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Technical Report No. 63

THE DISTRIBUTION OF ANIMALS IN THE EASTERN NORTH PACIFIC AND ITS RELATIONSHIP TO PHYSICAL AND CHEMICAL CONDITIONS

by

William Aron

Office of Naval Research
Contract Nonr-477(10)
Project NR 083-012
and
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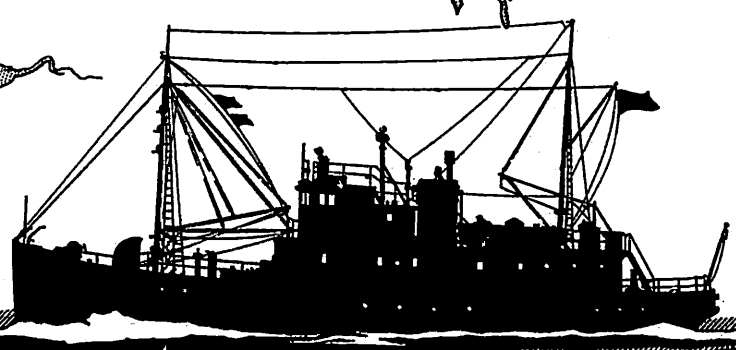
Grant G-6168

Reference 60-55
October 1960



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RICHARD H. FLEMING
Executive Officer

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

During the summer of 1957 and the summer and fall of 1958, the Department of Oceanography of the University of Washington conducted three cruises in the North Pacific aboard the research vessel Brown Bear. The first two of these cruises, Nos. 176 and 199, were part of the University's contribution to the International Geophysical Year. The third cruise, No. 202, was designed to investigate apparently anomalous oceanographic conditions detected off the Washington - British Columbia Coast during Cruise 199. The area studied ranged from about 32°N to 56°N and as far west as 174°E (Figure 1a, b, & c).

On all three cruises the standard measurements of salinity, temperature, oxygen, and phosphates were made; bathythermograms were taken regularly along the cruise track; in addition, nearly 600 hauls were taken using modified versions of the Isaacs-Kidd midwater trawl. Some of the data obtained from the trawl hauls are analyzed in this report, with particular emphasis on the relationship which exists between the physical and chemical conditions and the resident biological populations. The physical and chemical data has been presented in Fleming (1958a, 1959) and in Love (1960).

The quantity of material taken with the midwater trawl is large and varied, both in number of individual animals and in number of major animal groups represented. Although complete analysis is impossible at this time, this report presents the progress made in studies of the material--particularly in regard to the fishes and to certain aspects of the planktonic regime.

Methods

Samples were taken with 3- and 6-foot modified versions of the Isaacs-Kidd midwater trawl. The cod-end in all nets was a 0.5-meter plankton net with a mesh opening of 1/8-inch (Dupont Nylon, pattern 281, Marion Textiles, Inc., New York, N. Y.). It was fitted with a collecting bucket attached by means of a bayonet-type mount (Figure 2).

Hauls were made at depths ranging from the surface to about 400 meters. At most hauls the net was fished 30 minutes at depth. The total time was measured from the time the net first entered the water until the haul was terminated and the net was removed from the water. All hauls were made with the ship proceeding at one engine full, a speed of about 6.0 knots. The net was released with the ship underway at towing speed, and was recovered with the ship's speed reduced to about 4.5 knots. The hauls were made in a straight line along the cruise track.

The depth of fishing had been established by experiments prior to the cruises discussed in this report: a depth-distance recorder and a bathythermogram were attached to the cable just above the net; tows were made using different lengths of cable and different towing speeds. Results of replicate hauls on three separate cruises showed the net to

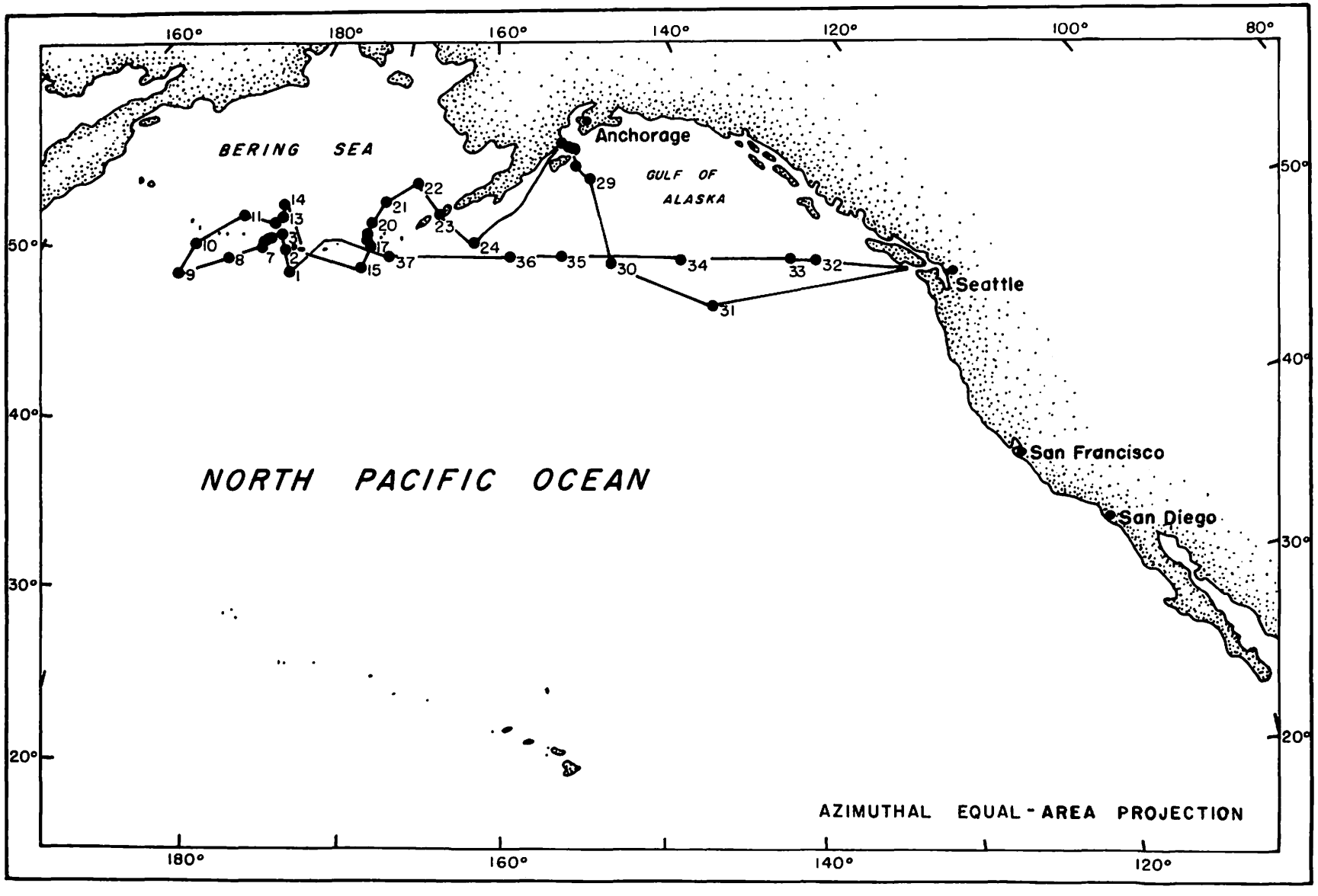

FIG. 1a. CRUISE TRACK OF BROWN BEAR CRUISE 176 SHOWING POSITION OF HYDROGRAPHIC STATIONS.

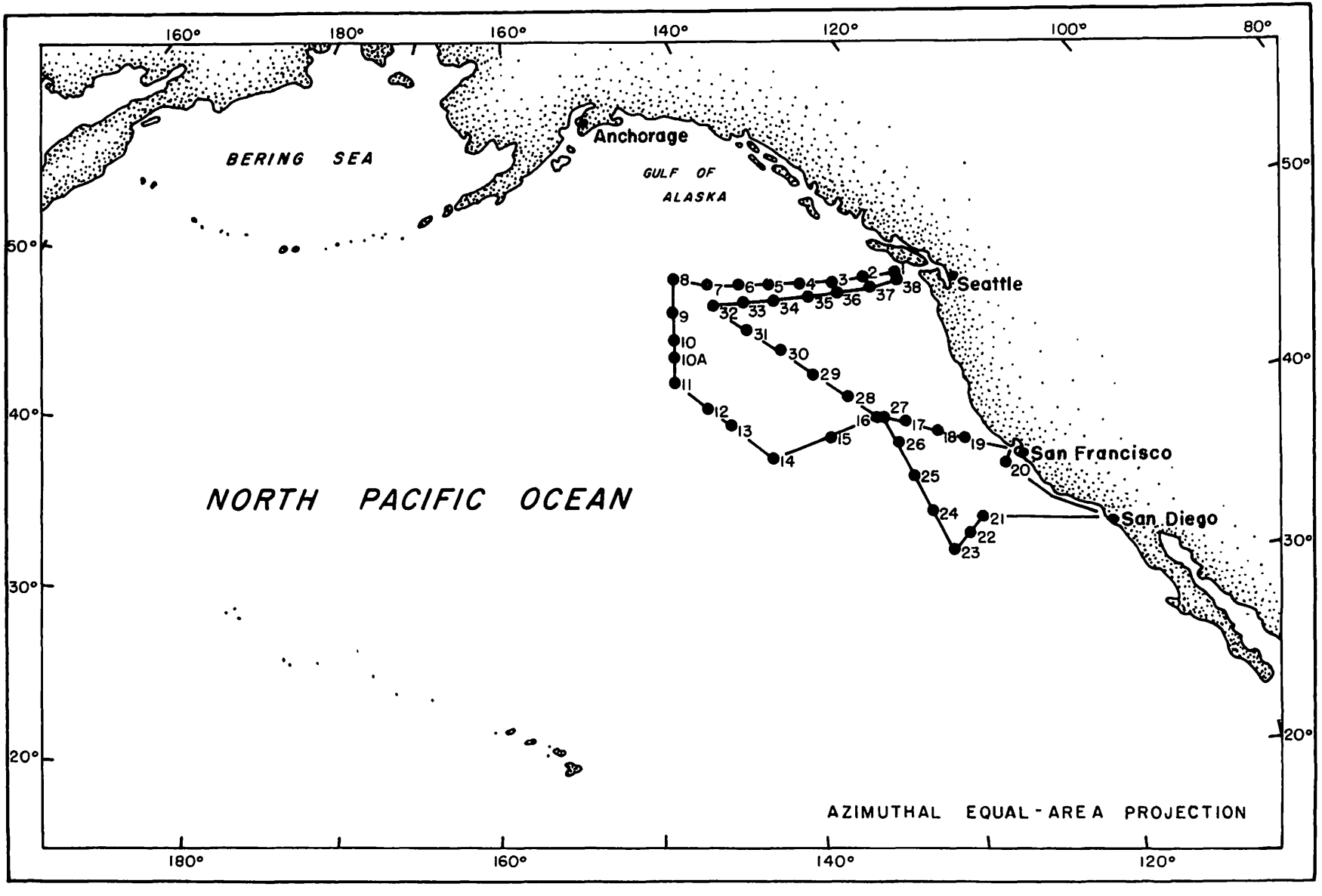

FIG. 1b. CRUISE TRACK OF BROWN BEAR CRUISE 199 SHOWING POSITION OF HYDROGRAPHIC STATIONS.

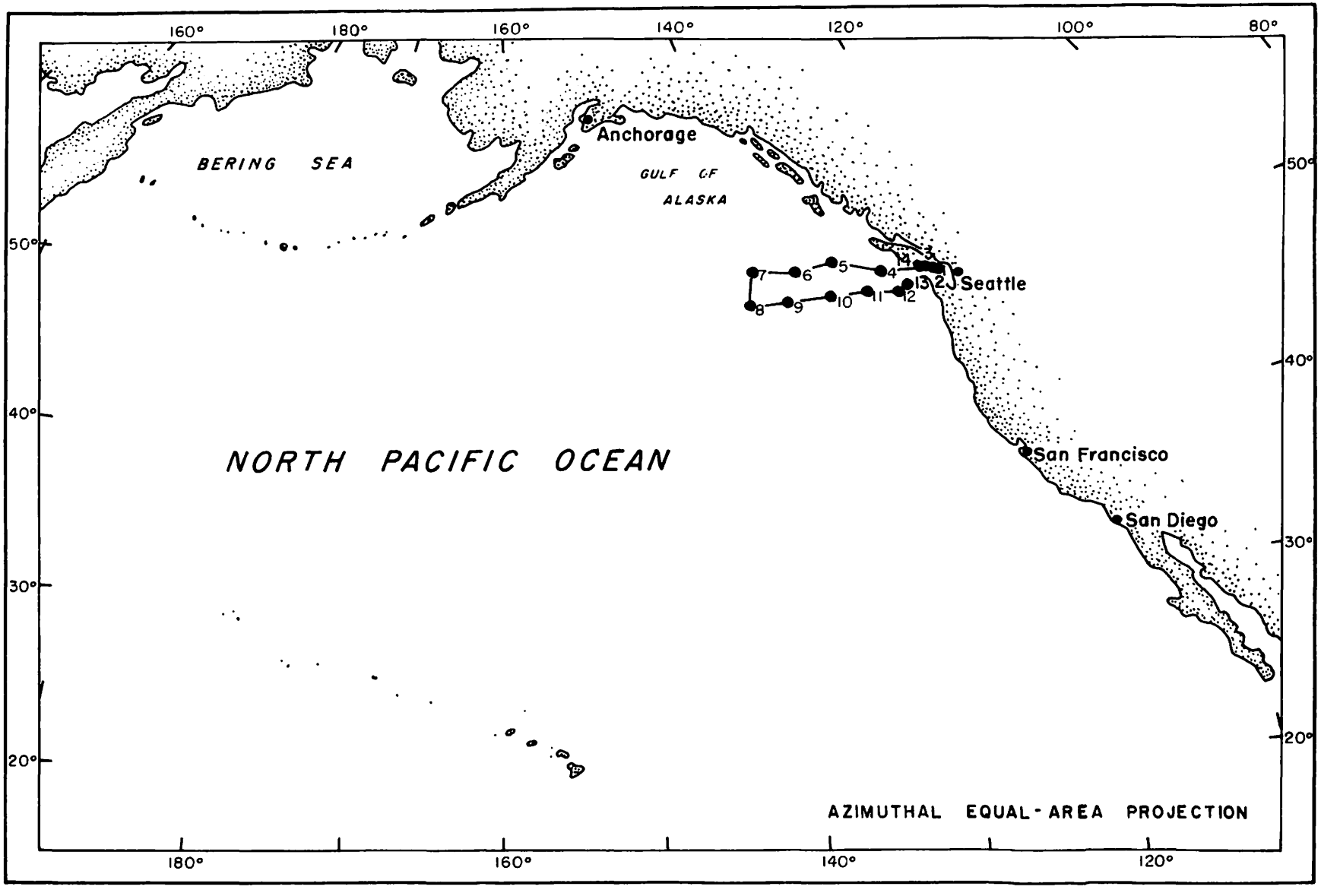

FIG. 1c. CRUISE TRACK OF BROWN BEAR CRUISE 202 SHOWING POSITION OF HYDROGRAPHIC STATIONS.

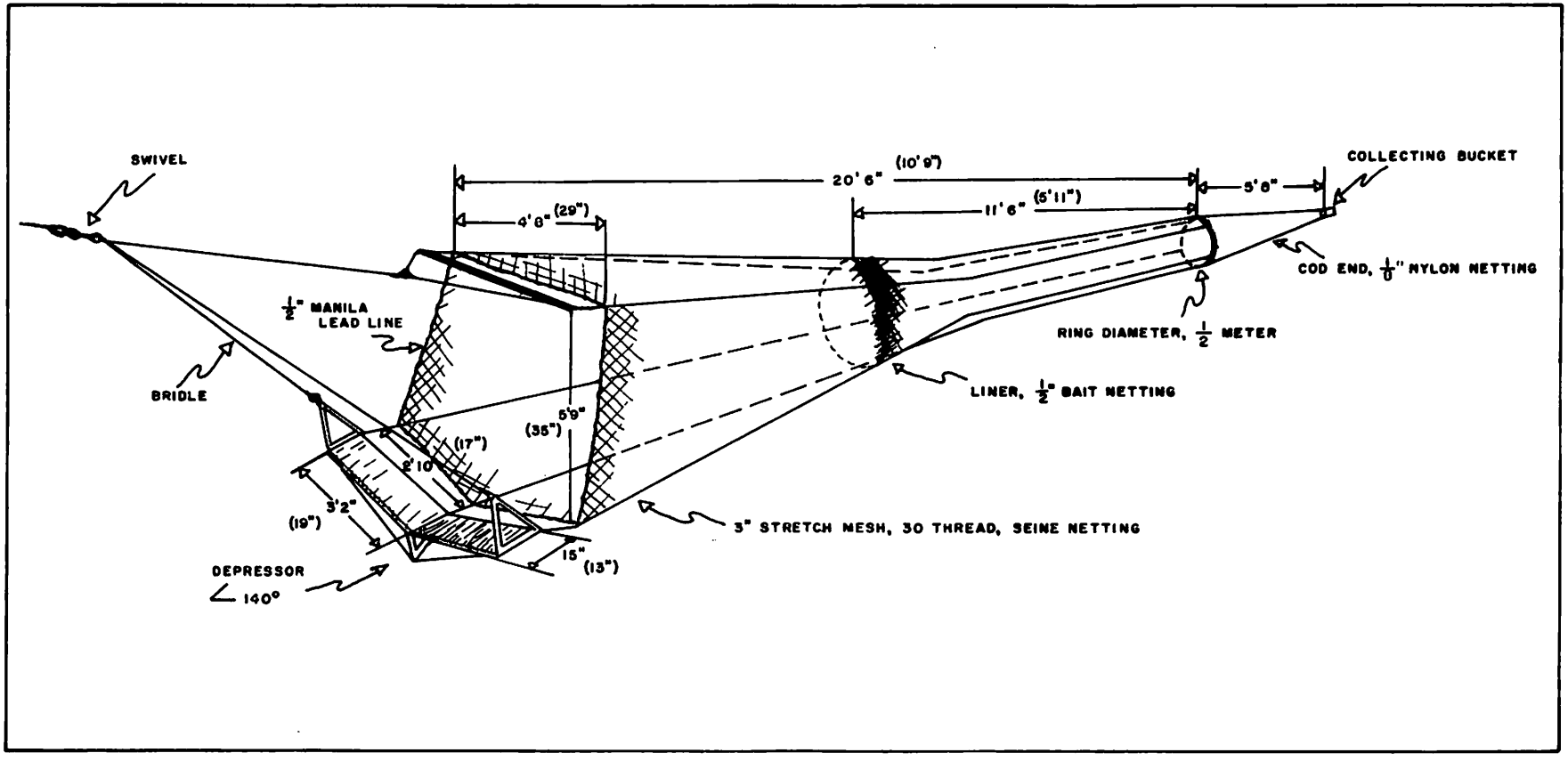

FIG. 2. MODIFIED VERSION OF THE ISAACS—KIDD MIDWATER TRAWL. (DIMENSIONS ARE GIVEN FOR THE 6-FOOT TRAWL; DIMENSIONS FOR THE 3-FOOT TRAWL ARE GIVEN IN PARENTHESES.)

be consistently fishing at the same depth. The reliability of the results was further confirmed by intentionally hitting the bottom with the net and also by comparing the catches taken from above and below oceanographic discontinuities which occurred at known depths.

Because of diurnal fluctuations in the availability of animals captured by the gear, the largest number of hauls were made during the night, with fewer hauls taken for comparative purposes during daylight. A standard series of hauls taken at depths of 30, 60, and 225 meters was usually taken each night. Hauls taken at other depths, or repeat hauls at the standard depths, were also made to provide additional information. Typically, six to eight samples were taken each night. Until new cable was supplied at San Diego during Cruise 199 the 225-meter depth represented the greatest sampling depth possible; the additional cable allowed sampling to a depth of about 400 meters.

The contents of each haul were preserved in 10 per cent formalin and stored in 16-ounce screw-cap jars. Adult fish and other obvious nekton, such as squids longer than 75 mm and large shrimps, were removed from the samples in the laboratory. The settled volume was then determined by placing the sample in a 500-ml tapered graduate and allowing it to settle for at least 15 minutes. For the purposes of comparison these volumes were then divided by the total time of the haul in minutes; the resulting figure was recorded as the corrected plankton volume.

After completion of volume determinations the hauls were examined and all fish larvae, molluscs, and annelids were sorted out. A representative sample (usually 5 to 10 animals) of each species of euphausiid, amphipod, copepod, pelagic shrimp, and mysid were removed from each haul. Samples of the less-frequently caught groups such as the coelenterates, crustacean larvae, isopods, etc., were also removed. The dominant planktonic animal or animals for each haul were noted at this time.

Nearly all of the adult fish were identified to species; the larval fish were generally identified to family, although in some cases species identifications were made. The maximum and minimum total lengths for each species were recorded for each haul. The molluscs, other than cephalopods, were generally identified to species. Mysids were also identified to species. Studies of the remaining invertebrates have not been completed.

Results

A total of 574 hauls with the midwater trawls were taken during the three cruises: 452 of them with the 6-foot trawl and the remaining 122 with the 3-foot trawl. Of this total, 564 of the samples are considered in this report. The ten samples omitted from consideration were either lost at sea or were used for radio-isotope analysis.

Appendix Table 1 gives the date, location, time of hauling, corrected plankton volume, depth of fishing, size of trawl, dominant plankton, number of adult fish, and number of larval fish for each haul.

Appendix Table 2 records the identity, size-range, and number of fish and larval fish for each haul.

Appendix Table 3 records the identity and number of heteropods and pteropods for each haul.

Appendix Table 4 records the capture of two genera of mysids, Gnathophausia and Boreomysis.

DISCUSSION

Analysis of the data obtained in this study indicates a high degree of relationship between the physical and chemical conditions of an oceanic area and the resident biological populations. A demonstration of this relationship is complicated by a number of sampling problems which must first be considered and evaluated.

The surveys covered a period of two summers and extended over a large geographic range that included a variety of oceanographic conditions. Faunal variations, besides reflecting different physical and chemical environments, might also be attributable to seasonal differences, year-to-year changes, plankton patchiness, variability caused by the inconsistency of the sampling methods, or sampling error caused by vertical migration. The limited amount of data, particularly in regard to seasonal and year-to-year variations, makes it impossible to completely evaluate errors; however, the sharpness of the faunistic splits appears sufficiently acute to minimize the significance of sampling errors.

NOTE: LOCATIONS OF HAULS AND STATIONS REFERRED TO THROUGHOUT THIS DISCUSSION ARE SHOWN ON FIGURES 8a, b, & c (pages 26, 27 and 28).

Consistency of Sampling

It is essential to demonstrate that qualitative and quantitative variations encountered during a study are not the result of the sampling process. Variations due to sampling are inevitable in any biological study and these must be kept smaller than the actual variations being studied to give significance to the results. (Note: the sampling problem resulting from the highly non-uniform distribution of animals is discussed in a following section dealing with plankton patchiness). Variations encountered under conditions of relative oceanographic homogeneity are considered in this section and it is shown that these are insignificant when compared to those variations found to occur between different oceanic regimes.

Pairs of hauls made with the 6-foot net during the same night at a depth of 225 meters are compared in terms of volume of plankton and numbers of fish caught. The paired hauls, made on Cruise 199, are: 34, 37; 63, 68; 80, 85; 88, 93; 96, 97; 104, 107; 112, 113; 122, 127; 131, 136; 149, 153; 169, 175; and 241, 242. These data are presented in Figure 3. Appendix Table 1 shows that the species composition, particularly in regard to the dominant animals, are very much alike in the paired hauls. The second haul of the pair, however, generally catches more species. The additional species are almost always represented by a few specimens of stomiatoid fishes which probably reside at greater daytime depths than the more abundant species caught by the trawl. The first haul probably was taken too early for these species to have completed their vertical migration, but they were available by the time the second haul was made.

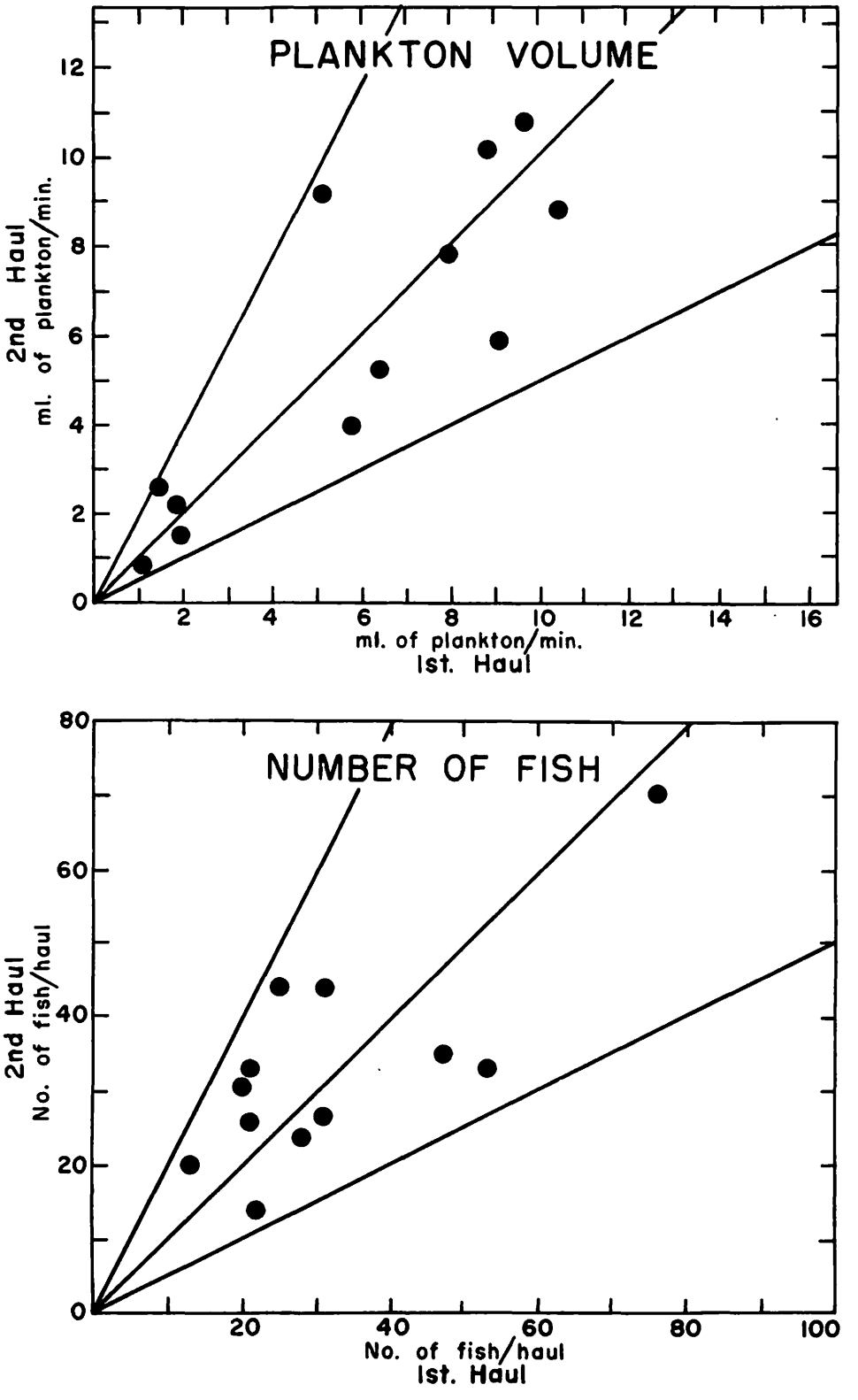

FIG. 3. COMPARISON OF PLANKTON AND FISH CATCHES OF PAIRED HAULS TAKEN AT A DEPTH OF 225 METERS.

Figure 3 shows that the difference in volume and number of fish caught between each of the paired hauls is always less than a factor of two. Although none of the samples were taken from exactly the same section of open ocean, conditions at a depth of 225 meters are relatively uniform over the distance involved in making a pair of hauls.

Quantitative and qualitative variations are much greater in areas that present different physical and chemical conditions. Table 1 compares the average catches of night hauls on Cruise 199 made at three depths from Stations 3-10, an area dominated by Subarctic water, and Stations 21-30, an area characterized by the influence of Intermediate, Central, and Equatorial water together with the presence of Subarctic water. More than twenty times as much plankton is caught in the upper 60 meters in the northern hauls, and even in the hauls made at greater depths the northern catches are more than four times larger than those made in the south. Except for the hauls taken in the upper 30 meters, where the northern catches are considerably greater than those to the south, the numbers of fish caught at the different depths are much alike. These catches, however, show the northern hauls to be dominated by Lampanyctus leucopsarus and Diaphus theta, and the southern catches to be dominated by L. ritteri and Ceratoscopelus townsendi. The distribution of these species is almost mutually exclusive and there is only a slight overlap in their ranges.

From these data it appears that variations imposed by sampling procedure are of minor importance in the interpretation of the data.

Plankton Patchiness

Plankton patchiness may be defined as non-uniform distribution of plankton populations resulting in dense swarms or patches within a small area. Aron (1958) has discussed some of the implications of patchiness with regard to sampling the smaller plankton caught in a 0.5-meter net and by a plankton pump. In the present study the nature of the gear and the method of towing minimizes the effects of patchiness; however, definite evidence of swarming is still apparent in the catch from several of the tows.

The most obvious case of patchiness is seen in the catches from Hauls 59 and 60 of Cruise 202. Both hauls are taken at a depth of 30 meters, one haul immediately following the other. The first haul was taken with the 3-foot trawl and produced a catch of 25.7 ml of plankton per minute of trawling. The second haul was taken with the 6-foot net and caught only 0.4 ml of plankton per minute of trawling. The larger catch was made up almost exclusively of sergestid shrimp. The smaller catch consisted of amphipods and euphausiids, and was very similar to other hauls made at the same depth in about the same area, but the catch of sergestids was larger than the catch made in any haul, regardless of depth, between Stations 10 and 12. Another example of the same phenomenon can be seen in Hauls 46 and 48 of Cruise 199. There is a 49-minute time gap between the completion of the first haul made

TABLE 1. Catches Made in Areas Between
Stations 3 and 10 and Stations 21 and 30, Cruise 199

Station Area	Depth (m)	No. of Hauls	Plankton Volume (ml/min)	No. of Fish	No. of *L. leucopsarus*	No. of *D. theta*	No. of *C. townsendi*	No. of *L. ritteri*
3-10	20-30	8	28.6	128.5	93.5	19.4	0.0	0.0
21-30	20-30	11	0.9	13.0	0.0	0.2	4.9	2.1
3-10	31-60	11	22.1	43.1	26.3	5.1	0.0	0.8
21-30	31-60	9	1.0	26.7	0.0	0.3	5.9	9.0
3-10	121-250	11	7.8	25.9	12.5	2.5	0.0	1.5
21-30	121-250	10	1.7	20.1	0.0	0.2	1.1	3.8

with the 6-foot net and the beginning of the second haul, which used the 3-foot net. The first catch consisted of a mixture of euphausiids and sergestids and had a settled volume of 7.2 ml of plankton per minute of trawling. The catch made with the smaller net consisted almost entirely of sergestids and had a volume of 100.0 ml of plankton per minute of trawling. Here again the very large catch cannot be considered as typical of the area for, with the exception of inshore hauls, it is the largest catch made during any of the three cruises, in spite of the fact that the smaller net was used. Further instances of patchiness were encountered in hauls made with the same net towed at similar depths at relatively close time intervals. On Cruise 202, Hauls 41 and 44 were both made at the surface using the 6-foot net; the first of the hauls caught 33.9 ml of plankton per minute, the second only 3.6 ml of plankton per minute. Hauls 43 and 49 of Cruise 202 caught 25.7 and 1.2 ml of plankton per minute; both of these hauls were made with the 6-foot net and both hauls were taken at a depth of 30 meters. In all of the cases just cited, sergestids were found almost to the exclusion of all other animals in the large catches; in fact, wherever patchiness occurred during these cruises, it was the sergestid shrimp which was the dominant animal.

The cause of patchiness is not thoroughly understood. Patchiness may be associated with the behavior patterns of the animals or it may be a direct function of a kind of oceanographic patchiness, the occurrence of islands of one type of water within another. In the case of the sergestids, schooling behavior certainly seems possible for, according to Welsh and Chase (1938), "...the last two pairs of thoracic legs are flattened and shorter than the other three pairs and fringed with long hairs. These, in conjunction with the long well developed pleopods suggest that the sergestids are among the fastest swimming of the pelagic Crustacea." The fact that virtually all of the cases of patchiness occurred in areas around transition zones between different water masses gives strength to the possibility that the swarming is conditioned by physical-chemical factors.

Seasonal and Year-to-Year Variation

On land it is possible to select a particular geographic location and then study, with a reasonable degree of precision, the seasonal and year-to-year changes of the flora and fauna that inhabit the area. This is not possible in studying pelagic organisms because their substratum is not fixed in any one position but meanders in a more or less unpredictable fashion. Studies made at a fixed geographic location are not necessarily time-studies of a specific population but may actually represent short glimpses of very different, and in some cases only distantly related, populations that are residents of a particular water mass.

Water-mass movement is relatively slow; hauls taken within two months of one another at about the same geographic point are likely to be taken in the same water mass unless the region in which the hauls were taken is at a boundary between two water masses.

TABLE 2. Hauls Taken Between Stations 16 and 17 and Stations 27 and 28, Cruise 199

Station Nos.	Depth (m)	Plankton Volume (ml/min)	No. Fish per haul	No. Species per haul	No. Larvae per haul
16-17	30	2.3	49	8	2
27-28	30	3.5	27	4	5
16-17	60	6.8	47	6	4
27-28	60	2.0	22	5	2
16-17	120	6.5	21	8	3
27-28	120	8.9	22	7	4
16-17	225	2.9	29	11	4
27-28	225	3.1	26	9	5

Data Taken from Hauls 23 and 104, Cruise 176

Hauls					
23	225	2.1	6	1	1
104	225	2.2	2	1	2

During Cruises 176 and 199 the cruise track crossed so that hauls were taken at about a one-month interval in approximately the same location. Table 2 presents data from hauls taken in these areas. Unfortunately, the data for Cruise 176 from the area where the cruise track crossed is represented by only two hauls taken during the day at a depth of 225 meters. Hauls taken just west and south of the crossing on this cruise are not strictly comparable because of diurnal effects, and the hauls to the south of the crossing are probably affected by the Subarctic Current. The data from Cruise 199 were taken from between Stations 15 and 16 and between Stations 27 and 28, for physical and chemical conditions in these areas are similar. Appendix Tables 2, 3, and 4 show the species composition of these hauls to be much alike, particularly in regard to the dominant species. These data show that variations encountered on a monthly scale are in the range encountered in hauls made during the same night. These variations, however, are small when compared to the differences between water masses, which will be shown to be as much as 100-fold in terms of volume of plankton and nearly mutually exclusive in terms of species composition.

On a year-to-year basis, however, physical and chemical variations at a particular point may be extensive. Tully, Dodimead and Tabata (1960), for example, have shown extensive changes in waters off the Pacific Coast of Canada during the four years beginning with 1955. Such variations make it necessary to consider a particular water mass rather than a fixed geographic location when studying the year-to-year changes of pelagic populations. Table 3 presents data based upon hauls made with the 6-foot net taken in the Subarctic water of the Gulf of Alaska. These data include all of the night hauls taken between Hauls 4 to 37 and 89 to 123 of Cruise 176 and all of the night hauls taken between Stations 3 and 10 on Cruise 199. These data were selected for comparison because, although the geographic areas sampled in the two years are different, physical and chemical conditions in the two areas are similar.

TABLE 3. Year-to-Year Variations of Animal Abundance (Cruise 176, 1957; Cruise 199, 1958)

Cruise No.	Depth (m)	Plankton Volume (ml/min)	No. Fish per haul	No. Species per haul	No. Larvae per haul	No. *L. leucopsarus* per haul
176	20-30	43.7	67.9	2.8	43.4	55.7
199	20-30	28.6	128.5	5.9	46.1	93.5
176	31-60	12.7	21.2	2.4	7.8	17.9
199	31-60	22.1	43.1	5.2	10.0	26.3
176	121-250	5.8	14.5	4.1	5.3	6.3
199	121-250	7.8	25.9	6.0	15.4	12.5

Table 3 shows that the year-to-year differences are generally small, usually within a factor of two and never exceeding a factor of three. The lower average number of species caught per haul on Cruise 176, however, does seem significant. The higher number of species caught per haul on Cruise 199 may be influenced by the occurrence of southern forms displaced to the north by the intrusion of Intermediate water. These species, however, made up only a small portion of the catch, for Lampanyctus leucopsarus, the fish caught most frequently during the studies, dominated the fish catch and occurred in about the same abundance on each of the two cruises.

Vertical Migrations

The vertical migrations of many planktonic organisms are well known, particularly those which are diurnal in nature. The early literature is reviewed in detail by Russell (1927) and the more recent literature is covered by Cushing (1951). Nearly all of the latest studies of vertical migration concern the Deep Scattering Layer (DSL) and related phenomena; this literature is summarized by Soli (1959).

The DSL observations point to concentrations of animals residing at a depth of about 300 to 800 meters during the daylight hours and migrating close to the surface at night. That this diurnal migration is influenced by light is well documented by such work as that of Clarke (1933, 1936) and Clarke and Backus (1956), and especially that of Bogorov (1946) who shows that species which undergo diurnal vertical migrations where there are day-night conditions do not migrate in the Arctic when no day-night conditions exist.

To eliminate the influence of diurnal fluctuations from the analysis hauls taken in daylight hours were separated from those taken at night. Hauls taken between one hour after sunset and one hour before sunrise were considered night hauls; hauls taken at other times were considered day hauls. Table 4 summarizes data obtained using the 6-foot net and, with the exception of hauls made in the Aleutian region, only includes offshore hauls made between hydrographic stations. These data show that in the night hauls the volume of plankton diminished with depth, and the number of fish species caught per haul increased with depth. The number of fish and fish larvae also decreased with depth until the deeper hauls in which the trend is reversed. The increased numbers are made up of mostly gonostomids and other stomiatoid fishes which also contribute to the species increase in the deeper waters. These species may be part of the two deep scattering layers noted by Batzler and Westerfield (1953) at about 400 and 700 meters which, according to the authors, do not participate in the diurnal migration. This latter theory may be questionable since no observations were made on these deeper layers during daylight hours, their possible occurrence being obscured by the main scattering layer. This leaves the possibility that animals making up the deeper layers may migrate still deeper during daylight hours. A suggestion that this really occurs is indicated by the day hauls showing a regular increase in plankton volume with depth, until the deepest hauls where there was a sudden decrease. The number

TABLE 4. Diurnal Variations of Animal Abundance*

Depth	20-30 m.		31-60 m.		61-120 m.		121-250 m.		251-400 m.	
	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day
Number of Hauls	78	30	67	33	29	6	88	42	21	6
Average Plankton Volume ml/min	14.7	0.4	12.2	1.9	10.8	2.0	6.3	3.3	4.8	0.9
Average No. Fish per haul	54.5	1.7	33.6	1.3	17.1	2.2	24.0	5.4	33.7	6.8
Average No. Larvae per haul	28.3	5.7	17.6	4.5	10.6	2.3	9.0	4.1	11.6	5.0
Average No. Species per haul	3.3	1.0	4.4	0.5	5.1	1.0	6.5	1.0	8.2	2.7

* Data obtained in off-shore hauls with 6-foot net.

of fish and fish species, however, increased with depth even to the deepest hauls made. Further complications are added by the distribution of larval fish, which during the daylight hours maintain the same pattern as during the hours of darkness. Regardless of depth, the night hauls caught a substantially greater biomass than the day hauls. The cause of this differential is uncertain, but it is most likely that during the day animals migrated to depths outside the range of the available equipment. Other possible causes of this differential include better escapement potential of the animals in the daytime, and more diffuse vertical distribution during the daylight hours.

Diurnal migrations are also influenced by local physical and chemical conditions. Weston (1958) showed a definite scattering layer at the thermocline in the North Sea. Hansen (1951) showed that different species, mostly of copepods, had a differential reaction to the thermocline: some preferred residence above the discontinuity layer, some below, some within the layer, and some species remained little affected. Other modifying influences, including weather, sunlight, phytoplankton distribution, and the age of the migrating plankton are discussed by Cushing (1951).

The surveys revealed diurnal migration of plankton to be modified by physical and chemical regimes. Figure 4 shows vertical temperature profiles made during Cruise 176. The first profile is a typical segment taken from the northern, outward leg of the cruise. Plotted on this profile are the average catch data for the hauls made with the 6-foot net at depths of 30 and 60 meters. These averages include all of the 30- and 60-meter hauls taken at night between Haul 4 and Haul 30. The second profile is a typical segment taken from the southern, inward leg and also includes the average catch data for the hauls made at 30 and 60 meters; these data include all 30- and 60-meter night hauls made between Hauls 124 and 148. For the northern leg of the cruise a greater catch was made at 30 meters than at 60 meters; the reverse was true for the southern portion. Temperatures and the depth of the thermocline for the two legs were different: the 50°F isotherm occurred at about 30 meters in the north and at 60 meters in the south; also, the thermocline was deeper in the south so that hauls made on the southern leg at a depth of 30 meters were taken above the thermocline.

The same type of modification is found in data obtained during the third of the survey cruises: Figure 5 shows a vertical temperature profile obtained during Cruise 202 between Stations 10 and 13. Plankton volumes for hauls made with the 6-foot net at 30 and 60 meters are plotted on this profile. For hauls between Stations 10 and 12 the catch at 30 meters (above the thermocline) was far lower than the catch at 60 meters (below the thermocline). Between Stations 12 and 13, colder water was closer to the surface, and the catch for the haul made at 30 meters was greater than the catch for the 60-meter haul. Besides showing a change in the vertical distribution of animal abundance, the catches made between Stations 12 and 13 showed very much greater quantity than catches made further to the west. Part of this increase is undoubtedly due to the proximity to land and the influence of the Straits of Juan de Fuca.

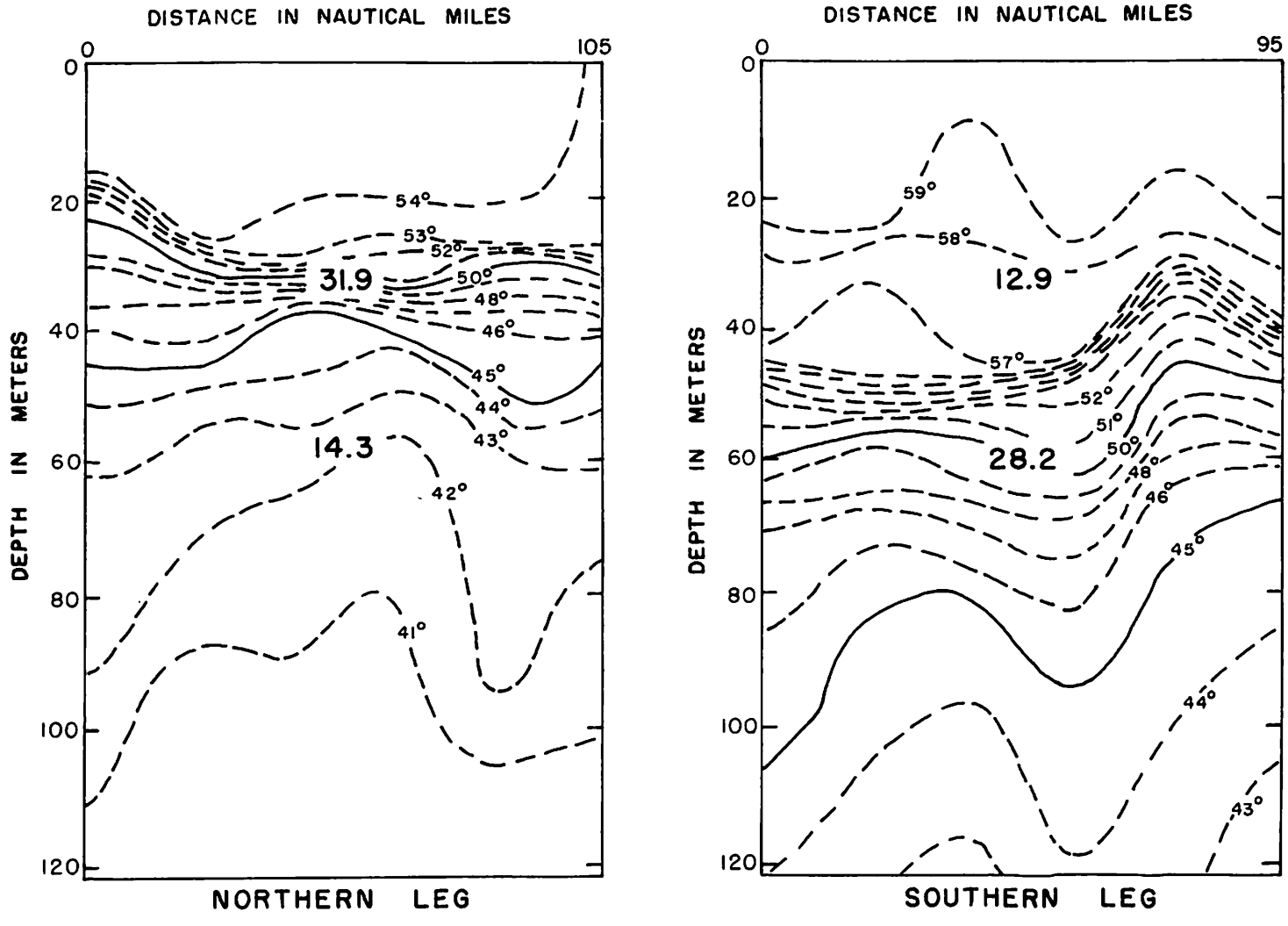

FIG. 4. VERTICAL TEMPERATURE PROFILES FROM NORTHERN AND SOUTHERN LEGS OF BROWN BEAR CRUISE 176. PLANKTON VOLUMES(ml/min) ARE SHOWN BETWEEN ISOTHERMS AT DEPTHS OF 30 AND 60 METERS.

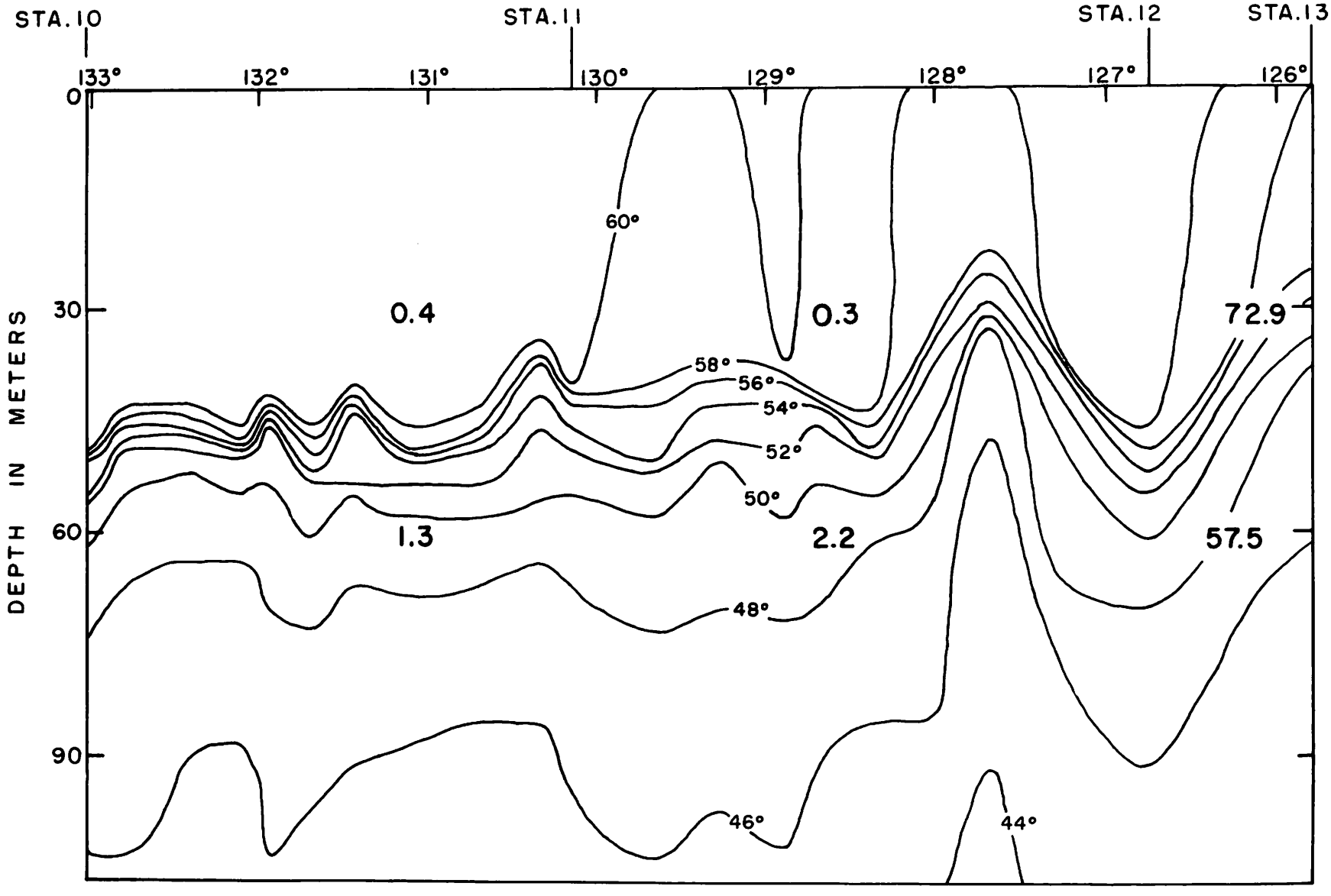

FIG. 5. VERTICAL TEMPERATURE PROFILE BETWEEN STATIONS 10 AND 13 (BROWN BEAR CRUISE 202). PLANKTON VOLUMES (ml/min) ARE SHOWN BETWEEN ISOTHERMS AT 30 AND 60 METERS.

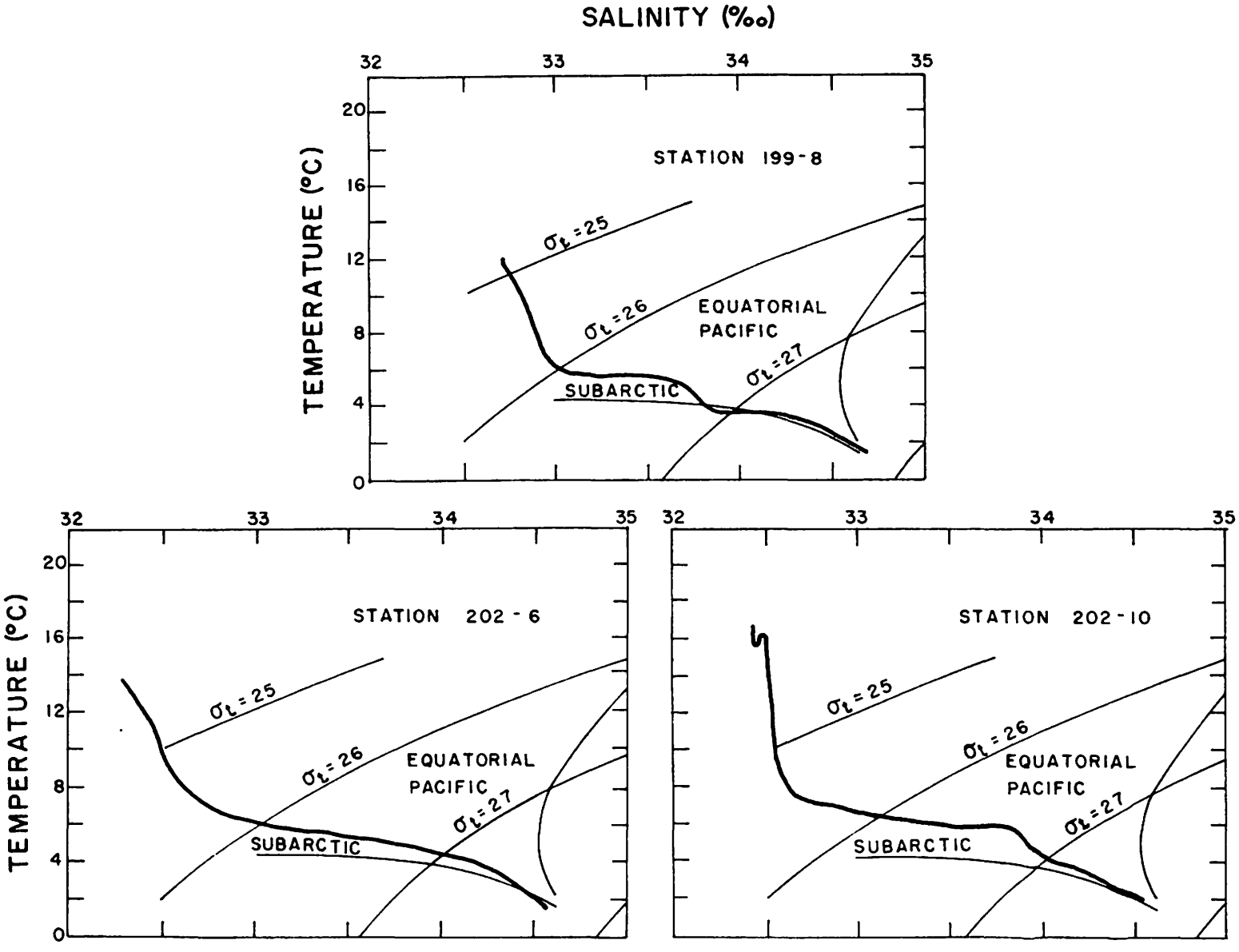

FIG. 6. TEMPERATURE - SALINITY DIAGRAMS FOR STATIONS 8 (BROWN BEAR CRUISE 199) AND STATIONS 6 AND 10 (BROWN BEAR CRUISE 202).

Part of the apparent increase, however, seems to be the result of a second kind of modification of the vertical migration pattern, in effect reducing the animal abundance in the upper waters west of Station 12.

Figure 6 presents Temperature-Salinity diagrams constructed from data obtained at Station 8 (Cruise 199) and Stations 6 and 10 (Cruise 202). Average catch data obtained in the hauls made with the 6-foot net in each of the areas are shown in Table 5. The averages are based on night hauls and include all hauls made between Stations 7 and 9 (Cruise 199) and between Stations 5 through 7 and 8 through 11 (Cruise 202), with the exception of two hauls, 20 and 43 (Cruise 202), which are eliminated from consideration because the author believes them to be unrepresentative for reasons discussed in the section dealing with plankton patchiness. All of the T-S diagrams show the typical quasi-isothermal halocline discussed by Fleming (1958b), but several differences between the diagrams are apparent. The curve for Cruise 199 is fairly typical of Subarctic conditions; the top of the halocline is at a depth between 75 and 100 meters; the temperature at the top of the halocline is about 6.0°C; and all temperatures within the halocline are under 6.0°C. The T-S diagram from Station 10 of Cruise 202, although showing the presence of considerable Subarctic water, shows the intrusion of Intermediate water at a depth between 200 and 400 meters. The top of the halocline is still between 75 and 100 meters; however, the temperature at the top is 8.0°C and all temperatures within the halocline are greater than 6.0°C. The T-S diagram for Station 6 presents an almost intermediate condition between the other two curves.

In the area influenced by the intrusion of Intermediate water neither the plankton nor Lampanyctus leucopsarus and Diaphus theta (the two most common fishes taken during the surveys) are capable of significant penetration through the halocline. Some differences in the species composition of the plankton are also apparent. The catches from the Subarctic waters are dominated by the copepod Calanus cristatus and by arrow worms, Sagitta spp., animals much less significant in catches made in the area characterized by the intrusion of Intermediate water. In the environment influenced by the Intermediate waters pelagic shrimp of the genus Sergestes, however, are of greater importance than in the more strictly Subarctic regime. Midway between the two extremes, migration through the halocline occurs although there was no significant penetration through the thermocline by either fish or plankton.

Temperature inversions appear to affect the migration patterns of the plankton. Figure 7 presents a vertical temperature profile made between Stations 11 and 12 (Cruise 199), and shows a temperature inversion between about 100 and 200 meters; the volume of the plankton catch according to depth is also shown. Both above and below the inversion the catch was low (1.1, 2.4, and 6.0 ml/min of trawling at 30, 60 and 225 meters) but it was high within the inversion (17.3 and 20.4 ml/min of trawling at 120 and 160 meters).

Diurnal migrations may be impossible in areas of extensive mixing because of water too turbulent for the swimming abilities of the animals involved. For the area considered in this study such a turbulence occurs

TABLE 5. Influence of Physical and Chemical Conditions on Diurnal Migration

Cruise No.	Station Area	Depth (m)	Plankton Volume (ml/min)	*L. leucopsarus* No. per haul	*L. leucopsarus* Freq. of occur.	*D. theta* No. per haul	*D. theta* Freq. of occur.
199	7-9	20-30	55.3	198.0	2/2	12.0	2/2
202	5-7	20-30	3.2	3.0	2/2	0.0	0/2
202	8-11	20-30	1.4	0.0	0/4	0.0	0/4
199	7-9	31-60	35.5	37.7	3/3	3.0	2/3
202	5-7	31-60	13.6	20.0	3/3	14.0	3/3
202	8-11	31-60	0.7	1.0	2/3	0.3	1/3
199	7-9	61-120	No hauls at this depth				
202	5-7	61-120	5.3	1.0	1/1	3.0	1/1
202	8-11	61-120	7.3	1.3	2/3	3.7	3/3
199	7-9	121-250	9.4	11.7	3/3	1.3	2/3
202	5-7	121-250	9.5	0.5	1/2	0.5	1/2
202	8-11	121-250	8.2	1.3	2/3	1.0	2/3
199	7-9	251-400	No hauls at this depth				
202	5-7	251-400	4.6	21.0	2/2	1.5	2/2
202	8-11	251-400	5.3	1.7	3/3	0.7	2/3

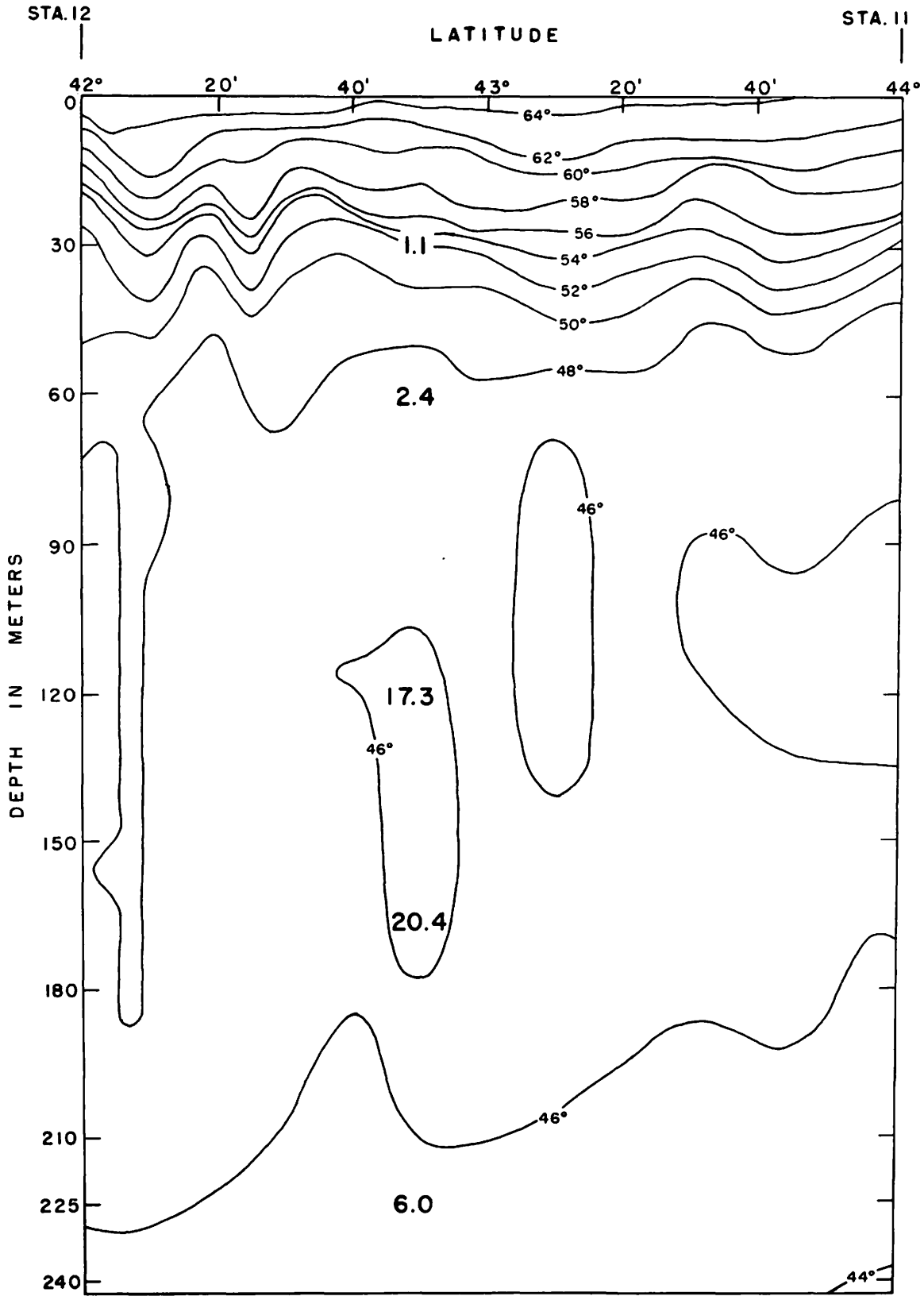

FIG. 7. VERTICAL TEMPERATURE PROFILE BETWEEN STATIONS 11 AND 12 (BROWN BEAR CRUISE 199). VOLUME (ml/min) OF PLANKTON ARE SHOWN AT THE DEPTHS OF THEIR CAPTURE.

only in the Aleutian passes, but insufficient data from the surveys are available to demonstrate such a modification. However, the author found no diurnal fluctuations during a 24-hour survey of the Colvos Passage-Tacoma Narrows region of Puget Sound (a region of high current velocities and virtually top-to-bottom mixing). The average volumes were 0.5 ml/min for both 12 day-hauls and 9 night-hauls, and the highest and lowest catches for both day and night were also identical.

The above examples are not intended to show that temperature and salinity are the effective barriers to diurnal migration. Temperature and salinity serve only as convenient and available measures of physical and chemical conditions which from the biological point of view are still poorly understood. Under usual conditions, an animal migrating from 400 meters to the surface must pass through greater temperature and salinity changes than occur in the thermocline, halocline, or inversions. The steepness of the gradient might be the effective barrier, but the mechanics of the barrier cannot be explained with our present knowledge of the physiology and behavior of the plankton and pelagic fishes.

The Relationship of Physical and Chemical Conditions to the Distribution of Animals

The distribution of marine animals in relation to physical and chemical conditions has been the subject of much study. Russell's work in the North Sea, summarized in his 1939 paper influenced the study of "plankton indicators" so that there is an overwhelming number of chaetognath papers in the bibliography of the field. Such papers as those by Sund and Renner (1959) and by Bieri (1959) clearly show their dependence upon the approach developed by Russell.

In most of the studies of organisms which might have significance as indicators of physical and chemical conditions the species used are not readily identifiable in the field. In the case of the diatom studies (Graham and Bronikovsky, 1944; Marumo, 1957) the species are microscopic and shipboard identification is impossible except under very special conditions. In the case of macroscopic plankton, chaetognaths (Bieri, 1959), euphausiids (Boden, Johnson and Brinton, 1955), some pteropods (Hida, 1957; Tesch, 1946, 1948), and the copepods (Johnson, 1956; Mednikov, 1958) identification can only be made by well-trained personnel and in most instances positive identification requires shore-based microscopic examination.

It has been nearly impossible to use larger animals as indicators until recently, when the development of the Isaacs-Kidd midwater trawl provided a convenient device for sampling the macroplankton and smaller nekton. Several species of fish and pteropods, all easily identifiable in the field, have distributions which are closely related to the distribution of water masses. The distributions of these and other forms and also the variations in standing crop of macroplankton, will be considered in relation to the physical and chemical conditions of the sampling area. The terminology used for water masses and currents considered in this paper will generally be that of Sverdrup, Johnson and Fleming (1942).

Figure 8 presents data showing the relative standing crop of macroplankton in the Eastern North Pacific. These data are presented as the volume of plankton in milliliters per minute of trawling; they represent the average catch of a series of night hauls made at depths of 30, 60, and 225 meters with the 6-foot net, except for the area between Stations 33 and 38 of Cruise 199 when data obtained from the 3-foot trawl are used. Hauls taken at 400 meters are not considered in these averages for no data from this depth are available from the 1957 survey.

Data obtained in 1957 show a decreasing abundance of plankton with an increasing distance from the coast. The plankton volume decreases from 33.9 ml/min just off the Washington Coast to 5.0 ml/min south of Kodiak Island. Just south of the Alaska Peninsula, adjacent to an area of low catch, the volume increases sharply to 66.3 ml/min. This increase takes place at a transition between two oceanographic areas which Fleming (1955) terms the Alaskan Coastal Region and the Alaskan Gyral. These areas are separated by the strong south-westward flowing current of the Alaskan Stream (Bennett, 1959). Oceanographic data from the area of high plankton abundance show higher concentrations of phosphates and lower amounts of oxygen than from the area of lower abundance more central to the Gulf of Alaska.

In the Aleutian Islands the plankton catch is variable; within short geographic distances the volume of plankton caught may change by a factor of ten. For example, Hauls 75, 76, and 77 have an average volume of 1.8 ml/min. These hauls were taken between two other series, (Hauls 68, 69, and 70; and Hauls 78, 79, and 80) having average volumes of 20.2 ml/min and 18.6 ml/min. Figure 9 shows vertical temperature profiles of the area in which these series were made. The large catches, dominated by euphausiids, were made in areas of high stability while the low catch, consisting mostly of copepods and chaetognaths, was made in an area of neutral stability. Hauls 50, 51, and 52, which resulted in an average volume of 3.7 ml/min composed mostly of copepods and chaetognaths, were also taken in an area of neutral stability.

Areas that are intermediate in their vertical temperature distribution are also intermediate with respect to their biota; Hauls 82, 83, and 84 have average volume of 11.3 ml/min, which is between the high and the low values for the Aleutian area. In Haul 81, with a corrected plankton volume of 1.3 ml/min, copepods and euphausiids have about equal quantitative importance.

The low standing crop in areas of either neutral stability or high turbulence may be a real index of low productivity. The results shown above for the zooplankton closely agree with results obtained in phytoplankton work by Gran and Braarud (1935), Riley (1942), and Sverdrup (1953). These workers all demonstrated that where the surface mixed layer was deep the productivity was low despite high nutrient concentrations. If phytoplankton production has a low average rate, the establishment of large populations of grazing animals is obviously impossible.

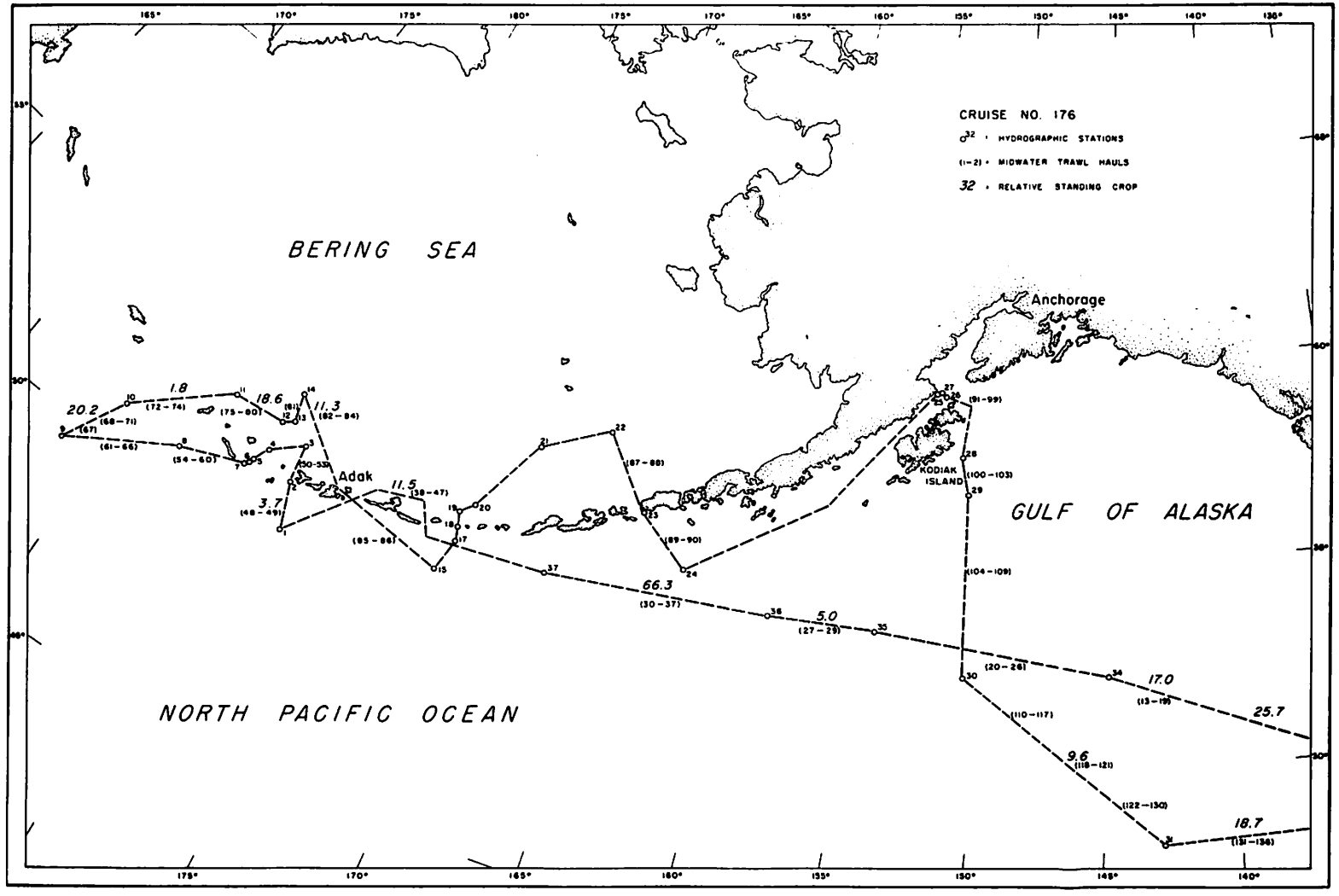

FIG. 8a. PARTIAL CRUISE TRACK OF BROWN BEAR CRUISE 176 SHOWING POSITION OF HYDROGRAPHIC STATIONS, POSITION OF HAULS AND RELATIVE STANDING CROP OF PLANKTON (THE AVERAGE VOLUME OF HAULS TAKEN AT 30, 60 AND 225-METER DEPTHS IN ml/min).

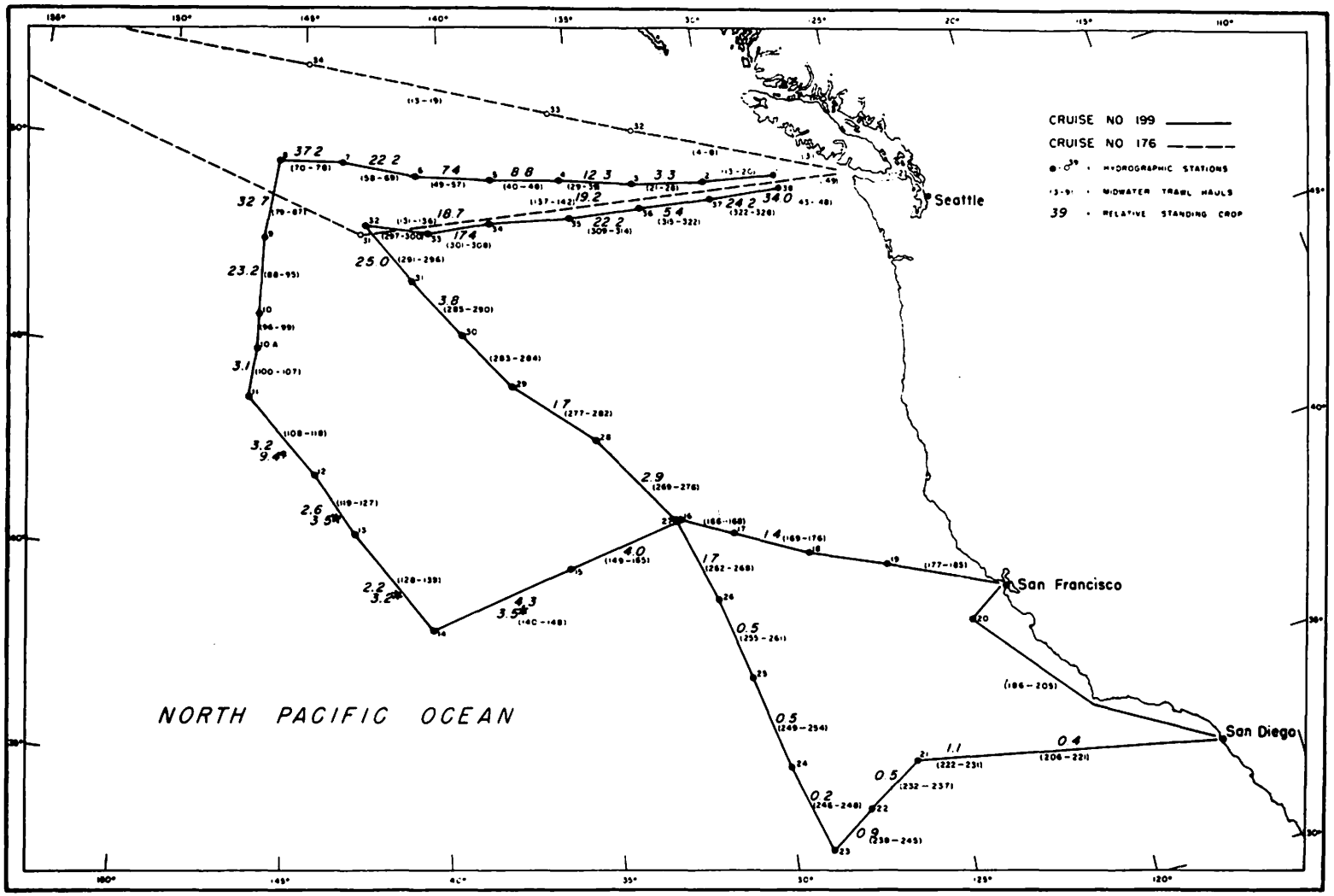

FIG. 8b. CRUISE TRACK OF BROWN BEAR CRUISE 199 AND SECTION OF CRUISE 176 SHOWING POSITION OF HYDROGRAPHIC STATIONS, POSITION OF HAULS AND RELATIVE STANDING CROP OF PLANKTON (THE AVERAGE VOLUME OF HAULS TAKEN AT 30, 60 AND 225 — METER DEPTHS EXPRESSED IN ml/min) ✳ RELATIVE STANDING CROP VALUE INCLUDING HAULS TAKEN WITHIN THE TEMPERATURE INVERSION.

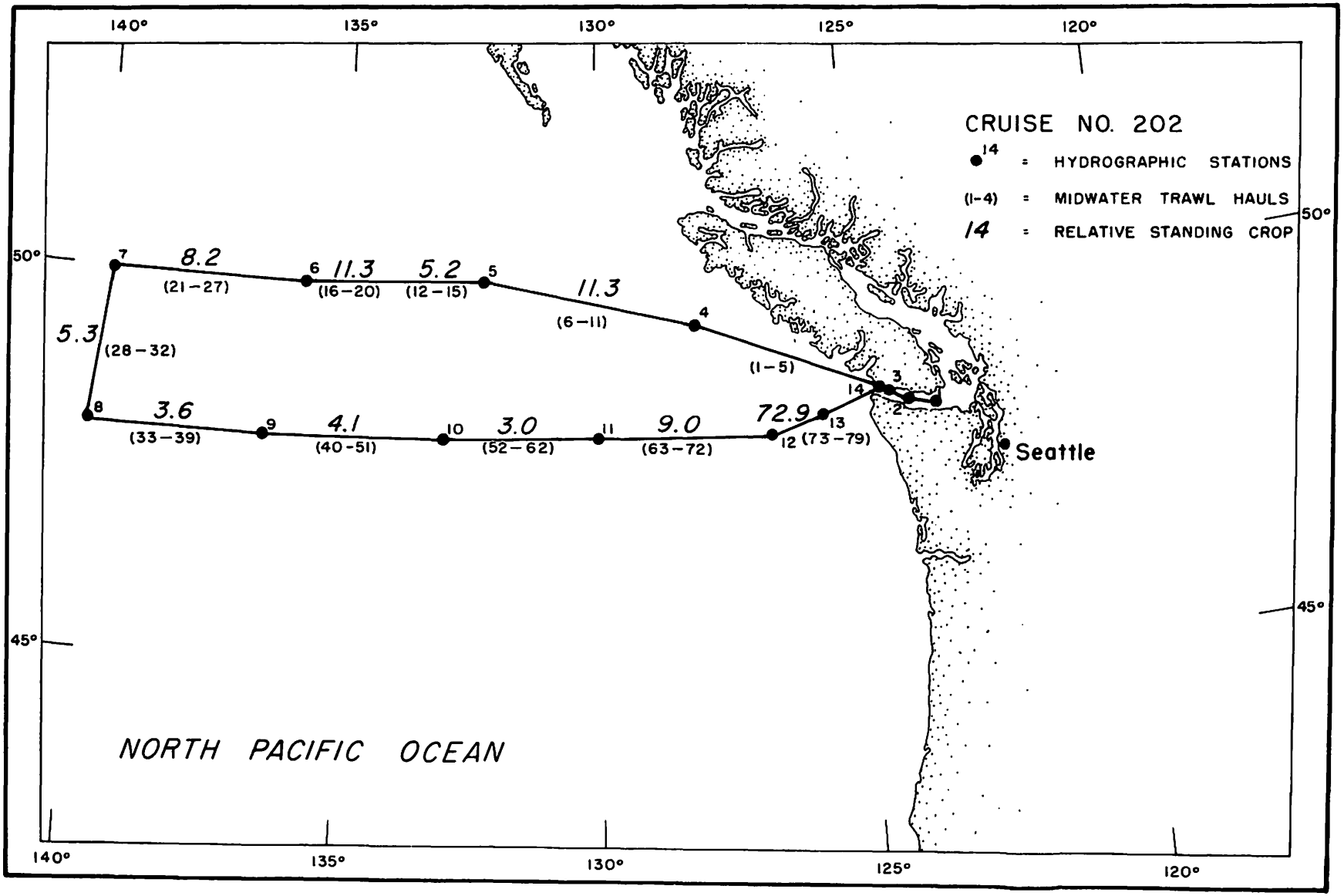

FIG. 8c. CRUISE TRACK OF BROWN BEAR CRUISE 202 SHOWING POSITION OF HYDROGRAPHIC STATIONS, POSITION OF HAULS AND RELATIVE STANDING CROP OF PLANKTON (THE AVERAGE VOLUME OF HAULS TAKEN AT 30, 60 AND 225-METER DEPTHS EXPRESSED IN ml/min).

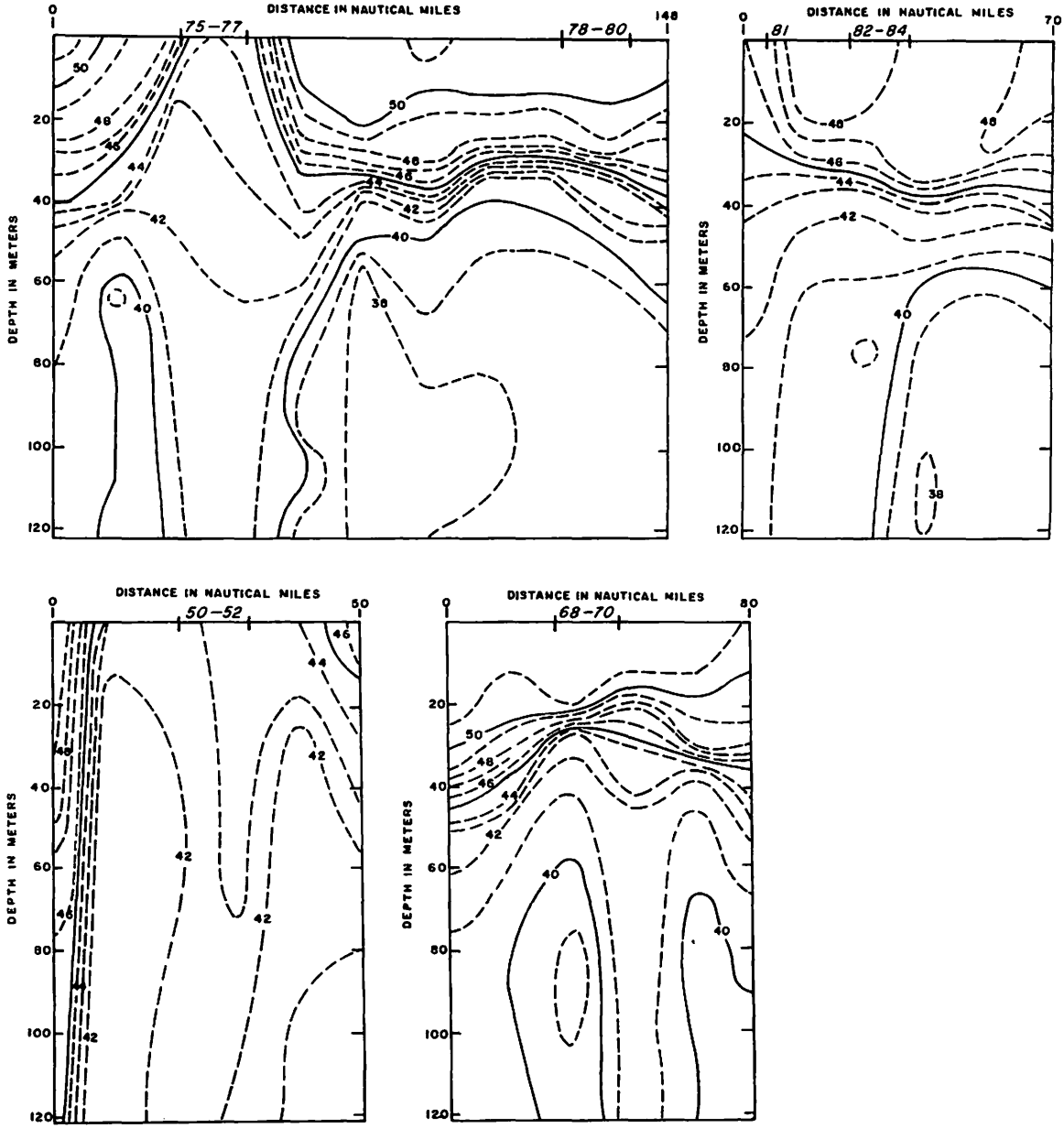

FIG. 9. VERTICAL TEMPERATURE PROFILES FROM THE ALEUTIAN ISLANDS. (HAULS ARE INDICATED IN THE AREA WHERE THEY WERE TAKEN)

The average volumes of hauls taken on the northern and southern legs off the Strait of Juan de Fuca are similar. The vertical distribution of the catches (discussed in the section dealing with vertical migration) is different. Displacement of the maximum catch from the 30-meter hauls on the northern leg to the 60-meter hauls on the southern leg appears to be the result of the influence of the Subarctic Current. The surface waters in the area influenced by the Subarctic Current are both warmer (by as much as 4.0°C) and more saline (by as much as 0.20 °/oo) than waters not influenced by the Subarctic Current. A number of fish species, previously unencountered to the north, were found on the southern leg. These will be discussed in a following section.

The 1958 collections, because of their wider latitudinal coverage, included a greater variety of physical and chemical conditions than the collections made in 1957. The differences in environments are paralleled by changes in the biota. Comparison of the standing crop estimates based upon the 1958 surveys with the estimates made in 1957 reveal some of the influences exerted in a particular geographic locale by physical and chemical conditions.

In 1958 the largest standing crop occurred in the sampling area furthest to the west, unlike the standing crop in 1957 when the catch decreased with an increasing distance from the Strait of Juan de Fuca. Between Stations 2 and 3 of Cruise 199 the plankton catch is only one-tenth that of 1957 in about the same geographic area. Low catches of 5.4 ml/min and 5.2 ml/min were also recorded in the same general area on the homeward leg of Cruise 199 and between Stations 5 and 6 of Cruise 202. (NOTE: It should be pointed out that mechanical difficulties with the main winch prevented the use of the 6-foot trawl during the last stages of Cruise 199. Because of the winch problems all hauls taken between Stations 33 and 38were made with the 3-foot trawl. The average plankton volumes obtained from these hauls are multiplied by 3, a factor based upon a series of paired hauls using the 3-foot and 6-foot nets. These hauls will be discussed under the section dealing with the quantitative evaluation of the trawls.)

On all of the East-West cruise legs made between 46° and 53°N standing crop estimates are about the same, except for the southernmost leg (the homeward leg of Cruise 202) and the three haul series mentioned in the previous paragraph. Catches made on the southernmost leg are low except close to shore. The T-S diagrams from these areas show a number of differences which parallel the biological variations. Figure 10 shows the T-S diagrams from Station 32 of Cruise 176; Stations 2, 3, and 36 of Cruise 199; and Stations 5 and 6 of Cruise 202. (T-S diagram for Station 10, Cruise 202 is shown in Figure 6). High plankton catches were associated with conditions demonstrated by the T-S diagrams from Station 32 of Cruise 176, Station 3 of Cruise 199, and Station 6 of Cruise 202. Low plankton catches were associated with conditions shown by the T-S diagrams from Stations 2 and 36 (Cruise 199) and 5 and 10 (Cruise 202). Differences are apparent between the T-S diagrams from rich areas and those from areas of reduced plankton abundance. Low catches were made in areas characterized by an extensive intrusion of Intermediate water into the predominant Subarctic water: temperatures

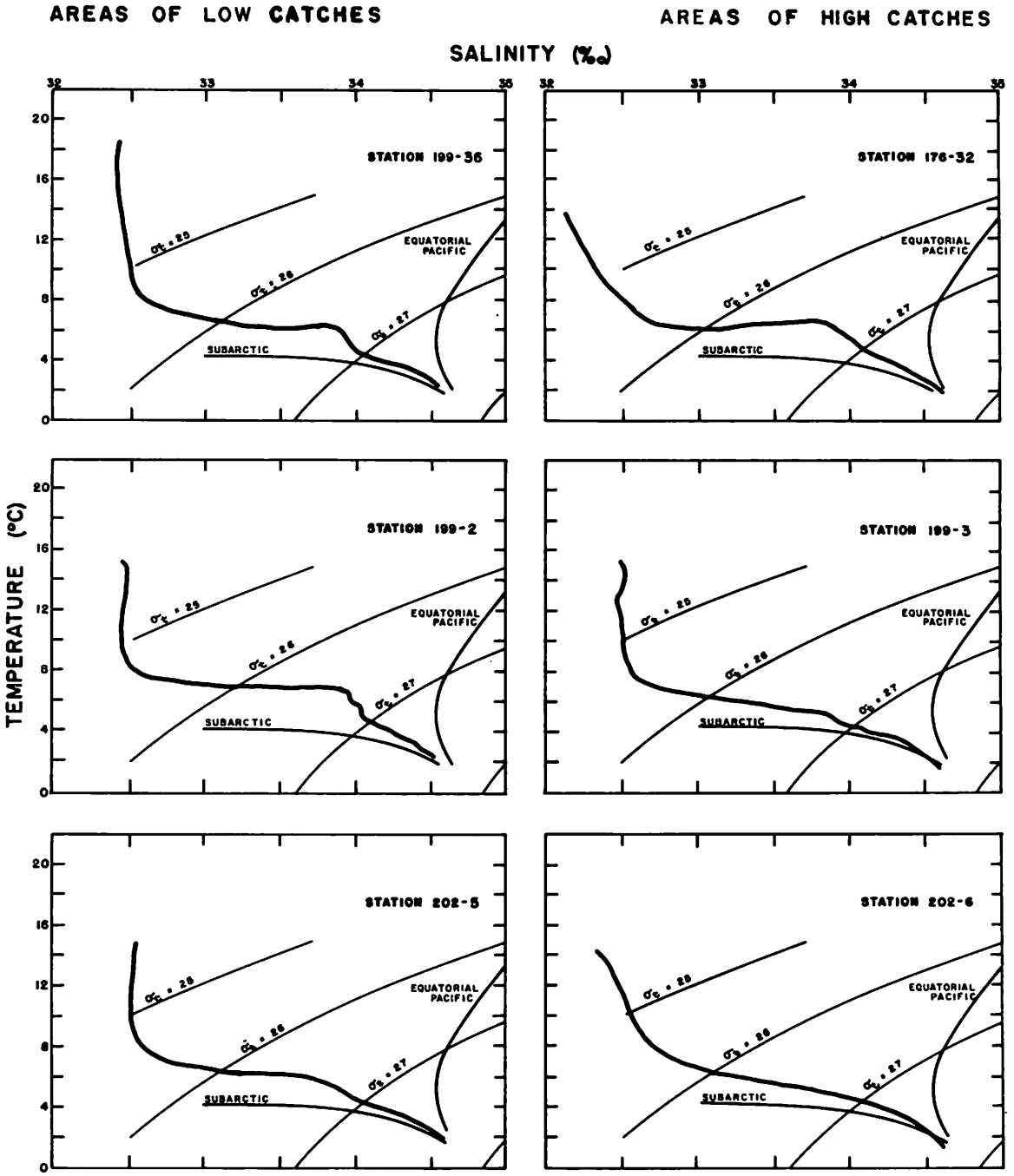

FIG. 10. COMPARISON OF TEMPERATURE–SALINITY DIAGRAMS FROM OCEANIC AREAS OF HIGH AND LOW PLANKTON CATCHES.

within the halocline were mostly above 6.0°C; at the top of the halocline the temperature exceeded 8.0°C; and the surface temperature exceeded 15°C. High catches were taken in areas where the influence of Intermediate water is either absent or much less significant; temperatures within the halocline, except at Station 32 (Cruise 176), were mostly below 6.0°C; at the top of the halocline the temperature was less than 8.0°C, and the surface temperatures were below 15°C. Comparisons are particularly striking between the T-S diagrams at adjoining stations, those made at Stations 2 and 3 (Cruise 199) and at Stations 5 and 6 (Cruise 202). The physical and chemical differences are obvious and the short time-interval between the haul series removes the possibility of results being distorted by seasonal or yearly changes. Figure 6 (T-S diagram from Station 8 of Cruise 199) shows that in this area the intrusion of Intermediate water was slight, the halocline temperatures were all below 6.0°C, and the surface temperature was below 12.0°C. This T-S diagram characterizes an area of high plankton abundance. Thus, it appears that (a) the low plankton catches made close to the coast are the result of the intrusion of Intermediate water, and (b) the plankton catches increase accordingly in those northern areas which are less influenced by this intrusion.

Between Stations 9 and 11 of Cruise 199 there was a sharp drop in the abundance of plankton, a decrease related to changes in the physical and chemical conditions. Figure 11 shows T-S diagrams obtained at Stations 9, 10, 10A, and 11. The progressive importance of the Intermediate water is apparent and it parallels the ten-fold decrease in the plankton catches. Coincident with the occurrence of Intermediate water was the appearance of a temperature inversion at depths between 100 and 200 meters. As noted previously, the plankton were concentrated within the inversion. This fact results in a distortion of the standing crop estimate for the area as the highest catches of plankton occurred at depths not used in the estimate. For example, using only catches made at standard depths (30, 60, and 225 meters) between Stations 11 and 12, the average catch was 3.1 ml/min of trawling. When the catches made in hauls taken within the inversion at depths of 120 and 160 meters were included in the estimate the average catch increased to 9.4 ml/min. Further to the south the inversion became less prominent and the plankton were less concentrated within the inversion. Between Stations 12 and 13, the estimate based upon the catches made at standard depths was 2.8 ml/min; by including the catches made within the inversion the average catch was increased to 5.9 ml/min. Between Stations 13 and 14 the inversion still occurred, but the water within the inversion was only about 0.1°C warmer than the overlying water. Here the average catch made in the standard hauls was 2.2 ml/min as opposed to a catch of 3.2 ml/min when the inversion catches were included in the average. The inversion disappeared between Stations 14 and 15 and inclusion of catches made at the same depths where the inversion was present only reduced the standing crop estimate. The average catch made in the standard hauls was 4.3 ml/min, but it was only 3.9 ml/min if catches made at 120 and 160 meters were included in the estimate.

Hauls made in the southernmost portion of the area sampled resulted in very low catches. Standing crop estimates for the waters off Southern California are only one-hundredth of those made at comparable longitudes off the Washington Coast. T-S diagrams from Stations 22, 23,

TABLE 6. Depth Distribution of Plankton Catches According to Area#

Cruise No.	Area	Average volume of catch (ml/min)				
	(Depth m)--20-30		31-60	61-120	121-250	251-400
176	A	43.7	12.7	4.3	5.8	No hauls
	B	12.9	28.2	17.8	10.8	No hauls
	C	18.3	7.7	No hauls	6.1	No hauls
199	D	0.6	6.1	No hauls	3.2	No hauls
	E	28.6	22.1	No hauls	7.8	No hauls
	F	1.8	3.4	6.2	5.1	No hauls
	G	0.9	1.0	4.0	1.7	1.2
	H	8.6	9.5	6.8	4.4	3.4
	I*	22.1	33.5	10.1	4.7	1.4
202	J	3.2	13.6	5.3	9.5	4.6
	K	8.7 (2.2)**	9.5 (3.5)	14.2 (10.5)	9.7	8.4 (7.3)

* Average volumes are 3 times average volumes caught by 3-foot net.

** Numbers in parentheses are volumes excluding catches made in Hauls 73-79.

See page 36 for description of areas.

Haul 292 of Cruise 199 and Hauls 20 and 43 of Cruise 202 were not used in compiling this table because of plankton patchiness.

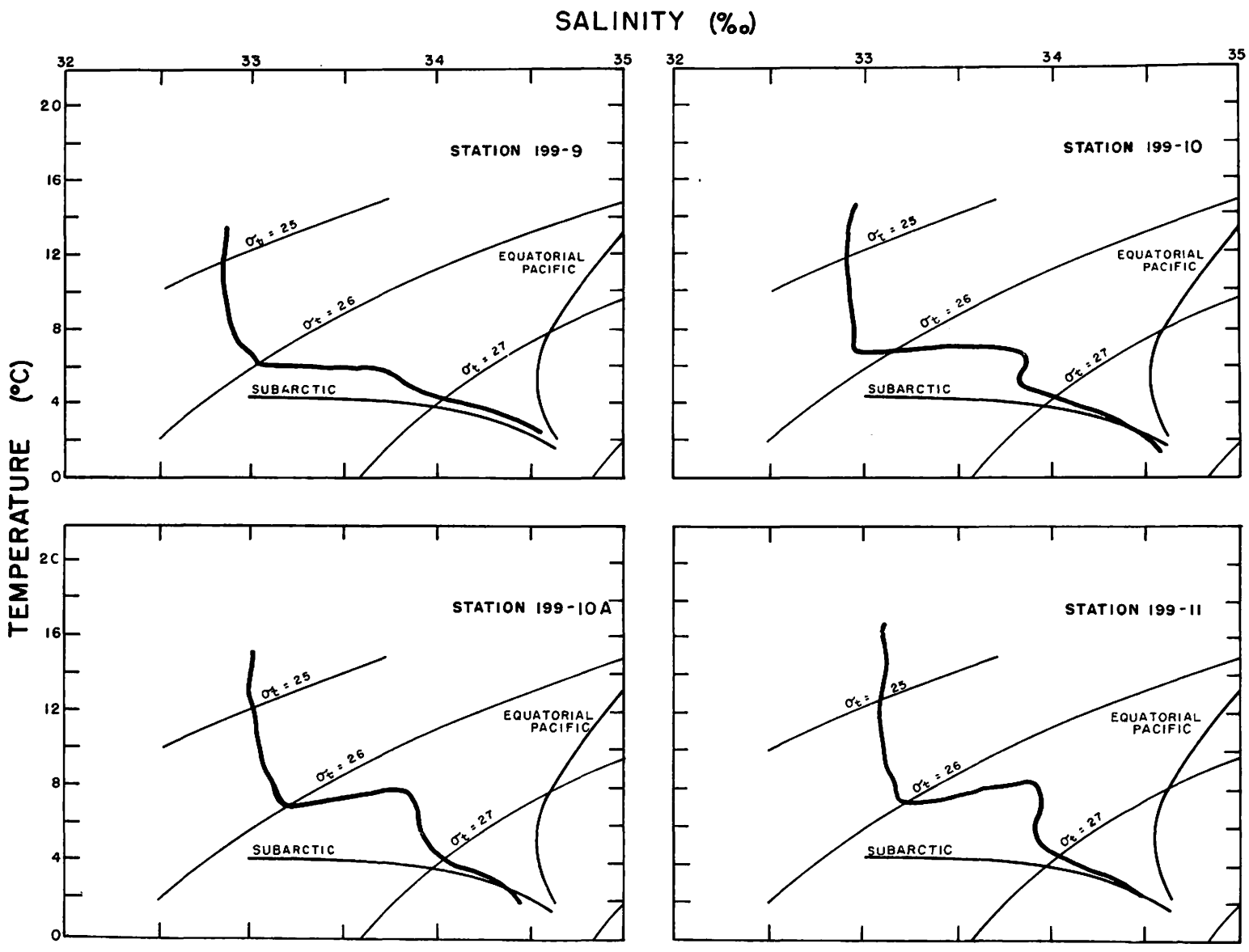

FIG. 11. TEMPERATURE—SALINITY DIAGRAMS FROM BROWN BEAR CRUISE 199, STATIONS 9, 10, 10A, AND 11.

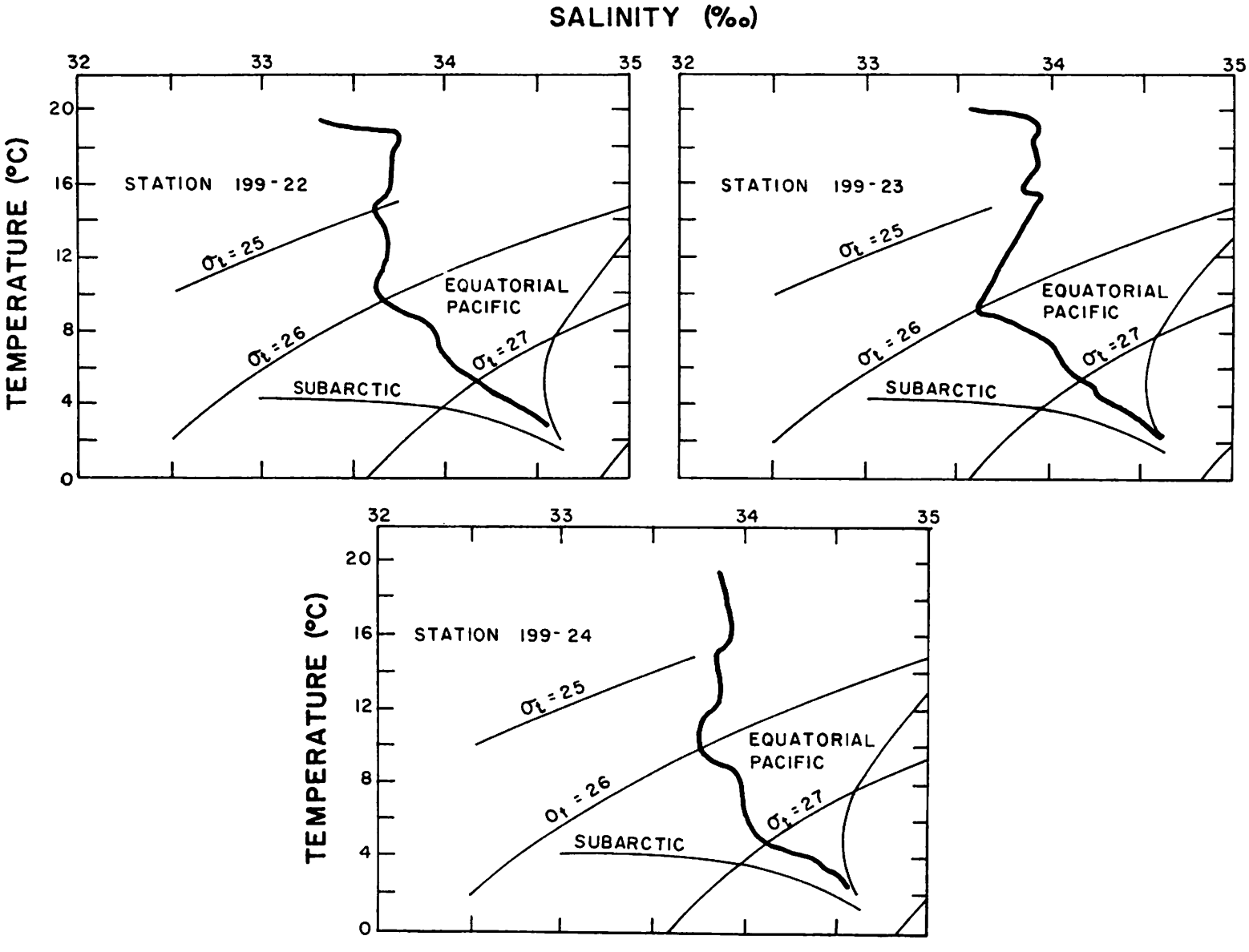

FIG. 12. TEMPERATURE - SALINITY DIAGRAMS FROM BROWN BEAR CRUISE 199, STATIONS 22, 23 AND 24

and 24 (Figure 12) show the dominance of Equatorial water in this area and the much reduced significance of Subarctic water. The night catches in the southern waters were greatest in hauls made deeper than 60 meters, usually at 120 to 400 meters.

Table 6 summarizes the depth distribution of the plankton catches according to area. This table is based on the accumulated oceanographic information obtained during the cruises; except for Area I it includes only the data obtained by using the 6-foot trawl.

Cruise 176 is divided into three areas:

Area A - Offshore region, not influenced by Subarctic Current, between Stations 32 and 37, and between Station 29 and north of 49°N (Hauls 4-37 and 89-123). Hauls 91-99 were not considered because they were taken in Shelikof Strait.

Area B - Offshore region where Subarctic Current was apparent, those hauls south of 49°N (Hauls 124-148).

Area C - The Aleutian Island area (Hauls 38-86).

No significant penetration of Intermediate water was noted on Cruise 176.

Cruise 199 is divided into six areas:

Area D - Area just off the Washington Coast between Station 1 and 3 where Intermediate water was present and the halocline temperatures were mostly above 6.0°C (Hauls 9-33).

Area E - Offshore region between Stations 3 and 10 of mostly Subarctic water with halocline temperatures mostly below 6.0°C (Hauls 34-95).

Area F - Offshore region between Station 10 and 19 strongly influenced by presence of Intermediate water and some Central and Equatorial water with halocline temperatures above 7.0°C and as high as 10.0°C (Hauls 96-176).

Area G - Offshore southern region between Stations 21 and 30, similar in most respects to the previous region, but with greater quantities of Equatorial water, halocline temperatures, where the halocline was present, exceeding 8.0°C (Hauls 232-284).

Area H - Offshore region, between Stations 30 and 33, oceanographically intermediate between areas described in E and F, Intermediate water was present, the halocline temperatures were all below 8.0°C (Hauls 285-300).

Area I - Offshore region, between Stations 33 and 38, mostly Subarctic waters, but Intermediate water was present along the cruise track, halocline temperatures varied, but were all below 8.0°C and sometimes were less than 6.0°C. In this area, because of the failure of the main winch, only hauls with the 3-foot net were available for study (Hauls 301-328).

Cruise 202 is divided into two areas:

Area J - Offshore region between 49°N, 135°W and Station 7 of Subarctic water, with halocline temperatures mostly below 6.0°C (Hauls 16-27).

Area K - Offshore region between Station 4 and 49°N, 135°W and between Stations 7 and 14 influenced by presence of Intermediate water having halocline temperatures above 6.0°C (Hauls 6-15 and 33-79).

On Cruise 176 and in Areas D, E, and F, the deepest haul made routinely was at 225 meters. In all other areas, new cable permitted routine sampling at depths to 400 meters. Table 6 shows that the major changes in plankton abundance occurred in the shallow hauls; catches made in the deeper hauls were relatively constant. This, of course, closely parallels the physical and chemical environment which geographically varies less at depth than in the surface waters. Even at the depths being considered, however, definite latitudinal variation is apparent. The lowest catches made in the deepest hauls, those at 400 meters, were found furthest to the south in waters that had the lowest percentage of Subarctic water. These catches were only one-third to one-seventh in volume of catches made at the same depths in more northern waters. The low average catch of 1.4 ml/min made in the 400-meter hauls with the 3-foot net probably is the result of insufficient sampling and of escapement, for the plankton caught in deeper hauls are larger and probably faster-swimming than those taken in shallower depths.

The data from Cruise 202 obtained in the area influenced by Intermediate water are somewhat distorted by the inclusion of hauls made close to shore in the region where cool water pushes towards the surface (Figure 5). The numbers shown in parentheses in Table 6 for this area are the average volumes of all hauls, not including those made close to shore. Removal of these hauls from consideration further emphasizes the fact of the concentration of plankton at depth and their absence in shallower water.

The preceding data show sharp and extensive quantitative variations which clearly relate to equivalent changes in the physical and chemical environment of the area under study. It can be shown that these variations are also qualitative. Tables 7a-k show a depth and area distribution for catches during the surveys for the seven most common fish (all Myctophidae), the three most common pteropods, and the most common heteropod; except for Area I, these data were obtained with the 6-foot net.

Lampanyctus leucopsarus, the most abundant and most frequently-caught fish on the surveys, was taken in almost every offshore haul north of 45°N except in those made in the upper 30 meters in that area of Cruise 202 influenced by the extensive intrusion of Intermediate water. South of 45°N the species occurred in only 15 of 89 hauls. Only three of these occurrences were in hauls made in the upper 60 meters, and these three records were all north of Station 11 (Cruise 199); south of Station 13 there were no catches at any depth, except in three hauls just west of Station 18. That the species is first eliminated in the shallow hauls is consistent with the physical and chemical data, for latitudinal gradients diminish with an increase in depth.

North of 45°N it is the vertical distribution of the species that reflects physical and chemical conditions; generally the abundance of the species was greatest in the upper 30 meters and decreased with depth. As mentioned in the section on vertical migration, the Subarctic Current appears to suppress the migration of the species. During the last part of Cruise 176 (Hauls 124-148) the peak abundance of the species occurred at about 60 meters rather than at 30 meters. The actual abundance of the species did not change; the sum of the average catches at all depths was 84.2 for the offshore portion of the cruise not influenced by the Subarctic Current, and 82.8 for the area influenced by the Subarctic Current.

During Cruise 202 a combination of the influence of Intermediate water and the Subarctic Current appeared to interact. During both legs of this cruise low catches were made in the upper 30 meters. In that portion influenced by the Intermediate water, peak catches occurred within the halocline; on the other leg the peak catch occurred above the halocline. The average catch at all depths, excluding the 400-meter hauls, was 20.5 for the area with Intermediate water and 26.5 for the more typically Subarctic water. The high averages obtained for the 400-meter hauls were probably sampling artifacts because these hauls were made at a time when the animals had begun their downward migration. These data are further distorted by the catch of 82 fish in a single haul (Haul 73) close to shore in an area where cold water pushes towards the surface.

The distribution of Diaphus theta (Table 7b) was much like the distribution of L. leucopsarus, except for D. theta's infrequent occurrence in the Aleutian Island region and its wider southern range. South 45°N the species occurred in only 26 of 89 hauls, with nine of these being in the upper 60 meters. D. theta did not occur in hauls in the upper 60 meters in offshore waters south of Station 13, although it appeared in the deeper hauls occasionally throughout the sampling area. In areas apparently influenced by the Subarctic Current D. theta, like L. leucopsarus, was most abundant, in hauls made deeper than 30 meters whereas it was abundant in the upper 30 meters in those areas not influenced by the Subarctic Current. The influence of Intermediate water on the vertical distribution of D. theta is less pronounced than for L. leucopsarus; however, where Intermediate water occurred north of 45°N, relatively high catches of D. theta were made in and below the halocline.

Tarletonbeania crenularis occurred less frequently than either D. theta or L. leucopsarus. Its pattern of distribution (Table 7c) closely resembles D. theta. The very low numbers of T. crenularis in the northernmost parts of the survey area is probably a function of inadequate sampling rather than its actual absence from the area. The species was extremely common throughout the area north of 45°N at all stations when night-light observations were possible. LeBrasseur (personal communication*) reports the species to be the most common fish taken in hauls made with a midwater trawl towed at the surface in the Gulf of Alaska. The fact that no surface tows were attempted in the area during our surveys probably distorts our horizontal distribution data for the species.

All specimens of Tarletonbeania taken during the cruises have been identified as T. crenularis. Wisner (1959) places the northern boundary of T. crenularis at about 50°N, so it is possible that those Tarletonbeania taken to the north of this line are actually T. taylori. However no adult male fish were taken and the criteria are questionable for distinguishing immature or female fish of T. taylori from T. crenularis.

Regardless of the specific identification, Tarletonbeania almost completely disappeared south of 45°N, occurring in only seven out of 89 hauls. With the exception of two hauls close to Station 18 the genus was absent from the offshore area south of Station 11.

The two species of Electrona, E. arctica and E. crockeri, (Tables 7d and 7e) are both primarily deep dwellers. They occurred only rarely in hauls made in the upper 120 meters, but the genus is represented in most of the deep hauls. The distribution of the two species is complementary. North of 45°N E. arctica occurred in 40 of the 74 hauls made at depths greater than 120 meters. South of 45°N the species occurred in only two of 41 hauls, both in hauls made at 400 meters. North of 45°N E. crockeri occurred in only eight of 74 hauls, but south of this latitude the species appeared in 29 of 41 hauls. During the surveys both species occurred in the same haul only five times and these were all in hauls made at a depth of 400 meters.

Ceratoscopelus townsendi (Table 7f), a resident of the upper waters, and Lampanyctus ritteri (Table 7g), a species with a wide vertical range, have distributions which complement the distributions of L. leucopsarus and D. theta: north of Station 10 they were found rarely, but south of that station they occurred in the majority of hauls. The capture of two specimens of L. ritteri near the tip of the Aleutian Islands (Haul 68, Cruise 176) seems anomalous until it is realized that this area is probably in the path of the Subarctic Current and that the only northern areas in which L. ritteri appeared with any degree of regularity were those sections influenced by the Subarctic Current. The wide vertical distribution of L. ritteri parallelled its relatively wide horizontal range, although its peak concentrations occurred towards the southern parts of the survey area. C. townsendi,

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* Robin LeBrasseur, Fisheries Research Board of Canada, December 1959.

with more restricted vertical distribution, is likewise limited horizontally. It occurred in 72 of the offshore hauls but in only 19 of these did it occur with L. leucopsarus, a species taken in 213 of the offshore hauls. All 19 occurrences are in areas of physical and chemical transition.

A number of other fish species, not listed in the table, had distributions limited to particular water masses. The lantern fishes Diogenichthys atlanticus and Myctophum californiense were primarily concentrated in waters influenced by the presence of Intermediate, Central and Equatorial water and were very rare in the Subarctic waters. Likewise concentrated in the south were other pelagic fishes such as Idiacanthus antrostomus, Argyopelecus heathi, A. olfersi, Melamphaes lugubris, M. bispinosus, Rhectogramma sherbourni, and Bathylychnops exilis. Only a few species, such as Lestidium ringens and Chauliodus macouni, seemed confined to the Subarctic water in the north. The distribution of C. macouni was noted by Haffner (1952) to be limited to the Gulf of Alaska and the waters off the coast of California.

The distributional patterns shown by the fish are repeated by all of the few invertebrates which have been investigated. Tables 7h-k give the distribution of the three most abundant pteropods (Limacina helicina, Cavolinia globulosa and Euclio pyramidata) and the most abundant heteropod genus (Atlanta).

Limacina helicina (Table 7h) has a distribution like L. leucopsarus and the other Subarctic-dwelling pelagic fishes. It occurred in only eight of the 89 offshore hauls taken south of 45°N, occurring only once in the upper 60 meters. No captures of this species were made south of Station 15. Captures north of 45°N are recorded in 72 of 214 hauls, with the species occurring most frequently in those areas having the highest percentage of Subarctic water.

Cavolinia globulosa (Table 7i) appeared only in hauls made south of Station 13 (Cruise 199), and its distribution definitely seems related to the distribution of Equatorial water. Tesch (1948) finds that this species, "...is practically confined to the tropical belt of the Indo-Pacific". A point of interest was the capture of 565 specimens in a 30-minute daytime haul (Haul 138) at a depth of 60 meters, latitude 38°36'N. The largest catch of the species previously reported by Tesch (made with a 2-meter stramin net) was 313 specimens per hour of towing at 3°40'N.

Euclio pyramidata (Table 7j) occurred in greatest numbers south of Station 10, where it was found in 58 of 89 hauls. Its northern range was primarily restricted to those areas influenced by Intermediate water; as the percentage of Subarctic water increased the catch of E. pyramidata decreased. No captures of this species were made in the Aleutian Islands region.

The identification of the species of the heteropods in the genus Atlanta is uncertain, probably at least two species being represented in our collection. Regardless of species identification, however, the

genus (Table 7k) was present in only six hauls made north of Station 10. It appeared in nearly all of the hauls south of Station 10 and increased in abundance with increased percentage of Central and Equatorial water.

Two species of Gnathophausia, a bathypelagic mysid, have a complementary distribution. G. ingens was recorded only in hauls taken south of 45°N, while G. gigas was limited to the deep hauls made to north of this latitude (Appendix Table 4).

Of special interest was the occurrence of a number of new species, as well as new records of species being taken far from their previously known geographic range. Captured during the surveys were: Bathophilus flemingi, a new species of stomiatoid, (Aron and McCrery, 1958); Astronesthes nigroides, another new stomiatoid, (Gibbs and Aron, 1960); a melamphid in the genus Melamphaes (Ebeling, personal communication*), and what appears to be a new chiasmodontid in the genus Pseudoscopelus. Also recorded were a number of myctophids which may represent new species in the genera Lampadena, Diaphus, Electrona and Notoscopelus. The Electrona fits the extreme range of E. rissoi and has been tentatively identified as that species but Bolin (personal communication**) expresses some doubts, believing that further study may reveal these fish as a new species.

Species whose captures during the surveys represent major range extensions included: the pelagic apogonid, Rhectogramma sherbourni, previously recorded from the Atlantic Coast of Africa; Photonectes margarita and Melanostomias biseriatus, both stomiatoids and both previously recorded only from the western Atlantic; and Opostomias mitsuii, another stomiatoid, known from only two specimens taken near Japan.

It is of ecological significance that all of the major range extensions mentioned above, as well as the capture of the questionable Electrona (if it is E. rissoi it would become the only Pacific myctophid with a bipolar distribution) and a number of specimens of Bathylychnops exilis (known previously from a single specimen), were made in about the same area, at about 40°N latitude. In this area a band of Central water from the south interleaves between the deeper Intermediate water and the overlying halocline. The narrow depth range of this band may serve to confine species that usually occur at greater depth, thus making them susceptible to capture.

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* Alfred Ebeling, Scripps Institution of Oceanography, February 1959.

** Rolf Bolin, Hopkins Marine Stations, July 1959.

Key to Areas Listed in Tables 7a-k

Area	Cruise No.	Haul Nos.	Description
A	176	4-37 89-123	Offshore area not influenced by Subarctic Current between Stations 32 and 37 and between Station 29 and 49°N latitude.
B	176	124-148	Offshore area where Subarctic Current is apparent south of 49°N latitude.
C	176	38-86	The Aleutian Island Area.
D	199	9-33	Area just off the Washington Coast between Stations 1 and 3 with considerable Intermediate water present.
E	199	34-95	Offshore region between Stations 3 and 10, composed mostly of Subarctic water.
F	199	96-176	Offshore region between Stations 10 and 19, strongly influenced by the presence of Intermediate water and some Central and Equatorial water.
G	199	232-284	Offshore region between Stations 21 and 30, similar in most respects to the previous region, but with greater quantities of Equatorial water.
H	199	285-300	Offshore region, oceanographically intermediate between Areas E and F.
I	199	301-328	Offshore region, mostly Subarctic water, but Intermediate water is present along the cruise track.
J	202	16-27	Offshore region between 49°N, 135°W and Station 7 of Subarctic water.
K	202	6-15 33-79	Offshore region between Station 4 and 49°N, 135°W and between Stations 7 and 14 with considerable Intermediate water present

TABLE 7a. Distribution of Lampanyctus leucopsarus

Area	Freq. of Occur.	Average No. per haul	Freq. of Occur.	Average No. per haul	Freq. of Occur.	Average No. per haul	Freq. of Occur.	Average No. per haul	Freq. of Occur.	Average No. per haul
(Depth)	20-30 m.		31-60 m.		61-120 m.		121-250 m.		251-400 m.	
A	9/10	55.7	10/10	17.9	3/3	4.3	12/12	6.3	No hauls	
B	6/6	20.0	5/5	43.6	3/3	10.6	9/9	8.6	No hauls	
C	4/9	88.5	8/9	18.5	No hauls		9/10	13.8	No hauls	
D	1/1	6.0	1/1	10.0	No hauls		1/1	3.0	No hauls	
E	8/8	93.5	11/11	26.3	No hauls		11/11	12.5	No hauls	
F	2/9	1.4	1/7	0.1	3/7	0.9	8/23	0.7	No hauls	
G	0/11	0.0	0/9	0.0	1/5	0.2	0/10	0.0	0/8	0.0
H	5/6	14.0	3/3	10.3	2/2	1.0	2/3	4.0	1/2	1.5
I	4/7	39.5	5/6	2.0	2/2	1.5	3/4	2.3	0/2	0.0
J	2/2	3.0	3/3	20.0	2/2	3.0	1/2	0.5	2/2	21.0
K	3/16	3.8	8/9	6.7	7/7	7.3	6/7	2.7	8/9	19.4

TABLE 7b. Distribution of Diaphus theta

Area	Freq. of Occur. (Depth) 20-30 m.	Average No. per haul 20-30 m.	Freq. of Occur. 31-60 m.	Average No. per haul 31-60 m.	Freq. of Occur. 61-120 m.	Average No. per haul 61-120 m.	Freq. of Occur. 121-250 m.	Average No. per haul 121-250 m.	Freq. of Occur. 251-400 m.	Average No. per haul 251-400 m.
A	6/10	13.6	4/10	1.7	3/3	1.0	7/12	1.1	No hauls	
B	5/6	3.7	5/5	4.0	2/3	2.0	6/9	1.4	No hauls	
C	2/9	0.6	2/9	0.8	No hauls		3/10	0.8	No hauls	
D	1/11	2.0	1/1	11.0	No hauls		1/1	7.0	No hauls	
E	8/8	19.4	10/11	5.1	No hauls		9/11	2.5	No hauls	
F	3/9	9.2	3/7	1.3	2/7	0.7	12/23	1.3	No hauls	
G	2/11	0.2	1/9	0.3	1/5	0.2	2/10	0.2	0/8	0.0
H	3/6	11.2	3/3	2.7	2/2	2.5	1/3	0.7	1/2	1.0
I	4/7	0.0	2/6	0.3	0/2	0.0	1/4	0.3	0/2	0.0
J	0/2	0.9	3/3	14.0	2/2	2.0	1/2	0.5	2/2	1.5
K	2/16	0.6	6/9	12.3	7/7	5.4	5/7	2.4	7/9	2.9

TABLE 7c. Distribution of Tarletonbeania crenularis

Area	Freq. of Occur. (Depth) 20-30 m.	Average No. per haul 20-30 m.	Freq. of Occur. 31-60 m.	Average No. per haul 31-60 m.	Freq. of Occur. 61-120 m.	Average No. per haul 61-120 m.	Freq. of Occur. 121-250 m.	Average No. per haul 121-250 m.	Freq. of Occur. 251-400 m.	Average No. per haul 251-400 m.
A	2/10	1.4	1/10	0.1	0/3	0.0	3/12	0.3	No hauls	
B	3/6	0.5	4/5	1.8	2/3	1.3	7/9	0.9	No hauls	
C	1/9	0.1	1/9	0.1	No hauls		1/10	0.1	No hauls	
D	1/1	26.0	1/1	26.0	No hauls		1/2	13.5	No hauls	
E	7/8	8.1	11/11	3.5	No hauls		8/11	3.5	No hauls	
F	1/9	0.4	2/7	0.3	1/7	0.1	3/23	0.2	No hauls	
G	No captures in any hauls									
H	4/6	1.7	2/3	2.0	1/2	0.5	1/3	0.3	0/2	0.0
I	5/7	3.6	6/6	1.7	1/2	0.5	1/4	0.5	1/2	1.0
J	2/2	23.0	3/3	2.3	1/2	0.5	1/2	0.5	1/2	1.0
K	7/16	3.1	8/9	1.8	3/7	1.7	5/7	1.0	8/9	1.8

TABLE 7d. Distribution of Electrona arctica

Area	Freq. of Occur. (Depth) 20-30 m.	Average No. per haul	Freq. of Occur. 31-60 m.	Average No. per haul	Freq. of Occur. 61-120 m.	Average No. per haul	Freq. of Occur. 121-250 m.	Average No. per haul	Freq. of Occur. 251-400 m.	Average No. per haul
A	3/10	0.3	2/10	0.8	0/3	0.0	10/12	5.1	No hauls	
B	0/6	0.0	0/5	0.0	0/3	0.0	3/9	1.9	No hauls	
C	1/9	0.1	2/9	0.2	No hauls		5/10	8.1	No hauls	
D	0/1	0.0	0/1	0.0	No hauls		0/1	0.0	No hauls	
E	0/8	0.0	0/11	0.0	No hauls		2/11	0.2	No hauls	
F	0/9	0.0	0/7	0.0	1/7	0.3	0/23	0.0	No hauls	
G	0/11	0.0	0/9	0.0	0/5	0.0	0/10	0.0	2/8	0.8
H	0/6	0.0	0/3	0.0	0/2	0.0	0/3	0.0	2/2	7.0
I	0/7	0.0	0/6	0.0	0/2	0.0	0/4	0.0	2/2	1.0
J	0/2	0.0	0/3	0.0	0/2	0.0	2/2	4.5	2/2	5.0
K	0/16	0.0	1/9	0.1	0/7	0.0	4/7	3.3	8/9	8.8

TABLE 7e. Distribution of Electrona crockeri

Area (Depth)	Freq. of Occur. 20-30 m.	Average No. per haul 20-30 m.	Freq. of Occur. 31-60 m.	Average No. per haul 31-60 m.	Freq. of Occur. 61-120 m.	Average No. per haul 61-120 m.	Freq. of Occur. 121-250 m.	Average No. per haul 121-250 m.	Freq. of Occur. 251-400 m.	Average No. per haul 251-400 m.
A	No occurrences in these areas									
B	No occurrences in these areas									
C	No occurrences in these areas									
D	0/1	0.0	0/1	0.0	No hauls		0.1	0.0	No hauls	
E	0/8	0.0	1/11	0.2	No hauls		1/11	0.1	No hauls	
F	2/9	0.2	4/7	2.6	1?/7	0.1?	18/23	3.7	No hauls	
G	0/11	0.0	3/9	0.6	1/5	0.4	5/10	5.4	6/8	2.0
H	0/6	0.0	0/3	0.0	1/2	1.0	2/3	1.3	2/2	1.0
I	0/7	0.0	0/6	0.0	0/2	0.0	1/4	0.3	0/2	0.0
J	0/2	0.0	0/3	0.0	0/2	0.0	0/2	0.0	0/2	0.0
K	1/16	0.1	0/9	0.0	0/7	0.0	2/7	0.3	0/9	0.0

TABLE 7f. Distribution of Ceratoscopelus townsendi

Area	Freq. of Occur. (Depth) 20-30 m.	Average No. per haul 20-30 m.	Freq. of Occur. 31-60 m.	Average No. per haul 31-60 m.	Freq. of Occur. 61-120 m.	Average No. per haul 61-120 m.	Freq. of Occur. 121-250 m.	Average No. per haul 121-250 m.	Freq. of Occur. 251-400 m.	Average No. per haul 251-400 m.
A	No occurrences in these areas									
B	3/6	1.3	2/5	0.4	No hauls		0/9	0.0	No hauls	
C	No occurrences in these areas									
D	No occurrences in these areas									
E	No occurrences in these areas									
F	7/9	19.1	6/7	3.4	3/7	2.0	11/23	0.8	No hauls	
G	9/11	4.9	8/9	5.9	5/5	4.8	6/10	1.1	4/8	0.6
H	5/6	1.8	0/3	0.0	1/2	1.0	0/3	0.0	1/2	1.0
I	1/7	0.1	1/6	0.2	0/2	0.0	0/4	0.0	0/2	0.0
J	0/2	0.0	0/3	0.0	0/2	0.0	0/2	0.0	0/2	0.0
K	1/15	0.1	1/9	0.1	1/7	0.1	1/7	0.1	0/9	0.0

TABLE 7g. Distribution of Lampanyctus ritteri

Area	Freq. of Occur. (Depth) 20-30 m.	Average No. per haul	Freq. of Occur. 31-60 m.	Average No. per haul	Freq. of Occur. 61-120 m.	Average No. per haul	Freq. of Occur. 121-250 m.	Average No. per haul	Freq. of Occur. 251-400 m.	Average No. per haul
A	No occurrences in the area in 35 hauls									
B	0/6	0.0	1/5	0.4	2/3	2.0	5/9	0.9	No hauls	
C	0/9	0.0	0/9	0.0	No hauls		1/10	0.2	No hauls	
D	0/1	0.0	0/1	0.0	No hauls		0/1	0.0	No hauls	
E	0/8	0.0	3/11	0.8	No hauls		7/11	1.5	No hauls	
F	6/9	1.9	7/7	13.4	6/7	7.1	22/23	5.3	No hauls	
G	3/11	2.1	6/9	9.0	4/5	9.2	9/10	3.8	7/8	5.4
H	1/6	0.2	3/3	2.0	1/2	1.0	1/3	1.0	2/2	1.0
I	0/7	0.0	0/6	0.0	1/2	0.5	1/4	0.3	0/2	0.0
J	0/2	0.0	0/3	0.0	0/2	0.0	1/2	1.0	0/2	0.0
K	0/16	0.0	0/9	0.0	1/7	0.1	4/7	1.0	3/9	0.7

TABLE 7h. Distribution of Limacina helicina

Area	Freq. of Occur. (Depth) 20-30 m.	Average No. per haul 20-30 m.	Freq. of Occur. 31-60 m.	Average No. per haul 31-60 m.	Freq. of Occur. 61-120 m.	Average No. per haul 61-120 m.	Freq. of Occur. 121-250 m.	Average No. per haul 121-250 m.	Freq. of Occur. 251-400 m.	Average No. per haul 251-400 m.
A	5/10	2.2	4/10	1.1	1/3	0.3	5/12	1.0	No hauls	
B	0/6	0.0	1/5	0.8	0/3	0.0	1/9	0.3	No hauls	
C	5/9	4.3	4/9	9.3	No hauls		7/10	3.8	No hauls	
D	1/1	7.0	1/1	47.0	No hauls		1/1	28.0	No hauls	
E	3/8	0.6	7/11	4.9	No hauls		6/11	2.3	No hauls	
F	0/9	0.0	1/7	0.8	2/7	0.5	5/23	1.3	No hauls	
G	0/11	0.0	0/9	0.0	0/5	0.0	0/10	0.0	0/8	0.0
H	0/6	0.0	2/3	1.3	1/2	0.5	0/3	0.0	1/2	0.5
I	2/7	9.1	3/6	3.6	1/2	0.5	0/4	0.0	0/2	0.0
J	0/2	0.0	0/3	0.0	0/2	0.0	1/2	0.5	0/2	0.0
K	9/16	2.9	5/9	9.3	4/7	1.7	3/7	1.0	4/9	1.0

TABLE 7i. Distribution of Cavolinia globulosa

Area	Freq. of Occur. (Depth) 20-30 m.	Average No. per haul	Freq. of Occur. 31-60 m.	Average No. per haul	Freq. of Occur. 61-120 m.	Average No. per haul	Freq. of Occur. 121-250 m.	Average No. per haul	Freq. of Occur. 251-400 m.	Average No. per haul
A	0/10	0.0	0/10	0.0	0/3	0.0	0/12	0.0	No hauls	
B	0/6	0.0	0/5	0.0	0/3	0.0	0/9	0.0	No hauls	
C	0/9	0.0	0/9	0.0	No hauls		0/10	0.0	No hauls	
D	0/1	0.0	0/1	0.0	No hauls		0/1	0.0	No hauls	
E	0/8	0.0	0/11	0.0	No hauls		0/11	0.0	No hauls	
F	0/9	0.0	0/7	0.0	3/7	3.0	8/23	9.9	No hauls	
G	0/11	0.0	3/9	0.3	4/5	10.4	3/10	2.3	4/8	12.5
H	0/6	0.0	0/3	0.0	0/2	0.0	0/3	0.0	0/2	0.0
I	0/7	0.0	0/6	0.0	0/2	0.0	0/4	0.0	0/2	0.0
J	0/2	0.0	0/3	0.0	0/2	0.0	0/2	0.0	0/2	0.0
K	0/16	0.0	0/9	0.0	0/7	0.0	0/7	0.0	0/9	0.0

TABLE 7j. Distribution of Euclio pyramidata

Area (Depth)	Freq. of Occur. 20-30 m.	Average No. per haul 20-30 m.	Freq. of Occur. 31-60 m.	Average No. per haul 31-60 m.	Freq. of Occur. 61-120 m.	Average No. per haul 61-120 m.	Freq. of Occur. 121-250 m.	Average No. per haul 121-250 m.	Freq. of Occur. 250-400 m.	Average No. per haul 250-400 m.
A	0/10	0.0	1/10	0.1	0/3	0.0	0/12	0.0	No hauls	
B	0/6	0.0	0/5	0.0	0/3	0.0	0/9	0.0	No hauls	
C	0/9	0.0	0/9	0.0	No hauls		0/10	0.0	No hauls	
D	1/1	3.0	1/1	3.0	No hauls		1/1	10.0	No hauls	
E	2/8	0.3	5/11	1.4	No hauls		1/11	0.1	No hauls	
F	2/9	1.1	6/7	2.7	5/7	22.4	14/23	3.0	No hauls	
G	7/11	5.3	6/9	3.6	5/5	6.4	8/10	3.3	5/8	3.0
H	2/6	1.3	1/3	0.6	0/2	0.0	1/3	1.0	0/2	0.0
I	2/7	2.5	2/6	0.6	0/2	0.0	0/4	0.0	0/2	0.0
J	0/2	0.0	0/3	0.0	0/2	0.0	0/2	0.0	0/2	0.0
K	6/16	1.5	4/9	1.3	3/7	0.5	2/7	0.2	2/9	0.6

TABLE 7k. Distribution of Atlanta sp.

Area	Freq. of Occur. (Depth) 20-30 m.	Average No. per haul 20-30 m.	Freq. of Occur. 31-60 m.	Average No. per haul 31-60 m.	Freq. of Occur. 61-120 m.	Average No. per haul 61-120 m.	Freq. of Occur. 121-250 m.	Average No. per haul 121-250 m.	Freq. of Occur. 251-400 m.	Average No. per haul 251-400 m.
A	0/10	0.0	0/10	0.0	0/3	0.0	0/12	0.0	No hauls	
B	0/6	0.0	0/5	0.0	0/3	0.0	0/9	0.0	No hauls	
C	0/9	0.0	0/9	0.0	No hauls		0/10	0.0	No hauls	
D	0/1	0.0	0/1	0.0	No hauls		0/1	0.0	No hauls	
E	0/8	0.0	1/11	0.1	No hauls		1/11	0.1	No hauls	
F	7/9	14.3	6/7	8.0	6/7	6.1	20/23	7.7	No hauls	
G	11/11	34.0	9/9	9.2	4/5	17.2	9/10	10.3	8/8	8.8
H	2/6	6.0	1/3	1.0	1/2	1.5	0/3	0.0	0/2	0.0
I	0/7	0.0	0/6	0.0	0/2	0.0	0/4	0.0	0/2	0.0
J	0/2	0.0	0/3	0.0	0/2	0.0	0/2	0.0	0/2	0.0
K	0/16	0.0	0/9	0.0	0/7	0.0	0/7	0.0	0/9	0.0

Quantitative Evaluation of the Midwater Trawls

There are no satisfactory estimates of the volume of water filtered by the different sections of the net, nor are there any measurements of the catching power of the trawls in relation to other nets. This makes it difficult to compare trawl catches with catches by other standard plankton-sampling devices.

Maximum values for the filtering capacity of the trawl may be computed by multiplying the cross-sectional area of the mouth opening by the length of the water column through which the net passes. Table 8, based upon a ship's speed of 6 knots, gives the maximum volume of water strained by different sections of the nets during one minute of trawling. Because the 3-foot net is not an exactly scaled-down version of the 6-foot trawl, the filtering capacities of the different sections are not proportional in the two nets.

The minimum amount of plankton and fish per cubic meter of sea water can be estimated by applying these values for filtering capacity. This minimum assumes: (a) that all water through which the net passes is filtered; (b) that each section of the net operates independently; and (c), that an animal is caught when it passes through the mouth opening of the particular section of the net. For example: in the 78 oceanic night-hauls made with the 6-foot net in the upper 30 meters, the average plankton catch was about 15 ml of plankton per minute of towing. For these same hauls 1.5 fish were caught per minute of towing. Dividing the average plankton catch (based on settled volumes) by a factor of 5 (Redfield, 1941) the actual weight of plankton caught was about 3 grams per minute. The average weight of each fish caught was about 0.75 grams. Using these weights and the assumptions made above, Table 8 shows the catch estimates made for each section of the 6-foot net.

Obviously the selectivity of the gear is different for each species. A euphausiid is more apt to pass through the 3-inch section of the net than through the section lined with the 1/2-inch bait netting. Once down in the cod-end, the small mesh makes the escape of adult euphausiids unlikely. Fish once in the net are less likely to pass through the 3-inch netting than are the smaller invertebrates. Table 9 permits some estimate of the gross selectivity and escapement potential of the different groups by presenting data on the 15 pairs of hauls made with the two trawls. These pairs were made at night at depths of 30 and 60 meters, with one haul of the pair immediately following the other as the ship maintained a straight-line course. The ratio of fish caught in the larger net to fish caught in the smaller net is 4.2 at 30 meters and 3.7 at 60 meters. The ratios of the plankton volumes are 3.1 and 2.9 in the 30- and 60-meter hauls. Larval fish ratios are 2.1 and 3.3 respectively in the 30- and 60-meter hauls.

The cross-sectional area, and hence the maximum filtering capacity, of the mouth opening of the 3-inch section of the 6-foot net is about 3.8 times more than the same section of the 3-foot net. Where the 1/2-inch bait netting begins, the cross-sectional area of the large net

TABLE 8. Quantitative Evaluation of the Midwater Trawl*

	Section of the Net					
	Front End (3-in. netting)		Middle Section (3-in netting, lined with 1/2-in. bait netting)		Cod-End (1/8-in. netting)	
	6-foot	3-foot	6-foot	3-foot	6-foot	3-foot
Cross-sectional area of mouth opening in M^2	5.040	1.320	1.320	0.670	0.197	0.197
Water strained per minute in M^3	933.500	244.000	244.000	125.000	36.400	36.400
Plankton concentration in grams per M^3	0.003	- -	0.12	- -	0.083	- -
Fish in grams per M^3	0.002	- -	0.005	- -	0.030	- -

* Assuming ship's speed at 6 knots.

is about twice that of the smaller trawl. The cross-sectional area of the cod-ends in the two different trawls is the same. The fact that the ratio of fish caught by the two nets closely approximates the ratio of the filtering capacity for the front section indicates that escapement through the 3-inch mesh is probably negligible for fish. As expected, the plankton-catch ratio (approximately 3) indicates that some escapement occurs through the 3-inch netting but that the front section serves to trap at least part of the plankton. The ratio of the larval-fish catch is a little less than the plankton-catch ratio, indicating a still greater escapement through the coarse mesh. As the larval fish are smaller on the average than most of the plankton caught by the trawls their higher escapement through the 3-inch section of the net is reasonable. The estimate of 0.002 grams of fish per cubic meter of sea water is probably a realistic value. Because of escapement, however, the value for the weight of plankton probably lies between 0.003 and 0.012 grams per cubic meter of sea water.

The plankton concentrations referred to here are for plankton populations a step higher on the food chain than those caught in gear such as the Clarke-Bumpus net or the standard 0.5-meter plankton nets. This is verified by the fact that the estimate made for the weight of fish per cubic meter of water is not much less than the estimate of the plankton. The bulk of the fish taken were myctophids; the most abundant plankton were euphausiids, large copepods (Calanus cristatus), and the pelagic shrimp (Sergestes spp.). Except for the shrimp, all of these form important items in the diet of the Pacific salmon (Allen and Aron, 1957; Andrievskaya, 1958), additional evidence of their similar positions in the food chain.

TABLE 9A. Comparison of Paired Hauls Made at 30 Meters

SIX-FOOT NET				THREE-FOOT NET				
	Plankton Volume ml/min	No. of Fish per haul	No. of Larvae per haul	Haul No.	Haul No.	Plankton Volume ml/min	No. of Fish per haul	No. of Larvae per haul	Cruise No.
	8.3	36	4	57	56	13.9	11	5	199
	42.1	109	7	67	66	10.7	34	8	199
	48.5	351	158	78	77	17.1	97	108	199
	62.1	108	128	84	83	8.1	18	34	199
	38.2	242	13	92	91	13.5	40	0	199
	0.7	0	90	37	36	0.1	0	31	202
	1.2	2	21	49	48	1.3	0	16	202
Total	201.1	849	421			64.7	200	202	
Average	28.7	121.3	60.1			9.2	28.5	28.9	
	Ratio	$\frac{\text{Catch of 6-foot net}}{\text{Catch of 3-foot net}}$				3.1	4.2	2.1	

TABLE 9B. Comparison of Paired Hauls Made at 60 Meters

	SIX-FOOT NET				THREE-FOOT NET				
	Plankton Volume ml/min	No. of Fish per haul	No. of Larvae per haul	Haul No.	Haul No.	Plankton Volume ml/min	No. of Fish per haul	No. of Larvae per haul	Cruise No.
	10.1	49	6	54	55	3.8	15	0	199
	16.4	23	11	64	65	7.3	8	6	199
	55.2	40	23	75	76	26.9	20	10	199
	34.2	33	14	81	82	3.8	5	3	199
	18.4	55	6	89	90	4.9	8	1	199
	0.5	6	5	34	35	0.1	0	2	202
	0.4	6	2	46	47	0.3	2	0	202
	1.3	6	11	57	58	0.1	0	2	202
Total	136.5	218	78			47.2	58	24	
Average	17.1	27.3	9.8			5.9	7.3	3.0	
	Ratio	$\frac{\text{Catch of 6-foot net}}{\text{Catch of 3-foot net}}$				2.9	3.7	3.3	

CONCLUSIONS

In spite of the limited data available, biological variations can be associated with variations in the physical and chemical characteristics of the area under consideration. The following general conclusions have been reached:

1. In areas of neutral stability or high turbulence the standing crop is low. This probably indicates a low rate of productivity, resulting from the increased time phytoplankton spend below the compensation depth in the turbulent areas.

2. The diurnal migrations of plankton and some fishes are affected by the physical and chemical environment. In the region of Subarctic water not influenced by the Subarctic Current the peak abundance of animals was found in the upper 30 meters. Where the Subarctic water mass was overlayed by the waters of the Subarctic Current the diurnal migration of animals was suppressed, the peak abundance occurring at a depth of about 60 meters. In both cases the peak abundance of animals occurred at about the same depth as the 50°F isotherm. In areas where Intermediate water intruded into the Subarctic water mass the halocline served as a partial barrier to migration; peak abundances of animals were found below the top of the halocline. Temperature inversions also modify the diurnal migration patterns. In the region of an extensive inversion the plankton were concentrated within, but not above or below, the inversion. As the temperature gradient of the inversion diminished the concentration of plankton within the inversion also diminished.

In all of the above examples the modifying influences are demonstrated by reference to temperature and salinity. These variables, however, are only used for convenience. Variations in temperature and salinity distributions are indicative of other, and probably more biologically significant, physical and chemical changes. Diurnal migrants under usual conditions pass through much larger temperature and salinity changes during their vertical travels than are being considered in the examples. It is possible that the gradients involved are of prime importance, but inadequate understanding of the basic physiology of the planktonic animals makes further discussion of this point superfluous.

3. In 1957 the standing crop of plankton diminished with increasing distance from the Washington Coast. The high standing-crop estimated for the area just south of the Alaska Peninsula occurs at the transition between the Alaska Coastal region and the Alaskan Gyral. The 1958 standing-crop estimates, made close to the Washington Coast, were about ten times less than estimates made for the same area in the previous year. The low standing-crop occurred where Intermediate water had intruded into the Subarctic water mass. As the influence of the Intermediate water diminished and the percentage of Subarctic water increased in the sampling region, the standing crop also increased.

4. In the open ocean the transition from Subarctic water to Intermediate water was marked by abrupt changes in both quantities and kinds of animals. The quantitative change was by a factor of ten and the qualitative change was such, at least for the animals that have been identified to species, that there was very little species overlap between the two oceanographic regimes.

5. In the most southerly part of the survey area, a region characterized by considerable quantities of Central and Equatorial waters, the standing-crop estimates were 100-fold less than at similar longitudes off the Washington Coast.

6. Where a band of Central water interleaved between the deeper Intermediate water and the surficial halocline water, a number of new species occurred, together with significant range extensions of previously described species. The narrow depth-range of this band may have served to confine species that usually occur at greater depths, thus making them susceptible to capture.

Future studies might well be divided into two phases: (1) a more complete analysis of the data already obtained, and (2) continued exploration of the area for further study of existing conditions and a quantitative evaluation of the sampling equipment.

Under the first phase the more pressing problems include:

a. Identification of the invertebrates to species and a study of their distribution in relation to the physical and chemical environment. Of particular importance appear to be the euphausiids, amphipods, and pelagic shrimp. These three groups are all well represented in the collections and, from the quantitative point of view, are probably better sampled than the species used in this study. Particularly amenable to analysis are the euphausiids which, because of the studies by Boden, Johnson and Brinton (1955), present the least taxonomic difficulties.

b. Identification of the fish larvae to species with a study of their distribution in relation to the physical and chemical oceanography of the area.

c. Identification of the remaining unidentified adult fish, including an analysis of the specimens of Tarletonbeania to better elucidate the problem posed by Wisner (1959).

Under the second phase the following problems should be considered:

a. A critical examination of the biological, physical, and chemical changes in the transition regions. These studies could be simplified by the abrupt changes in the biology which are easily and quickly detected in the field.

b. A study of the seasonal and year-to-year changes in a plankton population. This is an especially difficult problem because of the unpredictable meanderings of currents and water masses. To obtain an estimate of the population parameters of a plankton community in the open ocean, preliminary work should be done in a smaller, more easily sampled area (such as a portion of Puget Sound).

c. A study of the fishing power of the trawls. This would allow the trawl catches to be placed on an absolute rather than a relative basis, thus permitting comparisons between the trawl and other standard plankton-sampling devices.

d. Detailed studies of diurnal migration. Rates of migration and the depth of peak abundance during the daylight hours should be determined.

The modified Isaacs-Kidd midwater trawl stands as one of our best tools in the investigation of the macroplankton and the small nekton. The close relationship between the physical and chemical observations and the biological data obtained through the use of the trawl is a strong point in favor of the continued use of the gear in future studies of oceanic ecology.

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APPENDIX

NOTES FOR THE APPENDIX

The lists of fishes and station locations from BROWN BEAR Cruise 176 have previously been published in Technical Report 58. These data are included again in this report in order to permit identifications of previously unidentified material, corrections of errors, and changes in nomenclature.

Many people generously contributed their time and knowledge in the identification of the animals listed in the following tables. The lists of specialists and the groups in which they proved most helpful is given below as only a partial expression of the author's gratitude. In some cases all of the specimens of the group in our collection were examined by the specialist; in other cases, however, only a portion of the material was forwarded for study. Any errors of identification are, of course, the author's responsibility.

Fishes

The adult and juvenile fish listings in APPENDIX TABLE 2 are arranged alphabetically, except that myctophid fishes appear first because of their importance in the catches. The nomenclature of Fraser-Brunner (1949) has been adopted for the myctophids.

Elbert Ahlstrom	Bureau of Commercial Fisheries	Larval fishes
Rolf Bolin	Stanford University	Myctophids
Daniel Cohen	Bureau of Commercial Fisheries	Argentinoids
Alfred Ebeling	Scripps Institution of Oceanography	Melamphaids and bathypelagics in general
Robert Gibbs	Boston University	Stomiatoids
Marion Grey	Chicago Natural History Museum	Gonostomids
Ernest Lachner	United States National Museum	Apogonids
N. B. Marshall	British Museum	Scopelarchids
Giles Mead	Harvard University	Scopelarchids
James Morrow	Yale University	Stomiatoids
Arthur Welander	University of Washington	Bathypelagics in general
Robert Wisner	Scripps Institution of Oceanography	Myctophids

Pteropods and Heteropods

The pteropods and heteropods are listed alphabetically, by order. All species that appear in APPENDIX TABLE 3 were identified by Fay Linger, University of Washington. John McGowan, Scripps Institution of Oceanography, examined a selected sample of material from our collection.

Mysids

All of the mysids that appear in APPENDIX TABLE 4 were identified by William Clarke, Scripps Institution of Oceanography.

APPENDIX TABLE 1a - Catch Data For Each Haul - BROWN BEAR Cruise 176

Date 1957	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
July		↔8						
22	1	2320-2331	Admiralty Inlet	38.6	90	Crab Larvae	6	0
22-23	2	2350-0020	Admiralty Inlet	57.5	30	Crab Larvae	5	1
23	3	1315-1348	Off Swiftsure Lightship	2.4	30	Crab Larvae	0	0
23	4	2238-2335	49°06' N, 127°16' W	3.9	225	Shrimp, euphausiids	16	13
23-24	5	2337-0011	49°08' N, 127°25' W	10.4	30	Euphausiids, shrimp	73	42
24	6	1307-1435	49°35' N, 129°04' W	0.1	30	Euphausiids	1	16
24	7	2258-2334	49°57' N, 130°53' W	68.1	30	Euphausiids, shrimp	320	88
24-25	8	2345-0021	49°58' N, 131°02' W	26.4	60	Euphausiids, shrimp	115	33
	Hauls 9, 10, 11, 12, washed overboard							
26-27	13	2307-0010	51°18' N, 138°16' W	17.0	225	Euphausiids, copepods	28	22
27	14	0014-0052	51°20' N, 138°36' W	19.2	60	Euphausiids	12	28
27	15	0056-0131	51°21' N, 138°44' W	40.9	30	Euphausiids, copepods, arrow worms	122	188
27-28	16	2345-0041	51°59' N, 143°10' W	5.8	225	Euphausiids, shrimp	15	3
28	17	0045-0120	52°00' N, 143°20' W	12.1	60	Euphausiids	12	0
28	18	0123-0212	52°00' N, 143°28' W	3.1	150	Euphausiids	11	1
28	19	0219-0257	52°02' N, 143°36' W	32.9	30	Copepods, shrimp	28	6
28-29	20	2343-0017	52°17' N, 147°24' W	8.8	60	Euphausiids, shrimp	5	2
29	21	0026-0120	52°18' N, 147°32' W	3.7	225	Euphausiids, shrimp	6	2
29	22	0127-0200	52°19' N, 147°44' W	24.2	20	Euphausiids	16	56
29	23	1315-1414	52°34' N, 150°11' W	2.1	225	Copepods	6	1
29-30	24	2352-0101	52°39' N, 152°29' W	6.9	225	Euphausiids, copepods	18	0
30	25	0105-0149	52°40' N, 152°45' W	15.8	60	Euphausiids	16	0

APPENDIX TABLE 1a (continued)

Date 1957	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
July		+8						
30	26	0155-0225	52°40' N, 152°55' W	47.5	20	Euphausiids	12	4
31	27	0010-0115	52°46' N, 157°06' W	4.5	225	Euphausiids	5	3
31	28	0126-0203	52°45' N, 157°19' W	3.4	60	Euphausiids	8	0
31	29	0210-0310	52°44' N, 157°26' W	7.1	30	Euphausiids	21	0
31	30	1743-1820	52°35' N, 159°23' W	0.7	30	Euphausiids	3	1
31	31	1827-1906	52°34' N, 159°36' W	3.2	90	Euphausiids	1	0
31	32	1908-2009	52°33' N, 159°39' W	40.6	225	Euphausiids	5	2
August								
1	33	0028-0140	52°30' N, 160°43' W	6.9	225	Euphausiids	12	6
1	34	0146-0222	52°29' N, 160°59' W	8.9	60	Euphausiids	19	5
1	35	0228-0305	52°28' N, 161°08' W	183.1	30	Euphausiids	13	11
1	36	1323-1415	52°21' N, 163°33' W	13.0	250	Euphausiids	23	1
1-2	37	2306-0134	52°14' N, 165°42' W	4.4	225	Euphausiids	34	10
3	38	1215-1255	52°22' N, 172°14' W	3.7	120	Copepods, amphipods	10	0
3	39	1305-1347	52°28' N, 172°19' W	2.4	100	Copepods, arrow worms, amphipods	2	6
4	40	0020-0113	52°21' N, 174°45' W	3.3	225	Arrow worms, euphausiids, copepods	12	1
4	41	0117-0155	52°19' N, 174°50' W	3.9	60	Arrow worms euphausiids, amphipods	9	7
4	42	0201-0235	52°18' N, 174°52' W	27.2	30	Arrow worms, euphausiids	11	19
4	43	0243-0257	52°16' N, 174°57' W	32.1	20	Euphausiids	5	4
6-7	44	+11 2337-0015	51°52' N, 175°56' W	0.3	60	Euphausiids	1	0
7	45	0137-0210	51°49' N, 175°53' W	2.1	20	Euphausiids	0	8

APPENDIX TABLE 1a (continued)

Date 1957	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
August		+11						
7	46	0245-0338	51°41' N, 176°00' W	3.8	225	Euphausiids, arrow worms	2	3
7	47	0351-0430	51°31' N, 176°15' W	17.8	60	Arrow worms	16	8
9	48	1303-1403	50°42' N, 177°31' W	1.7	225	Arrow worms, amphipods	1	1
9	49	1418-1453	50°49' N, 177°32' W	2.6	60	Crab larvae	0	1
9	50	2324-2358	51°42' N, 178°20' W	3.7	30	Copepods	0	4
10	51	0003-0100	51°45' N, 178°22' W	1.7	225	Amphipods, arrow worms, copepods	0	2
10	52	0310-0346	52°03' N, 178°24' W	5.5	60	Copepods, arrow worms	1	2
10	53	1758-1905	52°28' N, 178°40' W	2.2	250	Arrow worms, copepods, euphausiids	49	1
11	54	1454-1550	51°47' N, 179°53' W	2.4	225	Arrow worms, copepods, euphausiids, amphipods	5	0
11	55	2044-2155	51°37' N, 179°58' W	2.5	225	Arrow worms, copepods, euphausiids, amphipods	3	4
11	56	2200-2240	51°35' N, 180°00'	4.4	60	Arrow worms, copepods, euphausiids, amphipods	3	6
12	57	1116-1217	51°22' N, 179°41' E	3.3	225	Arrow worms	0	7
12	58	1221-1257	51°18' N, 179°26' E	2.5	60	Arrow worms, amphipods	1	4
12	59	1618-1716	51°08' N, 178°44' E	10.3	225	Arrow worms, copepods, euphausiids	0	2
12	60	1723-1759	51°06' N, 178°32' E	---	60	(Sample discarded)		
14-15	61	2311-0015	50°31' N, 176°54' E	3.1	225	Euphausiids	32	1
15	62	0019-0053	50°28' N, 176°49' E	2.8	60	Euphausiids	6	1
15	63	0059-0135	50°25' N, 176°45' E	6.9	60	Euphausiids	0	0
15	64	0140-0212	50°23' N, 176°42' E	7.8	20	Euphausiids	0	1

APPENDIX TABLE 1a (continued)

Date 1957	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
August		+11						
15	65	1348-1445	49°44' N, 174°27' E	1.6	225	Euphausiids	0	0
15	66	1449-1527	49°40' N, 174°20' E	0.5	60	Euphausiids	0	0
16	67	0752-0848	49°26' N, 173°32' E	0.2	120	(1) Jellyfish	0	0
16	68	2232-2341	50°44' N, 174°20' E	8.8	225	Euphausiids	67	1
16-17	69	2348-0030	50°47' N, 174°24' E	11.3	60	Arrow worms, euphausiids	78	2
17	70	0035-0104	50°50' N, 174°28' E	40.5	30	Euphausiids	659	8
17	71	0110-0145	50°53' N, 174°31' E	---	60	(Sample used for isotope analysis)		
18	72	1331-1416	51°16' N, 174°49' E	0.1	60	Crab larvae	1	0
18	73	1411-1504	51°19' N, 175°00' E	3.3	225	Euphausiids, copepods	3	7
18	74	1848-1942	51°27' N, 175°46' E	7.2	225	Euphausiids, copepods	24	6
19	75	0336-0411	52°06' N, 177°03' E	2.0	30	Copepods, arrow worms	3	3
19	76	0414-0450	52°09' N, 177°06' E	2.5	60	Arrow worms, copepods	4	0
19	77	0453-0552	52°14' N, 177°08' E	1.0	225	Copepods, arrow worms	2	4
20	78	0005-0056	52°40' N, 178°21' E	14.7	225	Euphausiids	25	16
20	79	0101-0134	52°39' N, 178°26' E	12.9	60	Euphausiids	21	15
20	80	0139-0210	52°38' N, 178°33' E	28.2	30	Euphausiids, squid	95	71
20	81	1612-1700	52°46' N, 179°32' W	1.9	225	Copepods, euphausiids	12	4
20	82	2240-2345	52°58' N, 179°20' W	3.9	225	Euphausiids	39	27
20-21	83	2350-0033	53°04' N, 179°21' W	9.2	60	Euphausiids, arrow worms	58	28
21	84	0039-0114	53°09' N, 179°22' W	20.7	30	Euphausiids, squid	64	163
24	85	0032-0124	51°26' N, 174°10' W	6.2	225	Euphausiids, arrow worms	27	39
24	86	0132-0207	51°24' N, 174°06' W	10.0	225	Euphausiids, squid, arrow worms	49	7
29	87	0041-0127	55°18' N, 166°10' W	39.4	90	Amphipods, shrimp, euphausiids	0	1

APPENDIX TABLE 1a (continued)

Date 1957	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
August		+11						
29	88	0134-0208	55°15' N, 166°07' W	30.1	60	Amphipods, shrimp	3	2
29	89	2143-2249	53°20' N, 162°42' W	5.3	225	Euphausiids	12	16
29	90	2253-2331	53°18' N, 162°37' W	24.3	60	Euphausiids	12	10
September		+8						
7	91	0820-0856	58°43' N, 152°02' W	0.5	45	Crab larvae, amphipods	0	16
7	92	0903-0936	58°47' N, 152°07' W	0.9	25	Crab larvae	0	6
7	93	1056-1140	58°45' N, 152°39' W	2.0	120	Amphipods	0	1
8	94	2157-2240	58°42' N, 153°00' W	1.4	75	Shrimp	0	55
9	95	0004-0052	58°40' N, 152°48' W	5.0	120	Shrimp, euphausiids	0	41
9	96	0053-0127	58°41' N, 152°46' W	6.8	60	Shrimp, euphausiids	5	110
9	97	0128-0205	58°43' N, 152°44' W	4.0	60	Euphausiids, shrimp	12	85
9	98	0206-0240	58°45' N, 152°42' W	4.4	60	Euphausiids	1	121
9	99	0241-0317	58°45' N, 152°39' W	4.9	60	Crab larvae, euphausiids	2	88
11	100	0510-0553	56°48' N, 151°34' W	7.0	60	Euphausiids	1	3
11	101	0554-0651	56°45' N, 151°32' W	3.9	225	Euphausiids	15	2
11	102	0652-0728	56°42' N, 151°31' W	6.2	60	Euphausiids	20	1
11	103	0729-0829	56°40' N, 151°30' W	12.1	225	Euphausiids	25	3
13	104	1215-1312	53°07' N, 150°32' W	2.2	225	Copepods	2	2
13	105	1313-1347	53°07' N, 150°33' W	1.5	60	Copepods	4	4
13	106	1722-1815	52°38' N, 150°36' W	0.5	225	Copepods, euphausiids	4	0
13	107	1817-1904	52°34' N, 150°37' W	0.4	175	Copepods, euphausiids	4	1
13	108	1905-1945	52°29' N, 150°38' W	0.5	120	Copepods, arrow worms, euphausiids	0	0
13	109	1946-2024	52°25' N, 150°37' W	1.0	60	Copepods, euphausiids	0	0

APPENDIX TABLE 1a (continued)

Date 1957	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
September		+8						
14-15	110	2350-0040	51°49' N, 150°32' W	3.0	225	Euphausiids	5	0
15	111	0043-0126	51°45' N, 150°25' W	3.5	175	Euphausiids, arrow worms	4	1
15	112	0128-0207	51°42' N, 150°21' W	3.8	120	Euphausiids	4	0
15	113	0209-0245	51°40' N, 150°15' W	3.5	90	Euphausiids	2	1
15	114	0246-0318	51°38' N, 150°08' W	1.6	60	Euphausiids	1	0
15	115	0320-0350	51°36' N, 150°03' W	6.7	30	Euphausiids	0	0
15	116	1632-1730	51°00' N, 148°33' W	3.9	225	Euphausiids	0	4
15	117	1732-1809	50°58' N, 148°28' W	1.1	60	Euphausiids, jelly fish	0	0
16	118	0032-0124	50°37' N, 147°44' W	6.3	225	Euphausiids, shrimp	20	4
16	119	0126-0206	50°31' N, 147°37' W	5.5	120	Euphausiids, shrimp	10	2
16	120	0208-0242	50°27' N, 147°30' W	6.5	60	Euphausiids	12	0
16	121	0245-0315	50°24' N, 147°24' W	16.0	30	Euphausiids	74	39
16	122	1210-1300	49°49' N, 146°02' W	0.4	225	Euphausiids, arrow worms	4	0
16	123	1303-1336	49°46' N, 145°55' W	0.6	60	Euphausiids	1	11
17	124	0004-0058	49°00' N, 144°30' W	2.9	225	Euphausiids, shrimp	20	1
17	125	0100-0134	48°58' N, 144°21' W	1.8	30	Euphausiids, arrow worms	77	9
17	126	0137-0227	48°56' N, 144°21' W	4.0	225	Shrimp, arrow worms	19	4
17	127	0232-0307	48°54' N, 144°17' W	0.6	40	Arrow worms	33	3
17	128	0308-0340	48°52' N, 144°12' W	0.9	30	Jelly fish, arrow worms	9	5
17	129	1159-1253	48°13' N, 143°03' W	0.5	225	Arrow worms	0	6
17	130	1257-1336	48°11' N, 143°00' W	0.5	60	Arrow worms	0	8
19	131	0019-0050	47°58' N, 139°30' W	6.4	30	Shrimp, euphausiids	12	0
19	132	0052-0139	47°58' N, 139°25' W	19.7	120	Shrimp, euphausiids	12	0
19	133	0142-0233	47°58' N, 139°21' W	10.8	225	Shrimp, euphausiids	13	0

APPENDIX TABLE 1a (continued)

Date 1957	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
September		+8						
19	134	0237-0322	47°58' N, 139°16' W	15.0	175	Shrimp, euphausiids	18	0
19	135	0324-0357	47°58' N, 139°11' W	35.3	60	Euphausiids, shrimp	48	1
19	136	0403-0436	47°58' N, 139°07' W	13.6	30	Shrimp, euphausiids	18	1
20	137	0015-0047	48°03' N, 134°43' W	7.8	60	Euphausiids, shrimp, arrow worms	32	1
20	138	0050-0143	48°03' N, 134°40' W	7.1	225	Shrimp	21	5
20	139	0147-0232	48°03' N, 134°36' W	17.8	175	Shrimp	17	12
20	140	0238-0327	48°03' N, 134°30' W	16.3	120	Shrimp	29	11
20	141	0331-0405	48°03' N, 134°25' W	28.7	30	Shrimp	22	29
20	142	0407-0442	48°03' N, 134°20' W	35.7	60	Shrimp	85	16
21	143	0012-0104	48°15' N, 130°10' W	10.6	225	Shrimp	11	6
21	144	0108-0153	48°15' N, 130°08' W	10.0	175	Shrimp	19	14
21	145	0156-0236	48°15' N, 130°05' W	17.5	120	Shrimp, euphausiids	32	4
21	146	0243-0316	48°15' N, 129°56' W	61.4	60	Euphausiids, shrimp	125	6
21	147	0318-0350	48°15' N, 129°52' W	25.8	30	Shrimp, euphausiids	29	3
21	148	0352-0445	48°15' N, 129°47' W	18.9	225	Euphausiids, shrimp	34	3
22	149	0022-0033	48°25' N, 125°42' W	325.0	90	Euphausiids	7	3

APPENDIX TABLE 1b - Catch Data For Each Haul - BROWN BEAR Cruise 199
(* indicates hauls made with 3-foot net; all other hauls made with 6-foot net)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
June								
30	1	1304-1355	S. end Whidbey Is., Wn.	1.6	25	Crab larvae, amphiphods	0	4
30	2	1356-1507	Double Bluff, Wn.	2.1	45	Crab larvae	4	14
30	3	1509-1609	Bush Point, Wn.	20.0	60	Crab larvae, euphausiids	7	31
30	4	1611-1711	Marrowstone Pt., Wn.	24.2	75	Crab larvae, shrimp euphausiids	40	28
30	5	1713-1807	Pt. Wilson, Wn.	18.5	30	Crab larvae	2	5
30	6	2151-2234	Off Race Rocks, Str. Juan de Fuca	61.4	120	Euphausiids	31	22
30	7	2237-2314	W. of Race Rocks, Str. Juan de Fuca	232.4	60	Euphausiids	3	19
30	8	2317-2354	W. of Race Rocks, Str. Juan de Fuca	179.8	30	Euphausiids	1	26
July								
1	9*	1033-1113	48°37' N, 126°19' W	0.8	60	Crab larvae	0	1
1	10	1400-1501	48°39' N, 126°54' W	4.9	225	Euphausiids, arrow worms	0	1
1	11*	1504-1543	48°39' N, 127°03' W	0.3	60	Euphausiids	1	0
1	12*	1555-1644	48°40' N, 127°12' W	<0.1	60	Crab larvae	0	0
2	13	0424-0544	48°36' N, 127°38' W	7.5	225	Euphausiids	37	4
2	14	0548-0622	48°37' N, 127°41' W	0.4	30	Euphausiids (contaminated)	1	0
2	15	0624-0702	48°38' N, 127°57' W	0.2	60	Euphausiids (contaminated)	0	1
2	16*	0719-0759	48°38' N, 128°07' W	0.1	60	Pteropods	0	0
2	17	1314-1410	48°43' N, 129°10' W	0.1	225	Arrow worms, copepods	0	0
2	18	1414-1451	48°44' N, 129°18' W	<0.1	60	- - -	0	1
2	19*	1458-1538	48°44' N, 129°26' W	<0.1	60	- - -	2	0

APPENDIX TABLE 1b (continued)

Date 1958	Haul	Time	Position	Corr. Plankton Volume	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
July				ml/min				
2	20	1805-1902	48°47' N, 129°59' W	0.2	225	Amphipods	0	0
3	21	0219-0258	48°49' N, 130°17' W	0.6	30	Squids, euphausiids	37	0
3	22	0306-0343	48°49' N, 130°23' W	6.1	60	Euphausiids	54	0
3	23	0350-0453	48°50' N, 130°33' W	3.2	225	Euphausiids	40	0
3	24	0508-0546	48°50' N, 130°41' W	0.1	60	Amphipods, squids	0	0
3	25*	0603-0644	48°51' N, 130°51' W	<0.1	60	Copepods	0	0
3	26	1323-1418	48°56' N, 131°54' W	0.6	225	Arrow worms, amphipods	0	2
3	27*	1419-1457	48°57' N, 132°04' W	0.3	60	Arrow worms, amphipods	1	6
3	28*	1507-1547	48°58' N, 132°12' W	<0.1	60	Radiolarians, copepods	0	0
4	29	0811-0852	49°00' N, 132°57' W	<0.1	60	Crustacean larvae	0	0
4	30	1312-1413	49°02' N, 133°45' W	1.6	225	Arrow worms, amphipods, euphausiids	0	1
4	31	1414-1450	49°03' N, 133°54' W	0.1	60	Amphipods, squid	0	0
4	32*	1511-1553	49°04' N, 134°03' W	<0.1	60	Crustacean larvae	0	0
4	33*	1909-1951	49°08' N, 134°41' W	<0.1	60	Fish, crustacean larvae	0	6
4	34	2142-2244	49°09' N, 134°57' W	8.9	225	Shrimp, euphausiids, arrow worms	21	12
4	35	2245-2326	49°10' N, 135°05' W	11.6	60	Shrimp, euphausiids, copepods	37	18
4-5	36	2334-0010	49°10' N, 135°12' W	9.7	30	Euphausiids, copepods, shrimp	68	10
5	37	0011-0110	49°10' N, 135°19' W	10.2	225	Euphausiids, shrimp, arrow worms	26	10
5	38	0121-0159	49°10' N, 135°27' W	26.3	60	Shrimp, euphausiids	24	3
5	39	0201-0236	49°10' N, 135°32' W	5.7	30	Euphausiids	58	45

APPENDIX TABLE 1b (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
July								
5	40*	0957-1038	49°12' N, 135°28' W	0.2	60	Copepods	0	4
5	41	1423-1522	49°14' N 136°18' W	1.4	225	Arrow worms, copepods	1	4
5	42*	1533-1609	49°14' N, 136°28' W	1.7	60	Arrow worms	0	2
5	43*	1621-1704	49°14' N, 136°38' W	<0.1	60	Copepods	0	1
5	44*	1914-1957	49°16' N, 137°10' W	<0.1	60	- - -	0	0
5	45	2133-2235	49°16' N, 137°31' W	4.8	225	Shrimp	37	6
5	46	2237-2315	49°16' N, 137°42' W	7.2	60	Shrimp, euphausiids	46	11
5-6	47	2324-0002	49°16' N, 137°48' W	14.5	30	Shrimp, euphausiids	55	4
6	48*	0007-0051	49°16' N, 137°55' W	100.0	60	Shrimp	32	1
6	49	1324-1419	49°14' N, 138°28' W	0.4	225	Shrimp (contamination)	2	0
6	50	1421-1457	49°15' N, 138°37' W	0.1	60	(contamination)	1	0
6	51*	1516-1557	49°16' N, 138°51' W	0.2	60	Shrimp (contamination)	0	0
6	52*	1907-1950	49°19' N, 139°32' W	0.1	60	(contamination)	12	0
6	53	2230-2328	49°22' N, 140°10' W	3.9	225	Euphausiids, shrimp	25	3
6-7	54	2336-0013	49°23' N, 140°19' W	10.1	60	Shrimp, euphausiids	49	6
7	55*	0012-0051	49°23' N, 140°25' W	3.8	60	Euphausiids, shrimp	15	0
7	56*	0056-0132	49°24' N, 140°32' W	13.9	30	Euphausiids	11	5
7	57	0133-0209	49°24' N, 140°38' W	8.3	30	Euphausiids	36	4
7	58	1347-1503	49°29' N, 141°07' W	<0.1	225	(contamination)	3	1
7	59*	1521-1603	49°30' N, 141°21' W	0.1	60	(contamination)	2	0
7	60	1907-2002	49°33' N, 141°58' W	5.9	225	Copepods, arrow worms	0	17
7	61	2003-2040	49°33' N, 142°06' W	1.6	60	Copepods, arrow worms	0	3

APPENDIX TABLE 1b (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
July								
7	62*	2106-2145	49°34' N, 142°17' W	0.1	60	Copepods	0	1
7-8	63	2304-0006	49°36' N, 142°37' W	5.2	225	Euphausiids	13	3
8	64	0007-0045	49°37' N, 142°46' W	16.4	60	Euphausiids, arrow worms, copepods	23	11
8	65*	0045-0126	49°37' N, 142°52' W	7.3	60	Euphausiids, copepods	8	6
8	66*	0131-0206	49°38' N, 143° 00' W	10.7	30	Euphausiids, copepods	34	8
8	67	0206-0241	49°38' N, 143° 05' W	42.1	30	Euphausiids, copepods	109	7
8	68	0243-0338	49°39' N, 143° 12' W	9.1	225	Euphausiids, shrimp	20	13
8	69	0345-0424	49°39' N, 143°20' W	17.9	60	Arrow worms, euphausiids	62	13
8	70	1321-1419	49°45' N, 144° 03' W	1.2	225	Copepods, euphausiids	0	2
8	71	1421-1458	49°45' N, 144° 10' W	0.2	60	Copepods	0	3
8	72*	1559-1639	49°46' N, 144° 25' W	0.2	60	Copepods	0	0
8	73*	1941-2024	49°47' N, 144° 51' W	0.1	60	Copepods	0	2
8-9	74	2317-0013	49°48' N, 145° 20' W	8.0	225	Euphausiids, arrow worms, copepods	14	22
9	75*	0014-0052	49°48' N, 145° 28' W	55.2	60	Copepods	40	23
9	76*	0053-0132	49°48' N, 145° 34' W	26.9	60	Copepods	20	10
9	77*	0139-0214	49°48' N, 145°41' W	17.1	30	Copepods, shrimp, euphausiids	97	108
9	78	0213-0246	49°48' N, 145°46' W	48.5	30	Copepods, shrimp, euphausiids	351	158
9	79*	1954-2035	49°48' N, 145°47' W	0.5	60	Copepods, arrow worms	0	3
9-10	80	2342-0039	49°30' N, 145°53' W	9.6	225	Copepods, euphausiids, arrow worms	21	21
10	81	0050-0128	49°25' N, 145°54' W	34.2	60	Copepods	33	14
10	82*	0128-0208	49°22' N, 145°55' W	3.8	60	Copepods, euphausiids	5	3

APPENDIX TABLE 1b (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
July								
10	83*	0210-0247	49°19' N, 145°56' W	8.1	30	Copepods, euphausiids	18	34
10	84	0247-0324	49°16' N, 145°57' W	62.1	30	Copepods, shrimp, euphausiids	109	128
10	85	0332-0428	49°11' N, 145°59' W	10.7	225	Euphausiids, copepods	33	48
10	86	0430-0508	49°06' N, 146°00' W	17.1	60	Euphausiids	69	14
10	87	1237-1335	48°04' N, 146°19' W	0.3	225	Euphausiids (contamination)	6	2
10-11	88	2337-0033	47°36' N, 146°23' W	8.0	225	Euphausiids, shrimp, copepods	31	22
11	89	0034-0112	47°32' N, 146°24' W	18.4	60	Euphausiids, shrimp	55	6
11	90*	0112-0153	47°28' N, 146°24' W	4.9	60	Euphausiids, shrimp	8	1
11	91*	0158-0235	47°24' N, 146°25' W	13.5	30	Euphausiids, copepods	40	0
11	92	0234-0308	47°20' N, 146°26' W	38.2	30	Euphausiids, shrimp, copepods	242	13
11	93	0314-0412	47°16' N, 146°25' W	7.8	225	Euphausiids, shrimp, copepods	44	9
11	94	0414-0451	47°11' N, 146°25' W	28.4	60	Copepods, shrimp. euphausiids	36	4
11	95*	1148-1223	46°25' N, 146°29' W	0.1	Surface	Copepods (contamination)	0	0
12	96	0247-0344	45°56' N, 146°25' W	10.5	225	Shrimp	31	7
12	97	0350-0433	45°50' N, 146°25' W	8.7	130	Euphausiids, shrimp, copepods	27	8
12	98	0438-0513	45°46' N, 146°25' W	2.3	30	Euphausiids, arrow worms	72	117
12	99	0514-0551	45°42' N, 146°25' W	13.5	60	Euphausiids, copepods	8	21
12	100	1347-1445	45°09' N, 146°25' W	1.7	225	Heteropods, euphausiids	1	8
12	101	1446-1524	45°03' N, 146°25' W	3.2	60	Heteropods, arrow worms, copepods	1	8

APPENDIX TABLE 1b (continued)

Date 1958	Haul	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
July								
12	102*	1533-1627	44°58' N, 146°26' W	1.9	120	Heteropods	0	8
12	103	1936-2036	44°31' N, 146°29' W	0.3	225	Copepods, arrow worms	2	20
12	104	2204-2307	44°17' N, 146°34' W	5.7	225	Euphausiids, shrimp	76	20
12	105	2313-2351	44°12' N, 146°36' W	2.6	60	Euphausiids	94	21
12-13	106	2354-0028	44°12' N, 146°37' W	1.8	30	Euphausiids, heteropods	325	131
13	107	0029-0125	44°05' N, 146°38' W	4.0	225	Euphausiids, shrimp	70	44
13	108	1334-1430	43°52' N, 146°34' W	1.8	225	Shrimp, heteropods	8	26
13	109	1432-1507	43°47' N, 146°29' W	4.3	60	Copepods, heteropods	0	44
13	110*	1518-1555	43°42' N, 146°25' W	1.4	60	Heteropods	0	2
13	111*	1903-1943	43°20' N, 146°05' W	0.1	60	Heteropods, arrow worms	0	6
13-14	112	2308-0013	42°58' N, 145°37' W	9.1	250-300	Euphausiids	25	10
14	113	0015-0114	42°53' N, 145°30' W	5.9	225	Euphausiids	44	3
14	114	0123-0201	42°49' N, 145°24' W	2.4	60	Euphausiids	10	34
14	115	0202-0238	42°46' N, 145°20' W	1.1	30	Euphausiids	90	8
14	116	0240-0322	42°43' N, 145°16' W	17.3	120	Euphausiids	23	30
14	117	0329-0418	42°40' N, 145°10' W	20.4	160	Euphausiids	69	4
14	118	0421-0515	42°36' N, 145°05' W	6.0	225	Euphausiids	37	3
14	119	1914-2007	42°02' N, 144°21' W	0.2	225	Euphausiids	3	4
14	120	2009-2046	47°57' N, 144°17' W	0.1	60	- - -	1	3
14	121*	2051-2134	41°54' N, 144°14' W	<0.1	60	- - -	0	0
14-15	122	2330-0025	41°41' N, 144°00' W	6.4	225	Euphausiids	53	14
15	123	0026-0103	41°37' N, 143°56' W	1.6	60	Euphausiids, shrimp	23	1
15	124	0110-0145	41°34' N, 143°53' W	0.4	30	Euphausiids	40	3

APPENDIX TABLE 1b (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
July								
15	125	0147-0229	41°30' N, 143°49' W	4.2	120	Euphausiids	24	6
15	126	0232-0320	41°26' N, 143°45' W	5.2	160	Euphausiids	31	3
15	127	0327-0424	41°22' N, 143°40' W	5.3	225	Euphausiids	33	7
15	128	1611-1705	40°36' N, 142°54' W	0.2	225	Euphausiids	0	1
15	129	1712-1748	40°30' N, 142°49' W	2.5	60	Euphausiids	0	1
15	130*	1800-1840	40°25' N, 142°44' W	0.2	60	Euphausiids, pteropods	0	0
15-16	131	2307-0003	39°56' N, 142°14' W	1.8	225	Euphausiids	47	11
16	132	0004-0042	39°52' N, 142°10' W	1.6	60	Euphausiids	37	1
16	133	0043-0118	34°49' N, 142°06' W	2.9	30	Euphausiids	32	1
16	134	0127-0209	39°45' N, 142°03' W	4.1	120	Euphausiids	22	10
16	135	0211-0259	39°41' N, 141°59' W	5.2	160	Euphausiids	27	0
16	136	0308-0406	39°35' N, 141°53' W	2.2	225	Euphausiids, shrimp	35	6
16	137	1309-1408	38°41' N, 141°01' W	0.3	225	Pteropods	2	2
16	138	1409-1446	38°36' N, 140°56' W	3.2	60	Pteropods	0	2
16	139*	1508-1553	38°28' N, 140°50' W	0.2	60	Amphipods	1	0
17	140	1331-1429	38°25' N, 139°37' W	0.1	225	Heteropods, arrow worms, pteropods	1	3
17	141	1430-1507	38°27' N, 139°28' W	0.4	60	Pteropods	1	1
17	142*	1521-1602	38°29' N, 134°19' W	0.1	60	Pteropods, heteropods	0	0
17	143*	1910-1951	38°37' N, 138°43' W	2.7	60	Euphausiids	0	0
17-18	144	2310-0006	38°46' N, 138°08' W	1.8	225	Euphausiids	16	0
18	145	0007-0044	38°48' N, 138°02' W	8.1	60	Euphausiids	9	1

APPENDIX TABLE 1b (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
July								
18	146	0045-0120	38°50' N, 137°56' W	2.9	30	Euphausiids	11	0
18	147	0127-0210	38°51' N, 137°51' W	2.9	120	Euphausiids	15	0
18	148	0212-0300	38°53' N, 137°45' W	2.1	160	Euphausiids	8	2
18	149	0307-0403	38°56' N, 137°37' W	1.4	225	Euphausiids, shrimp	28	1
18	150	1642-1739	39°21' N, 136°21' W	1.4	225	Euphausiids	1	3
18	151*	1479-1825	39°23' N, 136°13' W	0.6	60	Pteropods, euphausiids	2	0
18	152*	1832-1914	39°25' N, 136°06' W	3.6	60	Euphausiids	0	0
18-19	153	2311-0008	39°36' N, 135°29' W	2.6	225	Euphausiids	24	3
19	154	0010-0047	39°38' N, 135°22' W	6.8	60	Euphausiids, shrimp	47	4
19	155	0049-0124	39°39' N, 135°15' W	2.3	30	Euphausiids	49	2
19	156	0038-0210	39°41' N, 135°09' W	0.5	20	Euphausiids	57	2
19	157	0212-0254	39°43' N, 135°04' W	6.5	120	Euphausiids	21	3
19	158	0259-0350	39°45' N, 134°56' W	3.9	160	Euphausiids	14	5
19	159	0359-0452	39°47' N, 134°48' W	3.3	225	Euphausiids	34	5
19	160	1325-1421	40°11' N, 133°27' W	0.3	225	Euphausiids	0	2
19	161	1422-1457	40°13' N, 133°19' W	0.7	60	Euphausiids	0	2
19	162*	1507-1551	40°15' N, 133°13' W	0.1	60	Amphipods	0	1
19	163*	1553-1635	40°17' N, 133°06' W	0.1	60	Amphipods	0	0
19	164*	1912-1955	40°28' N, 132°36' W	<0.1	60	Amphipods	0	0
19	165	2000-2042	40°31' N, 132°30' W	3.8	60	Euphausiids	0	1
20	166	1137-1246	40°20' N, 131°42' W	0.1	225	Arrow worms	0	9
20	167	1249-1328	40°18' N, 131°32' W	0.1	60	Arrow worms	0	4
20	168*	1339-1422	40°16' N, 131°24' W	<0.1	60	- - -	0	0

APPENDIX TABLE 1b (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
July								
20-21	169	2337-0031	40°02' N, 130°47' W	1.9	225	Euphausiids, shrimp	20	6
21	170	0032-0109	40°00' N, 130°40' W	0.8	60	Euphausiids	51	2
21	171	0118-0152	39°59' N, 130°34' W	1.8	30	Euphausiids	9	1
21	172	0154-0234	39°58' N, 130°29' W	5.6	120	Euphausiids, shrimp	18	1
21	173	0236-0329	39°56' N, 130°23' W	1.7	160	Euphausiids, shrimp	17	7
21	174	0332-0413	39°55' N, 130°17' W	3.0	90	Euphausiids, shrimp	26	1
21	175	0415-0509	39°53' N, 130°09' W	1.5	225	Euphausiids, shrimp	31	3
23	176*	Net lost -- cable parted						
23	177*	0235-0310	38°42' N, 125°59' W	0.1	30	Crustacean larvae	2	0
23	178	0320-0355	38°40' N, 125°54' W	2.6	30	Euphausiids, fish larvae	12	38
23	179*	0356-0437	38°38' N, 125°48' W	12.2	60	Euphausiids	13	11
23	180*	0438-0531	38°37' N, 125°43' W	4.7	120	Euphausiids	0	11
23	181*	1432-1508	38°16' N, 124°33' W	0.1	30	- - -	0	8
23	182*	1515-1555	38°14' N, 124°24' W	0.1	60	Larval fish	0	28
23	183*	2150-2233	38°03' N, 123°25' W	4.6	120	Euphausiids	2	10
23	184*	2235-2316	38°02' N, 123°20' W	2.4	60	Euphausiids	0	7
23	185*	2318-2354	37°59' N, 123°14' W	0.1	30	Crustacean larvae	0	4
27	186*	0041-0118	37°02' N, 123°45' W	44.6	30	Euphausiids	32	14
27	187*	0119-0155	36°58' N, 123°41' W	26.4	30	Euphausiids	29	8
27	188*	0157-0239	36°54' N, 123°36' W	25.0	60	Euphausiids	39	73
27	189*	0234-0324	36°50' N, 123°32' W	10.4	60	Euphausiids	23	30
27	190*	0326-0417	36°46' N, 123°27' W	14.6	120	Euphausiids	36	5
27	191*	0419-0511	36°40' N, 123°21' W	11.9	120	Euphausiids	11	10

APPENDIX TABLE 1b (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
July								
27	192*	1442-1538	35°39' N, 122°08' W	0.1	120	Amphipods	0	5
27	193*	1541-1622	35°33' N, 122°01' W	0.1	60	Fish, crustacean larvae	0	13
27	194*	1625-1658	35°30' N, 121°56' W	0.1	30	Fish, crustacean larvae	0	11
27-28	195*	2310-0003	34°54' N, 121°10' W	3.8	120	Euphausiids	25	10
28	196*	0005-0100	34°49' N, 121°04' W	5.0	120	Euphausiids	37	13
28	197*	0108-0151	34°46' N, 120°59' W	5.2	60	Euphausiids	7	5
28	198*	0153-0234	34°43' N, 120°55' W	3.2	60	Euphausiids	0	4
28	199*	0236-0312	34°40' N, 120°52' W	31.9	30	Euphausiids	0	1
28	200*	1310-1403	34°07' N, 119°31' W	0.2	120	Crustacean larvae	0	0
28	201*	1404-1448	34°06' N, 119°25' W	0.1	60	Crustacean larvae	0	0
28	202*	1451-1528	34°01' N, 119°17' W	0.1	30	Crustacean larvae	0	0
28	203*	2236-2332	33°21' N, 118°12' W	4.0	120	Euphausiids	44	0
28-29	204*	2337-0020	33°17' N, 118°05' W	5.2	60	Euphausiids	69	0
29	205*	0022-0059	33°13' N, 118°00' W	1.1	30	Euphausiids	0	0
31	206	2209-2331	32°47' N, 118°40' W	4.6	400	Euphausiids	39	45
August								
1	207	2338-0034	32°49' N, 118°49' W	6.7	225	Euphausiids	47	13
1	208	0038-0118	32°50' N, 118°56' W	5.0	60	Euphausiids	102	9
1	209	0123-0159	32°51' N, 119°02' W	16.7	30	Euphausiids	13	46
1	210	1309-1427	33°07' N, 120°32' W	0.6	400	Euphausiids	102	71
1	211	1429-1505	33°08' N, 120°41' W	0.3	60	Amphipods, fish and crustacean larvae	5	31

APPENDIX TABLE 1b (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
August								
1	212	1510-1600	33°08' N, 120°47' W	1.0	225	Euphausiids	3	12
1	213*	1606-1644	33°09' N, 120°54' W	<0.1	30	Crustacean, fish larvae	0	4
1	214*	2009-2050	33°13' N, 121°21' W	0.4	60	Euphausiids	5	3
1-2	215	2314-0008	33°16' N, 121°42' W	0.4	225	Euphausiids	10	9
2	216	0010-0046	33°16' N, 121°46' W	0.1	60	Euphausiids	0	3
2	217	0047-0122	33°17' N, 121°50' W	Net fouled. No satisfactory sample				
2	218	0128-0204	33°17' N, 121°55' W	0.6	60	Euphausiids	9	4
2	219	0206-0239	33°18' N, 121°58' W	0.3	30	Euphausiids	1	13
2	220	0240-0321	33°19' N, 122°03' W	0.7	120	Euphausiids	6	7
2	221	0325-0442	33°20' N, 122°10' W	0.5	400	Euphausiids	9	4
2	222	1312-1429	33°31' N, 123°28' W	0.1	400	Euphausiids	3	1
2	223	1447-1523	33°32' N, 123°34' W	<0.1	60	Amphipods	0	0
2	224*	1534-1617	33°32' N, 123°38'	<0.1	60	- - -	0	0
2	225*	1920-2002	33°38' N, 124°14' W	0.5	60	Euphausiids	0	0
2-3	226	2314-0007	33°43' N, 124°48' W	0.3	225	Copepods	11	8
3	227	0009-0050	33°44' N, 124°53' W	1.2	120	Euphausiids	24	0
3	228	0105-0142	33°45' N, 125°01' W	0.3	60	Euphausiids	7	1
3	229	0143-0219	33°46' N, 125°06' W	2.8	30	Euphausiids	14	9
3	230	0220-0307	33°46' N, 125°12' W	2.1	180	Euphausiids	24	4
3	231	0310-0421	33°48' N, 125°22' W	0.3	400	Copepods, euphausiids	20	12
3-4	232	2312-0006	33°42' N, 126°23' W	0.5	225	Euphausiids, shrimp	13	5
4	233	0010-0048	33°39' N, 126°28' W	0.3	60	Pteropods	16	2
4	234	0049-0126	33°36' N, 126°32' W	0.2	60	Euphausiids	4	3

APPENDIX TABLE 1b (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
August								
4	235	0130-0205	33°34' N, 126°35' W	0.7	30	Euphausiids	4	2
4	236	0207-0251	33°31' N, 126°40' W	1.1	120	Euphausiids	20	7
4	237	0255-0413	33°27' N, 126°46' W	0.5	400	Shrimp, euphausiids, copepods	23	5
4	238	1431-1542	32°52' N, 127°40' W	0.1	225	Pteropods	1	2
4	239	1544-1701	32°47' N, 127°48' W	0.1	400	Amphipods, pteropods	0	1
4	240	1710-1749	32°40' N, 127°57' W	0.1	60	Amphipods	0	0
4	241	2254-2350	32°16' N, 128°33' W	1.1	225	Euphausiids	22	7
4-5	242	2351-0047	32°12' N, 128°38' W	0.9	225	Euphausiids, shrimp, copepods	14	8
5	243	0054-0131	32°10' N, 128°43' W	0.4	60	Euphausiids	23	19
5	244	0132-0209	32°08' N, 128°47' W	1.4	30	Euphausiids	8	137
5	245	0210-0321	32°06' N, 128°51' W	0.4	400	Euphausiids, shrimp	15	42
5-6	246	2312-0007	33°00' N, 129°21' W	0.5	225	Shrimp	4	3
6	247	0010-0050	33°03' N, 129°23' W	0.1	60	Euphausiids	5	2
6	248	0058-0135	33°06' N, 129°24' W	0.1	30	Euphausiids	20	42
6-7	249	2317-0008	35°03' N, 130°09' W	0.4	225	Euphausiids, shrimp	6	3
7	250	0011-0050	35°05' N, 130°10' W	0.5	60	Euphausiids	17	4
7	251	0051-0127	35°08' N, 130°11' W	0.3	30	Euphausiids	19	17
7	252	0128-0204	35°10' N, 130°12' W	0.6	30	Euphausiids	18	14
7	253	0209-0247	35°13' N, 130°13' W	0.5	60	Euphausiids	8	6
7	254	0248-0406	35°17' N, 130°15' W	0.3	400	Euphausiids, shrimp	16	5
7	255	1902-2031	36°27' N, 130°44' W	0.2	400	Euphausiids	22	5
7-8	256	2310-0008	36°45' N, 130°51' W	0.3	225	Euphausiids, shrimp	34	9
8	257	0009-0054	36°48' N, 130°53' W	1.1	120	Euphausiids, shrimp	32	17

APPENDIX TABLE 1b (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
August								
8	258	0056-0133	36°52' N, 130°54' W	0.7	60	Euphausiids	19	13
8	259	0134-0210	36°55' N, 130°55' W	0.4	30	Euphausiids	6	17
8	260	0215-0248	36°58' N, 130°57' W	0.6	20	Euphausiids	12	12
8	261	0252-0408	37°03' N, 130°59' W	0.4	400	Euphausiids	8	10
8	262	1655-1810	38°35' N, 131°32' W	0.1	400	- - -	2	3
8-9	263	2309-0021	39°20' N, 131°49' W	0.7	400	Euphausiids	41	18
9	264	0022-0116	39°24' N, 131°50' W	1.9	225	Euphausiids	49	10
9	265	0118-0156	39°29' N, 131°52' W	2.6	60	Euphausiids	29	13
9	266	0159-0233	39°32' N, 131°53' W	0.6	30	Euphausiids	16	9
9	267	0234-0317	39°35' N, 131°54' W	0.7	120	Euphausiids	21	11
9	268	0318-0433	39°41' N, 131°57' W	0.5	400	Euphausiids	38	13
9	269	1904-2018	40°41' N, 132°33' W	0.7	400	Euphausiids	5	13
9-10	270	2310-0006	41°03' N, 132°58' W	3.1	225	Euphausiids	26	5
10	271	0007-0045	41°06' N, 133°02' W	2.0	60	Euphausiids	22	2
10	272	0047-0123	41°08' N, 133°05' W	3.5	30	Euphausiids	27	5
10	273	0124-0158	41°10' N, 133°07' W	1.2	20	Euphausiids, pteropods, heteropods	4	2
10	274	0204-0246	41°13' N, 133°10' W	8.9	120	Euphausiids	22	4
10	275	0248-0337	41°16' N, 133°13' W	6.1	180	Euphausiids	16	3
10	276	0338-0453	41°20' N, 133°18' W	3.0	400	Euphausiids	16	28
10-11	277	2310-0020	42°42' N, 135°17' W	5.0	225	Euphausiids	53	15
11	278	0024-0102	42°46' N, 135°22' W	2.0	60	Euphausiids	113	3
11	279	0104-0138	42°48' N, 135°24' W	0.6	30	Euphausiids	9	4
11	280	0139-0238	42°52' N, 135°28' W	2.5	225	Euphausiids, shrimp	17	8

APPENDIX TABLE 1b (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth	Dominant Plankton	No. Fish	No. Fish Larvae
August								
11	281	0242-0325	42°56' N, 135°33' W	8.1	120	Euphausiids, shrimp	21	7
11	282	0337-0454	43°01' N, 135°38' W	3.9	400	Euphausiids	28	27
12	283	1606-1645	45°24' N, 139°26' W	1.3	60	Copepods	0	5
12	284	1647-1742	45°27' N, 139°10' W	0.2	225	Copepods, arrow worms	0	1
12-13	285	2309-0005	45°36' N, 139°25' W	1.1	225	Euphausiids	19	8
13	286	0007-0044	45°39' N, 139°28' W	5.4	60	Euphausiids	32	9
13	287	0045-0121	45°41' N, 139°31' W	4.9	30	Euphausiids	247	28
13	288	0122-0155	45°43' N, 139°33' W	0.3	20	Euphausiids	2	22
13	289	0201-0244	45°46' N, 139°36' W	4.7	120	Euphausiids, shrimp	18	8
13	290	0245-0402	45°49' N, 139°40' W	2.9	400	Euphausiids, shrimp	38	5
13-14	291	2315-0008	47°22' N, 141°37' W	7.5	225	Euphausiids, shrimp	25	17
14	292	0010-0047	47°26' N, 141°41' W	56.8	60	Euphausiids, shrimp	68	8
14	293	0050-0125	47°29' N, 141°45' W	10.7	30	Euphausiids, shrimp	136	286
14	294	0126-0200	47°33' N, 141°49' W	4.4	20	Shrimp	8	31
14	295	0207-0249	47°41' N, 141°59' W	8.9	120	Shrimp	14	55
14	296	0250-0407	47°47' N, 142°06' W	3.9	400	Euphausiids	26	22
14-15	297	2345-0044	48°04' N, 142°35' W	4.7	225	Shrimp	18	46
15	298	0053-0137	48°04' N, 142°23' W	13.6	60	Euphausiids, shrimp, copepods	32	19
15	299	0146-0221	48°03' N, 142°13' W	22.1	30	Euphausiids, shrimp	87	91
15	300	0237-0312	48°04' N, 142°04' W	9.3	20	Euphausiids, shrimp	9	10
15	301*	1621-1658	48°04' N, 139°49' W	<0.1	60	- - -	0	0
15	302*	1712-1806	48°05' N, 139°35' W	0.1	225	- - -	0	6
15	303	1808-1921	48°05' N, 139°26' W	<0.1	400	- - -	0	6

APPENDIX TABLE 1b (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
August								
15	304*	2236-2328	48°10' N, 138°48' W	1.0	225	Euphausiids, shrimp	2	15
15-16	305*	2330-0005	48°11' N, 138°41' W	5.0	60	Shrimp	9	19
16	306*	0007-0042	48°11' N, 138°36' W	11.4	30	Euphausiids, shrimp	9	338
16	307*	0050-0125	48°12' N, 138°29' W	3.6	20	Euphausiids, shrimp	8	41
16	308*	0127-0239	48°13' N, 138°21' W	0.3	400	Shrimp	2	11
17	309*	0016-0052	48°17' N, 135°17' W	6.3	60	Euphausiids, shrimp	4	6
17	310*	0053-0127	48°18' N, 135°11' W	14.0	30	Shrimp	12	28
17	311*	0129-0202	48°18' N, 135°06' W	0.6	20	Fish larvae, amphipods	3	36
17	312*	0203-0243	48°18' N, 135°02' W	6.3	120	Euphausiids, shrimp	4	21
17	313*	0249-0345	48°19' N, 134°55' W	1.9	225	Euphausiids, shrimp	0	6
17	314*	0348-0500	48°19' N, 134°45' W	0.6	400	Euphausiids, shrimp	4	9
17	315*	1806-1918	48°22' N, 132°33' W	0.3	400	Shrimp, amphipods	2	3
17-18	316*	2311-0006	48°22' N, 131°49' W	1.6	225	Euphausiids	6	7
18	317*	0007-0046	48°23' N, 131°41' W	38.5	60	Euphausiids, shrimp	3	10
18	318*	0048-0123	48°23' N, 131°35' W	1.7	30	Euphausiids, shrimp	0	9
18	319*	0130-0207	48°23' N, 131°27' W	1.1	40	Euphausiids, shrimp	5	22
18	320*	0208-0253	48°23' N, 131°22' W	0.4	120	Euphausiids, shrimp	7	3
18	321*	0300-0338	48°23' N, 131°13' W	2.1	60	Euphausiids, shrimp	17	57
18	322*	0339-0413	48°24' N, 131°08' W		No Sample			
18	323*	1641-1751	48°24' N, 129°07' W	1.4	400	Euphausiids, shrimp, amphipods	4	15
18	324*	1758-1850	48°23' N, 128°56' W	0.1	225	- - -	0	4
18	325*	2238-2332	48°24' N, 127°58' W	1.7	225	Euphausiids, shrimp	12	12

APPENDIX TABLE 1b (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
August								
18-19	326*	2333-0009	48°25' N, 127°51' W	13.9	60	Euphausiids	17	7
19	327*	0015-0050	48°26' N, 127°43' W	8.6	30	Euphausiids, shrimp, galatheids	68	39
19	328*	0052-0126	48°27' N, 127°37' W	11.8	20	Euphausiids, shrimp	235	9
19	329*	2124-2207	W. of Kydakh Pt., Wn.	33.0	120	Mysids	25	2
19	330*	2208-2242	Kydakh Pt., Wn	11.1	30	Euphausiids	0	0
20	331*	0649-0708	N. W. of Pt. Wilson, Wn.	2.6	30	Euphausiids	3	0
20	332*	0709-0732	Pt. Wilson, Wn.	0.2	30	- - -	0	0
20	333*	0733-0817	Marrowstone Pt., Wn.	7.8	75	Euphausiids	0	0
20	334*	0818-0901	Bush Pt., Wn.	0.2	60	Euphausiids	0	0
20	335*	0902-0936	Double Bluff, Wn.	0.1	45	- - -	0	1
20	336*	0937-1027	S. end Whidbey Island, Wn.	<0.1	25	Crustacean larvae	0	0

APPENDIX TABLE 1c - Catch Data For Each Haul - BROWN BEAR CRUISE 202

(* indicates hauls made with 3-foot net; all other hauls made with 6-foot net)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
September								
20	1	2237-2326	Waada Isl., Wn.	71.4	180	Euphausiids, shrimp, mysids	7	0
20-21	2	2353-0029	48°25' N, 124°29' W	86.1	30	Euphausiids	1	0
21	3	2322-2358	49°08' N, 126°43' W	50.0	30	Euphausiids	1	0
22	4	0001-0040	49°09' N, 126°49' W	30.8	60	Euphausiids	7	2
22	5	0043-0117	49°11' N, 126°54' W	60.3	20	Euphausiids, shrimp	15	1
22-23	6	2310-0007	49°59' N, 130°10' W	7.0	225	Euphausiids, shrimp	35	66
23	7	0008-0047	49°59' N, 130°17' W	11.5	60	Euphausiids, shrimp	108	681
23	8	0049-0125	49°59' N, 130°24' W	16.3	30	Euphausiids	70	23
23	9	0138-0214	49°59' N, 130°28' W	3.5	20	Euphausiids	9	1
23	10	0215-0258	49°59' N, 130°34' W	12.8	120	Euphausiids	17	31
23	11	0308-0425	49°59' N, 130°47' W	11.7	400	Euphausiids, shrimp	41	14
23-24	12	2313-0009	49°54' N, 133°14' W	9.8	225	Shrimp	23	5
24	13	0013-0053	49°53' N, 133°15' W	5.6	60	Euphausiids, shrimp	68	15
24	14	0106-0142	49°52' N, 133°17' W	0.2	30	Euphausiids, amphipods	26	2
24	15	0153-0310	49°50' N, 133°20' W	2.9	400	Euphausiids, shrimp	46	22
24-25	16	2312-0007	49°52' N, 135°16' W	7.3	225	Shrimp	13	8
25	17	0010-0049	49°52' N, 135°19' W	21.8	60	Shrimp	12	2
25	18	0051-0127	49°52' N, 135°20' W	4.9	30	Euphausiids, shrimp	8	0
25	19	0137-0254	49°53' N, 135°23' W	5.1	400	Euphausiids, shrimp	38	3
25	20	0255-0340	49°53' N, 135°27' W	66.7	120	Shrimp	10	5
25-26	21	2312-0012	49°59' N, 137°56' W	11.7	225	Shrimp	6	6
26	22	0013-0052	49°59' N, 138°00' W	11.5	60	Euphausiids, shrimp	45	2
26	23	0104-0139	49°59' N, 138°03' W	1.4	30	Euphausiids	44	16

APPENDIX TABLE 1c (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
September								
26	24	0140-0215	49°59' N, 138°07' W		No Sample			
26	25	0221-0308	49°59' N, 138°14' W	5.3	120	Shrimp	10	2
26	26	0318-0440	49°59' N, 138°17' W	4.0	400	Shrimp, copepods	33	5
26	27	0442-0519	49°59' N, 138°22' W	7.4	60	Shrimp	59	4
26-27	28	2315-0010	49°15' N, 140°04' W	8.2	225	Shrimp	11	6
27	29	0013-0052	49°12' N, 140°05' W	5.1	60	Euphausiids	16	1
27	30	0101-0139	49°09' N, 140°06' W	2.6	30	Euphausiids	14	4
27	31	0140-0226	49°07' N, 140°06' W	15.2	120	Euphausiids, shrimp	7	5
27	32	0335-0451	48°59' N, 140°09' W	4.9	400	Euphausiids, shrimp, copepods	37	4
27-28	33	2349-0052	47°58' N, 138°41' W	9.5	225	Shrimp	11	12
28	34	0115-0152	47°58' N, 138°33' W	0.5	60	Shrimp	6	5
28	35*	0155-0234	47°58' N, 138°29' W	0.1	60	- - -	0	2
28	36*	0236-0310	47°58' N, 138°25' W	0.1	30	Fish larvae	0	31
28	37	0314-0350	47°58' N, 138°21' W	0.7	30	Fish larvae	0	90
28	38	0359-0440	47°58' N, 138°15' W	1.7	90	Euphausiids, fish larvae	12	54
28	39	0441-0552	47°58' N, 138°10' W	8.4	400	Shrimp	23	4
28	40	1601-1719	47°58' N, 136°27' W	1.3	400	Euphausiids, copepods	9	6
28	41	2130-2201	47°57' N, 135°24' W	33.9	Surface	Shrimp	2	5
28	42	2205-2237	47°57' N, 135°20' W	6.3	20	Shrimp	2	4
28	43	2238-2315	47°57' N, 135°16' W	25.7	30	Shrimp	2	8
28	44	2317-2347	47°57' N, 135°11' W	3.6	Surface	Shrimp	0	13
28-29	45	2353-0049	47°57' N, 135°07' W	10.7	225	Euphausiids, shrimp	10	5
29	46	0058-0136	47°57' N, 135°00' W	0.4	60	Euphausiids	6	2
29	47*	0138-0216	47°57' N, 134°54' W	0.3	60	Euphausiids	2	0

APPENDIX TABLE 1c (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume (meters)	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
September								
29	48*	0217-0255	47°57' N, 134°49' W	1.3	30	Euphausiids	0	16
29	49	0256-0329	47°57' N, 134°45' W	1.2	30	Euphausiids, shrimp	2	21
29	50	0337-0422	47°58' N, 134°40' W	13.3	120	Euphausiids	6	9
29	51	0423-0540	47°58' N, 134°33' W		No Sample			
29	52	1707-1824	47°58' N, 133°08' W	3.2	400	Euphausiids, copepods	3	2
29	53	2129-2242	47°58' N, 132°15' W	3.4	400	Euphausiids	33	3
29	54	2243-2315	47°58' N, 132°09' W	3.1	20	Euphausiids, shrimp	1	2
29	55	2316-2352	47°58' N, 132°04' W	0.6	20	Euphausiids, shrimp	0	3
29-30	56	2353-0030	47°58' N, 132°02' W	4.4	225	Euphausiids, shrimp	12	6
30	57	0059-0137	47°58' N, 131°55' W	1.3	60	Euphausiids, shrimp	6	11
30	58*	0141-0219	47°58' N, 131°51' W	0.1	60	Euphausiids, copepods	0	2
30	59*	0220-0255	47°58' N, 131°47' W	25.7	30	Shrimp	0	1
30	60	0258-0332	47°58' N, 131°43' W	0.4	30	Euphausiids, amphipods	0	1
30	61	0340-0424	47°58' N, 131°39' W	6.8	120	Euphausiids	5	1
30	62	0425-0539	47°58' N, 131°35' W	4.1	400	Euphausiids, shrimp, copepods	37	1
30	63	2130-2246	47°58' N, 129°02' W	6.6	400	Euphausiids, shrimp	23	1
30	64	2248-2319	47°58' N, 128°56' W	0.5	20	Euphausiids, shrimp	0	1
30	65	2320-2355	47°57' N, 128°51' W	0.3	20	Amphipods, shrimp	3	1
30-Oct. 1	66	2356-0102	47°57' N, 128°48' W	18.2	225	Euphausiids, shrimp	10	1
October								
1	67	0111-0156	47°58' N, 128°39' W	2.2	60	Euphausiids	14	1
1	68	0157-0235	47°58' N, 128°35' W	1.1	60	Euphausiids	3	2
1	69	0236-0313	47°57' N, 128°31' W	0.5	30	Euphausiids, amphipods	1	1
1	70	0314-0350	47°57' N, 128°26' W	0.3	30	Amphipods	0	2

APPENDIX TABLE 1c (continued)

Date 1958	Haul No.	Time	Position	Corr. Plankton Volume ml/min	Fishing Depth (meters)	Dominant Plankton	No. Fish	No. Fish Larvae
October								
1	71	0358-0441	47°57' N, 128°22' W	15.7	120	Euphausiids, shrimp	22	16
1	72	0442-0557	47°57' N, 128°17' W	16.0	400	Euphausiids	47	5
1	73	2235-2346	48°10' N, 125°47' W	17.6	400	Shrimp	101	1
1-2	74	2347-0033	48°12' N, 125°43' W	32.6	120	Euphausiids, shrimp	22	4
2	75	0043-0123	48°15' N, 125°37' W	57.5	60	Euphausiids	11	2
2	76*	0138-0215	48°16' N, 125°35' W	58.1	60	Euphausiids	0	2
2	77*	0221-0259	48°18' N, 125°29' W	34.9	30	Euphausiids	0	1
2	78	0307-0338	48°20' N, 125°25' W	72.9	30	Euphausiids	3	2
2	79	0339-0413	48°22' N, 125°20' W	28.7	20	Euphausiids	1	4
2	80	1803-1831	Pt. Wilson, Wn.	0.1	30	Amphipods	0	0
2	81	1832-1922	Marrowstone Pt., Wn.	6.5	75	Shrimp, mysids	1	0
2	82	1923-2018	Bush Pt., Wn.	5.9	60	Shrimp	10	1
2	83	2020-2108	Double Bluff, Wn.	13.0	45	Euphausiids	10	0
2	84	2111-2214	Point No Point, Wn.	38.1	25	Euphausiids	1	3
2	85	2217-2311	Possession Sound, Wn.	112.0	45	Euphausiids, shrimp	2	0
2	86	2313-2355	Gedney Is., Wn.	59.5	60	Euphausiids, shrimp	4	0
3	87	0000-0056	Saratoga Passage, Wn.	61.0	75	Euphausiids, shrimp	7	0
3	88	0100-0122	East Pt., Wn.	404.5	25	Euphausiids	1	0
3	89	0130-0211	Holmes Harbor, Wn.	187.0	25	Euphausiids	2	0

KEY TO ABBREVIATIONS IN TABLE 2

A. tobianus personatus	Ammodytes tobianus personatus
A. ocellatus	Anarrhichthys ocellatus
A. heathi	Argyopelecus heathi
A. olfersii	Argyopelecus olfersii
A. scintillans	Aristostomias scintillans
A. stomias	Atheresthes stomias
A. gilli	Avocettina gilli
B. flemingi	Bathophilus flemingi
B. bericoides	Bathylagus bericoides
B. milleri	Bathylagus milleri
B. ochotensis	Bathylagus ochotensis
B. pacificus	Bathylagus pacificus
B. exilis	Bathylychnops exilis
B. marginatus	Brosmophycis marginatus
C. townsendi	Ceratoscopelus townsendi
C. macouni	Chauliodus macouni
C. saira	Colalabis saira
C. glaber	Cyclopterichthys glaber
C. microdon	Cyclothone microdon
C. signata	Cyclothone signata
C. aggregatus	Cymatogaster aggregatus
D. oculatus	Danaphos oculatus
D. effulgens	Diaphus effulgens
D. theta	Diaphus theta
D. atlanticus	Diogenichthys atlanticus
D. laternatus	Diogenichthys laternatus

(continued)

KEY TO ABBREVIATIONS IN TABLE 2 (continued)

E. arctica	Electrona arctica
E. crockeri	Electrona crockeri
E. rissoi	Electrona rissoi
E. tridentatus	Entosphenus tridentatus
G. macrocephalus	Gadus macrocephalus
G. aculeatus	Gasterosteus aculeatus
G. sigalutes	Gibertidia sigalutes
G. zachirus	Glyptocephalus zachirus
G. gracile	Gonostoma gracile
H. hemilepidotus	Hemilepidotus hemilepidotus
H. elassodon	Hippoglossoides elassodon
H. reinhardti	Hygophum reinhardti
I. antrostomus	Idiacanthus antrostomus
L. jordani	Lampanyctus jordani
L. leucopsarus	Lampanyctus leucopsarus
L. mexicanus	Lampanyctus mexicanus
L. regalis	Lampanyctus regalis
L. ritteri	Lampanyctus ritteri
L. steinbecki	Lampanyctus steinbecki
L. bilineata	Lepidopsetta bilineata
L. ringens	Lestidium ringens
L. stilbius	Leuroglossus stilbius
L. mandibularis	Lycodapus mandibularis
M. catervarius	Mallotus catervarius
M. bispinosus	Melamphaes bispinosus
M. lugubris	Melamphaes lugubris

(continued)

KEY TO ABBREVIATIONS IN TABLE 2 (continued)

M. biseriatus	Melanostomias biseriatus
M. productus	Merluccius productus
M. microstoma	Microstoma microstoma
M. pacificus	Microstomus pacificus
M. affine	Myctophum affine
M. aurolaternatum	Myctophum aurolaternatum
M. californiense	Myctophum californiense
N. candida	Nansenia candida
N. oculo-fasciatus	Nautichthy oculo-fasciatus
N. pelagicus	Nectoliparis pelagicus
N. scolopaceus	Nemichthys scolopaceus
N. dentatus	Neoscopelarchoides dentatus
N. linguidens	Neoscopelarchoides linguidens
N. coruscans	Notolepis coruscans
N. valdiviae	Notolychnus valdiviae
N. elongatus	Notoscopelus elongatus
O. mitsuii	Opostomias mitsuii
P. margarita	Photonectes margarita
P. coenosus	Pleuronichthys coenosus
P. paradoxus	Psychrolutes paradoxus
P. goodei	Ptilichthys goodei
R. sherborni	Rhectogramma sherborni
R. nicholsii	Rhinogobiops nicholsii
S. caerula	Sardinops caerula
S. marmoratus	Scorpaenichthys marmoratus

(continued)

KEY TO ABBREVIATIONS IN TABLE 2 (continued)

S. alascanus	Sebastolobus alascanus
S. crameri	Sebastodes crameri
S. flavidus	Sebastodes flavidus
S. maeandricus	Sicyogaster maeandricus
S. acanthias	Squalus acanthias
S. griseo-lineatus	Syngnathus griseo-lineatus
T. macropus	Tactostoma macropus
T. crenularis	Tarletonbeania crenularis
T. chalcogramma	Theragra chalcogramma
T. symmetricus	Trachurus symmetricus
T. rex-salmonorum	Trachypterus rex-salmonorum
V. tripunctulatus	Valenciennellus tripunctulatus
V. lucetia	Vinciquerria lucetia
Z. silenus	Zaprora silenus

APPENDIX TABLE 2a - Fish and Fish Larvae Captured For Each Haul

BROWN BEAR Cruise 176

HAUL 1		mm
Juveniles and Adults:		
4	A. tobianus personatus	70-130
2	T. chalcogramma	70
Larvae and Post Larvae:		
No larvae		

HAUL 2		
Juveniles and Adults:		
1	A. tobianus personatus	65
1	E. tridentatus	200
2	G. aculeatus	30-70
1	L. bilineata	30
1	T. chalcogramma	75
Larvae and Post Larvae:		
No larvae		

HAUL 3
No fish

HAUL 4		
Juveniles and Adults:		
2	D. theta	65-85
5	E. arctica	22-37
2	L. leucopsarus	25-88
3	L. ritteri	85-125
1	T. crenularis	40
2	T. macropus	110-250
1	Bathylagid (B. ochotensis? in very bad shape)	35
2	Liparids	20
Larvae and Post Larvae:		
1	C. macouni	35
8	M. pacificus	15-25
1	Clupeid	20
1	Myctophid	20

HAUL 5		mm
Juveniles and Adults:		
25	D. theta	45-75
1	E. arctica (in very bad shape)	22
15	L. leucopsarus	20-65
1	M. californiense	115
11	T. crenularis	30-75
13	Unidentified myctophids (all species, in bad shape)	
2	B. ochotensis	32
1	C. saira	170
4	L. ringens	115-130
Larvae and Post Larvae:		
14	M. pacificus	15-20
14	Sebastodes spp.	20-30
1	Liparid	20
13	Myctophids (all in bad shape)	15-20

HAUL 6		
Juveniles and Adults:		
1	L. leucopsarus	37
Larvae and Post Larvae:		
15	Sebastodes spp.	30-60

HAUL 7		
Juveniles and Adults:		
35	D. theta	45-75
280	L. leucopsarus	26-60
3	T. crenularis	50-77
1	B. ochotensis	110
1	T. macropus	140
Larvae and Post Larvae:		
1	B. marginatus	20
2	G. zachirus	50-65
1	M. pacificus	18
72	Sebastodes spp.	13-63
12	Myctophids	12-16

APPENDIX TABLE 2a (continued)

HAUL 8		mm
Juveniles and Adults:		
8	D. theta	45-65
106	L. leucopsarus	25-60
1	T. macropus	165
Larvae and Post Larvae:		
7	M. pacificus	14-60
18	Sebastodes spp.	18-55
1	Liparid	16
7	Myctophids	14-16

HAUL 13		mm
Juveniles and Adults:		
4	D. theta	48-67
5	E. arctica	35-45
15	L. leucopsarus	25-105
1	T. crenularis	50
1	C. macouni	75
1	L. ringens	130
1	T. macropus	260
Larvae and Post Larvae:		
3	B. pacificus	20-25
11	Sebastodes spp.	13-25
8	Myctophids	13-25

HAUL 14		mm
Juveniles and Adults:		
3	D. theta	45-65
8	L. leucopsarus	28-72
1	L. ritteri	105
Larvae and Post Larvae:		
18	Sebastodes spp.	10-51
10	Myctophids	12-20

HAUL 15		mm
Juveniles and Adults:		
43	D. theta	47-85
73	L. leucopsarus	23-116
1	A. scintillans	125
1	T. macropus	150
4	Myctophids (in bad shape)	
Larvae and Post Larvae:		
102	Sebastodes spp.	10-52
86	Myctophids	9-20

HAUL 16		mm
Juveniles and Adults:		
1	D. theta	90
2	E. arctica	33-38
9	L. leucopsarus	28-110
1	T. crenularis	47
1	M. lugubris	75
1	Cottid (G. sigalutes?)	20
Larvae and Post Larvae:		
1	Sebastodes sp.	22
2	B. pacificus	18-20

HAUL 17		mm
Juveniles and adults:		
11	L. leucopsarus	30-63
1	T. macropus (very bad shape)	130
Larvae and Post Larvae:		
No larvae		

HAUL 18		mm
Juveniles and Adults:		
2	D. theta	35-65
9	L. leucopsarus	28-85
Larvae and Post Larvae:		
1	Myctophid	17

APPENDIX TABLE 2a (continued)

HAUL 19

		mm
Juveniles and Adults:		
6	D. theta	67-90
22	L. leucopsarus	25-80
Larvae and Post Larvae:		
6	Myctophids (3 species?)	12-20

HAUL 20

		mm
Juveniles and Adults:		
1	D. theta	70
3	L. leucopsarus	about 20-70
1	L. ringens	125
Larvae and Post Larvae:		
2	Myctophids	11-18

HAUL 21

		mm
Juveniles and Adults:		
1	D. theta	83
2	E. arctica	32
2	L. leucopsarus	27-81
1	C. macouni	80
Larvae and Post Larvae:		
2	Myctophids	11

HAUL 22

		mm
Juveniles and Adults:		
5	D. theta	60-68
1	E. arctica	35
10	L. leucopsarus	22-26
Larvae and Post Larvae:		
56	Myctophids	9-17

HAUL 23

		mm
Juveniles and Adults:		
6	L. leucopsarus	22-27
Larvae and Post Larvae:		
1	Unidentified larva (bad shape)	20

HAUL 24

		mm
Juveniles and Adults:		
8	E. arctica (all in bad shape)	23-47
9	L. leucopsarus	23-115
1	M. lugubris	72
Larvae and Post Larvae:		
	No larvae	

HAUL 25

		mm
Juveniles and Adults:		
6	E. arctica (in very bad shape)	25-38
9	L. leucopsarus	40-115
1	C. glaber	95
Larvae and Post Larvae:		
	No larvae	

HAUL 26

		mm
Juveniles and Adults:		
1	E. arctica (in bad shape)	30
11	L. leucopsarus	25-53
Larvae and Post Larvae:		
4	Myctophids	11-17

HAUL 27

		mm
Juveniles and Adults:		
4	L. leucopsarus	20-120
1	Myctophid (in bad shape)	32
Larvae and Post Larvae:		
1	Leuroglossus sp.	25
2	Bathymasterids	15

HAUL 28

		mm
Juveniles and Adults:		
7	L. leucopsarus	26-100
1	B. milleri (in bad shape)	50
Larvae and Post Larvae:		
	No larvae	

APPENDIX TABLE 2a (continued)

HAUL 29

		mm
Juveniles and Adults:		
21	L. leucopsarus	23-110
Larvae and Post Larvae:		
	No larvae	

HAUL 30

		mm
Juveniles and Adults:		
3	L. leucopsarus (in bad shape)	25
Larvae and Post Larvae:		
1	Unidentified	15

HAUL 31

		mm
Juveniles and Adults:		
1	L. leucopsarus (in bad shape)	20+
Larvae and Post Larvae:		
	No larvae	

HAUL 32

		mm
Juveniles and Adults:		
5	E. arctica	27-40
Larvae and Post Larvae:		
2	Unidentified (in bad shape)	20-25

HAUL 33

		mm
Juveniles and Adults:		
1	E. arctica	35
10	L. leucopsarus	28-120
1	M. lugubris	80
1	Myctophid (in bad shape)	42
Larvae and Post Larvae:		
5	Unidentified	15-32

HAUL 34

		mm
Juveniles and Adults:		
18	L. leucopsarus	25
1	T. crenularis	25-120
Larvae and Post Larvae:		
3	Leuroglossus sp.	20-34
2	Bathymasterids	12

HAUL 35

		mm
Juveniles and Adults:		
13	L. leucopsarus	23-90
Larvae and Post Larvae:		
11	Unidentified	13-33

HAUL 36

		mm
Juveniles and Adults:		
22	L. leucopsarus	27-45
1	Myctophid (in bad shape)	26
Larvae and Post Larvae:		
1	Unidentified	34

HAUL 37

		mm
Juveniles and Adults:		
20	E. arctica	20-35
8	L. leucopsarus	20-110
3	C. macouni	85-145
1	C. glaber	47
1	M. lugubris	62
1	T. macropus	155
Larvae and Post Larvae:		
1	Sebastodes sp.	37
9	Unidentified	15-30

APPENDIX TABLE 2a (continued)

HAUL 38

		mm
Juveniles and Adults:		
6	E. arctica (in very bad shape)	25-35
1	L. leucopsarus (in very bad shape)	30
1	C. macouni (in very bad shape)	65
1	Unidentified Myctophid (in bad shape)	40
Larvae and Post Larvae:		
1	Cottid	30

HAUL 39

Juveniles and Adults:		
1	E. arctica (in bad shape)	22
1	L. leucopsarus (in bad shape)	24
Larvae and Post Larvae:		
3	H. hemilepidotus	30-33
1	Z. silenus	38
2	Cottids (Gilbertidia sp?)	9-12

HAUL 40

Juveniles and Adults:		
3	D. theta (in very bad shape)	75-95
2	E. arctica	52
5	L. leucopsarus?(in very bad shape)	45-110
Larvae and Post Larvae:		
1	H. hemilepidotus	26
2	N. pelagicus	40

HAUL 41

		mm
Juveniles and Adults:		
1	L. leucopsarus	25
1	L. stilbius	55
1	Agonid	37
4	Unidentified (in very bad shape)	
Larvae and Post Larvae:		
2	H. hemilepidotus	33
2	Cottids	25
4	Xiphisterids	12-20
1	Unidentified (A. tobianus personatus?)	43

HAUL 42

Juveniles and Adults:		
2	A. tobianus personatus	about 40
5	L. stilbius	50-75
4	Agonids	40
Larvae and Post Larvae:		
1	C. glaber?	15
5	G. macrocephalus	20-30
1	H. hemilepidotus	23
5	Sebastodes sp.	17
1	Liparid	18
2	Pleuronectids (H. elassodon?)	16
2	Juveniles (reduced pelvics, spines on preopercle)	32-36
2	Unidentified larvae (in bad shape)	about 20

APPENDIX TABLE 2a (continued)

HAUL 43

		mm
Juveniles and Adults:		
4	L. stilbius	110-130
1	Agonid	36
Larvae and Post Larvae:		
3	Juveniles (reduced pelvics, spines on preopercle)	about 34
1	Unidentified larva	20

HAUL 44

Juveniles and Adults:		
1	M. catervarius	150
Larvae and Post Larvae:		
No larvae		

HAUL 45

Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
3	Sebastodes sp.	17-19
3	Pleuronectids (H. elassodon?)	20-23
2	Osmerids	22

HAUL 46

Juveniles and Adults:		
1	L. leucopsarus	32
1	N. pelagicus	33
Larvae and Post Larvae:		
1	Myctophid	18
2	Unidentified larvae	15-33

HAUL 47

		mm
Juveniles and Adults:		
14	L. leucopsarus	27-57
2	Agonids	22-25
Larvae and Post Larvae:		
1	Sebastodes sp.	20
2	Cottids (G. sigalutes?)	10
3	Myctophids	15
2	Unidentified larvae	10-30

HAUL 48

Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Sebastodes sp.	18
1	Cyclopterid	17

HAUL 49

Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Larva	17

HAUL 50

Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
2	Sebastodes sp.	16-19
1	Cottid	9
1	Osmerid	21

APPENDIX TABLE 2a (continued)

HAUL 51

		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Sebastodes sp.	25
1	Unidentified larva	28

HAUL 52

Juveniles and Adults:		
1	L. leucopsarus	32
Larvae and Post Larvae:		
2	Unidentified larvae	18-32

HAUL 53

Juveniles and Adults:		
11	L. leucopsarus	28-47
38	Myctophids (probably L. leucopsarus, in bad shape)	
Larvae and Post Larvae:		
1	Larva (in bad shape)	27

HAUL 54

Juveniles and Adults:		
4	L. leucopsarus? (in bad shape)	30-48
1	N. pelagicus (in bad shape)	28
Larvae and Post Larvae:		
No larvae		

HAUL 55

Juveniles and Adults:		
1	D. theta	105
1	C. glaber	13
1	Myctophid (in bad shape)	
Larvae and Post Larvae:		
1	Unidentified juvenile (may be hexagrammid)	27
3	Unidentified larvae	26

HAUL 56

Juveniles and Adults:		
3	L. leucopsarus	28-48
Larvae and Post Larvae:		
1	Sebastodes sp.	16
5	Unidentified larvae	30-35

HAUL 57

Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
6	Unidentified larvae	13-35

HAUL 58

Juveniles and Adults:		
1	Myctophid (in very bad shape)	20
Larvae and Post Larvae:		
2	H. hemilepidotus	30
1	Sebastodes sp.	19
1	Unidentified larva	30

APPENDIX TABLE 2a (continued)

HAUL 59

		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Myctophid	13
1	Unidentified larva	24

HAUL 60

Discarded

HAUL 61

		mm
Juveniles and Adults:		
26	E. arctica (many in very bad shape, may not be Electrona)	25-41
3	L. leucopsarus	30-120
1	T. crenularis	50
2	M. lugubris	77
Larvae and Post Larvae:		
1	Unidentified larva	30

HAUL 62

		mm
Juveniles and Adults:		
1	E. arctica	33
5	L. leucopsarus	65-115
Larvae and Post Larvae:		
1	Unidentified larva	27

HAUL 63

No fish

HAUL 64

		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Sebastodes sp.	30

HAUL 65

No fish

HAUL 66

No fish

HAUL 67

No fish

HAUL 68

		mm
Juveniles and Adults:		
3	D. theta	77-97
41	E. arctica	27-55
19	L. leucopsarus	30-112
2	L. ritteri	110-116
1	L. jordani	120
1	N. pelagicus	45
Larvae and Post Larvae:		
1	Unidentified larva (in bad shape)	21

HAUL 69

		mm
Juveniles and Adults:		
6	D. theta	70-80
67	L. leucopsarus	25-112
1	T. crenularis	40
2	B. ochotensis	60-70
1	T. macropus	205
Larvae and Post Larvae:		
1	Cyclopterid	14
2	Unidentified larvae	30

APPENDIX TABLE 2a (continued)

HAUL 70

		mm
Juveniles and Adults:		
4	D. theta	80
653	L. leucopsarus	25-55
1	T. crenularis	30
1	Nansenia sp.	about 140
Larvae and Post Larvae:		
4	Leuroglossus sp.	17-35
4	Sebastodes sp.	13-27

HAUL 71

Used for isotope analysis

HAUL 72

Juveniles and Adults:		
1	L. leucopsarus (in bad shape)	22
Larvae and Post Larvae:		
	No larvae	

HAUL 73

Juveniles and Adults:		
1	E. arctica	32
2	L. leucopsarus (in very bad shape)	26
Larvae and Post Larvae:		
1	Cottid (G. sigalutes?)	10
6	Unidentified larvae	17-28

HAUL 74

Juveniles and Adults:		
10	E. arctica	24-35
14	L. leucopsarus	28-60
Larvae and Post Larvae:		
6	Unidentified larvae	20-30

HAUL 75

		mm
Juveniles and Adults:		
1	E. arctica (in bad shape)	32
2	L. leucopsarus (in bad shape)	27
Larvae and Post Larvae:		
1	Sebastodes sp.	15
2	Unidentified larvae	18-20

HAUL 76

Juveniles and Adults:		
1	E. arctica (in bad shape)	about 25
3	L. leucopsarus	25-75
Larvae and Post Larvae:		
	No larvae	

HAUL 77

Juveniles and Adults:		
2	E. arctica	27-44
Larvae and Post Larvae:		
3	Sebastodes sp.	14-25
1	Cottid (G. sigalutes?)	12

HAUL 78

Juveniles and Adults:		
3	E. arctica	about 40
18	L. leucopsarus	55-126
1	C. macouni	95
1	B. milleri	130
2	M. lugubris	80
1	T. chalcogramma	50
Larvae and Post Larvae:		
15	Unidentified larvae	16-35

APPENDIX TABLE 2a (continued)

HAUL 79

		mm
Juveniles and Adults:		
1	D. theta	80
18	L. leucopsarus	30-115
1	A. tobianus personatus	70
1	B. milleri	90
Larvae and Post Larvae:		
15	Unidentified larvae	21-35

HAUL 80

Juveniles and Adults:		
1	D. theta	83
92	L. leucopsarus	28-50
2	A. tobianus personatus	55
Larvae and Post Larvae:		
5	H. elassodon	20-32
54	Leuroglossus sp.	20-38
9	Sebastodes spp.	13-27
3	Bathymasterids	20

HAUL 81

Juveniles and Adults:		
12	L. leucopsarus (in bad shape)	about 28
Larvae and Post Larvae:		
4	Unidentified	20-27

HAUL 82

Juveniles and Adults:		
2	D. theta	82-95
27	L. leucopsarus	28-115
4	A. tobianus personatus	about 50-60
6	T. chalcogramma	32-48
Larvae and Post Larvae:		
8	Sebastodes sp.	25
1	Cottid (G. sigalutes?)	12
18	Unidentified	22-34

HAUL 83

Juveniles and Adults:		
55	L. leucopsarus	28-110
1	A. tobianus personatus	53
2	L. stilbius	40-140
Larvae and Post Larvae:		
9	Sebastodes sp.	28
19	Unidentified	13-30

HAUL 84

Juveniles and Adults:		
49	L. leucopsarus	24-95
11	L. stilbius	5 about 140 6 about 35-45
4	T. chalcogramma	32-41
Larvae and Post Larvae:		
154	Sebastodes spp.	15-30
9	Unidentified	15-34

HAUL 85

Juveniles and Adults:		
9	E. arctica	30-48
16	L. leucopsarus	30-110
1	B. milleri	130
1	M. lugubris	75
Larvae and Post Larvae:		
1	Sebastodes sp.	13
2	Myctophids	18
36	Unidentified	20-32

HAUL 86

Juveniles and Adults:		
48	L. leucopsarus	20-116
1	C. macouni	120
Larvae and Post Larvae:		
1	G. zachirus	35
1	Sebastodes sp.	19
2	Cottids (G. sigalutes?)	10
3	Unidentified	21-28

APPENDIX TABLE 2a (continued)

HAUL 87

		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Larva (might be hexagrammid)	10

HAUL 88

		mm
Juveniles and Adults:		
1	A. tobianus personatus	80
1	H. hemilepidotus	35
1	Hexagrammid	60
Larvae and Post Larvae:		
2	Unidentified larvae	20-34

HAUL 89

		mm
Juveniles and Adults:		
4	E. arctica	35-43
7	L. leucopsarus	26-120
1	N. pelagicus	37
Larvae and Post Larvae:		
4	Myctophids	17
12	Unidentified larvae	14-27

HAUL 90

		mm
Juveniles and Adults:		
2	E. arctica	33
10	L. leucopsarus	25-120
Larvae and Post Larvae:		
1	G. zachirus	23
3	Leuroglossus sp.	25-30
1	Myctophid	13
5	Bathymasterids	15-20

HAUL 91

		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
11	H. elassodon	25-33
2	Sebastodes sp.	29-36
3	Cyclopterids	14

HAUL 92

Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
3	H. elassodon	24-38
2	Sebastodes sp.	12
1	Bathymasterid	30

HAUL 93

Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Unidentified larva (in bad shape)	about 15

HAUL 94

Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
2	H. elassodon	23
52	M. catervarius	15-31
1	Unidentified larva (in bad shape)	13

APPENDIX TABLE 2a (continued)

HAUL 95

		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	G. zachirus	15
4	H. elassodon	25-30
35	M. catervarius	15-45
1	N. oculo-fasciatus	30

HAUL 96

Juveniles and Adults:		
1	G. aculeatus	30
3	L. stilbius	53-72
1	Lumpenid (probably L. anguillaris)	65
Larvae and Post Larvae:		
10	H. elassodon	22-37
98	M. catervarius	14-55
1	Sebastodes sp.	40
1	Hexagrammid	18

HAUL 97

Juveniles and Adults:		
1	L. stilbius	65
6	M. catervarius	79-104
4	Liparids	30-45
1	Unidentified (in bad shape)	about 100
Larvae and Post Larvae:		
1	G. zachirus	41
11	H. elassodon	20-35
73	M. catervarius	15-45

HAUL 98

Juveniles and Adults:		
1	Lumpenid (probably L. anguillaris)	62
Larvae and Post Larvae:		
12	H. elassodon	16-30
106	M. catervarius	16-40
1	Sebastodes sp.	13
1	Bathymasterid?	32
1	Pleuronectid (Clioderma sp.?)	15

HAUL 99

Juveniles and Adults:		
1	G. aculeatus	30
1	Liparid	25
1	Lumpenid (L. anguillaris?)	60
Larvae and Post Larvae:		
1	G. zachirus	25
11	H. elassodon	18-35
71	M. catervarius	17-42
1	Sebastodes sp.	11
1	Bathymasterid	27
1	Cyclopterid	10
1	Unidentified (hexagrammid?)	16

HAUL 100

Juveniles and Adults:		
1	Unidentified myctophid (L. leucopsarus? in bad shape)	
Larvae and Post Larvae:		
2	M. catervarius	23-32
1	Myctophid	15

HAUL 101

Juveniles and Adults:		
12	E. arctica	25-40
3	L. leucopsarus	24-35
Larvae and Post Larvae:		
2	Unidentified	23-26

APPENDIX TABLE 2a (continued)

HAUL 102

		mm
Juveniles and Adults:		
7	E. arctica (in very bad shape)	about 30
13	L. leucopsarus (5 in bad shape)	25-32
Larvae and Post Larvae:		
1	Pleuronectid (in bad shape)	22

HAUL 103

Juveniles and Adults:		
8	E. arctica (some in bad shape)	32-42
15	L. leucopsarus (some in bad shape)	about 28
Larvae and Post Larvae:		
2	Cyclopterids	15
3	Unidentified larvae (2 in bad shape)	25

HAUL 104

Juveniles and Adults:		
2	E. arctica (1 in bad shape)	40
Larvae and Post Larvae:		
1	Cyclopterid	12
1	Myctophid	18

HAUL 105

Juveniles and Adults:		
4	Myctophids (in bad shape)	
Larvae and Post Larvae:		
1	Myctophid	17
3	Unidentified larvae (in bad shape)	

HAUL 106

		mm
Juveniles and Adults:		
4	E. arctica	30-38
Larvae and Post Larvae:		
	No larvae	

HAUL 107

Juveniles and Adults:		
4	E. arctica (in very bad shape)	
Larvae and Post Larvae:		
1	Myctophid	14

HAUL 108

No fish

HAUL 109

No fish

HAUL 110

Juveniles and Adults:		
3	E. arctica	27
2	L. leucopsarus	30-100
Larvae and Post Larvae:		
	No larvae	

HAUL 111

Juveniles and Adults:		
1	D. theta	75
1	E. arctica (in bad shape)	
2	L. leucopsarus	25-60
Larvae and Post Larvae:		
1	Myctophid (in bad shape)	15

APPENDIX TABLE 2a (continued)

HAUL 112	mm
Juveniles and Adults:	
1 D. theta	96
3 L. leucopsarus	30
Larvae and Post Larvae:	
No larvae	

HAUL 113	
Juveniles and Adults:	
1 D. theta	85
1 L. leucopsarus	30
Larvae and Post Larvae:	
1 Myctophid	12

HAUL 114	
Juveniles and Adults:	
1 L. leucopsarus	22
Larvae and Post Larvae:	
No larvae	

HAUL 115
No fish

HAUL 116	
Juveniles and Adults:	
No adults	
Larvae and Post Larvae:	
3 Myctophids	13-17
1 Unidentified	26

HAUL 117
No fish

HAUL 118	mm
Juveniles and Adults:	
2 D. theta	67
14 E. arctica	28-40
3 L. leucopsarus	26-50
1 M. lugubris	68
Larvae and Post Larvae:	
3 Myctophids (probably Lampanyctus)	15-22
1 Unidentified	30

HAUL 119	
Juveniles and Adults:	
1 D. theta	80
9 L. leucopsarus	32-90
Larvae and Post Larvae:	
1 E. arctica	22
1 L. leucopsarus	15

HAUL 120	
Juveniles and Adults:	
5 D. theta	35-95
6 L. leucopsarus	70-80
1 B. ochotensis	130
Larvae and Post Larvae:	
No larvae	

HAUL 121	
Juveniles and Adults:	
12 D. theta	50-70
62 L. leucopsarus	30-80
Larvae and Post Larvae:	
39 L. leucopsarus	11-18

APPENDIX TABLE 2a (continued)

HAUL 122		mm
Juveniles and Adults:		
4	L. leucopsarus	25-35
Larvae and Post Larvae:		
No larvae		

HAUL 123		
Juveniles and Adults		
1	L. leucopsarus	29
Larvae and Post Larvae:		
11	Myctophids	14-17

HAUL 124		
Juveniles and Adults:		
5	E. arctica	25-37
7	L. leucopsarus	23-115
1	T. crenularis	38
1	A. olfersi	68
2	A. gilli?	365-430
1	C. macouni	75
3	T. macropus	95-120
Larvae and Post Larvae:		
1	Myctophid	15

HAUL 125		
Juveniles and Adults:		
2	C. townsendi	80-85
12	D. theta	43-53
58	L. leucopsarus	22-42
1	M. californiense	110
4	B. ochotensis	39-52
Larvae and Post Larvae:		
8	Myctophids	14-18
1	Leptocephalus	210

HAUL 126		mm
Juveniles and Adults:		
14	L. leucopsarus	23-90
1	B. ochotensis	35
4	T. macropus	115-195
Larvae and Post Larvae:		
4	E. arctica	12-24

HAUL 127		
Juveniles and Adults:		
1	C. townsendi	90
6	D. theta	50-55
22	L. leucopsarus	23-45
1	M. californiense	85
2	L. ringens	110
1	Argentinid (L. stilbius?)	45
Larvae and Post Larvae:		
3	Myctophids	12-16

HAUL 128		
Juveniles and Adults:		
8	L. leucopsarus	26-41
1	T. crenularis	28
Larvae and Post Larvae:		
2	L. regalis	14-15
2	Unidentified spiny ray (sciaenid?)	20
1	Leptocephalus	206

HAUL 129		
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	L. regalis	13
3	Myctophids	13-21
2	Unidentified	22

APPENDIX TABLE 2a (continued)

HAUL 130		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
8	Myctophids	17-20

HAUL 131		
Juveniles and Adults:		
4	D. theta	48
5	L. leucopsarus	33-60
1	M. californiense	93
1	T. crenularis	29
1	C. saira	48
Larvae and Post Larvae:		
No larvae		

HAUL 132		
Juveniles and Adults:		
1	D. theta	38
4	L. leucopsarus	35
2	L. ritteri	90-103
1	C. saira	30
2	L. ringens	85-100
2	T. macropus	160
Larvae and Post Larvae:		
No larvae		

HAUL 133		
Juveniles and Adults:		
8	L. leucopsarus	26-102
1	L. ritteri	92
1	T. crenularis	32
3	T. macropus	195-260
Larvae and Post Larvae:		
No larvae		

HAUL 134		mm
Juveniles and Adults:		
5	D. theta	45-80
7	L. leucopsarus	30-100
1	L. ritteri	125
1	T. crenularis	33
3	B. ochotensis	57-100
1	T. macropus	190
Larvae and Post Larvae:		
No larvae		

HAUL 135		
Juveniles and Adults:		
1	C. townsendi	88
4	D. theta	40-75
29	L. leucopsarus	24-70
2	L. ritteri	80
2	T. crenularis	26-76
2	B. flemingi	about 115
2	B. ochotensis	115
6	T. macropus	about 100-130
Larvae and Post Larvae		
1	Myctophid	10

HAUL 136		
Juveniles and Adults:		
5	C. townsendi	82
2	D. theta	40
9	L. leucopsarus	30-40
1	L. ringens	85
1	T. macropus	100
Larvae and Post Larvae:		
1	Myctophid	13

APPENDIX TABLE 2a (continued)

HAUL 137

Juveniles and Adults:		
2	D. theta	50
24	L. leucopsarus	32-55
2	T. crenularis	29-75
1	B. flemingi	about 95
1	C. saira	30
2	T. macropus	about 130
Larvae and Post Larvae:		
1	Myctophid	10

HAUL 138

Juveniles and Adults:		
1	D. theta	44
7	L. leucopsarus	24-115
3	L. ritteri	75-110
1	T. crenularis	75
1	A. gilli?	520
1	B. flemingi	130
1	C. saira	35
6	T. macropus	150-275
Larvae and Post Larvae:		
1	M. pacificus	26
1	T. macropus	about 50
2	Myctophids	about 20
1	Unidentified larva (may be paralepidid or stomiatid)	25

HAUL 139

Juveniles and Adults:		
1	D. theta	72
7	L. leucopsarus	28-108
1	T. crenularis	33
1	A. gilli?	475
2	C. saira	20-30
5	T. macropus	115-195
Larvae and Post Larvae:		
4	M. pacificus	21-58
1	Myctophid (in bad shape)	18
7	Unidentified larvae	18-30

HAUL 140

		mm
Juveniles and Adults:		
10	L. leucopsarus	23-115
4	L. ritteri	53-110
3	T. crenularis	35-80
3	C. saira	about 30
9	T. macropus	160-220
Larvae and Post Larvae:		
1	M. pacificus	16
4	T. macropus?	30-55
2	Sebastodes spp.	10-15
4	Myctophids	17

HAUL 141

Juveniles and Adults:		
1	C. townsendi	85
2	D. theta	42-50
17	L. leucopsarus	32-50
1	M. californiense	120
1	T. crenularis	40
Larvae and Post Larvae:		
20	T. macropus?	18-60
9	Sebastodes sp.	6-12

HAUL 142

Juveniles and Adults:		
3	D. theta	about 45
34	L. leucopsarus	20-65
3	T. crenularis	26-85
1	A. scintillans	about 115
1	C. saira	43
28	T. macropus	about 110-170
4	Leuroglossus sp.	60-90
1	Nansenia sp.	about 60
Larvae and Post Larvae:		
1	M. pacificus	20
9	T. macropus?	15-55
2	Sebastodes sp.	6-11
4	Myctophids	18

APPENDIX TABLE 2a (continued)

HAUL 143		mm
Juveniles and Adults:		
3	D. theta	55-70
2	E. arctica	25-39
3	L. leucopsarus	42-105
2	L. ritteri	110
1	T. crenularis	38
Larvae and Post Larvae:		
3	M. pacificus	18-50
3	Myctophids	18

HAUL 144		
Juveniles and Adults:		
2	D. theta	45-90
7	L. leucopsarus	22-110
1	L. ritteri	110
2	T. crenularis	32
2	C. saira	about 21-44
5	T. macropus	125-250
Larvae and Post Larvae:		
2	G. zachirus	35-77
8	M. pacificus	13-60
1	Liparid	18
3	Myctophids	14-20

HAUL 145		
Juveniles and Adults:		
5	D. theta	58-75
21	L. leucopsarus	21-98
1	T. crenularis	27
1	B. flemingi (in bad shape)	90
1	C. saira	60
4	T. macropus	150-240
Larvae and Post Larvae:		
1	M. pacificus	64
1	Liparid	16
2	Myctophids	15

HAUL 146		mm
Juveniles and Adults:		
5	D. theta	50-73
109	L. leucopsarus	22-75
1	T. crenularis	40
1	C. saira	50
9	T. macropus	115-210
Larvae and Post Larvae:		
2	M. pacificus	13-17
1	S. alascanus	15
3	Myctophids	10-15

HAUL 147		
Juveniles and Adults:		
2	D. theta	47
23	L. leucopsarus	22-37
3	T. crenularis	25-30
1	Argentinid (L. stilbius?)	27
Larvae and Post Larvae:		
1	G. zachirus	34
1	L. regalis	15
1	Myctophid	14

HAUL 148		
Juveniles and Adults:		
1	D. theta	58
10	E. arctica	22-48
17	L. leucopsarus	20-110
2	L. ritteri	80-120
1	A. scintillans	105
1	C. macouni	65
2	C. saira	38
Larvae and Post Larvae:		
3	M. pacificus	14

HAUL 149		
Juveniles and Adults:		
4	L. leucopsarus	32-24
2	C. saira	130-140
Larvae and Post Larvae:		
1	G. zachirus	30
1	M. pacificus	14
1	Liparid	23
1	Unidentified	8

APPENDIX TABLE 2b - Fish and Fish Larvae Captured For Each Haul

BROWN BEAR Cruise 199

HAUL 1		mm
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
1	P. coenosus	9
3	Sebastodes sp.	8-25

HAUL 2		mm
Juveniles and Adults:		
1	P. goodei	142
3	T. chalcogramma	30-42
Larvae and Post Larvae:		
1	Sebastodes sp.	10
2	Blenneids?	22-23
1	Cottid	10
9	Pleuronectids	14-16
1	Unidentified	4

HAUL 3		mm
Juveniles and Adults:		
2	A. tobianus personatus	53-65
5	T. chalcogramma	22-45
Larvae and Post Larvae:		
1	S. maeandricus	12
4	Sebastodes sp.	9-15
4	Clupeids?	about 20
1	Cottid	12
12	Pleuronectids	13-19

HAUL 4		mm
Juveniles and Adults:		
35	A. tobianus personatus	42-63
2	S. griseo-lineatus	32
3	T. chalcogramma	27-37
Larvae and Post Larvae:		
3	S. maeandricus	10-13
8	Cottids?	9-14
1	Liparid	7
9	Pleuronectids	14-18
7	Unidentified	about 20

HAUL 5		mm
Juveniles and Adults:		
1	P. paradoxus	21
1	Agonid	19
Larvae and Post Larvae:		
2	Cottids	9-12
3	Pleuronectids	14-17

HAUL 6		mm
Juveniles and Adults:		
10	D. theta	36-45
1	L. leucopsarus	56
7	A. tobianus personatus	35-62
1	A. stomias	41
10	M. catervarius	48-72
1	P. paradoxus	25
1	Myctophid (bad shape)	42
Larvae and Post Larvae:		
9	Cottids?	7-14
12	Osmerids (bad shape)	15-23
1	Pleuronectid	14

HAUL 7		mm
Juveniles and Adults:		
1	D. theta	35
2	M. catervarius	58-66
Larvae and Post Larvae:		
1	Cottid	11
18	Osmerids (bad shape)	12-24

HAUL 8		mm
Juveniles and Adults:		
1	A. tobianus personatus	56
Larvae and Post Larvae:		
26	Osmerids (bad shape)	about 15

APPENDIX TABLE 2b (continued)

HAUL 9	mm
Juveniles and Adults:	
No adults	
Larvae and Post Larvae	
1 S. crameri?	45

HAUL 10	
Juveniles and Adults:	
No adults	
Larvae and Post Larvae:	
1 Liparid?	

HAUL 11	
Juveniles and Adults:	
1 L. ringens?	
Larvae and Post Larvae:	
No Larvae	

HAUL 12
No fish

HAUL 13	
Juveniles and Adults:	
8 D. theta	45-52
13 E. arctica	25-40
3 L. leucopsarus	24-38
12 T. crenularis	30-50
1 C. macouni	67
Larvae and Post Larvae:	
1 Liparid	19
3 Myctophids	19

HAUL 14	
Juveniles and Adults:	
2 S. crameri?	52-55
Larvae and Post Larvae:	
No larvae	

HAUL 15	mm
Juveniles and Adults:	
No adults	
Larvae and Post Larvae:	
1 Liparid	6

HAUL 16
No fish

HAUL 17
No fish

HAUL 18	
Juveniles and Adults:	
No adults	
Larvae and Post Larvae:	
1 Unidentified	40

HAUL 19	
Juveniles and Adults:	
2 S. crameri?	47-57
Larvae and Post Larvae:	
No Larvae	

HAUL 20
No fish

APPENDIX TABLE 2b (continued)

HAUL 21		mm
Juveniles and Adults:		
2	D. theta	40-55
6	L. leucopsarus	27-35
1	M. californiense	110
26	T. crenularis	30-35
1	B. ochotensis	34
1	L. ringens?	84
Larvae and Post Larvae:		
No larvae		

HAUL 22		
Juveniles and Adults:		
11	D. theta	33-70
10	L. leucopsarus	35-95
26	T. crenularis	25-37
1	B. ochotensis	69
1	L. ringens?	34
1	S. crameri?	56
3	S. flavidus?	56-65
1	T. rex-salmonorum	about 1200
Larvae and Post Larvae:		
No larvae		

HAUL 23		
Juveniles and Adults:		
7	D. theta	40-78
3	L. leucopsarus	25-30
27	T. crenularis	25-40
1	A. ocellatus	270
1	B. ochotensis	42
1	S. flavidus?	60
Larvae and Post Larvae:		
No larvae		

HAUL 24

No fish

HAUL 25

No fish

HAUL 26		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
2	Myctophids	15-20

HAUL 27

Juveniles and Adults:		
1	S. flavidus?	75
Larvae and Post Larvae:		
6	Myctophids	7-17

HAUL 28

No fish

HAUL 29

No fish

HAUL 30

Juveniles and Adults:		
No fish		
Larvae and Post Larvae:		
1	Myctophid	13

HAUL 31

No fish

HAUL 32

No fish

HAUL 33

Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
3	Sebastodes sp.	9-13
3	Myctophids	11-16

APPENDIX TABLE 2b (continued)

HAUL 34		mm
Juveniles and Adults:		
2	D. theta	45-55
5	L. leucopsarus	25-70
3	L. ritteri	100-120
2	B. ochotensis	40-85
1	Nansenia sp.	- - -
8	T. macropus	125-250
Larvae and Post Larvae:		
1	M. pacificus	51
10	Myctophids	9-20
1	Stomiatid?	34

HAUL 35		mm
Juveniles and Adults:		
9	D. theta	45-70
19	L. leucopsarus	25-100
1	L. ritteri	80
4	T. crenularis	28-50
1	B. flemingi	110
1	B. ochotensis	106
2	T. macropus	130-190
Larvae and Post Larvae:		
2	Sebastodes sp.	10-22
16	Myctophids	7-17

HAUL 36		mm
Juveniles and Adults:		
10	D. theta	45-80
38	L. leucopsarus	27-65
1	M. californiense	103
8	T. crenularis	26-50
6	B. ochotensis	100-125
1	L. ringens?	57
3	Nansenia sp.	85-93
1	T. macropus	120
Larvae and Post Larvae:		
6	Sebastodes sp.	15-22
4	Myctophids	10-16

HAUL 37		mm
Juveniles and Adults:		
4	D. theta	45-52
12	L. leucopsarus	25-95
1	L. ritteri	120
4	T. crenularis	26-32
1	C. macouni	80
1	C. saira	175
3	T. macropus	95-300
Larvae and Post Larvae:		
1	M. pacificus	61
1	T. macropus	40
1	Sebastodes sp.	25
7	Myctophids	7-18

HAUL 38		mm
Juveniles and Adults:		
3	D. theta	60-80
1	L. leucopsarus	25-100
1	T. crenularis	30
2	B. ochotensis	103-113
3	Argentinoids	45-84
Larvae and Post Larvae:		
1	Sebastodes sp.	18
2	Myctophids	13

HAUL 39		mm
Juveniles and Adults:		
15	D. theta	40-75
20	L. leucopsarus	25-95
9	T. crenularis	28-53
14	Argentinoids	70-100
Larvae and Post Larvae:		
43	Myctophids	8-19
2	Pleuronectids	30-32

HAUL 40		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
3	Myctophids	13-16
1	Unidentified	7

APPENDIX TABLE 2b (continued)

HAUL 41		mm
Juveniles and Adults:		
5	L. leucopsarus	20-25
Larvae and Post Larvae:		
1	M. pacificus	20
3	Myctophids	18

HAUL 42		
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Sebastodes sp.	20
1	Myctophid	12

HAUL 43		
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Sebastodes sp.	15

HAUL 44
No fish

HAUL 45		
Juveniles and Adults:		
3	D. theta	45-60
23	L. leucopsarus	20-95
11	T. crenularis	28-40
Larvae and Post Larvae:		
6	Myctophids	14-20

HAUL 46		
Juveniles and Adults:		
5	D. theta	65-75
19	L. leucopsarus	20-70
6	T. crenularis	27-34
16	Argentinoids	30-100
Larvae and Post Larvae		
11	Myctophids	10-15

HAUL 47		mm
Juveniles and Adults:		
18	D. theta	45-70
20	L. leucopsarus	25-55
2	T. crenularis	30-90
5	B. ochotensis	25-110
1	S. flavidus?	58
9	Nansenia sp.	65-90
3	Argentinoids	58-110
Larvae and Post Larvae:		
4	Myctophids	about 10

HAUL 48		
Juveniles and Adults:		
7	L. leucopsarus	25-35
2	T. crenularis	35-45
2	B. ochotensis	28-45
21	Nansenia sp.	50-95
Larvae and Post Larvae:		
1	Unidentified	7

HAUL 49		
Juveniles and Adults:		
2	L. leucopsarus	20-30
Larvae and Post Larvae:		
No larvae		

HAUL 50		
Juveniles and Adults:		
1	L. leucopsarus	25
Larvae and Post Larvae:		
No larvae		

HAUL 51
No fish

HAUL 52		
Juveniles and Adults:		
12	Nansenia sp.	80-85
Larvae and Post Larvae:		
No larvae		

APPENDIX TABLE 2b (continued)

HAUL 53

Juveniles and Adults:		
3	D. theta	42-45
5	L. leucopsarus	25-85
2	L. ritteri	70-115
2	T. crenularis	26-53
6	B. ochotensis	25-138
7	T. macropus	110-210
Larvae and Post Larvae:		
3	Myctophids	9-14

HAUL 54

Juveniles and Adults:		
10	D. theta	40-80
15	L. leucopsarus	28-105
9	T. crenularis	25-31
6	B. ochotensis	30-40
9	T. macropus	95-125
Larvae and Post Larvae:		
6	Myctophids	8-17

HAUL 55

Juveniles and Adults:		
1	D. theta	65
5	L. leucopsarus	31-60
1	T. crenularis	30
8	Argentinoids	34-90

No larvae

HAUL 56

Juveniles and Adults:		
4	D. theta	45-62
3	L. leucopsarus	25
1	T. crenularis	50
3	B. ochotensis	26-40
Larvae and Post Larvae:		
5	Myctophids	6-15

HAUL 57

		mm
Juveniles and Adults:		
22	D. theta	45-70
4	L. leucopsarus	25-31
2	N. elongatus	135
6	T. crenularis	30-56
1	B. ochotensis	87
1	Nansenia sp.	85
Larvae and Post Larvae:		
4	Myctophids	12-14

HAUL 58

Juveniles and Adults:		
1	D. theta	45
2	L. leucopsarus	about 25
Larvae and Post Larvae:		
1	Myctophid	15

HAUL 59

Juveniles and Adults:		
1	L. leucopsarus	25
1	Nansenia sp.	80

Larvae and Post Larvae:
No larvae

HAUL 60

Juveniles and Adults:
No adults

Larvae and Post Larvae:		
17	Myctophids	7-20

HAUL 61

Juveniles and Adults:
No Adults

Larvae and Post Larvae:		
3	Myctophids	8-13

APPENDIX TABLE 2b (continued)

HAUL 62	mm
Juveniles and Adults:	
No adults	
Larvae and Post Larvae:	
1 Myctophid	14

HAUL 63	mm
Juveniles and Adults:	
1 D. theta	65
8 L. leucopsarus	28-95
3 T. crenularis	30-55
1 B. ochotensis	95
Larvae and Post Larvae:	
3 Myctophids	12-16

HAUL 64	mm
Juveniles and Adults:	
1 D. theta	60
14 L. leucopsarus	25-82
2 T. crenularis	32-55
2 S. flavidus?	46
4 T. macropus	150-200
Larvae and Post Larvae:	
11 Myctophids	10-17

HAUL 65	mm
Juveniles and Adults:	
7 L. leucopsarus	33-90
1 T. macropus	155
Larvae and Post Larvae:	
6 Myctophids	11-17

HAUL 66	mm
Juveniles and Adults:	
7 D. theta	40-80
21 L. leucopsarus	25-75
3 T. crenularis	28-55
2 L. ringens	135-170
1 T. macropus	140
Larvae and Post Larvae:	
8 Myctophids	9-17

HAUL 67	mm
Juveniles and Adults:	
32 D. theta	43-80
76 L. leucopsarus	25-90
1 L. ringens	145
Larvae and Post Larvae:	
7 Myctophids	10-17

HAUL 68	mm
Juveniles and Adults:	
8 L. leucopsarus	25-34
4 L. ritteri	87-115
4 T. crenularis	29-55
1 A. scintillans	115
1 C. macouni	175
2 T. macropus	230-260
Larvae and Post Larvae:	
13 Myctophids	10-20

HAUL 69	mm
Juveniles and Adults:	
4 D. theta	42-65
58 L. leucopsarus	25-85
Larvae and Post Larvae:	
13 Myctophids	10-18

HAUL 70	mm
Juveniles and Adults:	
No adults	
Larvae and Post Larvae:	
2 Myctophids	10-18

HAUL 71	mm
Juveniles and Adults:	
No adults	
Larvae and Post Larvae:	
3 Myctophids	13-20

APPENDIX TABLE 2b (continued)

HAUL 72 — mm

No fish

HAUL 73

Juveniles and Adults:
No adults

Larvae and Post Larvae:

2	Myctophids	11-18

HAUL 74

Juveniles and Adults:

1	D. theta	80
3	L. leucopsarus	26-29
2	L. ritteri	88-111
7	T. crenularis	26-51
1	C. macouni	190

Larvae and Post Larvae:

3	Bathylagids?	17-22
19	Myctophids	10-22

HAUL 75

Juveniles and Adults:

37	L. leucopsarus	26-100
2	T. crenularis	24-27
1	T. macropus	175

Larvae and Post Larvae:

19	Myctophids	10-21
4	Unidentified (myctophids?)	14-16

HAUL 76

Juveniles and Adults:

20	L. leucopsarus	26-100

Larvae and Post Larvae:

10	Myctophids	12-20

HAUL 77 — mm

Juveniles and Adults:

2	D. theta	68
92	L. leucopsarus	25-100
3	L. ringens	195-220

Larvae and Post Larvae:

107	Myctophids	9-20
1	Unidentified	15

HAUL 78

Juveniles and Adults:

14	D. theta	60-80
332	L. leucopsarus	25-103
2	T. crenularis	35-55
2	B. ochotensis	75-90
1	L. ringens	240

Larvae and Post Larvae:

147	Myctophids	5-18
11	Unidentified (Bathylagids and Myctophids?)	12-17

HAUL 79

Juveniles and Adults:
No adults

Larvae and Post Larvae:

3	Myctophids	15-18

HAUL 80

Juveniles and Adults:

15	L. leucopsarus	25-47
1	L. ritteri	97
3	T. crenularis	50-55
1	B. ochotensis	85
1	C. macouni	75

Larvae and Post Larvae:

20	Myctophids	8-20
1	Unidentified (Bathylagid?)	16

APPENDIX TABLE 2b (continued)

HAUL 81

Juveniles and Adults:		
1	D. theta	68
22	L. leucopsarus	27-93
5	L. ritteri	85-93
2	T. crenularis	39-42
3	T. macropus	90-160
Larvae and Post Larvae:		
14	Myctophids	9-20

HAUL 82

Juveniles and Adults:		
4	L. leucopsarus	25-85
1	T. macropus	94
Larvae and Post Larvae:		
3	Myctophids	9-15

HAUL 83

Juveniles and Adults:		
4	D. theta	60-80
9	L. leucopsarus	33-80
5	T. crenularis	26-61
Larvae and Post Larvae:		
34	Myctophids	8-18

HAUL 84

Juveniles and Adults:		
10	D. theta	57-85
64	L. leucopsarus	22-94
32	T. crenularis	30-60
3	Argentinoids	89-190
Larvae and Post Larvae:		
128	Myctophids	6-18

HAUL 85

		mm
Juveniles and Adults:		
3	D. theta	49-70
1	E. arctica	61
17	L. leucopsarus	29-96
3	L. ritteri	108-118
1	B. flemingi	120
4	C. macouni	70-98
2	T. macropus	205-250
2	Argentinoids	32-78
Larvae and Post Larvae:		
44	Myctophids	8-20
4	Unidentified (Bathylagids?)	14-21

HAUL 86

Juveniles and Adults:		
8	D. theta	44-80
54	L. leucopsarus	22-68
7	T. crenularis	28-54
Larvae and Post Larvae:		
14	Myctophids	7-19

HAUL 87

Juveniles and Adults:		
6	L. leucopsarus	about 27
Larvae and Post Larvae:		
1	Bathylagid	13
1	Myctophid	18

APPENDIX TABLE 2b (continued)

HAUL 88		mm
Juveniles and Adults:		
2	D. theta	44-68
1	E. arctica	31
17	L. leucopsarus	24-106
4	T. crenularis	25-31
1	B. flemingi	120
2	C. macouni	95-143
3	M. lugubris	40-45
1	T. macropus	195
Larvae and Post Larvae:		
1	Bathylagid?	25
21	Myctophids	12-21

HAUL 89		mm
Juveniles and Adults:		
9	D. theta	40-82
24	L. leucopsarus	22-95
3	L. ritteri	82-93
2	T. crenularis	32-41
1	B. flemingi	138
2	B. ochotensis	33
12	T. macropus	120-210
2	Nansenia sp.	32-93
Larvae and Post Larvae:		
6	Myctophids	12-18

HAUL 90		mm
Juveniles and Adults:		
2	D. theta	45-63
2	L. leucopsarus	26-85
1	N. elongatus	140
1	C. saira	210
2	Nansenia sp.	82-87
Larvae and Post Larvae:		
1	Myctophid	14

HAUL 91		mm
Juveniles and Adults:		
4	D. theta	40-50
33	L. leucopsarus	22-65
2	B. ochotensis	85-105
1	T. macropus	92
Larvae and Post Larvae:		
No larvae		

HAUL 92		mm
Juveniles and Adults:		
34	D. theta	43-71
194	L. leucopsarus	22-90
1	M. californiense	115
6	T. crenularis	25-45
1	A. scintillans	118
1	B. ochotensis	98
4	T. macropus	90-100
1	Argentinoid	32
Larvae and Post Larvae:		
13	Myctophids	10-20

HAUL 93		mm
Juveniles and Adults:		
8	D. theta	44-81
1	E. crockeri	41
25	L. leucopsarus	24-112
1	A. olfersii	48
2	C. macouni	170-182
3	M. lugubris	36-39
4	T. macropus	92-250
Larvae and Post Larvae:		
4	Bathylagids?	17-26
5	Myctophids	14-19

HAUL 94		mm
Juveniles and Adults:		
6	D. theta	38-68
2	E. crockeri	30
20	L. leucopsarus	24-80
4	T. crenularis	22-31
1	B. flemingi	81
2	T. macropus	110-130
1	Nansenia sp.	85
Larvae and Post Larvae:		
4	Myctophids	7-13

HAUL 95

No fish

APPENDIX TABLE 2b (continued)

HAUL 96		mm
Juveniles and Adults:		
6	D. theta	33-35
2	E. crockeri	35
3	L. leucopsarus	25-40
1	L. ritteri	121
12	A. olfersii	20-65
1	B. flemingi	76
2	B. ochotensis	33-40
4	T. macropus	220-250
Larvae and Post Larvae:		
6	Myctophids	10-18
1	Stomiatid	30

HAUL 97		
Juveniles and Adults:		
9	D. theta	37-43
6	E. crockeri	28-39
2	L. leucopsarus	35
3	L. ritteri	90-111
1	T. crenularis	30
1	A. olfersii	33
2	B. ochotensis	35-42
3	T. macropus	90-205
Larvae and Post Larvae:		
3	Myctophids	10-14
2	Stomiatids	36-45
3	Unidentified (3 sp.)	11-19

HAUL 98		
Juveniles and Adults:		
57	D. theta	35-45
1	E. crockeri	21
2	M. californiense	88-95
4	T. crenularis	25-32
1	B. flemingi	65
1	L. ringens	85
5	N. candida	about 80
1	Argentinoid	24
Larvae and Post Larvae:		
115	Myctophids	7-14
2	Unidentified	15-20

HAUL 99		mm
Juveniles and Adults:		
1	D. theta	36
3	E. crockeri	27-37
1	L. leucopsarus	25
2	T. crenularis	25-30
1	L. ringens	96
Larvae and Post Larvae:		
18	Myctophids	7-18
3	Myctophids?	14-18

HAUL 100		
Juveniles and Adults:		
1	Nansenia sp.	40
Larvae and Post Larvae:		
3	Myctophids	11-14
5	Myctophids?	18-23

HAUL 101		
Juveniles and Adults:		
1	T. crenularis	31
Larvae and Post Larvae:		
2	Myctophids	10-16
6	Myctophids?	about 16

HAUL 102		
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
7	Myctophids	13-16
1	Myctophid?	22

HAUL 103		
Juveniles and Adults:		
2	Nansenia sp.	40-48
Larvae and Post Larvae:		
1	Bathylagid	16
4	Myctophids	11-17
3	Stomiatids	21-43
12	Unidentified (4 sp.)	15-26

APPENDIX TABLE 2b (continued)

HAUL 104		mm
Juveniles and Adults:		
1	C. townsendi	67
6	D. theta	35-82
8	E. crockeri	20-39
1	L. jordani	about 110
3	L. leucopsarus	38
4	L. ritteri	60-90
1	T. crenularis	25
16	A. olfersii	12-61
18	B. ochotensis	25-43
1	G. gracile	112
15	T. macropus	100-265
1	Nansenia sp.	38
1	Argentinoid	175
Larvae and Post Larvae:		
3	Bathylagids?	18-21
3	Gonostomids?	22-31
7	Myctophids	15-18
1	Myctophid?	19
2	Paralepidids	36-55
4	Stomiatids	34-43

HAUL 105		
Juveniles and Adults:		
2	C. townsendi	70
4	D. theta	35-38
9	L. leucopsarus	35-67
8	L. ritteri	52-72
12	B. ochotensis	25-102
1	L. ringens	86
58	T. macropus	70-206
Larvae and Post Larvae:		
1	Bathylagid?	25
20	Myctophids	10-19

HAUL 106		mm
Juveniles and Adults:		
21	C. townsendi	58-70
25	D. theta	31-42
12	L. leucopsarus	38-50
3	L. ritteri	40-56
242	B. ochotensis	23-91
1	L. ringens?	93
6	T. macropus	75-145
15	Nansenia sp.	42-85
Larvae and Post Larvae:		
5	Bathylagids?	17-22
123	Myctophids	10-18
2	Paralepidids	27
1	Unidentified	14

HAUL 107		
Juveniles and Adults:		
1	D. theta	79
6	E. crockeri	20-30
3	L. leucopsarus	28-38
2	L. ritteri	105-111
1	T. crenularis	24
1	Lampadena n. sp.?	115
1	A. heathi	30
19	A. olfersii	11-54
14	B. ochotensis	24-88
1	G. gracile	82
1	I. antrostomus	330
1	N. scolopaceus	680
18	T. macropus	100-260
1	Nansenia sp.	50
1	Pseudoscopelus n. sp.?	115
Larvae and Post Larvae:		
1	Bathylagus sp.	18
3	Gonostomids	23-28
1	Leptocephalus	222
38	Myctophids	7-19
1	Stomiatid	28

APPENDIX TABLE 2b (continued)

HAUL 108		mm
Juveniles and Adults:		
4	E. crockeri	20-25
3	B. ochotensis	20-48
1	N. scolopaceus	550
Larvae and Post Larvae:		
3	Bathylagids	21-24
21	Myctophids	12-24
2	Stomiatids	24-30

HAUL 109		
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
42	Myctophids	13-24
2	Stomiatids	about 20

HAUL 110		
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
2	Unidentified	9-12

HAUL 111		
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
4	Myctophids	about 15
2	Stomiatids?	18

HAUL 112		mm
Juveniles and Adults:		
1	C. townsendi	62
1	D. theta	80
8	E. crockeri	18-40
1	L. leucopsarus	70
1	L. ritteri	120
1	M. californiense	67
3	A. heathi	29-36
3	A. olfersii	22-25
4	G. gracile	110-115
1	T. macropus	200
1	Nansenia sp.	35
Larvae and Post Larvae:		
4	D. oculatus	20-37
1	T. symmetricus	19
5	Myctophids	about 18

HAUL 113		
Juveniles and Adults:		
1	D. theta	99
5	E. crockeri	20-41
1	L. leucopsarus	67
2	L. ritteri	93-124
20	A. olfersii	11-50
2	C. saira	68-72
4	G. gracile	105-120
1	I. antrostomus	300
1	I. elongatus	80
1	M. lugubris	23
6	T. macropus	140-210
Larvae and Post Larvae:		
3	Stomiatids	20-42

APPENDIX TABLE 2b (continued)

HAUL 114

Juveniles and Adults:		
1	C. townsendi	58
2	E. crockeri	18-23
2	L. ritteri	85
2	A. olfersii	9-11
1	C. saira	70
1	M. lugubris	23
1	Argentinoid	28
Larvae and Post Larvae:		
1	Melamphaes sp.	12
1	Bathylagid?	15
31	Myctophids	14-21
1	Paralepidid	22

HAUL 115

Juveniles and Adults:		
1	D. theta	33
1	L. leucopsarus?	about 20
6	L. ritteri	34-93
81	B. ochotensis	23-78
1	C. saira	67
Larvae and Post Larvae:		
1	Melamphaes sp.	19
6	Myctophids	16-18
1	Stomiatid?	20

HAUL 116

Juveniles and Adults:		
1	D. theta	37
1	E. crockeri?	about 18
1	L. leucopsarus	65
7	L. ritteri	38-90
6	B. ochotensis	27-37
7	T. macropus	140-200
Larvae and Post Larvae:		
27	Myctophids	15-20
2	Stomiatids	30-42
1	Unidentified	about 25

HAUL 117

		mm
Juveniles and Adults:		
1	D. theta	87
7	E. crockeri	15-23
1	L. jordani	93
3	L. ritteri	50-120
32	A. olfersii	22-46
1	A. scintillans	about 100
2	B. flemingi	about 65-95
5	B. ochotensis	about 25
1	G. gracile	115
1	I. antrostomus	350
15	T. macropus	140-260
Larvae and Post Larvae:		
1	Myctophid	12
1	Paralepidid	28
2	Stomiatids	35-45

HAUL 118

Juveniles and Adults:		
5	E. crockeri	20-32
5	L. ritteri	40-118
9	A. olfersii	16-58
5	B. ochotensis	22-26
1	G. gracile	115
3	M. lugubris	21-23
3	T. macropus	140-230
Larvae and Post Larvae:		
3	Stomiatids	27-38

HAUL 119

Juveniles and Adults:		
3	E. crockeri	18-21
Larvae and Post Larvae:		
1	Stomiatid	40
3	Unidentified (3 sp.)	12-18

APPENDIX TABLE 2b (continued)

HAUL 120

		mm
Juveniles and Adults:		
1	E. crockeri	22
Larvae and Post Larvae:		
2	Myctophids	about 15
1	Stomiatid	23

HAUL 121

No fish

HAUL 122

		mm
Juveniles and Adults:		
1	C. townsendi	51
21	E. crockeri	16-30
3	L. ritteri	about 40-110
15	A. olfersii	13-45
3	B. ochotensis	22-32
2	M. lugubris	24-25
1	N. coruscans	70
7	T. macropus	75-220
Larvae and Post Larvae:		
1	Bathylagid?	37
4	Myctophids	15-20
9	Stomiatids	20-40

HAUL 123

		mm
Juveniles and Adults:		
1	D. theta	31
2	E. crockeri	18
11	L. ritteri	40-88
6	B. ochotensis	20-50
1	C. saira	32
2	T. macropus	180-200
Larvae and Post Larvae:		
1	Myctophid	17

HAUL 124

		mm
Juveniles and Adults:		
10	C. townsendi	50-61
1	L. ritteri	81
28	B. ochotensis	23-41
1	C. saira	39
Larvae and Post Larvae:		
1	Myctophid	15
1	Paralepidid	18
1	Unidentified	about 25

HAUL 125

		mm
Juveniles and Adults:		
2	E. crockeri	13
3	L. ritteri	42-60
1	B. ochotensis	25
18	T. macropus	130-190
Larvae and Post Larvae:		
6	Myctophids	13-20

HAUL 126

		mm
Juveniles and Adults:		
1	E. crockeri	28
5	L. ritteri	40-105
12	A. olfersii	21-45
1	I. antrostomus	340
12	T. macropus	160-230
Larvae and Post Larvae:		
3	Stomiatids	35-43

APPENDIX TABLE 2b (continued)

HAUL 127		mm
Juveniles and Adults:		
1	C. townsendi	44
1	D. effulgens?	90
4	E. crockeri	19-40
1	L. leucopsarus	50
2	L. ritteri	48-102
6	A. olfersii	17-31
1	B. flemingi	95
2	B. ochotensis	29-40
2	M. lugubris	23-26
2	Melamphaes sp.	20-24
12	T. macropus	160-235
Larvae and Post Larvae:		
7	Stomiatids	30-40

HAUL 128

Juveniles and Adults:
No adults

Larvae and Post Larvae:
1 Stomiatid 35

HAUL 129

Juveniles and Adults:
No adults

Larvae and Post Larvae:
1 Stomiatid 32

HAUL 130

No fish

HAUL 131		mm
Juveniles and Adults:		
2	C. townsendi	54
6	E. crockeri	18-31
5	L. ritteri	76-120
1	A. heathi	30
22	A. olfersii	12-41
1	B. bericoides	about 100
1	C. saira	18
4	M. lugubris	21-24
4	N. coruscans	28-44
1	Argentinoid	32
Larvae and Post Larvae:		
3	Myctophids	8-16
2	Paralepidids	19-41
5	Stomiatids	30-35
1	Unidentified	50

HAUL 132

Juveniles and Adults:		
11	C. townsendi	51-85
2	E. crockeri	about 18
11	L. ritteri	27-75
11	B. ochotensis?	23-87
2	B. exilis	108-113
Larvae and Post Larvae:		
1	Myctophid	15

HAUL 133

Juveniles and Adults:		
32	C. townsendi	45-75
Larvae and Post Larvae:		
1	Unidentified (Paralepidid?)	50

APPENDIX TABLE 2b (continued)

HAUL 134		mm
Juveniles and Adults:		
4	C. townsendi	40-73
15	L. ritteri	38-60
1	M. californiense	65
1	C. saira	35
1	R. sherborni	62
Larvae and Post Larvae:		
1	B. exilis	21
1	Melamphaes sp.	13
1	Myctophid	15
7	Stomiatids	14-40

HAUL 135		
Juveniles and Adults:		
14	L. ritteri	37-112
1	A. olfersii	40
1	A. scintillans	about 60
2	C. saira	24-33
3	I. antrostomus	260-275
1	M. lugubris	20
2	T. macropus	150-195
2	Bathylagus sp.	29-45
3	Argentinoids	29-100
Larvae and Post Larvae:		
	No larvae	

HAUL 136		
Juveniles and Adults:		
2	E. rissoi?	15-43
22	L. ritteri	35-115
1	A. olfersii	45
1	B. flemingi	73
1	B. exilis	115
1	C. saira	21
1	I. antrostomus	185
4	N. coruscans	30-40
1	O. mitsuii	68
1	P. margarita	about 160
Larvae and Post Larvae:		
6	Stomiatids	16-32

HAUL 137		mm
Juveniles and Adults:		
1	L. ritteri	about 42
1	Melamphaes sp.	18
Larvae and Post Larvae:		
2	Unidentified (2 sp.)	10-18

HAUL 138		
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
1	Stomiatid	38
1	Unidentified	12

HAUL 139		
Juveniles and Adults:		
1	C. saira?	28
Larvae and Post Larvae:		
	No larvae	

HAUL 140		
Juveniles and Adults:		
1	B. exilis	103
Larvae and Post Larvae:		
2	Melamphaes sp.	about 17
1	Myctophid	18

HAUL 141		
Juveniles and Adults:		
1	C. saira	19
Larvae and Post Larvae:		
1	Unidentified	13

APPENDIX TABLE 2b (continued)

HAUL 142 — mm

No fish

HAUL 143

No fish

HAUL 144

Juveniles and Adults:

1	C. townsendi	90
1	D. theta	80
2	E. crockeri	18
2	L. ritteri	50-70
1	A. heathi	30
3	A. olfersii	14-25
1	B. bericoides	140
2	M. lugubris	24-25
1	Melamphaes n. sp.	44
1	N. coruscans?	51
1	R. sherborni	75

Larvae and Post Larvae:

No larvae

HAUL 145

Juveniles and Adults:

2	C. townsendi	80
4	L. ritteri	about 50
1	C. saira	37
1	I. antrostomus	60
1	R. sherborni	65

Larvae and Post Larvae:

1	Leptocephalus	193

HAUL 146

Juveniles and Adults:

5	C. townsendi	49-80
1	D. atlanticus	25
1	L. ritteri	75
1	A. scintillans	72
1	B. exilis	52
1	Notoscopelus sp.	62

Larvae and Post Larvae:

No larvae

HAUL 147 — mm

Juveniles and Adults:

5	L. ritteri	37-87
1	M. californiense	66
1	B. flemingi	73
1	B. bericoides	65
1	B. exilis	43
1	C. saira	38
1	M. lugubris	26
3	Melamphaes n. sp.	42
1	N. coruscans	98

Larvae and Post Larvae:

No larvae

HAUL 148

Juveniles and Adults:

1	C. townsendi	50
1	D. theta?	41
1	A. olfersii	48
2	B. ochotensis	34-53
1	C. saira	34
1	Melamphaes n. sp.	43
1	R. sherborni	63

Larvae and Post Larvae:

2	Stomiatids	25-40

HAUL 149

Juveniles and Adults:

1	D. theta	30
2	D. atlanticus	21-24
7	L. ritteri	42-98
2	A. olfersii	37-58
1	Astronesthes n. sp.	84
1	B. bericoides	136
4	B. ochotensis	25-73
1	B. exilis	48
2	C. saira	20-22
1	M. biseriatus	235
2	Melamphaes n. sp.	41
1	N. scolopaceus	560
1	P. margarita	215
2	R. sherborni	65
1	T. macropus	230

Larvae and Post Larvae:

1	Stomiatid	21

APPENDIX TABLE 2b (continued)

HAUL 150		mm
Juveniles and Adults:		
1	C. saira	45
Larvae and Post Larvae:		
2	Melamphaes sp.	13-17
1	Unidentified	41

HAUL 151

Juveniles and Adults:		
1	N. scolopaceus	360
1	N. coruscans	75
Larvae and Post Larvae:		
	No larvae	

HAUL 152

No fish

HAUL 153		
Juveniles and Adults:		
2	C. townsendi	73
7	E. crockeri	18-37
5	L. ritteri	42-75
3	A. olfersii	19-44
2	B. bericoides	95-150
1	Melamphaes n. sp.	45
1	M. microstoma	50
2	R. sherborni	40-75
1	Argentinoid	31
Larvae and Post Larvae:		
1	Myctophid	15
1	Paralepidid	35
1	Stomiatid	25

HAUL 154		mm
Juveniles and Adults:		
7	C. townsendi	55-82
36	L. ritteri	22-68
1	B. exilis	112
1	C. saira	16
1	I. antrostomus	360
1	R. sherborni	64
Larvae and Post Larvae:		
4	Paralepidids	25-55

HAUL 155		
Juveniles and Adults:		
41	C. townsendi	45-80
1	D. atlanticus	27
1	E. crockeri	15
2	L. ritteri	59-62
1	C. saira	25
1	I. antrostomus	75
1	N. scolopaceus	430
1	T. rex-salmonorum	470
Larvae and Post Larvae:		
1	Myctophid	12
1	Unidentified	22

HAUL 156		
Juveniles and Adults:		
55	C. townsendi	38-81
1	D. effulgens?	80
1	C. saira	21
Larvae and Post Larvae:		
2	Paralepidids?	30-45

APPENDIX TABLE 2b (continued)

HAUL 157		mm
Juveniles and Adults:		
6	C. townsendi	45-77
1	D. atlanticus	25
6	L. ritteri	25-108
2	B. ochotensis	30
3	C. saira	13-24
1	M. lugubris	22
1	R. sherborni	60
1	T. macropus	180
Larvae and Post Larvae:		
1	Myctophid	15
2	Paralepidids	20-31

HAUL 158		
Juveniles and Adults:		
2	C. townsendi	49-52
6	L. ritteri	22-80
1	A. olfersii	54
2	B. ochotensis	37-50
1	I. antrostomus?	about 70
1	R. sherborni	83
1	Melamphaes sp.	22
Larvae and Post Larvae:		
1	Myctophid?	19
1	Paralepidid?	17
2	Stomiatids	13-20
1	Unidentified	16

HAUL 159		
Juveniles and Adults:		
5	C. townsendi	49-68
1	D. theta?	92
1	D. atlanticus	20
5	E. crockeri	17-25
7	L. ritteri	25-62
5	A. olfersii	15-61
2	B. ochotensis	38-42
1	L. ringens?	68
1	L. scolopaceus	280
1	N. coruscans	38
2	O. mitsuii	125-140
2	R. sherborni	51-55
1	T. macropus	270
Larvae and Post Larvae:		
2	Myctophids	12-15
1	Paralepidid?	18
2	Stomiatids?	18-25

HAUL 160		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
2	Unidentified	15-26

HAUL 161		
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
2	Stomiatids	27-35

HAUL 162		
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Stomiatid	25

HAUL 163

No fish

HAUL 164

No fish

HAUL 165		
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Stomiatid?	35

HAUL 166		
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	D. theta	12
3	Melamphaes sp.	17-20
4	Stomiatids	29-38
1	Unidentified	14

APPENDIX TABLE 2b (continued)

HAUL 167		mm
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
3	Myctophids	9-11
1	Stomiatid	35

HAUL 168		
	No fish	

HAUL 169		
Juveniles and Adults:		
1	D. theta	82
6	E. crockeri	19-35
4	L. ritteri	38-110
5	A. olfersii	17-48
1	B. ochotensis	30
1	I. antrostomus	68
1	M. lugubris	23
1	T. macropus	108
Larvae and Post Larvae:		
2	Myctophids	8
2	Paralepidids?	27-30
2	Stomiatids	about 45

HAUL 170		
Juveniles and Adults:		
1	C. townsendi	61
23	L. ritteri	24-70
24	B. ochotensis	25-40
1	C. saira	71
2	Nansenia sp.	57-92
Larvae and Post Larvae:		
2	Paralepidids	23-42

HAUL 171		mm
Juveniles and Adults:		
8	C. townsendi	47-72
1	L. ritteri	23
Larvae and Post Larvae:		
1	Paralepidid	33

HAUL 172		
Juveniles and Adults:		
1	L. leucopsarus	32
10	L. ritteri	50-77
1	T. crenularis	28
1	C. saira	50
1	M. lugubris	28
4	T. macropus	90-210
Larvae and Post Larvae:		
1	Paralepidid	35

HAUL 173		
Juveniles and Adults:		
3	E. crockeri	21-22
3	L. ritteri	45-97
5	A. olfersii	32-39
1	C. saira	45
3	Melamphaes sp.	21-25
2	Argentinoids	22-30
Larvae and Post Larvae:		
1	Sebastodes sp.	11
3	Paralepidids	30-45
3	Stomiatids	30-35

HAUL 174		
Juveniles and Adults:		
4	C. townsendi	47-80
1	D. theta	25
1	L. leucopsarus	20
9	L. ritteri	25-65
4	B. ochotensis	30-35
7	T. macropus	85-160
Larvae and Post Larvae:		
1	Myctophid	8

APPENDIX TABLE 2b (continued)

HAUL 175

		mm
Juveniles and Adults:		
1	C. townsendi	60
3	E. crockeri	20-38
2	L. leucopsarus	20
7	L. ritteri	22-80
2	T. crenularis	25-27
10	A. olfersii	18-52
1	I. antrostomus (very bad shape)	about 290
1	R. sherborni	42
4	T. macropus	90-180
Larvae and Post Larvae:		
2	Paralepidids	25-33
1	Stomiatid	28

HAUL 176

Net lost when cable parted.

HAUL 177

Juveniles and Adults:		
1	D. theta	32
1	T. crenularis	22
Larvae and Post Larvae:		
	No larvae	

HAUL 178

Juveniles and Adults:		
4	D. theta	37-50
1	L. leucopsarus	45
1	M. californiense	95
6	B. ochotensis	28-38
Larvae and Post Larvae:		
2	M. pacificus	11-21
1	T. rex-salmonorum	about 30
16	Sebastodes sp.	6-12
1	Myctophid	13
6	Paralepidids	25-45
10	Pleuronectids	12-22
2	Unidentified	13-18

HAUL 179

		mm
Juveniles and Adults:		
1	C. townsendi	61
5	D. theta	38-55
5	L. leucopsarus	37-82
1	M. californiense	81
1	T. macropus	110
Larvae and Post Larvae:		
4	Sebastodes sp.	7-12
3	Myctophids	about 14
4	Unidentified (2 sp.)	14-25

HAUL 180

Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
3	Sebastodes sp.	8-10
6	Myctophids	12-16
1	Pleuronectid	about 15
1	Stomiatid	32

HAUL 181

Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
6	T. symmetricus	8-15
1	Sebastodes sp.	15
1	Pleuronectid	20

HAUL 182

Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
23	Sebastodes sp.	7-11
1	Myctophid	12
1	Pleuronectid?	15
3	Unidentified	12-16

APPENDIX TABLE 2b (continued)

HAUL 183

		mm
Juveniles and Adults:		
1	D. theta	60
5	L. leucopsarus	54-82
Larvae and Post Larvae:		
5	Sebastodes sp.	7-10
1	Bathylagid?	15
1	Myctophid	15
1	Paralepidid	20
2	Pleuronectids	17-21

HAUL 184

Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
2	Sebastodes sp.	11
1	Bathylagid?	about 12
1	Pleuronectid	27
2	Stomiatids	30-37
1	Unidentified	18

HAUL 185

Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
1	Sebastodes sp.	12
2	Pleuronectids (2 sp.)	16-33
1	Unidentified	15

HAUL 186

Juveniles and Adults:		
11	C. townsendi	55-65
2	D. theta	30-54
15	L. leucopsarus	20-67
3	M. californiense	72-92
1	T. crenularis (in bad shape)	32
1	B. ochotensis	46
Larvae and Post Larvae:		
1	Sebastodes sp.	10
1	Paralepidid	50
1	Pleuronectid	20
11	Stomiatids	17-37

HAUL 187

		mm
Juveniles and Adults:		
6	C. townsendi	55-65
21	L. leucopsarus	20-58
1	M. californiense	85
1	T. crenularis	27
Larvae and Post Larvae:		
1	Sebastodes sp.	12
1	Myctophid	10
3	Paralepidids?	about 25-30
2	Pleuronectids	10-32
1	Unidentified	12

HAUL 188

Juveniles and Adults:		
5	C. townsendi	50-76
20	L. leucopsarus	20-75
4	L. ritteri	41-51
1	A. scintillans	115
1	I. antrostomus	210
2	T. macropus	120-125
5	Argentinoids	28-40
Larvae and Post Larvae:		
70	Sebastodes sp.	6-13
3	Paralepidids	20-45

HAUL 189

Juveniles and Adults:		
1	C. townsendi?	72
1	D. theta	35
12	L. leucopsarus	20-65
6	L. ritteri	53-62
3	T. macropus	95-170
Larvae and Post Larvae:		
27	Sebastodes sp.	6-12
1	Myctophid	13
1	Pleuronectid	16
1	Stomiatid	30

APPENDIX TABLE 2b (continued)

HAUL 190		mm
Juveniles and Adults:		
19	L. leucopsarus	26-80
14	L. ritteri	40-95
2	T. macropus	135-165
1	Argentinoid	30
Larvae and Post Larvae:		
5	Sebastodes sp.	7-13

HAUL 191		
Juveniles and Adults:		
1	D. theta	33
8	L. leucopsarus	35-65
2	L. ritteri	45-66
Larvae and Post Larvae:		
1	M. pacificus	15
6	Sebastodes sp.	8-11
2	Myctophids?	about 12
1	Pleuronectid	28

HAUL 192		
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
5	Sebastodes sp.	6-15

HAUL 193		
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
12	Sebastodes sp.	7-13
1	Unidentified	15

HAUL 194		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
10	Sebastodes sp.	9-14
1	Unidentified	19

HAUL 195		
Juveniles and Adults:		
23	L. leucopsarus	21-62
1	L. mexicanus	32
1	L. ritteri	50
Larvae and Post Larvae:		
1	G. zachirus?	50
1	M. pacificus	15
1	Sebastodes sp.	14
1	Bathylagid	23
2	Pleuronectids	33
4	Unidentified	15-24

HAUL 196		
Juveniles and Adults:		
3	D. theta	37-53
29	L. leucopsarus	22-55
1	T. crenularis	62
1	L. ringens?	90
2	Argentinoids	30-34
1	Unidentified	22
Larvae and Post Larvae:		
2	Sebastodes sp.	8-19
9	Bathylagids?	13-19
2	Pleuronectids	18-27

HAUL 197		
Juveniles and Adults:		
1	D. theta	35
4	L. leucopsarus	25-57
1	C. saira	60
1	Myctophid? (bad shape)	22
Larvae and Post Larvae:		
1	Pleuronectid	29
4	Unidentified	about 10-20

APPENDIX TABLE 2b (continued)

HAUL 198		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Myctophid	12
2	Pleuronectids	13-18
1	Unidentified	13

HAUL 199		
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Unidentified	10

HAUL 200

No fish

HAUL 201

No fish

HAUL 202

No fish

HAUL 203		
Juveniles and Adults:		
5	L. leucopsarus	47-60
29	L. mexicanus	30-57
4	L. ritteri	24-50
6	Leuroglossus sp.	25-78
Larvae and Post Larvae:		
No larvae		

HAUL 204		
Juveniles and Adults:		
1	L. leucopsarus	23
57	L. mexicanus	26-68
11	Leuroglossus sp.	about 50-70
Larvae and Post Larvae:		
No larvae		

HAUL 205		mm
No fish		

HAUL 206		
Juveniles and Adults:		
1	D. theta	15
15	L. leucopsarus	19-75
19	L. mexicanus	32-55
1	L. ritteri	45
1	M. californiense	32
1	A. olfersii	20
1	B. ochotensis	72
Larvae and Post Larvae:		
40	C. signata? (bad shape)	18-30
2	Sebastodes sp.	20-28
3	Unidentified	12-18

HAUL 207		
Juveniles and Adults:		
11	L. leucopsarus	18-77
29	L. mexicanus	35-65
4	L. ritteri	36-52
1	T. crenularis	38
2	A. olfersii	14-18
Larvae and Post Larvae:		
8	C. signata? (bad shape)	17-28
1	Sebastodes sp.	36
4	Unidentified	18-22

HAUL 208		
Juveniles and Adults:		
1	D. theta	35
14	L. leucopsarus	23-56
66	L. mexicanus	30-60
18	L. ritteri	34-39
1	M. californiense	32
2	L. ringens	105-120
Larvae and Post Larvae:		
3	C. signata? (in very bad shape)	about 25
3	Sebastodes sp.	13-18
3	Unidentified	8-12

APPENDIX TABLE 2b (continued)

HAUL 209

		mm
Juveniles and Adults:		
12	Lampanyctus sp. (mixture of leucopsarus, mexicanus, ritteri, all in poor condition)	21-56
1	A. olfersi	12
Larvae and Post Larvae:		
2	Sebastodes sp.	8-10
44	S. caerula?	10-23

HAUL 210

		mm
Juveniles and Adults:		
11	L. leucopsarus	21-83
63	L. mexicanus	34-58
28	L. ritteri	24-66
Larvae and Post Larvae:		
67	C. signata (in very bad shape)	about 18-40
4	S. caerula?	11-26

HAUL 211

		mm
Juveniles and Adults:		
1	L. leucopsarus	22
1	L. mexicanus	30
2	L. ritteri	28-41
1	T. rex-salmonorum	54
Larvae and Post Larvae:		
23	C. signata (in bad shape)	20-30
1	M. pacifica	22
2	S. caerula?	about 15
1	Melamphaes sp.	18
4	Sebastodes sp.	13

HAUL 212

		mm
Juveniles and Adults:		
3	E. crockeri	19-31
Larvae and Post Larvae:		about
7	C. signata (in bad shape)	25
1	Argyopelecus sp.	10
1	Sebastodes sp.	20
3	Unidentified	13-27

HAUL 213

Juveniles and Adults:
No adults

Larvae and Post Larvae:		
1	Sebastodes sp.	12
1	Sebastodes sp.?	10
2	Pleuronectids	12-16

HAUL 214

Juveniles and Adults:		
4	C. townsendi	38-48
1	Myctophid (probably Ceratoscopelus in bad shape)	65
Larvae and Post Larvae:		
2	Clupeids?	11-20
1	Pleuronectid	17

HAUL 215

Juveniles and Adults:		
1	C. townsendi	64
2	D. theta	16-46
1	D. atlanticus	15
1	L. mexicanus	41
2	L. ritteri	23-27
3	M. californiense	32-57
Larvae and Post Larvae:		
7	C. signata (in bad shape)	about 20-30
1	Myctophid	15
1	Unidentified	30

APPENDIX TABLE 2b (continued)

HAUL 216

		mm
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
1	C. signata (in bad shape)	about 25
2	Unidentified	about 7

HAUL 217

No fish

HAUL 218

		mm
Juveniles and Adults:		
1	D. atlanticus	17
8	L. mexicanus	45-55
1	V. lucetia	55
Larvae and Post Larvae:		
1	T. symmetricus	20
1	Idiacanthus sp.	38
2	Unidentified (2 sp.)	16-30

HAUL 219

		mm
Juveniles and Adults:		
1	Lampanyctus sp. (in very bad shape)	55
Larvae and Post Larvae:		
5	T. symmetricus	20-23
3	V. lucetia	20
5	Unidentified	8-15

HAUL 220

		mm
Juveniles and Adults:		
1	C. townsendi	46
1	L. mexicanus	63
4	L. ritteri	21-28
Larvae and Post Larvae:		
3	V. lucetia	14-21
2	Idiacanthus sp.	about 20
1	Myctophid	14
1	Unidentified	7

HAUL 221

		mm
Juveniles and Adults:		
1	D. theta	52
1	L. mexicanus	62
1	L. ritteri	22
4	A. heathi	17-19
1	B. flemingi	85
1	R. sherborni	47
Larvae and Post Larvae:		
1	V. lucetia	19
3	Unidentified	15-20

HAUL 222

		mm
Juveniles and Adults:		
3	E. crockeri	23-37
Larvae and Post Larvae:		
1	C. signata?	21

HAUL 223

No fish

HAUL 224

No fish

HAUL 225

No fish

HAUL 226

		mm
Juveniles and Adults:		
1	C. townsendi	50
1	D. atlanticus	24
1	L. mexicanus	57
2	L. ritteri	39-85
1	M. californiense	38
3	Melamphaes n. sp.	37-41
1	R. sherborni	60
1	V. lucetia	45
Larvae and Post Larvae:		
5	C. signata? (bad shape)	25-35
1	Idiacanthus sp.	25
1	Cottid?	9
1	Paralepidid	36

APPENDIX TABLE 2b (continued)

HAUL 227

		mm
Juveniles and Adults:		
2	C. townsendi	32-46
1	D. atlanticus	19
1	L. mexicanus	60
19	L. ritteri	20-42
1	N. valdiviae	25
Larvae and Post Larvae:		
	No larvae	

HAUL 228

		mm
Juveniles and Adults:		
3	C. townsendi	45-47
3	D. atlanticus	13-20
1	Myctophid	about 30
Larvae and Post Larvae:		
1	C. signata? (in bad shape)	about 30

HAUL 229

		mm
Juveniles and Adults:		
11	D. atlanticus	16-23
1	V. lucetia	47
2	Myctophids (in bad shape)	33
Larvae and Post Larvae:		
3	V. lucetia	18-23
6	Clupeids?	about 12

HAUL 230

		mm
Juveniles and Adults:		
5	C. townsendi	38-54
1	D. theta	53
2	D. atlanticus	17-18
11	L. ritteri	28-110
1	N. elongatus?	68
1	Melamphaes n. sp.	33
3	R. sherborni	40-52
Larvae and Post Larvae:		
2	V. lucetia	12-17
2	Unidentified	13-16

HAUL 231

		mm
Juveniles and Adults:		
2	C. townsendi	40-45
2	D. atlanticus	22
6	L. ritteri	25-42
1	M. affine	65
1	A. heathi	27
4	D. oculatus	about 35
1	M. lugubris	23
1	Melamphaes n. sp.	38
1	P. margarita	127
1	Alepocephalid	about 65
1	Stomiatid (poor condition)	36
Larvae and Post Larvae:		
12	C. signata? (very poor condition)	about 15-20

HAUL 232

		mm
Juveniles and Adults:		
1	D. theta	57
5	L. ritteri	23-102
1	M. californiense	28
1	A. heathi	26
1	A. olfersii?	45
1	M. lugubris	23
1	Melamphaes n. sp.	47
1	V. lucetia	50
1	Alepisaurid?	42
Larvae and Post Larvae:		
2	T. symmetricus	16-19
3	Unidentified (2 sp.) (bad shape)	about 15

HAUL 233

		mm
Juveniles and Adults:		
5	C. townsendi	21-49
6	D. atlanticus	20-25
3	M. californiense	30-34
2	A. heathi	about 25
Larvae and Post Larvae:		
2	Unidentified (very bad shape)	10-20

APPENDIX TABLE 2b (continued)

HAUL 234		mm
Juveniles and Adults:		
2	C. townsendi	23-30
1	D. atlanticus	21
1	L. ritteri	22
Larvae and Post Larvae:		
1	T. rex-salmonorum	27
2	Unidentified	10-27

HAUL 235		
Juveniles and Adults:		
4	D. atlanticus	16
Larvae and Post Larvae:		
1	T. rex-salmonorum	12
1	Unidentified (bad shape)	12

HAUL 236		
Juveniles and Adults:		
19	C. townsendi	16-50
1	N. elongatus	25
Larvae and Post Larvae:		
6	Myctophids	10-15
1	Unidentified	18

HAUL 237		
Juveniles and Adults:		
1	C. townsendi	50
4	D. atlanticus	17-20
10	L. ritteri	20-85
3	A. heathi	16-30
1	A. olfersii	39
1	M. bispinosus	42
2	Melamphaes n. sp.	42-45
1	R. sherborni	42
Larvae and Post Larvae:		
2	Myctophids	10-18
3	Unidentified	13-20

HAUL 238		mm
Juveniles and Adults:		
1	Myctophid	22
Larvae and Post Larvae:		
1	Myctophid	13
1	Unidentified	16

HAUL 239		
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
1	Unidentified	11

HAUL 240

No fish

HAUL 241		
Juveniles and Adults:		
2	C. townsendi	22-24
1	D. theta?	29
3	D. atlanticus	16-22
2	L. ritteri	34-38
1	M. aurolaternatum	24
1	A. heathi	25
1	A. olfersii?	47
1	A. scintillans	41
1	Melamphaes n. sp.	44
1	V. lucetia	24
8	Myctophids (2 sp.)	14-23
Larvae and Post Larvae:		
2	V. lucetia	15
5	Unidentified (3 sp.)	14-20

APPENDIX TABLE 2b (continued)

HAUL 242		mm
Juveniles and Adults:		
4	C. townsendi	21-56
4	L. ritteri	27-55
1	I. anstrotomus	165
1	V. lucetia	34
4	Myctophids (2 sp.) (in bad shape)	20-30
Larvae and Post Larvae:		
2	V. lucetia	17-22
1	Myctophid	14
5	Stomiatoids (in bad shape)	14-28

HAUL 243		
Juveniles and Adults:		
5	C. townsendi	25-48
3	D. atlanticus	15-21
1	H. reinhardti	18
3	L. mexicanus	31-35
1	L. ritteri	36
1	M. aurolaternatum	18
7	N. elongatus	32-40
1	Notoscopelus sp.	53
1	Myctophid	20
Larvae and Post Larvae:		
3	V. lucetia	15-21
4	Myctophids	7-12
12	Unidentified (mostly stomiatoids)	10-30

HAUL 244		
Juveniles and Adults:		
8	D. laternatus	14-22
Larvae and Post Larvae:		
21	V. lucetia	15-20
108	V. lucetia?	4-16
7	Myctophids	6-15
1	Leptocephalus	190

HAUL 245		mm
Juveniles and Adults:		
1	C. townsendi	37
4	D. atlanticus	18-21
1	E. crockeri	52
3	L. ritteri	27-88
1	A. heathi	32
1	A. olfersii	12
1	M. bispinosus	64
1	V. tripunctulatus	23
2	Myctophids (2 sp.) (poor condition)	18-25
Larvae and Post Larvae:		
1	C. signata	28
32	V. lucetia (in poor shape)	10-20
3	Myctophids	14-19
6	Unidentified	6-34

HAUL 246		
Juveniles and Adults:		
1	L. regalis	63
2	L. ritteri	28-38
1	Myctophid (poor shape)	20
Larvae and Post Larvae:		
3	Gonostomids?	8-25

HAUL 247		
Juveniles and Adults:		
1	D. atlanticus	24
4	Myctophids (very bad shape)	19-25
Larvae and Post Larvae:		
1	Myctophid	12
1	Unidentified	7

APPENDIX TABLE 2b (continued)

HAUL 248

		mm
Juveniles and Adults:		
4	C. townsendi	24-29
8	D. atlanticus	18-25
6	N. elongatus	30-38
2	Unidentified	22
Larvae and Post Larvae:		
8	V. lucetia	14-24
1	Myctophid	8
33	Unidentified	4-23

HAUL 249

		mm
Juveniles and Adults:		
1	L. ritteri	45
1	M. californiense	32
1	R. sherborni	42
3	Myctophids (very bad shape)	22-36
Larvae and Post Larvae:		
1	T. symmetricus	10
2	Stomiatids	23

HAUL 250

		mm
Juveniles and Adults:		
8	C. townsendi	20-50
5	L. ritteri	22-27
1	Lampadena n. sp.	62
1	A. heathi	29
2	B. pacificus	77-82
Larvae and Post Larvae:		
3	Stomiatids	22-28
1	Unidentified (bad shape)	12

HAUL 251

		mm
Juveniles and Adults:		
13	C. townsendi	20-45
1	D. atlanticus	20
3	M. californiense	24-30
2	Myctophids (very poor shape)	about 20-25
Larvae and Post Larvae:		
1	V. lucetia	19
13	Stomiatids	15-42
3	Unidentified	7-19

HAUL 252

		mm
Juveniles and Adults:		
7	C. townsendi	24-51
7	D. atlanticus	17-26
2	N. elongatus	56-58
2	Myctophids (bad shape)	14-23
Larvae and Post Larvae:		
1	V. lucetia	20
10	Stomiatids	12-42
3	Unidentified	4-16

HAUL 253

		mm
Juveniles and Adults:		
4	C. townsendi	22-50
2	D. atlanticus	18-19
1	N. elongatus	75
1	Myctophid (bad shape)	about 20
Larvae and Post Larvae:		
1	Myctophid	10
5	Stomiatids	19-27

APPENDIX TABLE 2b (continued)

HAUL 254		mm
Juveniles and Adults:		
1	D. atlanticus	20
1	L. steinbecki	47
1	M. californiense	29
5	A. heathi	16-28
1	A. olfersii	50
1	C. saira	12
3	D. oculatus	22-37
1	M. bispinosus	25
1	P. margarita	165
1	Argentinoid	32
Larvae and Post Larvae:		
1	T. macropus?	45
1	V. lucetia	17
1	Paralepidid?	48
2	Unidentified	8-18

HAUL 255		
Juveniles and Adults:		
6	C. townsendi	20-64
7	D. atlanticus	14-19
3	L. ritteri?	23
1	A. heathi	18
1	A. olfersii	10
1	A. scintillans?	41
3	Melamphaes n. sp.	40-45
Larvae and Post Larvae:		
2	Myctophids	11-18
1	Stomiatid	37
2	Unidentified	15-19

HAUL 256		
Juveniles and Adults:		
1	C. townsendi	31
3	D. atlanticus	17-21
2	M. californiense	31-32
2	A. heathi	17-30
2	A. olfersii?	45-51
1	B. ochotensis	40
1	M. bispinosus	75
1	Melamphaes n. sp.	44
1	R. sherborni	61
20	T. symmetricus	18-30
Larvae and Post Larvae:		
1	D. oculatus (bad shape)	about 25
2	Myctophids	7-10
5	Stomiatids?	16-45
1	Unidentified	16

HAUL 257		mm
Juveniles and Adults:		
1	C. townsendi	65
4	D. atlanticus	18-20
1	E. rissoi?	25
12	L. ritteri	25-57
2	M. californiense	32-34
1	A. heathi	19
1	C. saira	43
1	I. antrostomus	78
4	M. lugubris	22-30
3	Melamphaes n. sp.	18-39
2	Argentinoids	32-44
Larvae and Post Larvae:		
6	Melamphaes sp. (very poor shape)	7-18
2	Myctophids	9-10
9	Unidentified	17-42

HAUL 258		
Juveniles and Adults:		
12	C. townsendi	22-70
3	D. atlanticus	17-19
3	L. ritteri	26-53
1	M. californiense	32
Larvae and Post Larvae:		
3	Myctophids	5-16
2	Stomiatids	25-47
8	Unidentified	18-38

HAUL 259		
Juveniles and Adults:		
4	C. townsendi	22-52
2	M. californiense	37-40
Larvae and Post Larvae:		
15	Stomiatids	10-45
2	Unidentified	11-19

APPENDIX TABLE 2b (continued)

HAUL 260		mm
Juveniles and Adults:		
1	C. townsendi	72
7	D. atlanticus	16-18
1	H. reinhardti	38
1	C. saira	36
1	T. rex-salmonorum	121
1	Myctophid (bad shape)	23
Larvae and Post Larvae:		
1	T. symmetricus	22
11	Stomiatids	16-50

HAUL 261		mm
Juveniles and Adults:		
1	E. crockeri	45
3	L. ritteri	19-120
1	A. heathi	16
1	A. olfersii	50
1	B. flemingi	135
1	B. ochotensis	47
Larvae and Post Larvae:		
1	Melamphaes sp.	12
3	Myctophids	10-17
1	Gonostomid	20
5	Stomiatids	15-50

HAUL 262		mm
Juveniles and Adults:		
1	C. saira	40
1	B. exilis	85
Larvae and Post Larvae:		
1	Melamphaes sp.	15
1	Gonostomid	39
1	Unidentified	15

HAUL 263		mm
Juveniles and Adults:		
1	E. crockeri	32
8	L. ritteri	22-122
24	A. heathi	10-27
5	A. olfersii	11-59
1	C. saira	32
1	N. coruscans	73
1	R. sherborni	70
Larvae and Post Larvae:		
6	D. oculatus	26-36
1	T. symmetricus	28
1	Myctophid	14
10	Unidentified (mostly stomiatids?)	15-30

HAUL 264		mm
Juveniles and Adults:		
2	C. townsendi	22-44
2	E. crockeri (in bad shape)	about 20
1	L. ritteri	21-108
2	M. californiense	28-47
16	A. heathi	11-20
10	A. olfersii	13-53
1	B. ochotensis	30
3	Melamphaes n. sp.	40-41
1	N. scolopaceus	480
1	R. sherborni	70
1	T. macropus	190
Larvae and Post Larvae:		
1	M. pacificus	57
9	Unidentified	10-35

APPENDIX TABLE 2b (continued)

HAUL 265

		mm
Juveniles and Adults:		
13	C. townsendi	20-77
1	E. crockeri	21
7	L. ritteri	24-62
1	M. californiense	32
2	A. heathi	11-14
2	A. olfersii	10-11
1	C. saira	28
1	I. antrostomus	74
1	N. scolopaceus	480
Larvae and Post Larvae:		
2	D. oculatus (very bad shape)	about 25
9	Myctophids	7-19
2	Stomiatids (very bad shape)	about 25-30

HAUL 266

Juveniles and Adults:		
13	C. townsendi	19-54
1	D. atlanticus	21
1	M. californiense	63
1	T. rex-salmonorum	40
Larvae and Post Larvae:		
2	T. symmetricus	6-10
7	Stomiatids?	22-38

HAUL 267

Juveniles and Adults:		
2	C. townsendi	20
2	D. theta	15
14	L. ritteri	24-50
1	M. californiense	37
1	M. microstoma	32
1	R. sherborni	47
Larvae and Post Larvae:		
3	Melamphaes sp.?	8-15
2	Myctophids	10-12
6	Stomiatids	16-43

HAUL 268

		mm
Juveniles and Adults:		
2	C. townsendi	52-79
1	D. effulgens?	82
2	E. crockeri	18-32
12	L. ritteri	22-180
9	A. heathi	10-27
1	A. olfersii?	11
2	B. flemingi	45-66
1	C. saira	30
1	M. lugubris	55
1	Melamphaes n. sp.	43
3	R. sherborni	70-80
1	Melanomus sp.	130
1	Argentinoid	32
1	Myctophid (poor shape)	22
Larvae and Post Larvae:		
1	T. symmetricus	11
3	Melamphaes sp.	9-16
3	Myctophids	10-19
6	Unidentified (poor shape)	17-34

HAUL 269

Juveniles and Adults:		
1	E. crockeri	25
4	A. heathi	11-21
Larvae and Post Larvae:		
3	D. oculatus	22-30
10	Unidentified	17-33

HAUL 270

Juveniles and Adults:		
8	E. crockeri	16-22
4	L. ritteri	47-130
1	M. californiense	32
1	A. heathi	27
8	A. olfersii	14-25
1	A. scintillans	about 210
1	B. ochotensis	31
1	R. sherborni	65
1	T. macropus	225
Larvae and Post Larvae:		
1	Melamphaes sp.	20
1	Myctophid	13
3	Unidentified	20-51

APPENDIX TABLE 2b (continued)

HAUL 271		mm
Juveniles and Adults:		
5	C. townsendi	56-87
3	E. crockeri	20-24
12	L. ritteri	38-43
1	A. olfersii	16
1	B. exilis	97
Larvae and Post Larvae:		
2	Paralepidids?	28

HAUL 272		
Juveniles and Adults:		
8	C. townsendi	46-64
1	D. theta	17
17	L. ritteri	27-47
1	C. saira	19
Larvae and Post Larvae:		
4	Myctophids	7-11
1	Unidentified	36

HAUL 273		
Juveniles and Adults:		
1	C. townsendi	49
2	L. ritteri? (bad shape)	about 23
1	A. olfersii? (bad shape)	about 14
Larvae and Post Larvae:		
2	Stomiatids?	26-34

HAUL 274		
Juveniles and Adults:		
1	C. townsendi	58
13	L. ritteri	23-80
1	B. ochotensis	30
1	M. lugubris	24
1	R. sherborni	40
1	T. macropus	about 210
4	Melamphaes sp. (bad shape)	10-25
Larvae and Post Larvae:		
1	Myctophid	14
1	Paralepidid	30
2	Unidentified	about 20

HAUL 275		mm
Juveniles and Adults:		
1	C. townsendi	52
4	E. crockeri	17-35
8	L. ritteri	28-45
1	B. ochotensis	26
1	I. antrostomus	350
1	M. lugubris	48
Larvae and Post Larvae:		
1	Myctophid	14
1	Stomiatid	30
1	Unidentified	12

HAUL 276		
Juveniles and Adults:		
1	E. arctica	19
4	E. crockeri	16-22
3	L. ritteri	24-62
6	A. heathi	16-31
1	B. bericoides	116
1	T. macropus	170
Larvae and Post Larvae:		
18	D. oculatus	16-35
3	N. dentatus	35
2	Argyopelecus sp.	10-12
1	Melamphaes sp.?	16
7	Unidentified	19-35

HAUL 277		
Juveniles and Adults:		
1	C. townsendi	58
34	E. crockeri	20-35
5	L. ritteri	38-93
1	A. heathi	27
9	A. olfersii	18-53
1	B. bericoides	127
1	T. macropus	220
1	Melamphaes sp.	21
1	Argentinoid	28
Larvae and Post Larvae:		
1	Gonostomid	20
14	Stomiatids	30-45

APPENDIX TABLE 2b (continued)

HAUL 278

		mm
Juveniles and Adults:		
4	C. townsendi	55-73
3	D. theta	25-27
1	E. crockeri	20
59	L. ritteri	24-55
1	A. heathi (bad shape)	11
6	A. scintillans	63-85
37	B. ochotensis	26-60
1	O. mitsuii	75
1	Nansenia sp.	---
Larvae and Post Larvae:		
2	Gonostomids	22
1	Stomiatid	40

HAUL 279

Juveniles and Adults:		
3	C. townsendi	53-55
1	D. theta	14
1	D. atlanticus	21
4	L. ritteri? (bad shape)	about 38
Larvae and Post Larvae:		
4	Paralepidids	22-24

HAUL 280

Juveniles and Adults:		
1	C. townsendi	52
6	E. crockeri	21-39
2	L. ritteri	72-104
5	B. ochotensis	29-35
1	B. exilis	103
1	I. antrostomus	350
1	T. macropus	215
Larvae and Post Larvae:		
1	N. dentatus	28
1	Myctophid	17
2	Paralepidids	20-25
2	Stomiatids	about 40
2	Unidentified	20-24

HAUL 281

		mm
Juveniles and Adults:		
2	E. crockeri (bad shape)	20-27
1	L. leucopsarus	35
7	L. ritteri	41-80
5	B. ochotensis	28-38
2	M. lugubris	24-27
1	N. scolopaceus	550
3	T. macropus	180-190
Larvae and Post Larvae:		
4	T. symmetricus	8-10
3	Paralepidids	28-30

HAUL 282

Juveniles and Adults:		
1	C. townsendi	73
5	E. arctica	19-30
7	E. crockeri	16-23
4	L. ritteri	64-115
5	A. heathi	15-32
1	B. ochotensis	33
4	C. saira	18-30
1	R. sherborni	57
Larvae and Post Larvae:		
21	D. oculatus (bad shape)	19-32
1	N. dentatus	25
1	Myctophid	13
1	Paralepidid	44
3	Stomiatids	24-41

HAUL 283

Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
2	D. oculatus	about 25-30
1	T. symmetricus	16
1	Myctophid?	11
1	Unidentified	21

APPENDIX TABLE 2b (continued)

HAUL 284		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	D. oculatus (bad shape)	about 20
1	T. symmetricus	18

HAUL 285		
Juveniles and Adults:		
2	E. crockeri	25-36
1	A. olfersii	28
13	B. ochotensis	20-47
3	T. macropus	50-80
Larvae and Post Larvae:		
1	N. dentatus	27
1	T. symmetricus	10
2	Myctophids	19
4	Stomiatids	32-50

HAUL 286		
Juveniles and Adults:		
4	D. theta	30-40
5	L. leucopsarus	27-48
3	L. ritteri	36-65
1	M. lugubris	20
8	T. macropus	110-180
11	Argentinoids	20-30
Larvae and Post Larvae:		
3	T. symmetricus	8
6	Myctophids	9-16

HAUL 287		mm
Juveniles and Adults:		
4	C. townsendi	65-70
14	D. theta	28-50
3	L. leucopsarus	27-31
1	L. ritteri	40
1	T. crenularis	24
222	B. ochotensis	22-60
1	C. saira	22
1	L. ringens	73
Larvae and Post Larvae:		
1	N. dentatus	28
1	T. macropus	58
14	T. symmetricus	7-12
12	Myctophids	8-15

HAUL 288		
Juveniles and Adults:		
1	C. townsendi	68
1	Argentinoid (poor shape)	20
Larvae and Post Larvae:		
11	T. symmetricus	7-13
1	Myctophid	12
10	Stomiatids	14-52

HAUL 289		
Juveniles and Adults:		
2	C. townsendi	62-67
2	D. theta	37-72
1	L. leucopsarus	31
2	L. ritteri	65
1	T. crenularis	26
3	B. ochotensis	23-34
1	L. ringens?	48
1	N. scolopaceus	640
5	T. macropus	150-215
Larvae and Post Larvae:		
8	Stomiatids	20-50

APPENDIX TABLE 2b (continued)

HAUL 290

		mm
Juveniles and Adults:		
2	C. townsendi	60-66
6	E. arctica	18-35
1	E. crockeri	37
1	L. ritteri	114
1	A. heathi	21
11	B. ochotensis	24-42
1	C. macouni	about 200
1	L. ringens?	72
5	M. lugubris	24-88
9	T. macropus	100-320
Larvae and Post Larvae:		
1	D. oculatus	25
2	N. dentatus	30-33
2	Stomiatids	34-43

HAUL 291

		mm
Juveniles and Adults:		
2	D. theta	40-84
7	L. leucopsarus	25-55
1	M. californiense	78
1	T. crenularis	25
1	A. olfersii	28
3	B. ochotensis	25-36
2	N. scolopaceus	600-656
5	T. macropus	135-220
3	Electrona sp. (bad shape)	about 18-25
Larvae and Post Larvae:		
1	M. pacificus	52
1	N. dentatus	29
1	Gonostomid (bad shape)	27
12	Myctophids	12-18
2	Stomiatids (bad shape)	about 20-25

HAUL 292

		mm
Juveniles and Adults:		
2	D. theta	36-39
20	L. leucopsarus	25-91
2	L. ritteri	63-65
3	T. crenularis	24-34
4	B. ochotensis	25-27
33	T. macropus (very bad shape)	85-185
1	Melamphaes sp.	28
3	Unidentified (very bad shape)	about 25-30
Larvae and Post Larvae:		
7	Myctophids	8-13
1	Stomiatid (bad shape)	23

HAUL 293

		mm
Juveniles and Adults:		
3	C. townsendi	59-67
23	D. theta	28-42
24	L. leucopsarus	23-32
77	B. ochotensis	25-42
7	L. ringens	42-81
2	T. macropus	90-190
Larvae and Post Larvae:		
285	Myctophids	8-18
1	Paralepidid	25

HAUL 294

		mm
Juveniles and Adults:		
1	C. townsendi	60
1	L. leucopsarus	25
1	T. crenularis	21
3	B. ochotensis	25-30
1	C. saira	26
1	T. macropus	100
Larvae and Post Larvae:		
31	Myctophids	10-16

APPENDIX TABLE 2b (continued)

HAUL 295		mm
Juveniles and Adults:		
3	D. theta	35-75
2	E. crockeri	18-27
1	L. leucopsarus	80
5	T. macropus	150-220
3	Argentinoids	22-32
Larvae and Post Larvae:		
55	Myctophids	8-16

HAUL 296		mm
Juveniles and Adults:		
2	D. theta	38-83
8	E. arctica	19-46
1	E. crockeri	31
3	L. leucopsarus	34-106
1	L. ritteri	108
1	B. milleri	148
1	B. ochotensis	45
1	C. macouni	85
1	N. scolopaceus	500
3	N. linguidens	175-180
3	T. macropus	about 110-220
1	Avocettina sp.	550
Larvae and Post Larvae:		
20	Myctophids	10-20
2	Stomiatids	30-35

HAUL 297		mm
Juveniles and Adults:		
2	D. theta	39-60
2	E. crockeri	20-22
5	L. leucopsarus	25-46
3	L. ritteri	45-120
1	B. flemingi	123
5	T. macropus	150-210
Larvae and Post Larvae:		
43	Myctophids	10-20
3	Stomiatids	about 30

HAUL 298		mm
Juveniles and Adults:		
2	D. theta	37-63
6	L. leucopsarus	26-33
1	L. ritteri	71
3	T. crenularis	30-33
3	B. ochotensis	27-45
17	T. macropus	80-180
Larvae and Post Larvae:		
19	Myctophids	10-19

HAUL 299		
Juveniles and Adults:		
2	C. townsendi	64-70
30	D. theta	37-56
41	L. leucopsarus	21-48
2	T. crenularis	23-29
8	B. ochotensis	29-45
2	L. ringens	91-97
2	T. macropus	85-100
Larvae and Post Larvae:		
91	Myctophids	7-15

HAUL 300		
Juveniles and Adults:		
1	D. theta	38
1	L. leucopsarus (bad shape)	25
6	T. crenularis	25-30
1	B. flemingi (very bad shape)	65
Larvae and Post Larvae:		
10	Myctophids	7-15

HAUL 301

No fish

HAUL 302		
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	T. symmetricus	8
2	Myctophids	11-14
3	Stomiatids	34-40

APPENDIX TABLE 2b (continued)

HAUL 303		mm
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
1	T. symmetricus	15
2	Myctophids	11-18
3	Stomiatids	20-35

HAUL 304		
Juveniles and Adults:		
1	L. leucopsarus	92
1	T. macropus	150
Larvae and Post Larvae:		
1	T. symmetricus	12
7	Myctophids	15-19
7	Stomiatids	25-44

HAUL 305		
Juveniles and Adults:		
1	D. theta	34
1	T. crenularis	27
6	T. macropus	75-160
1	Nansenia sp.	78
Larvae and Post Larvae:		
14	Myctophids	10-14
5	Stomiatids	30-37

HAUL 306		
Juveniles and Adults:		
2	D. theta	40
3	L. leucopsarus	22-25
3	B. ochotensis	30-45
1	L. ringens	83
Larvae and Post Larvae:		
24	T. symmetricus	6-15
13	Myctophids	10-13
301	Stomiatids	20-45

HAUL 307		
Juveniles and Adults:		
1	D. theta	38
7	T. crenularis	25-32
Larvae and Post Larvae:		
1	Myctophid	15
40	Stomiatids	25-40

HAUL 308		mm
Juveniles and Adults:		
1	E. arctica	36
1	A. scintillans	125
Larvae and Post Larvae:		
2	T. symmetricus	8
4	Myctophids	14-17
5	Stomiatids	30-42

HAUL 309		
Juveniles and Adults:		
1	L. leucopsarus	23
1	T. crenularis	25
1	B. ochotensis	43
1	T. macropus	90
Larvae and Post Larvae:		
3	T. symmetricus	11-14
3	Stomiatids	37-42

HAUL 310		
Juveniles and Adults:		
1	C. townsendi (bad shape)	73
1	D. theta	36
2	L. leucopsarus	25-27
8	T. crenularis	25-31
Larvae and Post Larvae:		
4	T. symmetricus	5-9
1	Myctophid	9
23	Stomiatids	20-45

HAUL 311		
Juveniles and Adults:		
3	T. crenularis	25-28
Larvae and Post Larvae:		
3	T. symmetricus	9-10
3	Myctophids (bad shape)	10-13
30	Stomiatids	25-45

APPENDIX TABLE 2b (continued)

HAUL 312

		mm
Juveniles and Adults:		
2	L. leucopsarus	73-81
2	T. macropus	250-280
Larvae and Post Larvae:		
2	Myctophids	13
19	Stomiatids	30-40

HAUL 313

Juveniles and Adults:
No adults

Larvae and Post Larvae:		
1	Myctophid	15
5	Stomiatids (poor shape)	20-37

HAUL 314

Juveniles and Adults:		
1	L. ritteri	95
1	C. macouni	42
1	N. scolopaceus	720
1	T. macropus? (very bad shape)	about 100
Larvae and Post Larvae:		
1	T. symmetricus	9
3	Myctophids	9-13
5	Stomiatids	35-45

HAUL 315

Juveniles and Adults:		
1	C. saira	18
1	N. scolopaceus	530
Larvae and Post Larvae:		
1	Bathylagid?	23
2	Myctophids	about 15

HAUL 316

		mm
Juveniles and Adults:		
2	L. leucopsarus	75-87
1	L. ritteri	102
3	T. macropus	100-240
Larvae and Post Larvae:		
1	T. symmetricus (very bad shape)	10
6	Myctophids	10-18

HAUL 317

Juveniles and Adults:		
1	T. crenularis (bad shape)	22
1	L. ringens	83
1	T. macropus (very poor shape)	about 100
Larvae and Post Larvae:		
10	Myctophids	10-14

HAUL 318

Juveniles and Adults:
No adults

Larvae and Post Larvae:		
1	D. theta	13
2	Sebastodes sp.	6-9
6	Myctophids	7-12

HAUL 319

Juveniles and Adults:		
1	C. townsendi	68
2	L. leucopsarus	18-22
1	T. crenularis	34
1	Myctophid (very poor shape)	about 35
Larvae and Post Larvae:		
22	Myctophids	7-12

APPENDIX TABLE 2b (continued)

HAUL 320

		mm
Juveniles and Adults:		
1	L. leucopsarus	33
1	L. ritteri	90
1	T. crenularis	25
4	T. macropus	120-175
Larvae and Post Larvae:		
3	Myctophids	11-12

HAUL 321

Juveniles and Adults:		
1	L. leucopsarus	20-44
2	T. crenularis	25-30
10	T. macropus	90-120
1	Lampadena sp.	117
Larvae and Post Larvae:		
6	Sebastodes sp.	8-11
51	Myctophids	10-14

HAUL 323

Juveniles and Adults:		
1	E. arctica	about 18
2	T. crenularis (bad shape)	about 30
1	T. macropus	about 70
Larvae and Post Larvae:		
9	Sebastodes sp.	7-10
3	Myctophids	11-18
3	Unidentified	16-20

HAUL 324

Juveniles and Adults		
	No adults	
Larvae and Post Larvae:		
2	Sebastodes sp.	7-10
1	Bathylagid?	12
1	Myctophid	12

HAUL 325

		mm
Juveniles and Adults:		
1	D. theta	49
1	E. crockeri	29
6	L. leucopsarus	27-100
2	T. crenularis	28-64
2	T. macropus	80-250
Larvae and Post Larvae:		
5	Sebastodes sp.	8-12
2	Liparids	11-14
5	Myctophids	9-15

HAUL 326

Juveniles and Adults:		
1	D. theta	62
3	L. leucopsarus	35-42
4	T. crenularis	30-42
2	L. ringens	64-132
7	T. macropus	95-165
Larvae and Post Larvae:		
7	Myctophids (bad shape)	about 15

HAUL 327

Juveniles and Adults:		
49	L. leucopsarus	21-35
2	T. crenularis	27-31
1	A. scintillans (bad shape)	87
1	B. ochotensis	27
15	T. macropus	75-185
Larvae and Post Larvae:		
1	S. marmoratus?	14
32	Sebastodes sp.	8-14
5	Myctophids (bad shape)	about 13
1	Pleuronectid	13

APPENDIX TABLE 2b (continued)

HAUL 328

		mm
Juveniles and Adults:		
2	D. theta	43-44
222	L. leucopsarus	20-38
5	T. crenularis	26-36
5	B. ochotensis	35-47
1	L. ringens	68
Larvae and Post Larvae:		
8	Sebastodes sp.	10-15
1	Bathylagid?	16

HAUL 329

Juveniles and Adults:		
25	L. leucopsarus	about 25
Larvae and Post Larvae:		
2	Osmerids	31-33

HAUL 330

No fish

HAUL 331

Juveniles and Adults:		
3	A. tobianus personatus	63-80

Larvae and Post Larvae:
No larvae

HAUL 332

No fish

HAUL 333

No fish

HAUL 334

No fish

HAUL 335

		mm
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
1	Agonid	12

HAUL 336

No fish

APPENDIX TABLE 2c - Fish and Fish Larvae Captured For Each Haul

BROWN BEAR Cruise 202

HAUL 1		mm
Juveniles and Adults:		
6	D. theta	40-51
1	M. catervarius	37
Larvae and Post Larvae:		
	No larvae	

HAUL 2		
Juveniles and Adults:		
1	M. catervarius	42
1	S. acanthias	430
Larvae and Post Larvae:		
	No larvae	

HAUL 3		
Juveniles and Adults:		
1	M. catervarius	32
Larvae and Post Larvae:		
	No larvae	

HAUL 4		
Juveniles and Adults:		
6	D. theta	41-70
1	S. griseo-lineatus	38
Larvae and Post Larvae:		
1	Liparid	15
1	Unidentified	20

HAUL 5		
Juveniles and Adults:		
2	D. theta	38-48
7	L. leucopsarus	25-64
6	T. crenularis	32-44
Larvae and Post Larvae:		
1	Unidentified	22

HAUL 6		mm
Juveniles and Adults:		
6	D. theta	40-63
14	E. arctica	32-53
7	L. leucopsarus	19-86
1	L. regalis	103
1	T. crenularis	33
1	N. scolopaceus	700
5	T. macropus	55-200
Larvae and Post Larvae:		
65	Sebastodes sp.	10-26
1	Myctophid	14

HAUL 7		
Juveniles and Adults:		
86	D. theta	37-71
1	E. arctica	18
11	L. leucopsarus	21-60
1	T. crenularis	23
1	L. ringens	95
7	T. macropus	95-145
Larvae and Post Larvae:		
660	Sebastodes sp.	9-30
21	Myctophids	12-19

HAUL 8		
Juveniles and Adults:		
1	D. theta	50
55	L. leucopsarus	20-35
14	T. crenularis	28-64
Larvae and Post Larvae:		
21	Sebastodes sp.	10-20
2	Pleuronectids	11-17

HAUL 9		
Juveniles and Adults:		
1	L. leucopsarus	20
1	M. californiense	98
7	T. crenularis	34-38
Larvae and Post Larvae:		
1	Sebastodes sp.	8

APPENDIX TABLE 2c (continued)

HAUL 10		mm
Juveniles and Adults:		
6	D. theta	40-63
6	L. leucopsarus	20-93
5	T. macropus	120-185
Larvae and Post Larvae:		
28	Sebastodes sp.	10-28
3	Myctophids	13-16

HAUL 11		
Juveniles and Adults:		
2	D. theta	16-70
5	E. arctica	19-44
24	L. leucopsarus	18-103
2	T. crenularis	36
1	B. milleri	70
3	C. macouni	37-42
4	T. macropus	120-240
Larvae and Post Larvae:		
12	Sebastodes sp.	13-24
2	Gonostomids	24-28

HAUL 12		
Juveniles and Adults:		
1	D. theta	77
5	E. arctica	30-42
3	L. leucopsarus	28-90
1	L. ritteri	105
2	T. crenularis	28-30
2	A. scintillans	108-115
1	C. macouni	43
1	M. lugubris	53
7	T. macropus	50-210
Larvae and Post Larvae:		
2	Myctophids	10-15
3	Stomiatids	38-50

HAUL 13		mm
Juveniles and Adults:		
10	D. theta	35-48
22	L. leucopsarus	18-57
2	T. crenularis	26-30
34	T. macropus	45-110
Larvae and Post Larvae:		
1	T. symmetricus	13
1	Sebastodes sp.	10
13	Myctophids	11-18

HAUL 14		
Juveniles and Adults:		
25	T. crenularis	25-45
1	C. saira	240
Larvae and Post Larvae:		
2	Stomiatids	32-45

HAUL 15		
Juveniles and Adults:		
3	E. arctica	15-19
29	L. leucopsarus	18-113
1	T. crenularis	24
1	B. milleri	36
7	C. macouni	35-150
3	C. microdon? (bad shape)	about 40
1	M. lugubris	61
2	T. macropus	101-245
Larvae and Post Larvae:		
22	Myctophids	15-20

HAUL 16		
Juveniles and Adults:		
7	E. arctica	20-40
1	T. crenularis	28
2	C. saira	240-280
3	T. macropus	175-230
Larvae and Post Larvae:		
8	Myctophids (bad shape)	about 20

APPENDIX TABLE 2c (continued)

HAUL 17		mm
Juveniles and Adults:		
5	D. theta	40-57
4	L. leucopsarus	17-20
3	T. crenularis	29-78
Larvae and Post Larvae:		
2	Myctophids	16-17

HAUL 18		
Juveniles and Adults:		
4	L. leucopsarus	45-52
4	T. crenularis	25-30
Larvae and Post Larvae:		
	No larvae	

HAUL 19		
Juveniles and Adults:		
2	D. theta	55-61
3	E. arctica	17-20
25	L. leucopsarus	15-25
2	T. crenularis	30-33
4	C. macouni	40-85
2	C. microdon?	26-40
Larvae and Post Larvae:		
3	Myctophids	13-15

HAUL 20		
Juveniles and Adults:		
1	D. theta	55
5	L. leucopsarus	20-88
1	C. macouni	33
3	T. macropus	130-180
Larvae and Post Larvae:		
3	Myctophids	11-14
2	Stomiatids	35

HAUL 21		mm
Juveniles and Adults:		
1	D. theta	38
2	E. arctica	27-34
1	L. leucopsarus	26
2	L. ritteri	80-98
Larvae and Post Larvae:		
1	Bathylagid?	29
3	Myctophids	13-18
2	Stomiatids	23-50

HAUL 22		
Juveniles and Adults:		
13	D. theta	34-47
26	L. leucopsarus	20-60
3	T. crenularis	24-37
1	B. ochotensis	48
1	C. macouni	about 60
1	Nansenia sp.	90
Larvae and Post Larvae:		
2	Stomiatids	20-47

HAUL 23		
Juveniles and Adults:		
2	L. leucopsarus	25-33
42	T. crenularis	28-40
Larvae and Post Larvae:		
16	Stomiatids	23-40

HAUL 24		

HAUL 25		
Juveniles and Adults:		
3	D. theta	40-62
1	L. leucopsarus	25
1	T. crenularis	25
1	B. flemingi	117
1	B. ochotensis	38
3	T. macropus	115-190
Larvae and Post Larvae:		
2	Myctophids	13-16

APPENDIX TABLE 2c (continued)

HAUL 26		mm
Juveniles and Adults:		
1	D. theta	44
7	E. arctica	20-56
17	L. leucopsarus	18-108
1	B. milleri	135
6	C. macouni	38-140
1	T. macropus	220
Larvae and Post Larvae:		
2	Myctophids	16-18
3	Stomiatids	15-40

HAUL 27		
Juveniles and Adults:		
24	D. theta	35-60
1	L. leucopsarus	18-45
1	T. crenularis	25
1	L. ringens	140
3	T. macropus	110-175
Larvae and Post Larvae:		
1	Myctophid (bad shape)	15
3	Stomiatids (bad shape)	15-35

HAUL 28		
Juveniles and Adults:		
3	E. arctica	31-34
3	L. leucopsarus	28-91
1	L. ritteri	70
4	T. macropus	120-190
Larvae and Post Larvae:		
2	Bathylagids?	21-23
3	Myctophids	18-20
1	Stomiatid	35

HAUL 29		
Juveniles and Adults:		
12	D. theta	35-45
3	L. leucopsarus	29-48
1	T. crenularis	25
Larvae and Post Larvae:		
1	Myctophid	14

HAUL 30		mm
Juveniles and Adults:		
1	C. townsendi	74
8	D. theta	38-47
4	L. leucopsarus	25-36
1	T. crenularis	37
Larvae and Post Larvae:		
2	Myctophids	12-15
2	Stomiatids	35-38

HAUL 31		
Juveniles and Adults:		
3	D. theta	44-67
2	L. leucopsarus	23-98
1	L. ritteri	70
1	T. macropus	112
Larvae and Post Larvae:		
3	Myctophids	16-18
2	Stomiatids	34-40

HAUL 32		
Juveniles and Adults:		
2	D. theta	42-44
4	E. arctica	17-20
24	L. leucopsarus	18-100
1	T. crenularis	28
1	B. ochotensis	49
1	C. macouni	155
1	M. lugubris	49
1	T. macropus	185
2	Avocettina sp.	480-550
Larvae and Post Larvae:		
4	Myctophids	15-18

HAUL 33		
Juveniles and Adults:		
1	D. theta	15
2	L. ritteri	68-87
7	T. macropus	50-85
1	Avocettina sp.	480
Larvae and Post Larvae:		
4	Myctophids	15-18
6	Stomiatids	20-53
2	Unidentified	12-14

APPENDIX TABLE 2c (continued)

HAUL 34		mm
Juveniles and Adults:		
1	L. leucopsarus	28
4	T. crenularis	28-30
1	T. macropus	55
Larvae and Post Larvae:		
2	Myctophids?	16-18
3	Stomiatids	40-47

HAUL 35		
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
2	Stomiatids	30-37

HAUL 36		
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
31	Stomiatids	24-52

HAUL 37		
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
1	T. symmetricus	10
89	Stomiatids	22-53

HAUL 38		
Juveniles and Adults:		
1	C. townsendi	72
6	D. theta	36-44
2	L. leucopsarus	28-30
3	Nansenia sp.	85-90
Larvae and Post Larvae:		
1	Myctophid	17
53	Stomiatids	14-48

HAUL 39		mm
Juveniles and Adults:		
1	D. theta	39
2	E. arctica	19-28
3	L. leucopsarus	20-80
2	L. ritteri	105-107
1	C. macouni	75
1	M. lugubris	49
12	T. macropus	45-93
1	Avocettina sp.	525
Larvae and Post Larvae:		
1	Myctophid	19
3	Stomiatids	23-47

HAUL 40		
Juveniles and Adults:		
1	E. arctica	47
1	C. macouni (bad shape)	60
7	T. macropus (bad shape)	about 45
Larvae and Post Larvae:		
1	N. dentatus	37
4	Stomiatids (bad shape)	about 40
2	Unidentified	15-37

HAUL 41		
Juveniles and Adults:		
1	C. saira	40
1	T. macropus (bad shape)	48
Larvae and Post Larvae:		
5	T. symmetricus	6-11

HAUL 42		
Juveniles and Adults:		
1	M. californiense	84
1	T. crenularis	29
Larvae and Post Larvae:		
4	Stomiatids	18-45

APPENDIX TABLE 2c (continued)

HAUL 43

		mm
Juveniles and Adults:		
2	T. macropus (bad shape)	about 50
Larvae and Post Larvae:		
5	T. symmetricus	12-19
3	Stomiatids	21-35

HAUL 44

Juveniles and Adults:
No adults

Larvae and Post Larvae:		
11	T. symmetricus	8-20
2	Stomiatids (bad shape)	about 30

HAUL 45

Juveniles and Adults:		
1	C. townsendi	77
2	D. theta	13-17
1	E. crockeri	29
1	L. leucopsarus	40
1	T. crenularis	30
4	T. macropus	210-230
Larvae and Post Larvae:		
1	T. symmetricus	12
1	Leptocephalus	233
3	Stomiatids	28-35

HAUL 46

Juveniles and Adults:		
5	T. crenularis	29-35
1	L. ringens	150
Larvae and Post Larvae:		
1	T. symmetricus	16
1	Stomiatid	28

HAUL 47

		mm
Juveniles and Adults:		
1	T. crenularis	29
1	L. ringens	60

Larvae and Post Larvae:
No larvae

HAUL 48

Juveniles and Adults:
No adults

Larvae and Post Larvae:		
3	T. symmetricus	12-20
13	Stomiatids	25-45

HAUL 49

Juveniles and Adults:		
1	T. crenularis	30
1	C. saira	33
Larvae and Post Larvae:		
6	T. symmetricus	11-17
2	Myctophids	15-18
13	Stomiatids	25-40

HAUL 50

Juveniles and Adults:		
3	D. theta	15-54
2	T. crenularis	24-27
1	L. ringens	57
Larvae and Post Larvae:		
2	T. symmetricus	15-17
1	Myctophid	13
6	Stomiatids	26-50

HAUL 51

No fish

APPENDIX TABLE 2c (continued)

HAUL 52		mm
Juveniles and Adults:		
1	E. arctica	21
2	E. crockeri	25-35
Larvae and Post Larvae:		
1	T. symmetricus	15
1	Myctophid	15

HAUL 53		
Juveniles and Adults:		
18	E. arctica	18-57
1	L. leucopsarus	107
1	A. heathi	22
1	C. macouni	160
12	T. macropus	105-215
Larvae and Post Larvae:		
1	M. pacificus	17
1	N. dentatus	38
1	Myctophid	19

HAUL 54		
Juveniles and Adults:		
1	E. crockeri	30
Larvae and Post Larvae:		
2	T. symmetricus	18-25

HAUL 55		
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	T. symmetricus	24
2	Myctophids	14-15

HAUL 56		mm
Juveniles and Adults:		
1	E. crockeri	36
3	L. leucopsarus	25-37
2	L. ritteri	59-61
2	T. crenularis	31-40
1	B. flemingi	136
3	T. macropus	100-235
Larvae and Post Larvae:		
1	Sebastodes sp.	12
2	Myctophids	10-14
3	Stomiatids	36-43

HAUL 57		
Juveniles and Adults:		
1	C. townsendi	70
1	D. theta	14
2	L. leucopsarus	22-29
1	T. crenularis	22
1	B. flemingi	84
Larvae and Post Larvae:		
1	T. symmetricus	21
8	Sebastodes sp.	6-7
1	Myctophid	16
1	Stomiatid	38

HAUL 58		
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
2	Unidentified (very bad shape)	about 15

HAUL 59		
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Myctophid (bad shape)	about 15

APPENDIX TABLE 2c (continued)

HAUL 60		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Sebastodes sp.	11

HAUL 61		
Juveniles and Adults:		
2	D. theta	38-40
2	L. leucopsarus	55-80
1	T. crenularis	28
Larvae and Post Larvae:		
1	D. theta?	14

HAUL 62		
Juveniles and Adults:		
1	D. theta	13
15	E. arctica	18-50
1	L. leucopsarus	18
1	L. ritteri	128
2	T. crenularis	22-30
3	A. scintillans	85-92
14	T. macropus	51-250
Larvae and Post Larvae:		
1	N. dentatus	27

HAUL 63		
Juveniles and Adults:		
1	D. theta	55
9	E. arctica	19-48
3	L. leucopsarus	28-83
3	L. ritteri	75-119
1	T. crenularis	66
6	T. macropus	90-340
Larvae and Post Larvae:		
1	Stomiatid	40

HAUL 64		mm
Juveniles and Adults:		
No adults		
Larvae and Post Larvae:		
1	Sebastodes sp.	14

HAUL 65		
Juveniles and Adults:		
1	T. crenularis	24
1	T. macropus (bad shape)	about 100
1	Electrona sp. (bad shape)	about 20
Larvae and Post Larvae:		
1	Myctophid	15

HAUL 66		
Juveniles and Adults:		
2	D. theta	40-53
1	E. arctica	18
2	L. leucopsarus	51-85
1	T. crenularis	28
4	T. macropus	110-220
Larvae and Post Larvae:		
1	Sebastodes sp.	18

HAUL 67		
Juveniles and Adults:		
1	D. theta	14
10	L. leucopsarus	25-83
1	T. crenularis	36
2	L. ringens	85-106
Larvae and Post Larvae:		
1	R. nicholsii?	18

APPENDIX TABLE 2c (continued)

HAUL 68		mm
Juveniles and Adults:		
1	D. theta	18
1	L. leucopsarus	20
1	T. crenularis	39
Larvae and Post Larvae:		
2	Sebastodes sp.	13-15

HAUL 69		
Juveniles and Adults:		
1	M. californiense	102
Larvae and Post Larvae:		
1	Myctophid	13

HAUL 70		
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
1	R. nicholsii?	20
1	Sebastodes sp.	10

HAUL 71		
Juveniles and Adults:		
10	D. theta	44-75
2	L. leucopsarus	28-30
10	T. crenularis	29-77
Larvae and Post Larvae:		
13	Sebastodes sp.	10-21
1	Liparid	6
2	Myctophids	8-10

HAUL 72		mm
Juveniles and Adults:		
3	D. theta	65-90
2	E. arctica	22-38
24	L. leucopsarus	20-40
1	M. californiense	90
2	T. crenularis	65-75
8	C. macouni	36-78
7	T. macropus	110-140
Larvae and Post Larvae:		
3	Sebastodes sp.	10-17
2	Myctophids	13-16

HAUL 73		
Juveniles and Adults:		
10	D. theta	41-66
82	L. leucopsarus	18-94
6	T. crenularis	38-54
1	B. milleri	60
2	L. mandibularis	145-155
Larvae and Post Larvae:		
1	Sebastodes sp.	26

HAUL 74		
Juveniles and Adults:		
8	D. theta	45-75
13	L. leucopsarus	20-55
1	T. crenularis	42
Larvae and Post Larvae:		
1	Sebastodes sp.	30
3	Liparids	12-14

HAUL 75		
Juveniles and Adults:		
11	L. leucopsarus	20-35
Larvae and Post Larvae:		
1	R. nicholsii	22
1	Sebastodes sp.	22

APPENDIX TABLE 2c (continued)

HAUL 76		mm
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
1	Cottid?	10
1	Pleuronectid	18

HAUL 77		
Juveniles and Adults:		
	No adults	
Larvae and Post Larvae:		
1	Pleuronectid	16

HAUL 78		
Juveniles and Adults:		
3	Myctophids (very bad shape-*L. leucopsarus*?)	about 25
Larvae and Post Larvae:		
1	*Sebastodes* sp.	26
1	Pleuronectid	17

HAUL 79		
Juveniles and Adults:		
1	*S. griseo-lineatus*	39
Larvae and Post Larvae:		
1	*R. nicholsii*	18
2	*Sebastodes* sp.	23-24
1	Pleuronectid	22

HAUL 80
No fish

HAUL 81		
Juveniles and Adults:		
1	*G. aculeatus*	52
Larvae and Post Larvae:		
	No larvae	

HAUL 82		mm
Juveniles and Adults:		
2	*A. tobianus personatus*	79-85
1	*G. aculeatus*	45
1	*H. elassodon*	55
1	*M. catervarius*	42
2	*S. griseo-lineatus*	60-82
3	*T. chalcogramma*	95-102
Larvae and Post Larvae:		
1	Pleuronectid	23

HAUL 83		
Juveniles and Adults:		
8	*G. aculeatus*	34-47
1	*P. paradoxus*	38
1	*T. chalcogramma*	93
Larvae and Post Larvae:		
	No larvae	

HAUL 84		
Juveniles and Adults:		
1	*M. productus*	53
Larvae and Post Larvae:		
2	*R. nicholsii*	17
1	Cottid	15

HAUL 85		
Juveniles and Adults:		
1	*C. aggregatus*	80
1	*M. catervarius*	52
Larvae and Post Larvae:		
	No larvae	

HAUL 86		
Juveniles and Adults:		
4	*M. productus*	41-100
Larvae and Post Larvae:		
	No larvae	

APPENDIX TABLE 2c (continued)

HAUL 87	mm
Juveniles and Adults:	
6 M. productus	48-340
1 Unidentified (bad shape)	about 30
Larvae and Post Larvae:	
No larvae	

HAUL 88	
Juveniles and Adults:	
1 M. productus	42
Larvae and Post Larvae:	
No larvae	

HAUL 89	
Juveniles and Adults:	
1 G. aculeatus	48
1 M. productus	280

INDEX ADULT AND JUVENILE FISH

cont'd.

INDEX ADULT AND JUVENILE FISH (continued)

cont'd.

INDEX ADULT AND JUVENILE FISH (continued)

cont'd.

INDEX ADULT AND JUVENILE FISH (continued)

INDEX ADULT AND JUVENILE FISH (continued)

INDEX ADULT AND JUVENILE FISH (continued)

cont'd.

INDEX ADULT AND JUVENILE FISH (continued)

INDEX LARVAL FISH

INDEX LARVAE FISH (continued)

cont'd.

INDEX LARVAE FISH (continued)

cont'd.

INDEX LARVAE FISH (continued)

KEY TO ABBREVIATIONS IN TABLE 3a

Pteropoda:

C. globulosa	Cavolinia globulosa
C. inflexa	Cavolinia inflexa
C. columnella	Cuvierina columnella
D. trispinosa	Diacria trispinosa
E. balantium	Euclio balantium
E. cuspidata	Euclio cuspidata
E. pyramidata	Euclio pyramidata
L. helicina	Limacina helicina
P. apicifulva	Peraclis apicifulva
S. subula	Styliola subula

Heteropods:

C. cristata	Carinaria cristata
P. coronata	Pterotrachea coronata
P. hippocampus	Pterotrachea hippocampus
P. scutata	Pterotrachea scutata

APPENDIX TABLE 3a - Pteropods and Heteropods Captured For Each Haul

BROWN BEAR Cruise 176

HAUL 1-3

No Pteropods or Heteropods

HAUL 4

Pteropods:
2 L. helicina

No Heteropods

HAUL 5

Pteropods:
1 L. helicina
1 Gymnosomata

No Heteropods

HAUL 6

No Pteropods or Heteropods

HAUL 7

Pteropods:
17 L. helicina
3 Gymnosomata

No Heteropods

HAUL 8

Pteropods:
1 E. pyramidata
3 L. helicina
1 Gymnosomata

Heteropods:
1 C. cristata

HAUL 13

Pteropods:
6 L. helicina

No Heteropods

HAUL 14

No Pteropods or Heteropods

HAUL 15

Pteropods:
1 E. balantium

No Heteropods

HAUL 16

Pteropods:
1 L. helicina

No Heteropods

HAUL 17

Pteropods
2 E. balantium
5 L. helicina

No Heteropods

HAUL 18

Pteropods:
2 L. helicina

No Heteropods

HAUL 19

Pteropods:
1 L. helicina

No Heteropods

HAUL 20-22

No Pteropods or Heteropods

APPENDIX TABLE 3a (continued)

HAUL 23

Pteropods:
2 L. helicina
1 Gymnosomata

No Heteropods

HAUL 24

Pteropods:
1 L. helicina

No Heteropods

HAUL 25

Pteropods:
2 L. helicina
2 Gymnosomata

No Heteropods

HAUL 26

Pteropods:
1 L. helicina
16 Gymnosomata

HAUL 27

Pteropods:
3 Gymnosomata

No Heteropods

HAUL 28

Pteropods:
3 Gymnosomata

No Heteropods

HAUL 29

Pteropods:
2 Gymnosomata

No Heteropods

HAUL 30

No Pteropods or Heteropods

HAUL 31

Pteropods:
2 Gymnosomata

No Heteropods

HAUL 32

Pteropods:
1 Gymnosomata

No Heteropods

HAUL 33

No Pteropods or Heteropods

HAUL 34

Pteropods:
4 Gymnosomata

No Heteropods

HAUL 35

Pteropods:
2 L. helicina
7 Gymnosomata

No Heteropods

HAUL 36-38

No Pteropods or Heteropods

HAUL 39

Pteropods:
1 L. helicina

No Heteropods

APPENDIX TABLE 3a (continued)

HAUL 40

Pteropods:
2 L. helicina

No Heteropods

HAUL 41

Pteropods:
1 L. helicina
1 Gymnosomata

No Heteropods

HAUL 42

Pteropods:
2 L. helicina

No Heteropods

HAUL 43

Pteropods:
1 L. helicina

No Heteropods

HAUL 44-45

No Pteropods or Heteropods

HAUL 46

Pteropods:
5 L. helicina
4 Gymnosomata

No Heteropods

HAUL 47

Pteropods:
43 L. helicina
5 Gymnosomata

No Heteropods

HAUL 48-49

No Pteropods or Heteropods

HAUL 50

Pteropods:
2 L. helicina

No Heteropods

HAUL 51

Pteropods:
8 L. helicina
2 Gymnosomata

No Heteropods

HAUL 52

No Pteropods or Heteropods

HAUL 53

Pteropods:
7 L. helicina

No Heteropods

HAUL 54

Pteropods
1 L. helicina

No Heteropods

HAUL 55

Pteropods:
18 L. helicina

No Heteropods

APPENDIX TABLE 3a (continued)

HAUL 56

Pteropods:
29 L. helicina

No Heteropods

HAUL 57

No Pteropods or Heteropods

HAUL 58

Pteropods:
1 L. helicina

No Heteropods

HAUL 59

No Pteropods or Heteropods

HAUL 60

Sample discarded

HAUL 61-67

No Pteropods or Heteropods

HAUL 68

Pteropods:
3 L. helicina
2 Gymnosomata

No Heteropods

HAUL 69

Pteropods:
11 L. helicina
2 Gymnosomata

HAUL 70

Pteropods:
1 E. balantium
32 L. helicina
8 Gymnosomata

No Heteropods

HAUL 71

Sample used for isotope study

HAUL 72-73

No Pteropods or Heteropods

HAUL 74

Pteropods:
1 Gymnosomata

No Heteropods

HAUL 75-80

No Pteropods or Heteropods

HAUL 81

Pteropods:
1 L. helicina

No Heteropods

HAUL 82-83

No Pteropods or Heteropods

HAUL 84

Pteropods:
2 L. helicina

No Heteropods

APPENDIX TABLE 3a (continued)

HAUL 85

Pteropods:
1 L. helicina
3 Gymnosomata

No Heteropods

HAUL 86

Pteropods:
1 L. helicina

No Heteropods

HAUL 87-89

No Pteropods or Heteropods

HAUL 90

Pteropods:
1 L. helicina

No Heteropods

HAUL 91

Pteropods:
1 L. helicina
5 Gymnosomata

No Heteropods

HAUL 92

Pteropods:
1 L. helicina
19 Gymnosomata

No Heteropods

HAUL 93

Pteropods:
14 L. helicina
13 Gymnosomata

No Heteropods

HAUL 94

Pteropods:
14 L. helicina
15 Gymnosomata

No Heteropods

HAUL 95

Pteropods:
38 Gymnosomata

No Heteropods

HAUL 96

Pteropods:
49 Gymnosomata

No Heteropods

HAUL 97

Pteropods:
1 L. helicina
15 Gymnosomata

No Heteropods

HAUL 98

Pteropods:
2 L. helicina
8 Gymnosomata

No Heteropods

HAUL 99

Pteropods:
2 L. helicina
19 Gymnosomata

No Heteropods

HAUL 100

Pteropods:
120 L. helicina
2 Gymnosomata

No Heteropods

HAUL 101

Pteropods:
30 L. helicina
5 Gymnosomata

No Heteropods

APPENDIX TABLE 3a (continued)

HAUL 102

Pteropods:
4 L. helicina

No Heteropods

HAUL 103

Pteropods:
1 E. balantium
10 L. helicina
1 Gymnosomata

No Heteropods

HAUL 104-106

No Pteropods or Heteropods

HAUL 107

Pteropods:
1 Gymnosomata

No Heteropods

HAUL 108

No Pteropods or Heteropods

HAUL 109

Pteropods:
1 Gymnosomata

No Heteropods

HAUL 110-111

No Pteropods or Heteropods

HAUL 112

Pteropods:
1 L. helicina

No Heteropods

HAUL 113-119

No Pteropods or Heteropods

HAUL 120

Pteropods:
1 Gymnosomata

No Heteropods

HAUL 120

Pteropods:
1 Gymnosomata

No Heteropods

HAUL 121-136

No Pteropods or Heteropods

HAUL 137

No Pteropods

Heteropods:
3 C. cristata

HAUL 138-142

No Pteropods or Heteropods

HAUL 143

Pteropods:
3 L. helicina

No Heteropods

HAUL 144

Pteropods:
1 Gymnosomata

No Heteropods

HAUL 145

No Pteropods or Heteropods

HAUL 146

Pteropods:
4 L. helicina

No Heteropods

HAUL 147-149

No Pteropods or Heteropods

APPENDIX TABLE 3b - Pteropods and Heteropods Captured For Each Haul

BROWN BEAR Cruise 199

HAUL 1-9

No Pteropods or Heteropods

HAUL 10

Pteropods:
1 E. balantium
22 L. helicina

No Heteropods

HAUL 11

Pteropods:
2 E. balantium
5 L. helicina
1 Euclio sp.

No Heteropods

HAUL 12

Pteropods:
1 E. balantium
1 L. helicina

No Heteropods

HAUL 13

Pteropods:
7 E. pyramidata
42 L. helicina
1 Gymnsomata

No Heteropods

HAUL 14

Pteropods:
2 L. helicina
1 Gymnosomata

No Heteropods

HAUL 15

Pteropods:
1 E. balantium

No Heteropods

HAUL 16

Pteropods:
14 L. helicina

No Heteropods

HAUL 17

No Pteropods or Heteropods

HAUL 18

Pteropods:
1 E. balantium
1 L. helicina

No Heteropods

HAUL 19

Pteropods:
1 L. helicina

No Heteropods

HAUL 20

Pteropods:
1 L. helicina

No Heteropods

HAUL 21

Pteropods:
3 E. pyramidata
7 L. helicina

No Heteropods

APPENDIX TABLE 3b (continued)

HAUL 22

Pteropods:
3 E. pyramidata
47 L. helicina

No Heteropods

HAUL 23

Pteropods:
10 E. pyramidata
28 L. helicina
1 Gymnosomata

No Heteropods

HAUL 24

No Pteropods or Heteropods

HAUL 25

Pteropods:
2 L. helicina

No Heteropods

HAUL 26

Pteropods:
1 L. helicina

No Heteropods

HAUL 27-28

No Pteropods or Heteropods

HAUL 29

No Pteropods

Heteropods:
1 C. cristata

HAUL 30

Pteropods:
1 L. helicina

No Heteropods

HAUL 31-33

No Pteropods or Heteropods

HAUL 34

Pteropods:
2 L. helicina

Heteropods:
2 C. cristata
1 Atlanta sp.

HAUL 35

No Pteropods

Heteropods:
1 Atlanta sp.

HAUL 36

Pteropods:
1 L. helicina

No Heteropods

HAUL 37

Pteropods:
1 Gymnosomata

Heteropods:
1 C. cristata

HAUL 38-39

No Pteropods or Heteropods

APPENDIX TABLE 3b (continued)

HAUL 40

Pteropods:
1 L. helicina

No Heteropods

HAUL 41

Pteropods:
2 L. helicina

Heteropods:
3 C. cristata

HAUL 42-44

No Pteropods or Heteropods

HAUL 45

Pteropods:
1 Euclio sp.

Heteropods:
2 C. cristata

HAUL 46

Pteropods:
1 L. helicina

No Heteropods

HAUL 47-53

No Pteropods or Heteropods

HAUL 54

Pteropods:
3 E. pyramidata

No Heteropods

HAUL 55

Pteropods:
1 E. pyramidata

HAUL 56-59

No Pteropods or Heteropods

HAUL 60

Pteropods:
4 L. helicina

No Heteropods

HAUL 61

Pteropods:
1 L. helicina

No Heteropods

HAUL 62

Pteropods:
2 L. helicina

No Heteropods

HAUL 63

No Pteropods or Heteropods

HAUL 64

Pteropods:
4 L. helicina

No Heteropods

APPENDIX TABLE 3b (continued)

HAUL 65

Pteropods:
1 L. helicina

No Heteropods

HAUL 66-67

No Pteropods or Heteropods

HAUL 68

Pteropods:
2 L. helicina

No Heteropods

HAUL 69

Pteropods:
1 E. pyramidata
22 L. helicina

No Heteropods

HAUL 70

Pteropods:
1 Gymnosomata

No Heteropods

HAUL 71

No Pteropods or Heteropods

HAUL 72

Pteropods:
1 E. pyramidata

No Heteropods

HAUL 73

No Pteropods or Heteropods

HAUL 74

Pteropods:
1 E. balantium
1 E. pyramidata
3 L. helicina
1 Gymnosomata

No Heteropods

HAUL 75

Pteropods:
2 E. pyramidata
8 L. helicina
1 Gymnosomata

No Heteropods

HAUL 76

Pteropods:
2 E. pyramidata
60 L. helicina

No Heteropods

HAUL 77

Pteropods:
1 E. pyramidata
18 L. helicina

No Heteropods

HAUL 78

Pteropods:
2 E. pyramidata
3 L. helicina

No Heteropods

APPENDIX TABLE 3b (continued)

HAUL 79

Pteropods:
1 E. balantium
3 E. pyramidata
1 L. helicina

No Heteropods

HAUL 80

Pteropods:
6 L. helicina

No Heteropods

HAUL 81

Pteropods:
4 E. pyramidata
13 L. helicina

No Heteropods

HAUL 82

Pteropods:
65 E. pyramidata
1 L. helicina

No Heteropods

HAUL 83

Pteropods:
1 E. balantium
1 E. pyramidata

No Heteropods

HAUL 84

Pteropods:
1 E. pyramidata
1 L. helicina

No Heteropods

HAUL 85

Pteropods:
6 L. helicina

No Heteropods

HAUL 86

Pteropods:
1 L. helicina

No Heteropods

HAUL 87

No Pteropods or Heteropods

HAUL 88

Pteropods:
6 L. helicina

Heteropods:
1 C. cristata

HAUL 89

No Pteropods or Heteropods

HAUL 90

Pteropods:
2 L. helicina

No Heteropods

HAUL 91

Pteropods:
1 E. pyramidata

No Heteropods

APPENDIX TABLE 3b (continued)

HAUL 92

No Pteropods or Heteropods

HAUL 93

Pteropods:
1 L. helicina

Heteropods:
1 C. cristata

HAUL 94

Pteropods:
6 E. pyramidata
5 L. helicina

No Heteropods

HAUL 95

No Pteropods or Heteropods

HAUL 96

Pteropods:
2 E. pyramidata
26 L. helicina

Heteropods:
6 C. cristata

HAUL 97

Pteropods:
2 L. helicina

Heteropods:
19 C. cristata
1 Atlanta sp.

HAUL 98

Pteropods:
1 Gymnosomata

Heteropods:
17 C. cristata
1 Atlanta sp.

HAUL 99

Pteropods:
1 E. pyramidata

Heteropods:
20 C. cristata

HAUL 100

No Pteropods

Heteropods:
35 C. cristata
1 C. cristata?

HAUL 101

No Pteropods

Heteropods:
46 C. cristata
1 Atlanta sp.

HAUL 102

No Pteropods

Heteropods:
21 C. cristata
1 Atlanta sp.

HAUL 103

No Pteropods

Heteropods:
17 C. cristata

APPENDIX TABLE 3b (continued)

HAUL 104

Pteropods:
1 E. pyramidata

Heteropods:
47 C. cristata
2 Atlanta sp.

HAUL 105

No Pteropods

Heteropods:
31 C. cristata
1 Atlanta sp.

HAUL 106

Pteropods:
1 Peraclis sp.

Heteropods:
1 A. peroni
71 C. cristata
1 Atlanta sp.

HAUL 107

No Pteropods

Heteropods:
18 C. cristata
4 Atlanta sp.

HAUL 108

Pteropods:
1 Peraclis sp.

Heteropods:
34 C. cristata

HAUL 109

No Pteropods

Heteropods:
54 C. cristata
2 Atlanta sp.
3 Carinaria sp.

HAUL 110

No Pteropods

Heteropods:
62 C. cristata
3 Atlanta sp.

HAUL 111

No Pteropods

Heteropods:
8 C. cristata
1 Carinaria sp.

HAUL 112

Pteropods:
1 L. helicina

Heteropods:
6 C. cristata
4 Atlanta sp.
1 Carinaria sp.

HAUL 113

No Pteropods

Heteropods:
2 C. cristata
1 Atlanta sp.

APPENDIX TABLE 3b (continued)

HAUL 114

Pteropods:
1 E. cuspidata
2 E. pyramidata

Heteropods:
11 C. cristata
1 P. scutata
1 Atlanta sp.
2 Carinaria sp.

HAUL 115

No Pteropods

Heteropods:
1 C. cristata
1 Carinaria sp.

HAUL 116

Pteropods:
1 L. helicina

Heteropods:
1 Atlanta sp.

HAUL 117

No Pteropods

Heteropods:
1 Atlanta sp.

HAUL 118

No Pteropods or Heteropods

HAUL 119

Pteropods:
2 E. pyramidata

No Heteropods

HAUL 120

No Pteropods or Heteropods

HAUL 121

No Pteropods

Heteropods:
2 Atlanta sp.

HAUL 122

No Pteropods

Heteropods:
3 Atlanta sp.

HAUL 123

Pteropods:
1 E. cuspidata
1 E. pyramidata

Heteropods:
5 Atlanta sp.

HAUL 124

No Pteropods

Heteropods:
1 Atlanta sp.

HAUL 125

Pteropods:
2 D. trispinosa
1 E. cuspidata
3 E. pyramidata

Heteropods:
1 C. cristata
1 P. coronata
2 Atlanta sp.

APPENDIX TABLE 3b (continued)

HAUL 126

Pteropods:
1 E. pyramidata

Heteropods:
4 Atlanta sp.

HAUL 127

Pteropods:
1 E. pyramidata

Heteropods:
3 Atlanta sp.

HAUL 128

Pteropods:
2 C. columnella

Heteropods:
2 Atlanta sp.

HAUL 129

Pteropods:
6 D. trispinosa

Heteropods:
28 Atlanta sp.

HAUL 130

Pteropods:
15 D. trispinosa
18 E. pyramidata
76 L. helicina

Heteropods:
19 Atlanta sp.

HAUL 131

Pteropods:
2 D. trispinosa
1 E. cuspidata
5 E. pyramidata

Heteropods:
25 Atlanta sp.

HAUL 132

Pteropods:
1 C. inflexa
2 E. pyramidata
6 L. helicina

Heteropods:
24 Atlanta sp.

HAUL 133

Pteropods:
1 C. columnella

Heteropods:
24 Atlanta sp.

HAUL 134

Pteropods:
3 C. globulosa
5 D. trispinosa
1 D. trispinosa (juvenile)
2 E. pyramidata

Heteropods:
1 C. cristata
1 P. scutata
17 Atlanta sp.

APPENDIX TABLE 3b (continued)

HAUL 135

Pteropods:
18 C. globulosa
1 D. trispinosa
9 E. pyramidata
1 L. helicina
1 P. apicifulua

Heteropods:
25 Atlanta sp.

HAUL 136

Pteropods:
47 C. globulosa
7 E. pyramidata

Heteropods:
2 P. scutata
17 Atlanta sp.

HAUL 137

Pteropods:
7 C. globulosa
5 C. columnella
3 D. trispinosa
1 E. pyramidata
1 L. helicina

Heteropods:
15 Atlanta sp.

HAUL 138

Pteropods:
565 C. globulosa
1 C. inflexa
10 D. trispinosa
50 L. helicina
4 Gymnosomata

Heteropods:
137 Atlanta sp.

HAUL 139

Pteropods:
23 C. globulosa
5 E. pyramidata
2 L. helicina

Heteropods:
76 Atlanta sp.

HAUL 140

Pteropods:
2 C. globulosa
8 C. columnella
2 D. trispinosa
1 D. trispinosa (juvenile)

Heteropods:
5 P. scutata
9 Atlanta sp.

HAUL 141

Pteropods:
26 C. globulosa
10 D. trispinosa

Heteropods:
7 Atlanta sp.

HAUL 142

Pteropods:
11 C. globulosa

Heteropods:
16 Atlanta sp.

APPENDIX TABLE 3b (continued)

HAUL 143

Pteropods:
43 C. globulosa
1 T. trispinosa
3 E. pyramidata
5 L. helicina

Heteropods:
36 Atlanta sp.

HAUL 144

Pteropods:
54 C. globulosa
3 D. trispinosa
2 L. helicina

Heteropods:
1 P. coronata
5 P. scutata
44 Atlanta sp.

HAUL 145

Pteropods:
1 D. trispinosa
1 E. balantium

Heteropods:
1 P. scutata
17 Atlanta sp.

HAUL 146

Pteropods:
1 E. pyramidata

Heteropods:
16 Atlanta sp.

HAUL 147

Pteropods:
12 C. globulosa
2 D. trispinosa
2 D. trispinosa (juvenile)
4 E. pyramidata

Heteropods:
1 P. coronata
1 P. scutata
9 Atlanta sp.

HAUL 148

Pteropods:
29 C. globulosa
1 D. trispinosa
1 D. trispinosa (juvenile)
2 E. pyramidata

Heteropods:
1 P. coronata
5 P. scutata
2 Atlanta sp.

HAUL 149

Pteropods:
39 C. globulosa
2 E. pyramidata

Heteropods:
5 P. scutata
11 Atlanta sp.

HAUL 150

Pteropods:
9 C. globulosa
1 C. inflexa
9 C. columnella
10 D. trispinosa
1 D. trispinosa (juvenile)

Heteropods:
2 P. scutata
4 Atlanta sp.

APPENDIX TABLE 3b (continued)

HAUL 151

Pteropods:
21 C. globulosa
2 D. trispinosa

Heteropods:
4 Atlanta sp.

HAUL 152:

Pteropods:
9 C. globulosa

Heteropods:
14 Atlanta sp.

HAUL 153

Pteropods:
9 C. globulosa
1 E. cuspidata
1 E. pyramidata

Heteropods:
16 Atlanta sp.

HAUL 154

Pteropods:
11 E. pyramidata

Heteropods:
8 Atlanta sp.

HAUL 155

Pteropods:
1 C. globulosa

Heteropods:
2 C. cristata
55 Atlanta sp.

HAUL 156

Pteropods:
2 C. inflexa

Heteropods:
6 C. cristata
1 P. coronata
29 Atlanta sp.

HAUL 157

Pteropods:
6 C. globulosa
1 E. cuspidata

Heteropods:
1 C. cristata
13 Atlanta sp.

HAUL 158

Pteropods:
20 C. globulosa
10 E. pyramidata

Heteropods:
6 Atlanta sp.

HAUL 159

Pteropods:
12 C. globulosa
1 D. trispinosa
2 E. cuspidata
3 E. pyramidata

Heteropods:
2 P. scutata
9 Atlanta sp.

APPENDIX TABLE 3b (continued)

HAUL 160

Pteropods:
2 C. globulosa
1 D. trispinosa
1 E. cuspidata
1 E. pyramidata

Heteropods:
3 Atlanta sp.

HAUL 161

Pteropods:
2 C. globulosa
43 E. pyramidata
1 Gymnosomata

Heteropods:
21 Atlanta sp.

HAUL 162

Pteropods:
20 E. pyramidata

Heteropods:
1 C. cristata
4 Atlanta sp.

HAUL 163

Pteropods:
13 E. pyramidata

Heteropods:
6 Atlanta sp.

HAUL 164

Pteropods:
3 E. pyramidata

No Heteropods

HAUL 165

No Pteropods

Heteropods:
29 Atlanta sp.

HAUL 166

Pteropods:
4 E. pyramidata

No Heteropods

HAUL 167

No Pteropods

Heteropods:
15 Atlanta sp.

HAUL 168

No Pteropods

Heteropods:
2 Atlanta sp.

HAUL 169

Pteropods:
2 E. pyramidata

Heteropods:
1 Atlanta sp.

HAUL 170

Pteropods:
5 E. pyramidata

Heteropods:
1 C. cristata

APPENDIX TABLE 3b (continued)

HAUL 171

Pteropods:
9 E. pyramidata

Heteropods:
2 C. cristata
2 Atlanta sp.

HAUL 172

Pteropods:
41 E. pyramidata

Heteropods:
1 C. cristata
2 Atlanta sp.

HAUL 173

Pteropods:
23 E. pyramidata

Heteropods:
1 P. scutata

HAUL 174

Pteropods:
107 E. pyramidata
3 L. helicina
8 Gymnosomata

Heteropods:
2 C. cristata
1 P. scutata
1 Atlanta sp.

HAUL 175

Pteropods:
35 E. pyramidata
1 Gymnosomata

Heteropods:
1 Atlanta sp.

HAUL 176

No sample

HAUL 177

Pteropods:
9 E. pyramidata

No Heteropods

HAUL 178

Pteropods:
1 E. balantium
14 E. pyramidata
2 L. helicina

Heteropods:
3 C. cristata
2 Atlanta sp.

HAUL 179

Pteropods:
1 E. pyramidata
2 L. helicina
2 Gymnosomata

Heteropods:
1 C. cristata

HAUL 180

Pteropods:
2 E. pyramidata

No Heteropods

HAUL 181

Pteropods:
1 E. pyramidata

No Heteropods

APPENDIX TABLE 3b (continued)

HAUL 182

Pteropods:
1 E. pyramidata

No Heteropods

HAUL 183

Pteropods:
1 E. pyramidata
1 L. helicina

No Heteropods

HAUL 184

Pteropods:
1 E. pyramidata

No Heteropods

HAUL 185

Pteropods:
1 L. helicina

No Heteropods

HAUL 186

Pteropods:
8 E. pyramidata

No Heteropods

HAUL 187

Pteropods:
3 E. pyramidata

Heteropods:
1 C. cristata

HAUL 188

Pteropods:
6 E. pyramidata
1 L. helicina

No Heteropods

HAUL 189

Pteropods:
7 E. pyramidata

No Heteropods

HAUL 190

Pteropods:
9 E. pyramidata

No Heteropods

HAUL 191

Pteropods:
16 E. pyramidata

No Heteropods

HAUL 192

No Pteropods

Heteropods:
1 Atlanta sp.

HAUL 193

No Pteropods

Heteropods:
1 Atlanta sp.

HAUL 194

No Pteropods or Heteropods

APPENDIX TABLE 3b (continued)

HAUL 195

Pteropods:
9 E. pyramidata

No Heteropods

HAUL 196

Pteropods:
15 E. pyramidata

Heteropods:
1 C. cristata

HAUL 197

Pteropods
7 E. pyramidata

Heteropods:
1 C. cristata

HAUL 198

Pteropods:
3 E. pyramidata

No Heteropods

HAUL 199-205

No Pteropods or Heteropods

HAUL 206

Pteropods:
5 E. pyramidata

No Heteropods

HAUL 207

Pteropods:
3 E. pyramidata

No Heteropods

HAUL 208

Pteropods:
1 E. pyramidata
1 D. trispinosa

Heteropods:
1 P. coronata

HAUL 209-211

No Pteropods or Heteropods

HAUL 212

Pteropods
1 E. pyramidata

No Heteropods

HAUL 213

No Pteropods

Heteropods:
1 Atlanta sp.

HAUL 214

Pteropods:
1 C. globulosa
1 E. pyramidata

No Heteropods

HAUL 215

Pteropods:
1 C. inflexa

No Heteropods

APPENDIX TABLE 3b (continued)

HAUL 216

No Pteropods

Heteropods:
1 P. scutata

HAUL 217

Pteropods:
1 E. pyramidata

No Heteropods

HAUL 218

Pteropods:
1 C. columnella
3 D. trispinosa
7 E. pyramidata

Heteropods:
1 P. scutata

HAUL 219

Pteropods:
1 C. columnella

No Heteropods

HAUL 220

Pteropods:
1 C. globulosa
2 C. columnella
1 D. trispinosa

Heteropods:
2 P. scutata

HAUL 221

Pteropods:
1 C. inflexa
3 D. trispinosa
1 E. pyramidata

Heteropods:
1 P. scutata

HAUL 222

Pteropods:
1 C. columnella
9 E. pyramidata

No Heteropods

HAUL 223

Pteropods:
3 C. globulosa

Heteropods:
1 P. coronata

HAUL 224

Pteropods:
1 C. globulosa

Heteropods:
1 Atlanta sp.

HAUL 225

Pteropods:
1 C. inflexa
1 C. columnella

No Heteropods

HAUL 226

Pteropods:
2 C. inflexa
1 D. trispinosa
4 E. pyramidata

Heteropods:
1 P. coronata
2 P. scutata
1 Atlanta sp.

APPENDIX TABLE 3b (continued)

HAUL 227

Pteropods:
1 C. columnella
3 E. pyramidata

Heteropods:
1 Atlanta sp.

HAUL 228

Pteropods:
2 E. pyramidata

Heteropods:
1 Atlanta sp.

HAUL 229

Pteropods:
1 C. columnella
3 E. pyramidata

Heteropods:
1 P. scutata

HAUL 230

Pteropods:
1 C. globulosa
2 C. columnella
4 E. pyramidata

Heteropods:
2 P. scutata
1 Atlanta sp.

HAUL 231

Pteropods:
1 C. globulosa
1 C. inflexa
1 C. columnella
1 D. trispinosa

Heteropods:
1 Pterotrachea sp.

HAUL 232

Pteropods:
1 D. trispinosa
2 E. pyramidata

Heteropods:
2 Atlanta sp.

HAUL 233

Pteropods:
2 C. globulosa
1 C. columnella
4 D. trispinosa
2 E. pyramidata

Heteropods:
1 Atlanta sp.

HAUL 234

Pteropods:
1 C. globulosa
1 C. inflexa
1 C. columnella
3 D. trispinosa
1 E. pyramidata

Heteropods:
1 C. cristata
4 Atlanta sp.

HAUL 235

Pteropods:
9 C. inflexa
2 C. columnella
1 D. trispinosa (juvenile)
2 E. pyramidata

Heteropods:
1 C. cristata
8 Atlanta sp.

APPENDIX TABLE 3b (continued)

HAUL 236

Pteropods:
2 C. inflexa
2 C. columnella
1 E. pyramidata
1 Gymnosomata

Heteropods:
3 C. cristata
2 P. scutata

HAUL 237

Pteropods:
1 C. columnella

Heteropods:
3 Atlanta sp.
1 Pterotrachea sp.

HAUL 238

Pteropods:
5 C. columnella
2 D. trispinosa

Heteropods:
5 Atlanta sp.
1 Pterotrachea sp.

HAUL 239

Pteropods:
1 C. globulosa
2 C. inflexa
1 C. columnella

Heteropods:
8 Atlanta sp.
1 P. scutata

HAUL 240

Pteropods:
1 D. trispinosa

Heteropods:
20 Atlanta sp.

HAUL 241

Pteropods:
11 C. inflexa
1 D. trispinosa
1 E. pyramidata
2 S. subula
1 Gymnosomata

Heteropods:
3 P. coronata
2 P. scutata
4 Atlanta sp.

HAUL 242

Pteropods:
3 C. inflexa
1 D. trispinosa
2 E. pyramidata

Heteropods:
2 P. coronata
1 P. hippocampus
2 P. scutata

HAUL 243

Pteropods:
4 C. inflexa
1 E. pyramidata

Heteropods:
2 P. hippocampus
3 Atlanta sp.

HAUL 244

Pteropods:
6 C. inflexa
2 D. trispinosa
3 E. pyramidata
1 S. subula

Heteropods:
2 P. hippocampus
1 P. scutata
14 Atlanta sp.

APPENDIX TABLE 3b (continued)

HAUL 245

Pteropods:
1 D. trispinosa
1 E. pyramidata

Heteropods:
1 P. coronata
1 P. scutata
3 Atlanta sp.

HAUL 246

Pteropods:
5 C. inflexa
1 C. columnella

Heteropods:
1 P. hippocampus
1 P. scutata
3 Atlanta sp.

HAUL 247

Pteropods:
2 C. columnella

Heteropods:
4 Atlanta sp.

HAUL 248

Pteropods:
1 C. inflexa

Heteropods:
3 P. hippocampus
2 Atlanta sp.

HAUL 249

Pteropods:
2 C. columnella
2 D. trispinosa

Heteropods:
1 P. scutata
4 Atlanta sp.

HAUL 250

Pteropods:
2 C. inflexa
2 C. columnella
1 D. trispinosa (juvenile)

Heteropods:
5 Atlanta sp.

HAUL 251

Pteropods:
3 C. columnella

Heteropods:
5 Atlanta sp.

HAUL 252

Pteropods:
1 C. inflexa
2 C. columnella
1 D. trispinosa
1 D. trispinosa (juvenile)
1 E. pyramidata

Heteropods:
5 Atlanta sp.

HAUL 253

Pteropods:
1 C. inflexa
1 C. columnella

Heteropods:
2 Atlanta sp.

HAUL 254

Pteropods:
4 D. trispinosa

Heteropods:
1 P. scutata
1 Atlanta sp.

APPENDIX TABLE 3b (continued)

HAUL 255

Pteropods:
1 C. globulosa
1 C. columnella
1 E. pyramidata

Heteropods:
2 P. scutata
1 Atlanta sp.

HAUL 256

Pteropods:
1 D. trispinosa
4 E. pyramidata

Heteropods:
4 P. scutata
14 Atlanta sp.

HAUL 257

Pteropods:
4 C. globulosa
2 C. inflexa
5 E. pyramidata

Heteropods:
3 C. cristata
4 P. scutata
11 Atlanta sp.

HAUL 258

Pteropods:
5 C. columnella
1 D. trispinosa
1 E. pyramidata

Heteropods:
11 Atlanta sp.

HAUL 259

Pteropods:
1 C. columnella
1 D. trispinosa
3 E. pyramidata

Heteropods:
7 Atlanta sp.

HAUL 260

Pteropods:
1 C. inflexa

Heteropods:
6 Atlanta sp.

HAUL 261

Pteropods:
2 C. globulosa
2 E. pyramidata

Heteropods:
1 P. scutata
6 Atlanta sp.

HAUL 262

Pteropods:
1 C. globulosa
6 C. columnella
1 D. trispinosa
14 E. pyramidata

Heteropods:
2 P. scutata
2 Atlanta sp.

APPENDIX TABLE 3b (continued)

HAUL 263

Pteropods:
4 C. globulosa
1 E. cuspidata
8 E. pyramidata

Heteropods:
1 C. cristata
1 P. coronata
3 P. scutata
6 Atlanta sp.

HAUL 264

Pteropods:
2 C. globulosa
2 C. inflexa
1 D. trispinosa
7 E. pyramidata

Heteropods:
4 Atlanta sp.

HAUL 265

Pteropods:
1 C. globulosa
1 C. inflexa
5 E. pyramidata

Heteropods:
9 Atlanta sp.

HAUL 266

No Pteropods

Heteropods:
11 Atlanta sp.

HAUL 267

Pteropods:
2 C. globulosa
6 E. pyramidata

Heteropods:
3 P. scutata
6 Atlanta sp.

HAUL 268

Pteropods:
3 C. globulosa
1 D. trispinosa
4 E. pyramidata

Heteropods:
3 Atlanta sp.

HAUL 269

Pteropods:
8 E. pyramidata

Heteropods:
4 Atlanta sp.

HAUL 270

Pteropods:
13 E. pyramidata

Heteropods:
14 Atlanta sp.

HAUL 271

Pteropods:
1 C. globulosa
15 E. pyramidata

Heteropods:
20 Atlanta sp.

HAUL 272

Pteropods:
1 C. inflexa
1 E. balantium
7 E. pyramidata

Heteropods:
99 Atlanta sp.

APPENDIX TABLE 3b (continued)

HAUL 273

Pteropods:
12 C. inflexa
1 C. columnella
41 E. pyramidata

Heteropods:
2 C. cristata
134 Atlanta sp.

HAUL 274

Pteropods:
37 C. globulosa
1 C. inflexa
1 D. trispinosa
10 E. pyramidata

Heteropods:
12 Atlanta sp.

HAUL 275

Pteropods:
1 C. globulosa
2 E. pyramidata

Heteropods:
4 P. scutata
15 Atlanta sp.

HAUL 276

Pteropods:
1 C. globulosa
1 E. cuspidata
13 E. pyramidata
1 Gymnosomata

Heteropods:
4 Atlanta sp.

HAUL 277

Pteropods:
3 E. pyramidata

Heteropods:
28 Atlanta sp.

HAUL 278

Pteropods:
11 E. pyramidata

Heteropods:
25 Atlanta sp.

HAUL 279

Pteropods:
2 E. pyramidata
1 Gymnosomata

Heteropods:
83 Atlanta sp.

HAUL 280

Pteropods:
20 C. globulosa
3 E. pyramidata

Heteropods:
43 Atlanta sp.

HAUL 281

Pteropods:
9 C. globulosa
10 E. pyramidata
1 Gymnosomata

Heteropods:
57 Atlanta sp.

APPENDIX TABLE 3b (continued)

HAUL 282

Pteropods:
3 E. pyramidata
1 Gymnosomata

Heteropods:
1 C. cristata
45 Atlanta sp.

HAUL 283

Pteropods:
1 E. pyramidata
4 L. helicina

No Heteropods

HAUL 284

Pteropods:
4 L. helicina

Heteropods:
1 Atlanta sp.

HAUL 285

Pteropods:
3 E. pyramidata
1 Gymnosomata

No Heteropods

HAUL 286

Pteropods:
1 L. helicina

Heteropods:
3 Atlanta sp.

HAUL 287

Pteropods:
1 E. pyramidata
1 Gymnosomata

Heteropods:
4 Atlanta sp.

HAUL 288

Pteropods:
7 E. pyramidata

Heteropods:
32 Atlanta sp.

HAUL 289

Pteropods:
1 C. globulosa
1 L. helicina

Heteropods:
1 C. cristata
3 Atlanta sp.

HAUL 290

Pteropods:
1 L. helicina

No Heteropods

HAUL 291-295

No Pteropods or Heteropods

HAUL 296

No Pteropods

Heteropods:
1 C. cristata

APPENDIX TABLE 3b (continued)

HAUL 297

No Pteropods or Heteropods

HAUL 298

Pteropods:
2 E. pyramidata
3 L. helicina

No Heteropods

HAUL 299

No Pteropods or Heteropods

HAUL 300

No Pteropods

Heteropods:
1 C. cristata

HAUL 301-316

No Pteropods or Heteropods

HAUL 317

Pteropods:
1 L. helicina

No Heteropods

HAUL 318-319

No Pteropods or Heteropods

HAUL 320

Pteropods:
1 L. helicina

No Heteropods

HAUL 321

Pteropods:
1 E. pyramidata
18 L. helicina
10 Gymnosomata

No Heteropods

HAUL 322

No sample

HAUL 323

Pteropods:
1 E. balantium
1 E. pyramidata
3 L. helicina
1 Gymnosomata

No Heteropods

HAUL 324-325

No Pteropods or Heteropods

HAUL 326

Pteropods:
3 E. pyramidata
3 L. helicina

HAUL 327

Pteropods:
17 E. pyramidata
62 L. helicina

No Heteropods

HAUL 328

Pteropods:
1 E. pyramidata
3 L. helicina

No Heteropods

HAUL 329-332

No Pteropods or Heteropods

HAUL 333

Pteropods:
1 Gymnosomata

No Heteropods

HAUL 334-336

No Pteropods or Heteropods

APPENDIX TABLE 3c - Pteropods and Heteropods Captured For Each Haul

BROWN BEAR Cruise 202

HAUL 1-2

No Pteropods or Heteropods

HAUL 3

Pteropods:
8 E. pyramidata

No Heteropods

HAUL 4

Pteropods:
1 L. helicina

No Heteropods

HAUL 5

Pteropods:
2 L. helicina

No Heteropods

HAUL 6

Pteropods:
3 L. helicina
1 Gymnosomata

No Heteropods

HAUL 7

Pteropods:
2 E. balantium
5 E. pyramidata

No Heteropods

HAUL 8

Pteropods:
4 E. pyramidata
3 L. helicina

No Heteropods

HAUL 9

Pteropods:
1 E. pyramidata
2 L. helicina

HAUL 10

Pteropods:
3 E. balantium
2 E. pyramidata
3 L. helicina

No Heteropods

HAUL 11

Pteropods:
1 E. balantium
1 L. helicina

No Heteropods

HAUL 12-15

No Pteropods or Heteropods

HAUL 16

Pteropods:
1 L. helicina

No Heteropods

HAUL 17-23

No Pteropods or Heteropods

HAUL 24

No sample

HAUL 25-27

No Pteropods or Heteropods

APPENDIX TABLE 3c (continued)

HAUL 28

Pteropods:
1 E. pyramidata

No Heteropods

HAUL 29-30

No Pteropods or Heteropods

HAUL 31

Pteropods:
1 E. pyramidata

No Heteropods

HAUL 32-38

No Pteropods or Heteropods

HAUL 39

Pteropods:
1 E. balantium

HAUL 40-43

No Pteropods or Heteropods

HAUL 44

No Pteropods

Heteropods:
1 C. cristata

HAUL 45-47

No Pteropods or Heteropods

HAUL 48

No Pteropods

Heteropods:
1 C. cristata

HAUL 49

No Pteropods or Heteropods

HAUL 50

No Pteropods

Heteropods:
1 C. cristata

HAUL 51

No sample

HAUL 52

Pteropods:
77 L. helicina

No Heteropods

HAUL 53

Pteropods:
1 L. helicina

No Heteropods

HAUL 54

Pteropods:
1 L. helicina

No Heteropods

APPENDIX TABLE 3c (continued)

HAUL 55

Pteropods:
2 E. pyramidata

Heteropods:
2 Atlanta sp.

HAUL 56

Pteropods:
1 L. helicina

No Heteropods

HAUL 57

Pteropods:
3 E. pyramidata
12 L. helicina

No Heteropods

HAUL 58

Pteropods:
2 L. helicina

No Heteropods

HAUL 59

Pteropods:
3 E. pyramidata
2 L. helicina

Heteropods:
1 Atlanta sp.

HAUL 60

Pteropods:
8 E. pyramidata
16 L. helicina

Heteropods:
1 Atlanta sp.

HAUL 61

Pteropods:
1 E. pyramidata
1 L. helicina
2 Gymnosomata

Heteropods:
1 C. cristata
1 Atlanta sp.

HAUL 62

Pteropods:
3 E. pyramidata
4 L. helicina

No Heteropods

HAUL 63

Pteropods
3 L. helicina
1 Gymnosomata

No Heteropods

HAUL 64

Pteropods:
6 E. pyramidata
4 L. helicina

No Heteropods

HAUL 65

Pteropods:
3 E. pyramidata

No Heteropods

APPENDIX TABLE 3c (continued)

HAUL 66

Pteropods:
1 E. pyramidata
3 L. helicina
2 Gymnosomata

No Heteropods

HAUL 67

Pteropods:
2 E. pyramidata
21 L. helicina
2 Gymnosomata

No Heteropods

HAUL 68

Pteropods:
9 L. helicina

No Heteropods

HAUL 69

Pteropods:
9 L. helicina

No Heteropods

HAUL 70

Pteropods:
7 L. helicina

No Heteropods

HAUL 71

Pteropods:
4 L. helicina

No Heteropods

HAUL 72

Pteropods:
1 E. balantium
3 E. pyramidata

No Heteropods

HAUL 73

No Pteropods or Heteropods

HAUL 74

Pteropods:
4 L. helicina

No Heteropods

HAUL 75

Pteropods:
2 E. pyramidata
41 L. helicina

No Heteropods

HAUL 76

Pteropods:
2 L. helicina

No Heteropods

HAUL 77

Pteropods:
3 L. helicina

No Heteropods

APPENDIX TABLE 3c (continued)

HAUL 78

Pteropods:
9 L. helicina

No Heteropods

HAUL 79

No Pteropods or Heteropods

HAUL 80

Pteropods:
1 Gymnosomata

No Heteropods

HAUL 81-84

No Pteropods or Heteropods

HAUL 85

Pteropods:
1 Gymnosomata

No Heteropods

HAUL 86

Pteropods:
1 Gymnosomata

No Heteropods

HAUL 87

Pteropods:
2 Gymnosomata

No Heteropods

HAUL 88-89

No Pteropods or Heteropods

APPENDIX TABLE 4a - Mysids Captured For Each Haul

BROWN BEAR Cruise 199

HAUL 80

1 G. gigas

HAUL 221

11 G. ingens

HAUL 231

3 G. ingens

HAUL 237

2 G. ingens

HAUL 241

1 G. ingens

HAUL 245

5 G. ingens

HAUL 246

2 G. ingens

HAUL 248

1 G. ingens

HAUL 254

2 G. ingens

HAUL 261

1 G. ingens

HAUL 270

1 G. ingens

HAUL 296

3 G. gigas

APPENDIX TABLE 4b - Mysids Captured For Each Haul

BROWN BEAR Cruise 202

HAUL 11

4 G. gigas
2 Boreomysis sp.

HAUL 12

2 G. gigas

HAUL 15

1 G. gigas
3 Boreomysis sp.

HAUL 16

2 G. gigas

HAUL 19

4 G. gigas

HAUL 26

4 G. gigas

HAUL 32

3 G. gigas

HAUL 39

2 G. gigas

HAUL 53

5 G. gigas

HAUL 73

3 Boreomysis sp.

HAUL 74

1 Boreomysis sp.

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