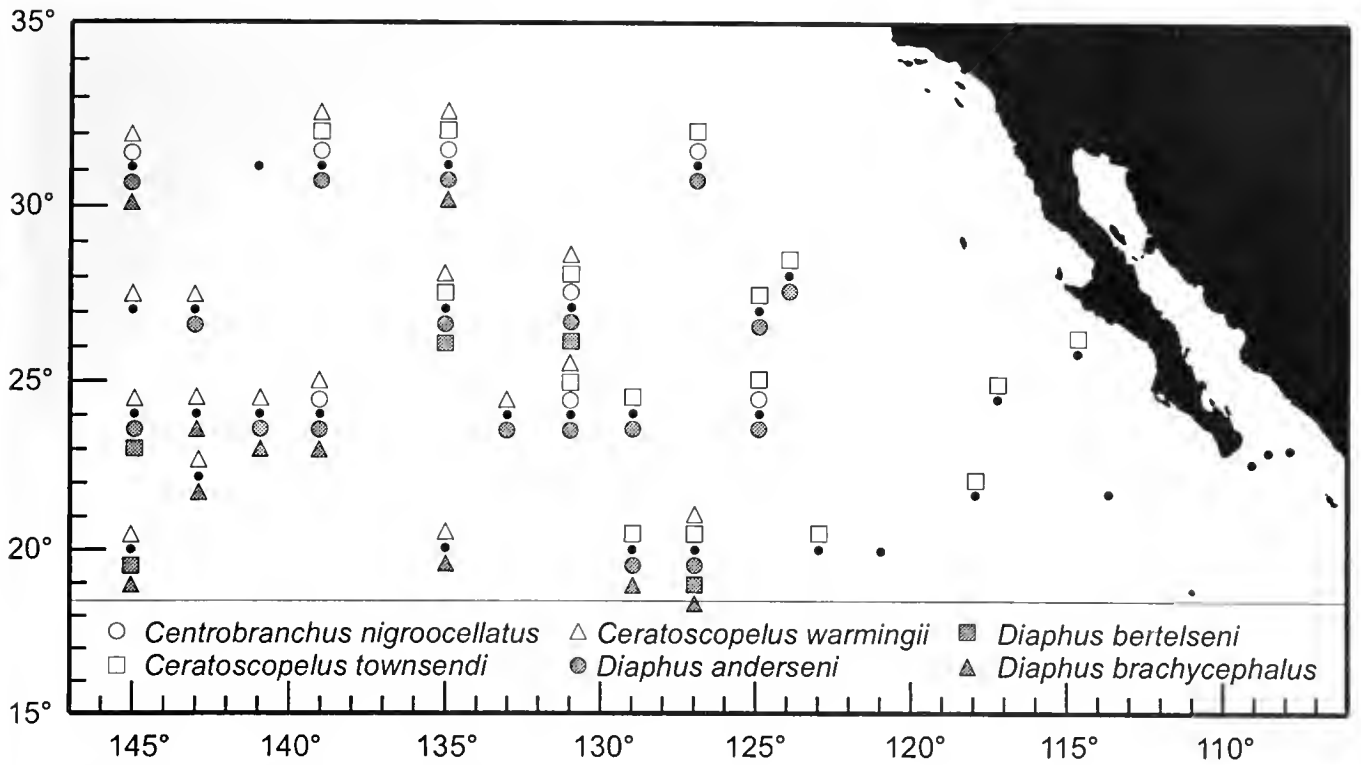


Figure 23. See caption for figure 2.

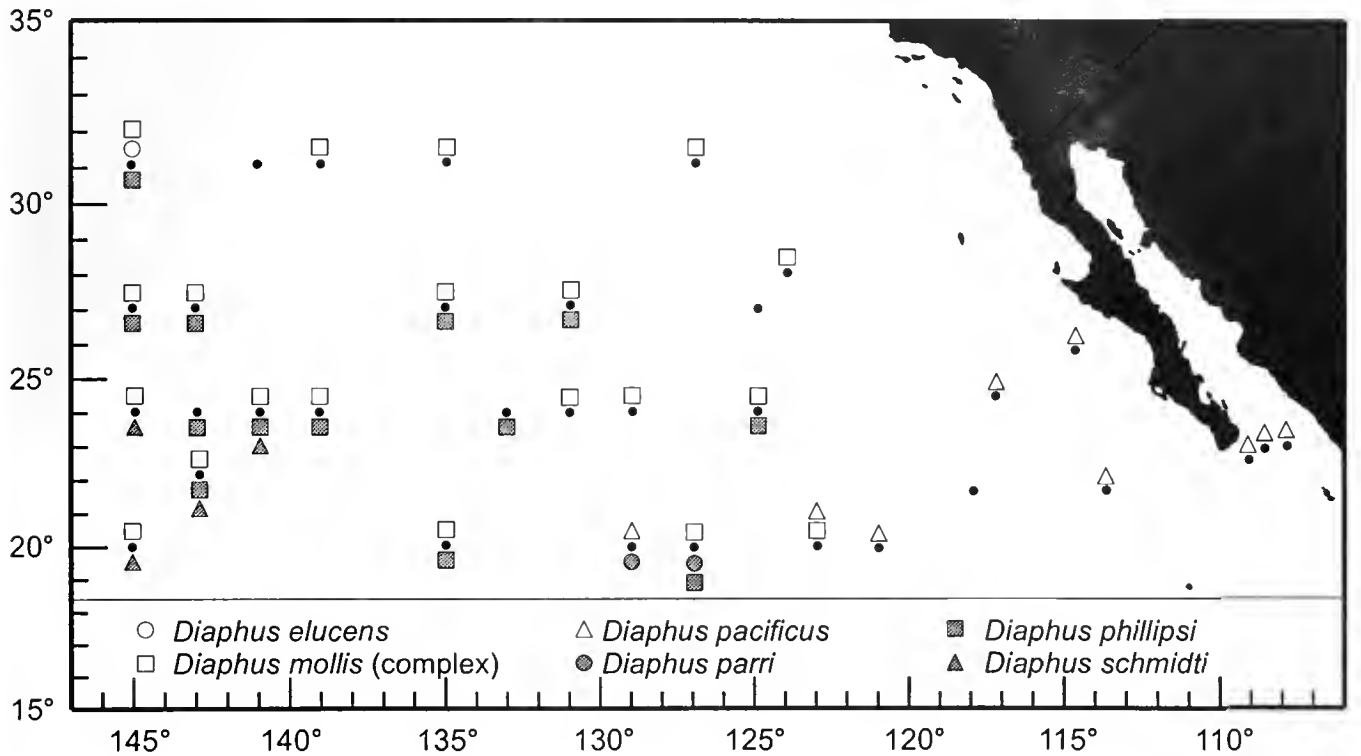


Figure 24. See caption for figure 2.

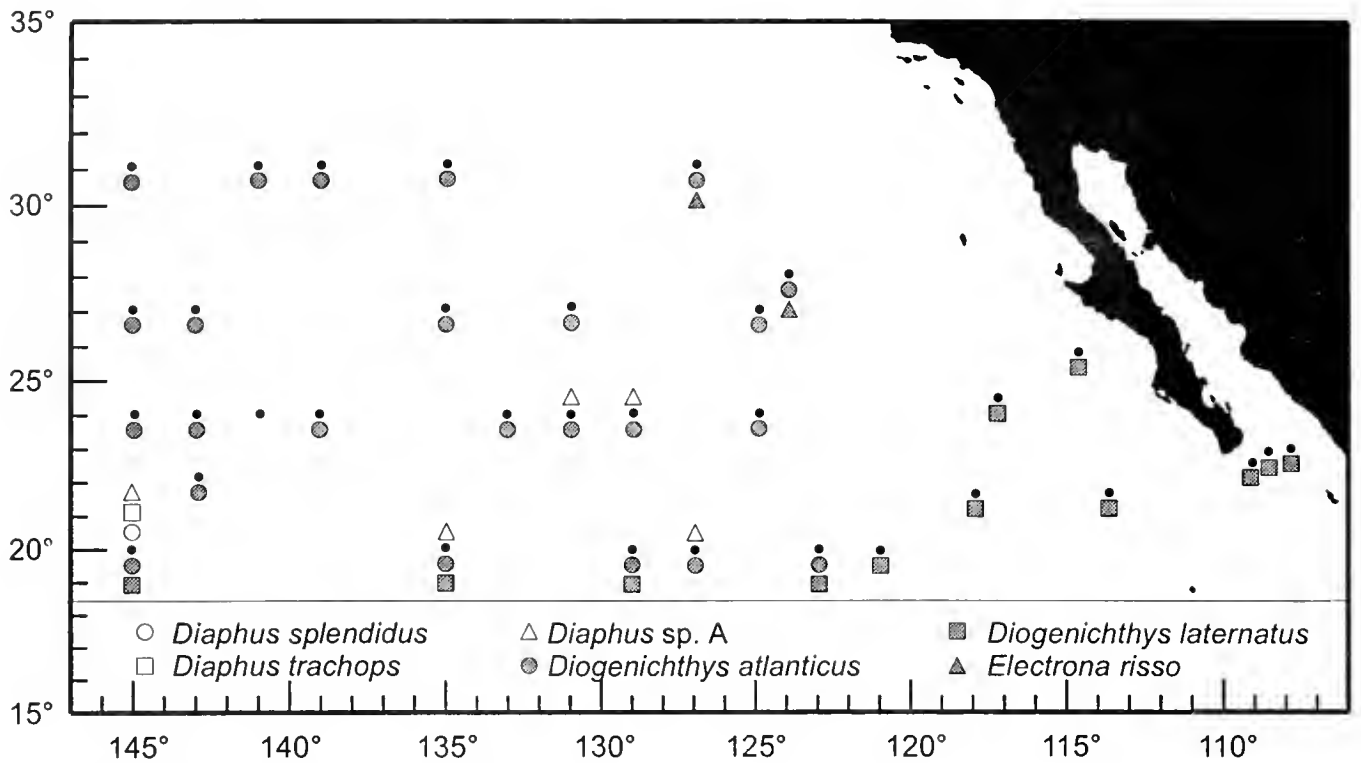


Figure 25. See caption for figure 2.

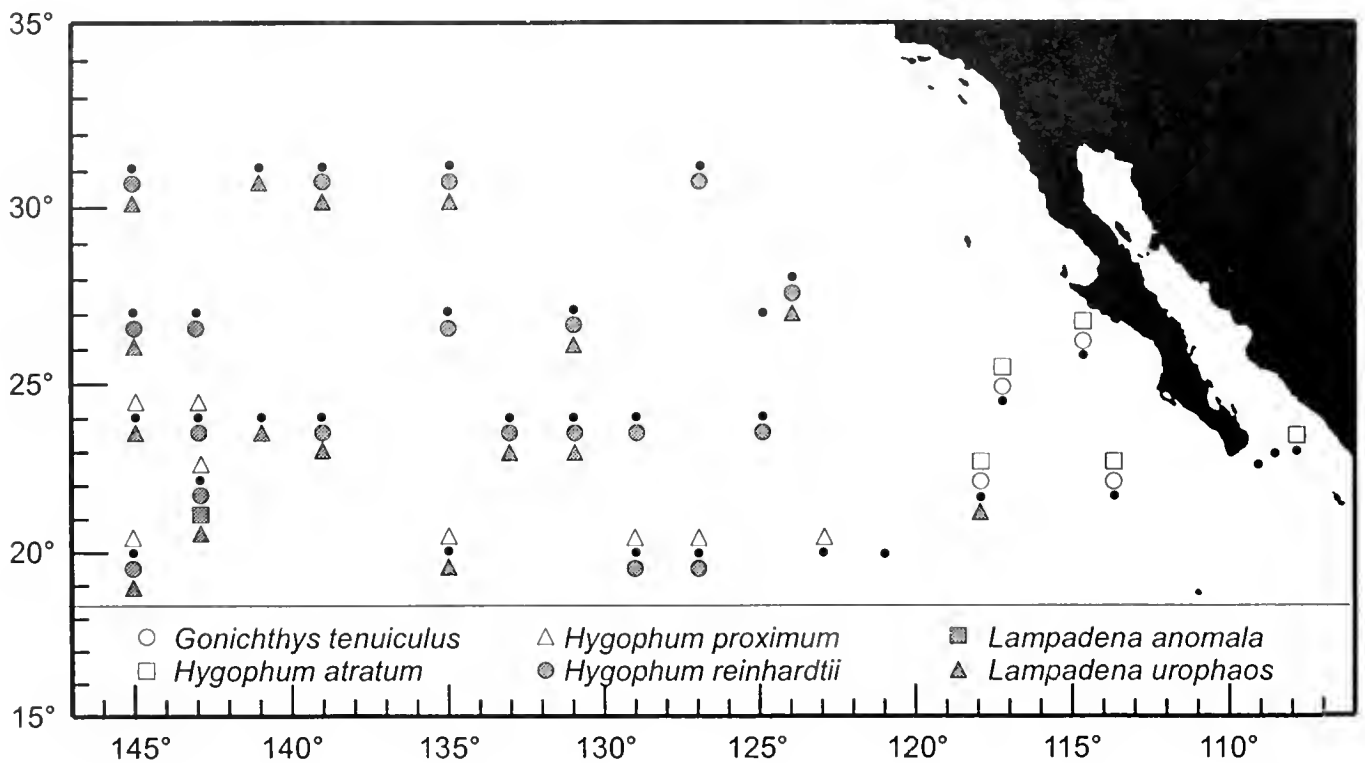


Figure 26. See caption for figure 2.

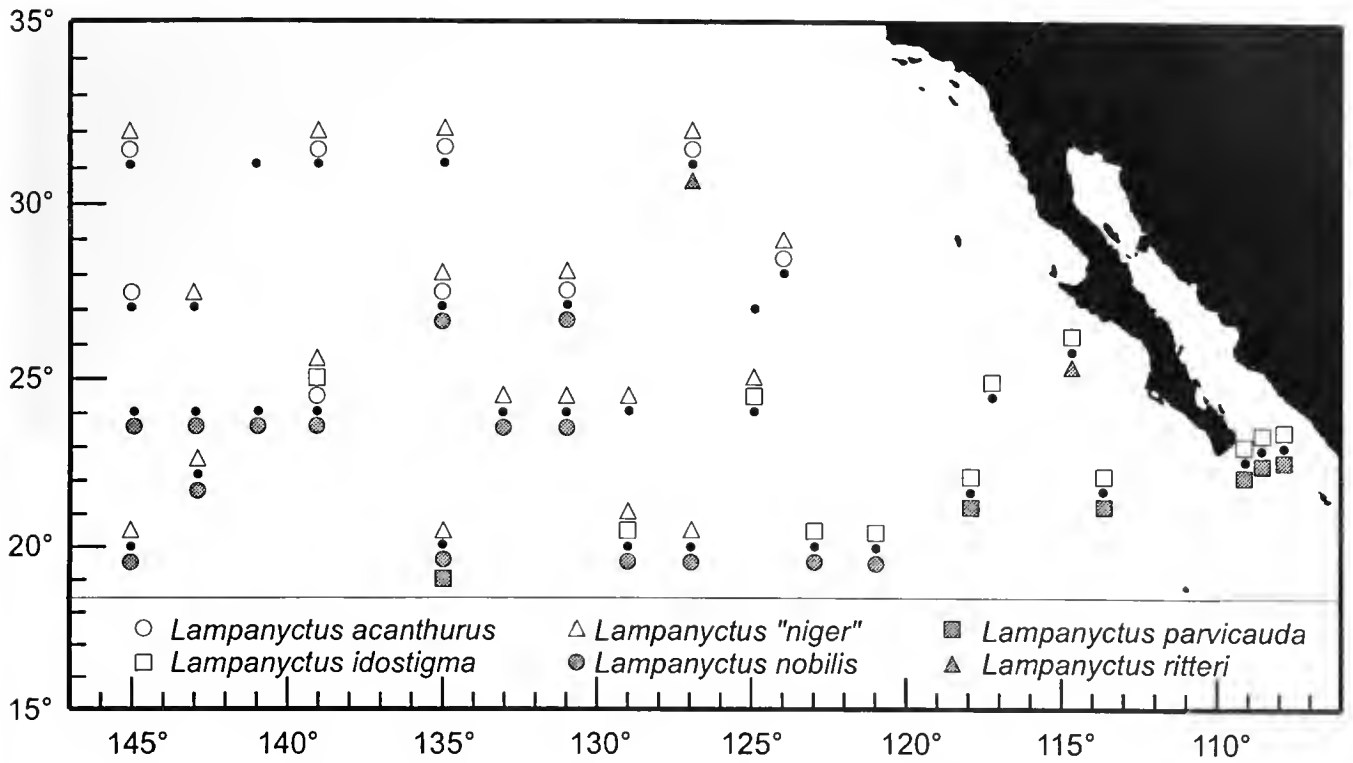


Figure 27. See caption for figure 2.

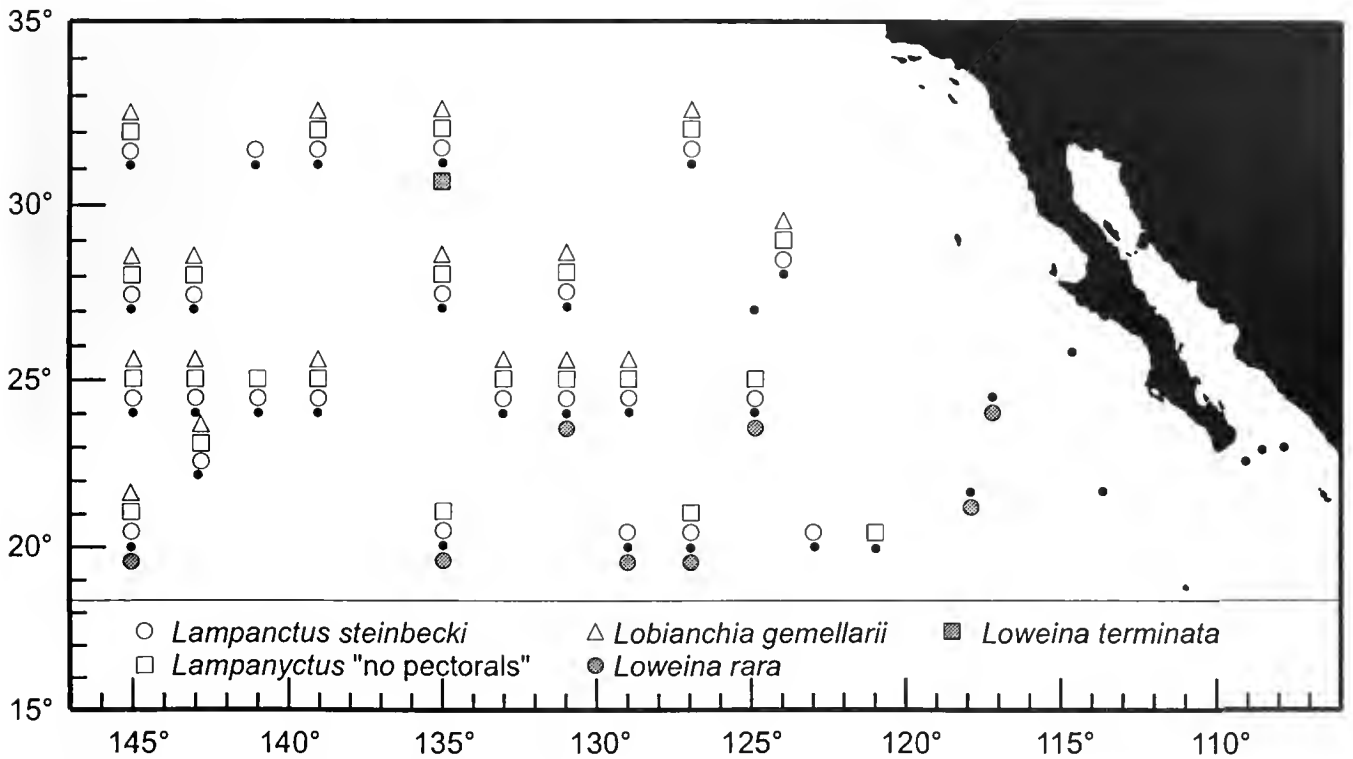


Figure 28. See caption for figure 2.

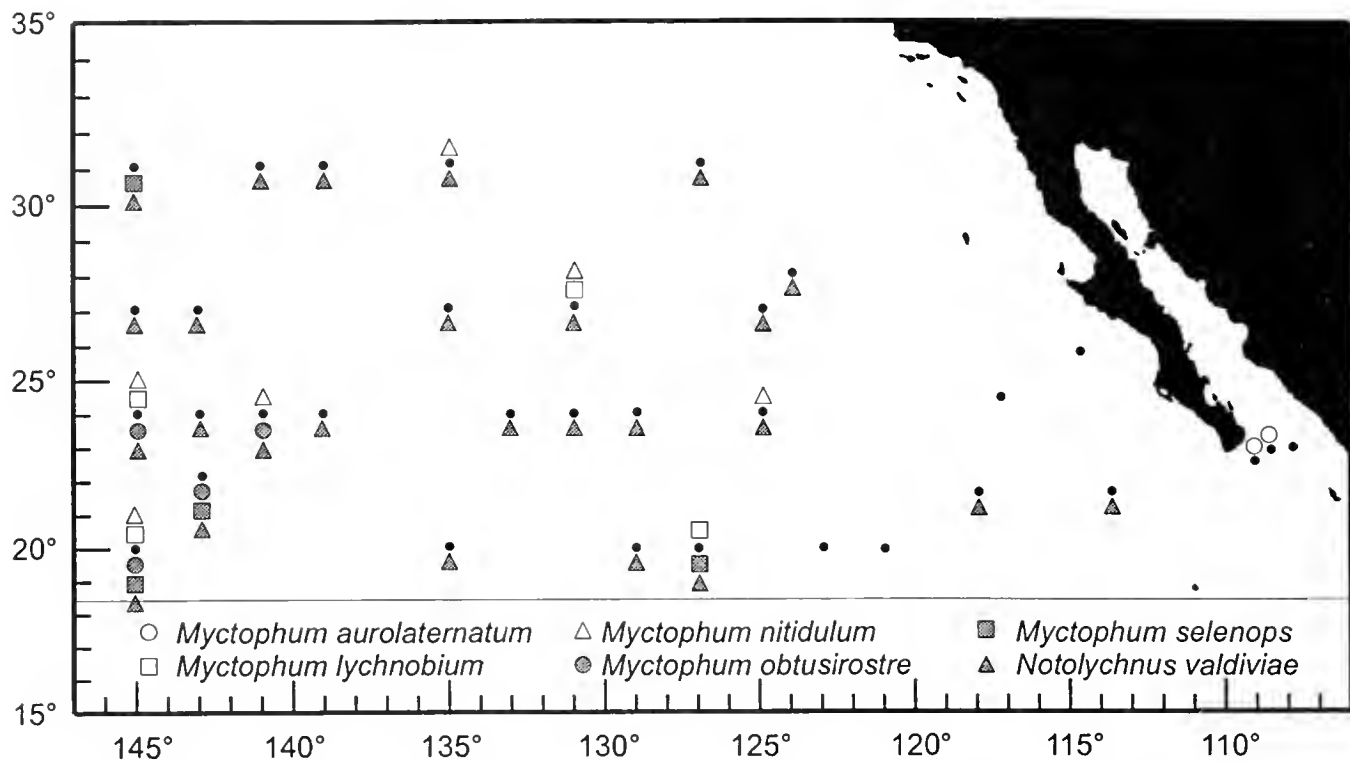


Figure 29. See caption for figure 2.

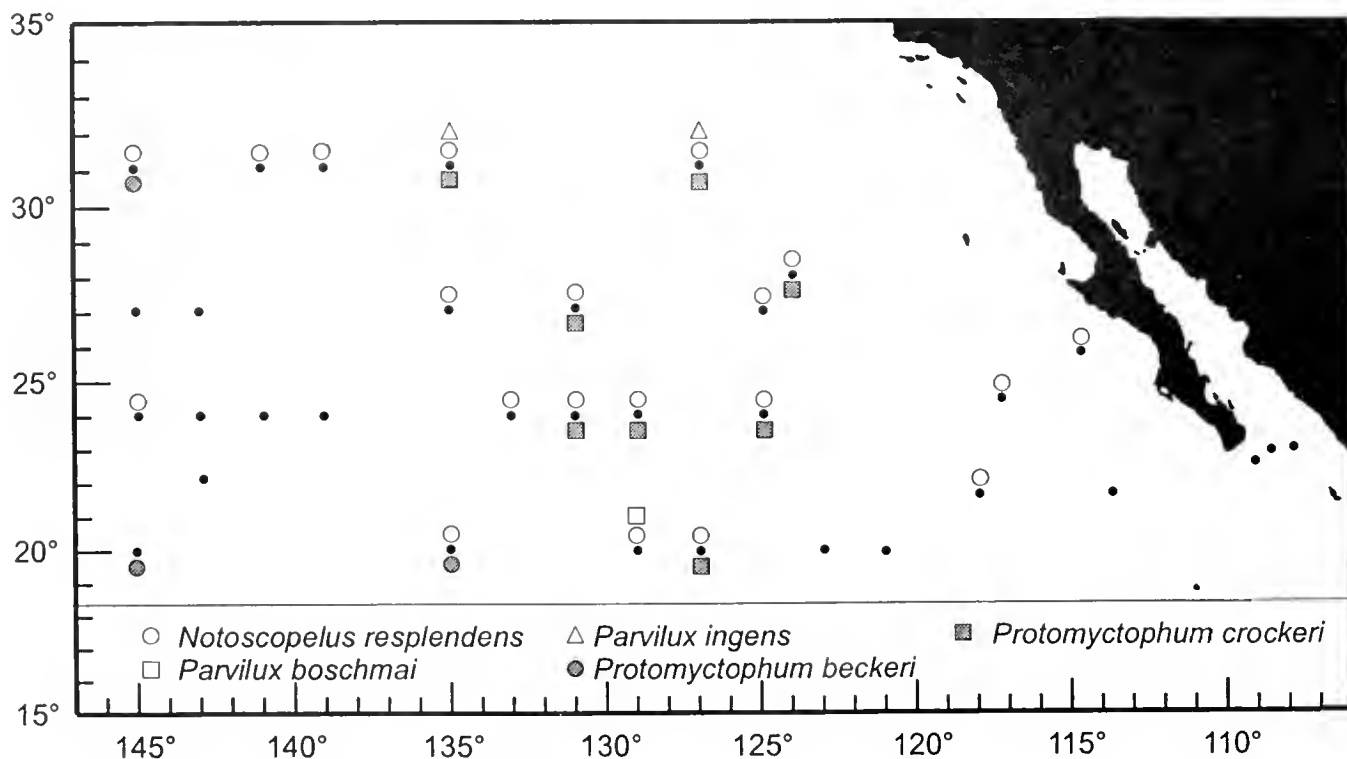


Figure 30. See caption for figure 2.

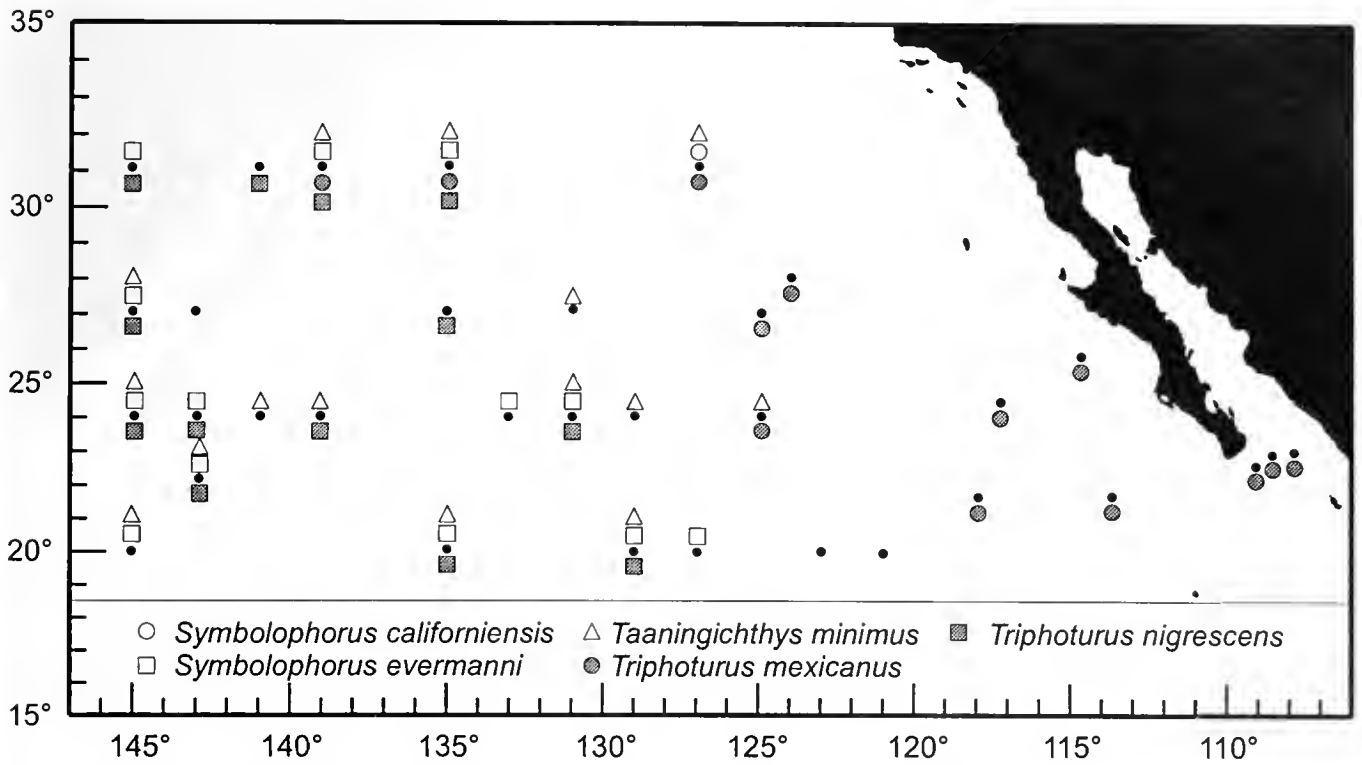


Figure 31. See caption for figure 2.

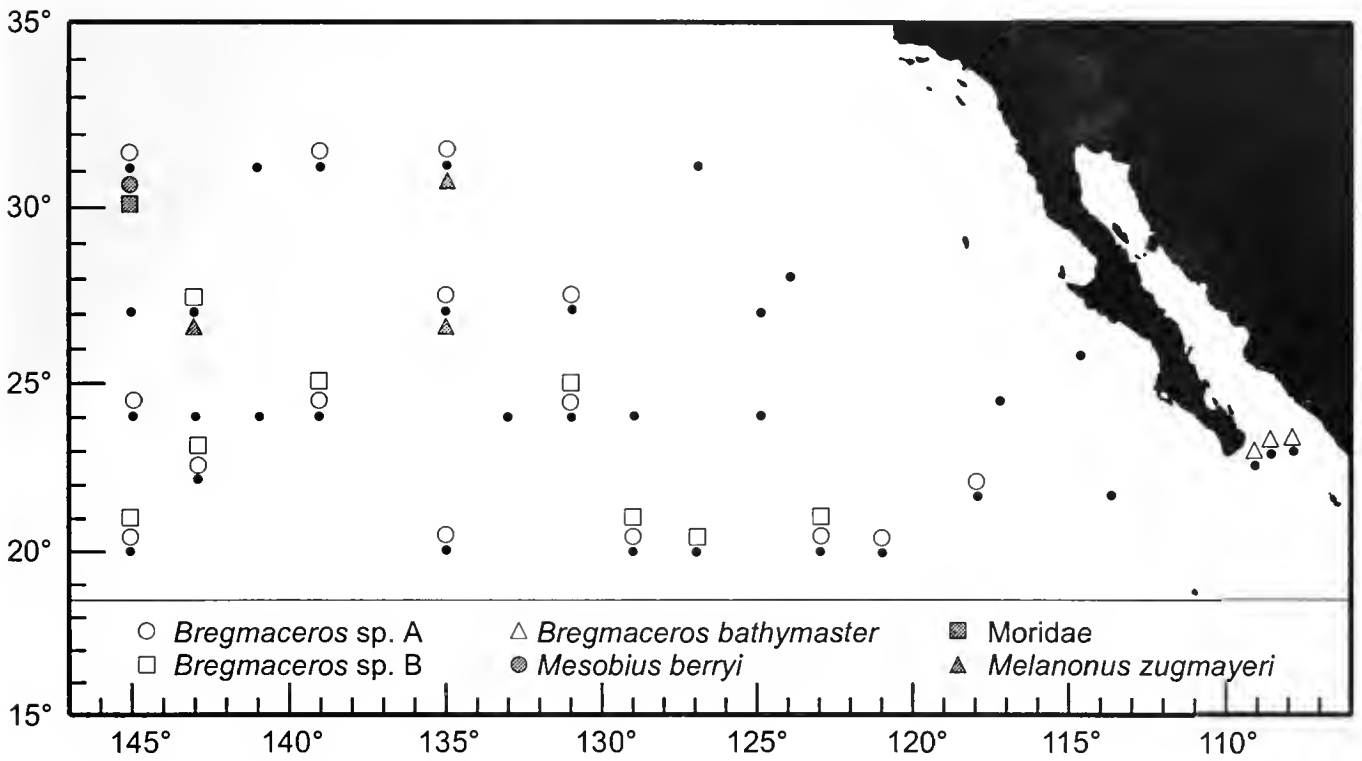


Figure 32. See caption for figure 2.

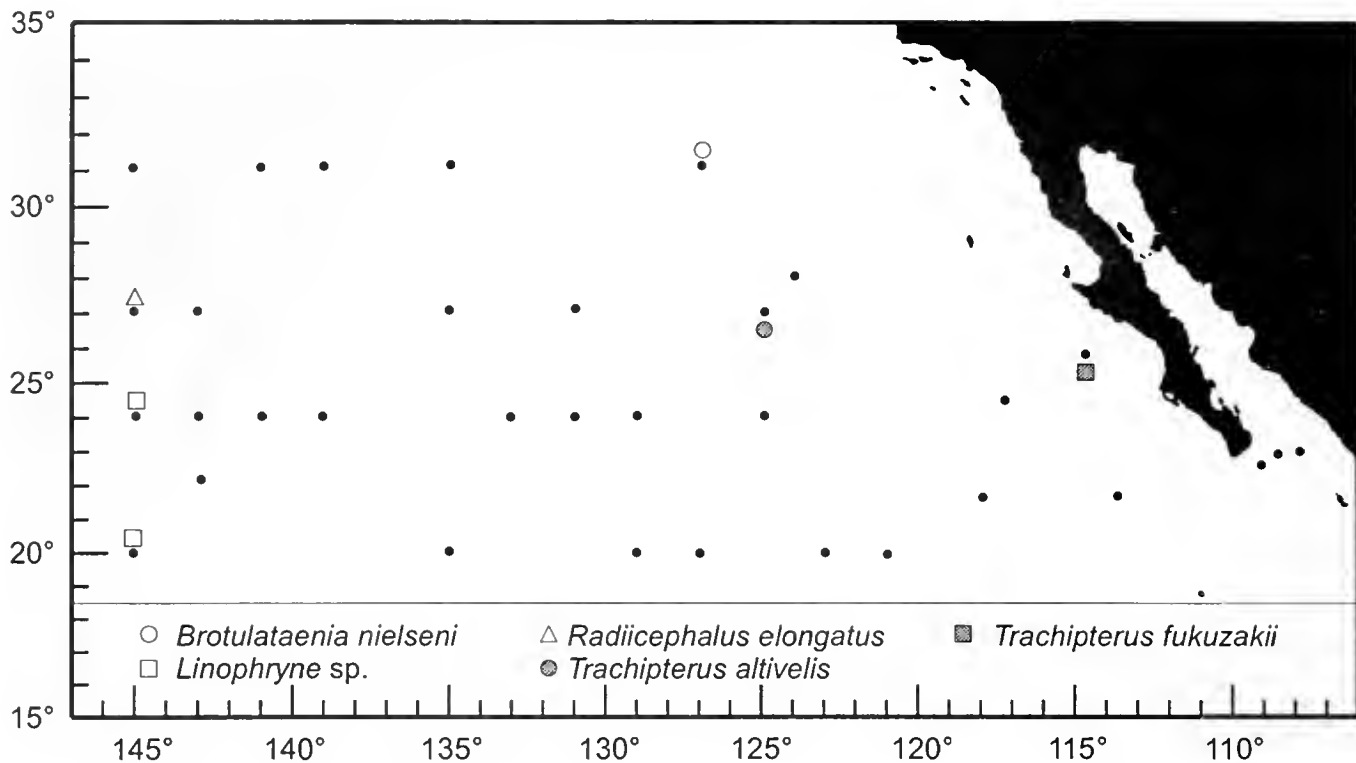


Figure 33. See caption for figure 2.

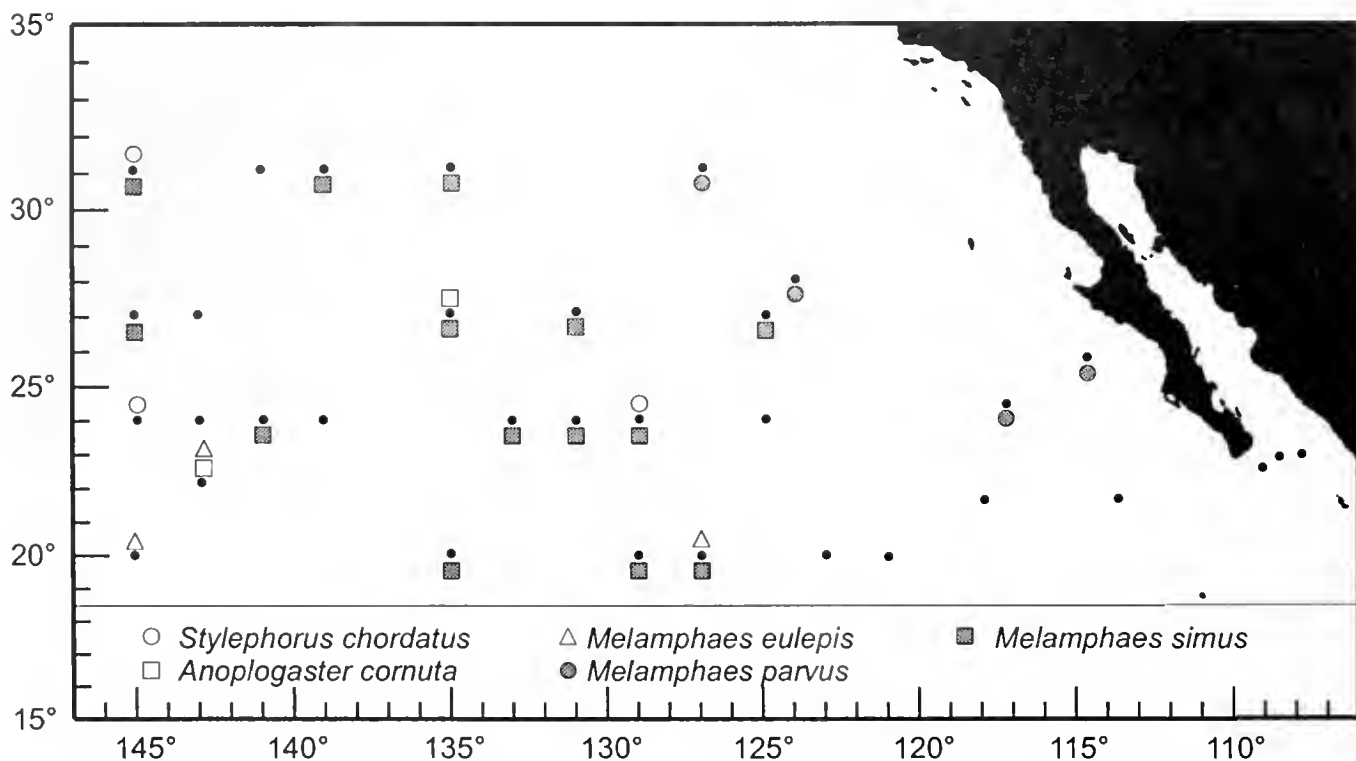


Figure 34. See caption for figure 2.

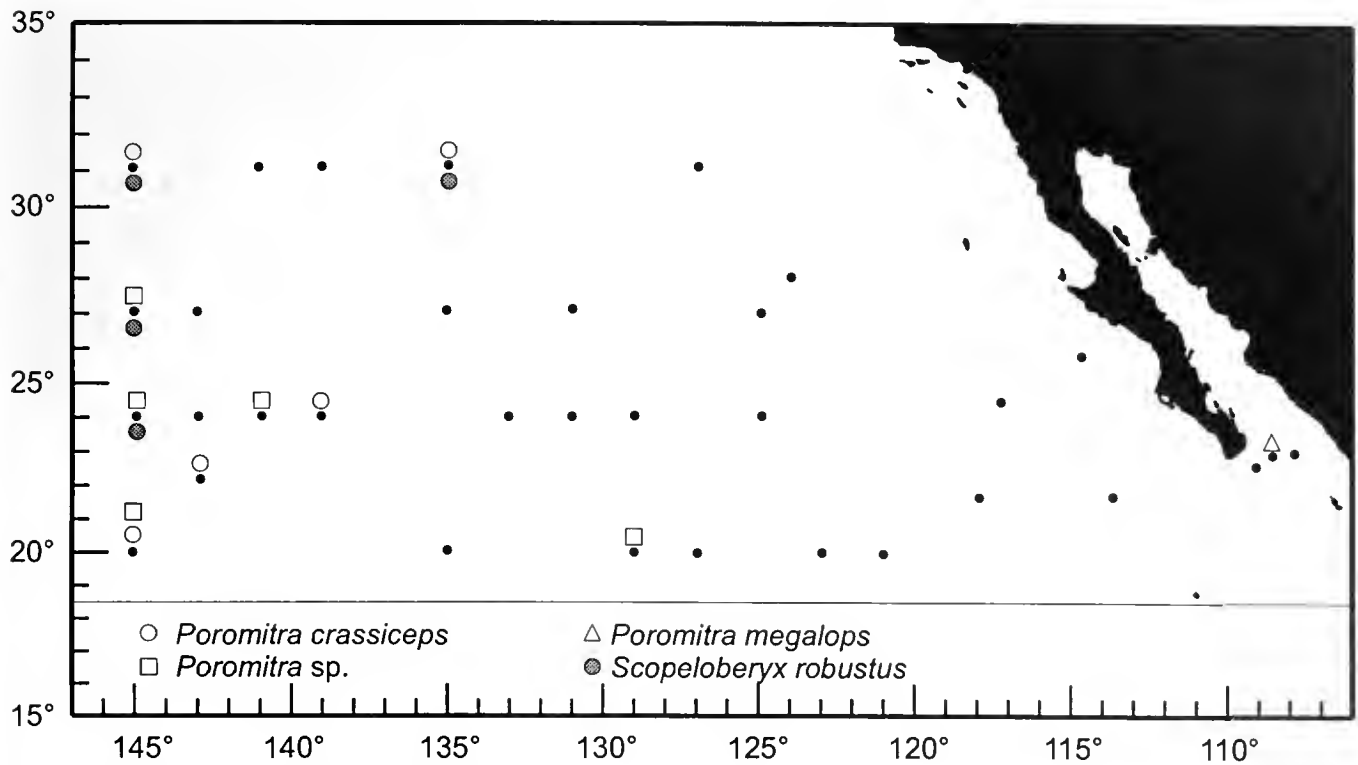


Figure 35. See caption for figure 2.

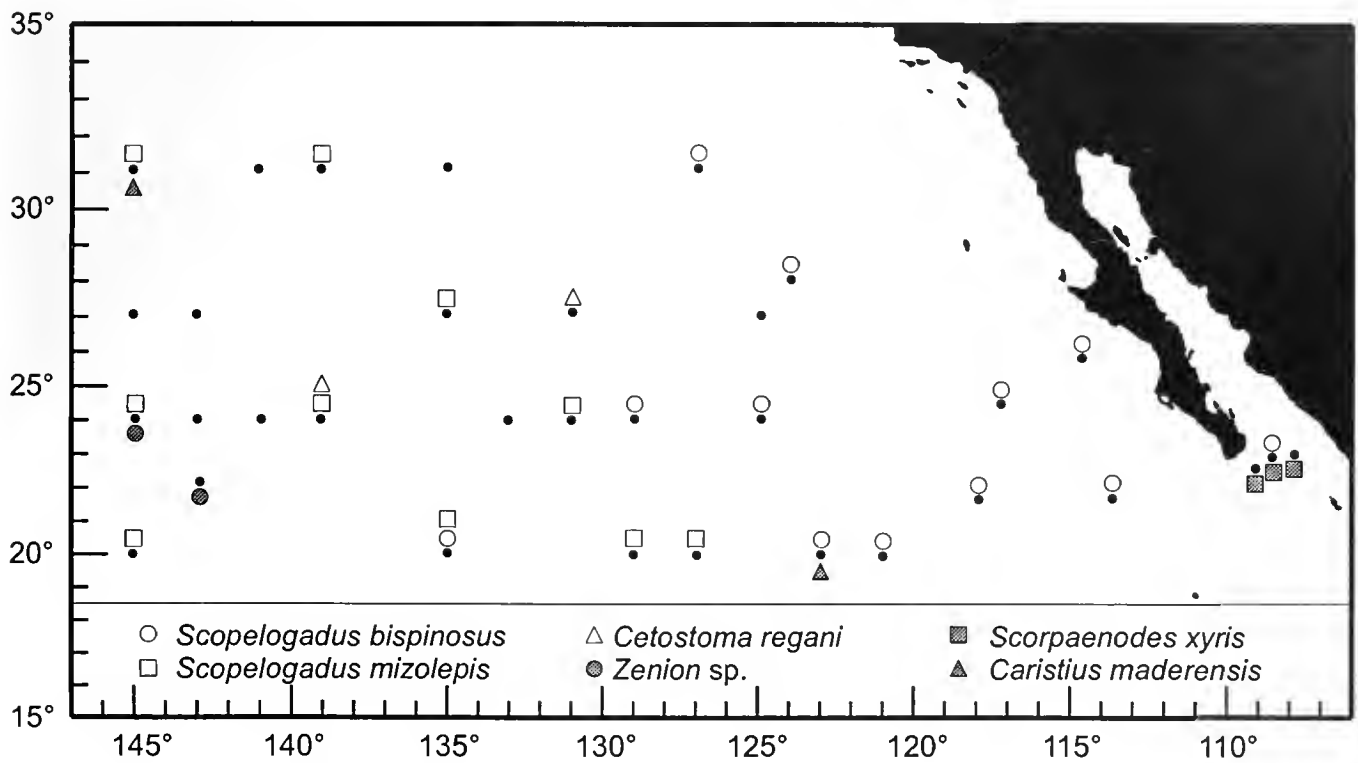


Figure 36. See caption for figure 2.

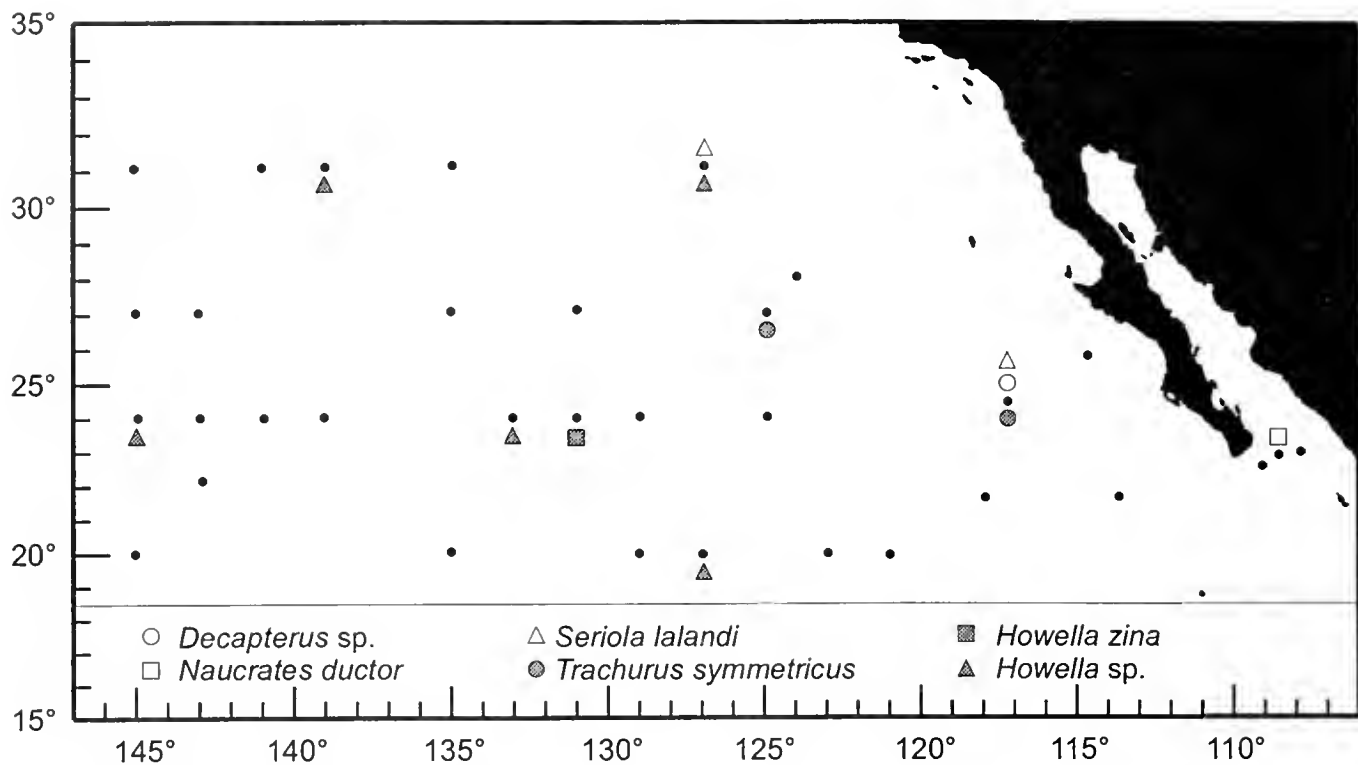


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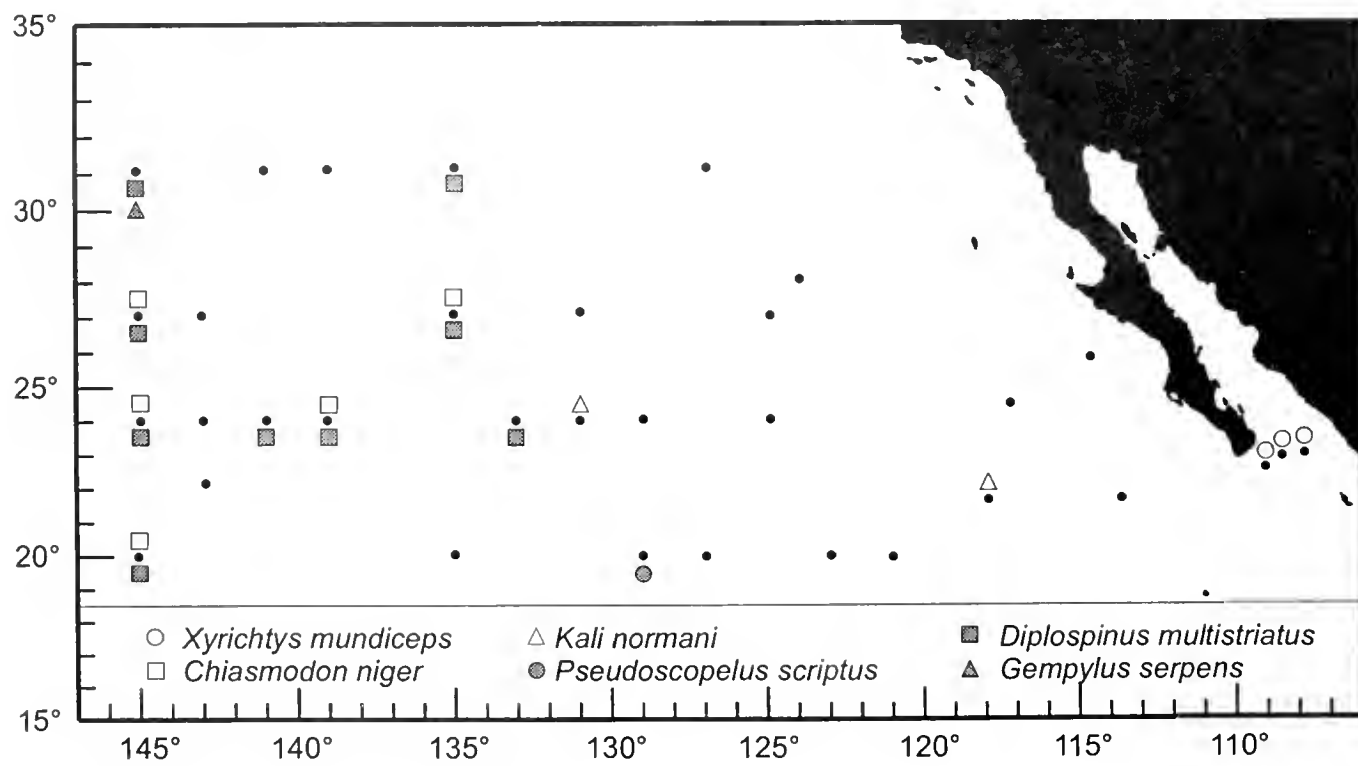


Figure 38. See caption for figure 2.



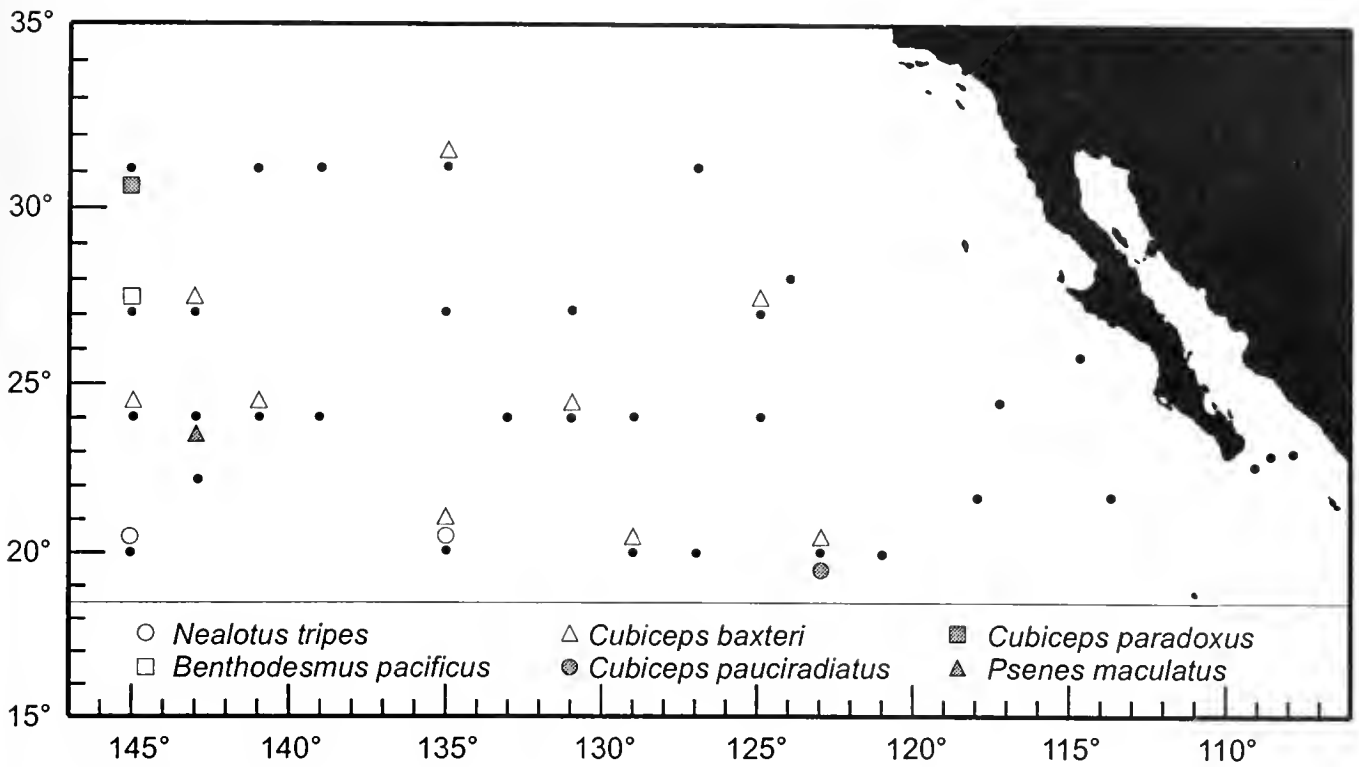


Figure 39. See caption for figure 2.

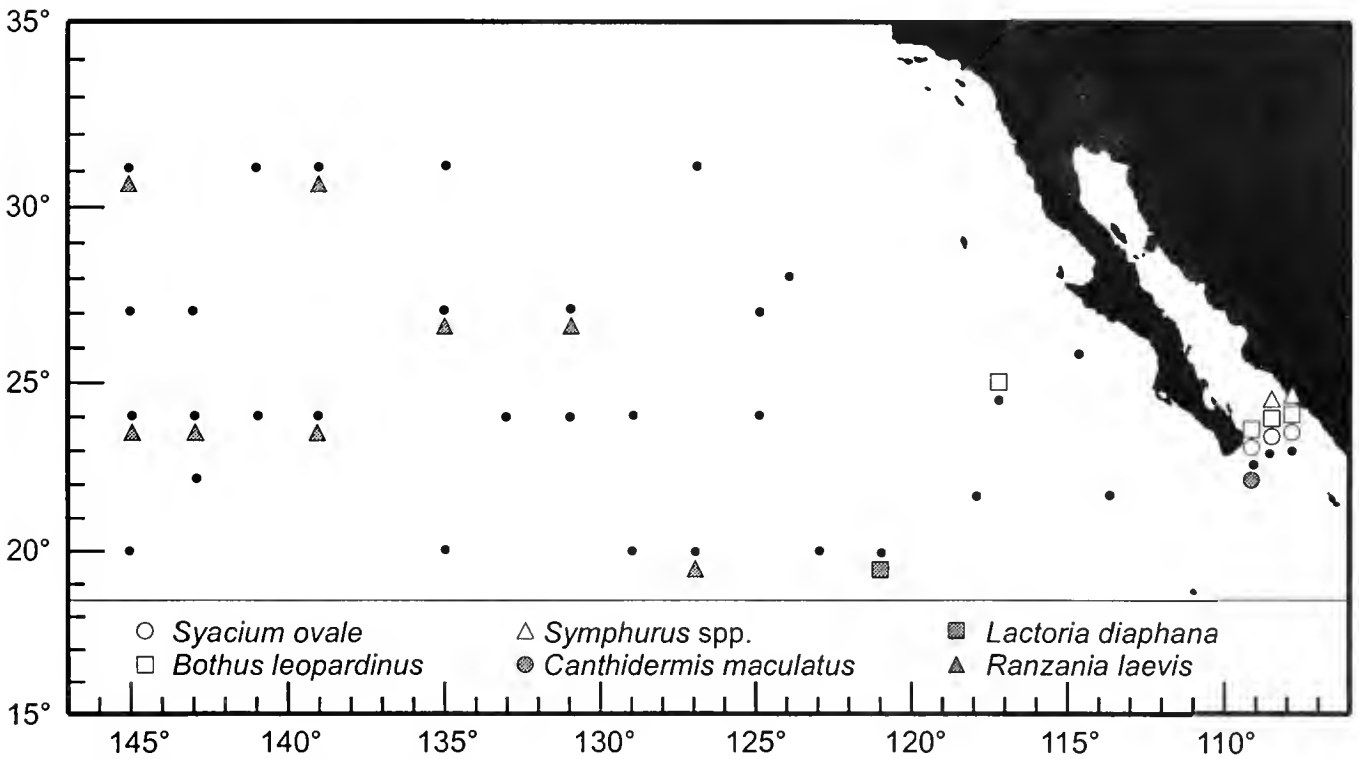


Figure 40. See caption for figure 2.



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