# A Photographic Survey of the Megafauna of the Central and Eastern Gulf of Maine

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**ABSTRACT: During the summers of 1983 through 1985 the JOHNSON-SEA-LINK manned submersible systems were used to survey the megafauna in the central and eastern Gulf of Maine. Quantitative 35 mm color photographs were taken at 29 stations, 5,714 photos were examined, and the megafauna identified. Eighteen taxa represented 96% of all the organisms counted, and of these 18 only 5 groups, from 2 phyla, were numerically dominant. Ophiuroidea and Asteroidea were the dominant echinoderms while Ceriantharia, *Pennatula*, and *Bolocera* were the dominant cnidarians. The relationship between sediment type and the megafauna was also investigated. Again, relatively few taxa were important and these groups showed substrate specificity. *Pennatula* occurred in a variety of substrates but were most abundant in silt (1.20 individuals $m^{-2}$). Ceriantharians were generally found in sandy substrates at densities as high as 1.12 $m^{-2}$, while *Bolocera* dominated on gravel but at much lower densities (0.017 $m^{-2}$). Scallops, *Placopecten*, were restricted to gravelly sand, while pandalid shrimp occurred on the finer sands and mud, both at low densities ($\leq$0.04 $m^{-2}$). Asteroidea covered almost the entire range of substrates at low density, although they were more numerous on sands (max. = 0.16 $m^{-2}$) and gravels (max. = $0.17^{-2}$). Ophiuroidea reached their maximum density (1.23 $m^{-2}$) on slightly gravelly sand but also occurred at $\geq$1 $m^{-2}$ on gravelly mud. The only fish observed at $\geq$0.01 $m^{-2}$ were *Lumpenus lumpretaeformis* and *Merluccius bilinearis*, both of which were found on mud substrates.**

The Gulf of Maine has been described as an epicontinental sea or macroestuary extending from Massachusetts to Nova Scotia (Uchupi 1965, 1966; Emery and Uchupi 1972; Campbell 1986). It has its origins in the last glacial period, 11,000 BP (Before Present), having been shaped by both fluvial and glacial erosion (Emery et al. 1965; Ziegler et al. 1965). The resulting uneven topography and mixture of sediments offer a variety of habitats for the establishment of benthic organisms, of both commercial and noncommercial value (Rich 1929; Emery et al. 1965). The distribution and abundance of commercial species have been studied over the years (Bigelow and Schroeder 1939, 1953) but with few exceptions, primarily small-scale studies, the benthic communities have received little attention (Dexter 1944; Stickney 1959; Hanks 1964; Sears and Cooper 1978; Larsen 1979; Hulbert et al. 1982; Larsen et al. 1983a, b; Witman and Cooper 1983). Published reports describing the soft bottom benthos in the offshore regions of the Gulf are limited to the work of Emery et al. (1965), who conducted a geological and biological survey of the U.S. east coast continental shelf, and a study of two contiguous deep basins (Wilkinson and Murray) in the western Gulf by Rowe et al. (1975). Several, as yet unpublished, databases also exist describing the Gulf's benthic communities. One of these is a detailed expansion of the work outlined by Emery et al. (1965) (Theroux and Wigley[1]), while the other is from recent box core sampling and submersible observations in the Gulf (Watling et al. 1988).

The current study was initiated as a submersible survey of offshore lobster habitat in the Gulf of Maine. In addition to this fisheries orientation, however, numerous 35 mm color photographs were taken to characterize the associated megafauna. Because of the paucity of information on the benthic communities of the Gulf, it is the purpose of this paper to summarize the photographic data collected from the years 1983 through 1985 using the JOHNSON-SEA-LINK submersible systems.

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[1]Theroux, R. B., and R. L. Wigley. Quantitative composition and distribution of the macrobenthic invertebrate fauna of the New England region. Unpubl. manuscr. Northeast Fisheries Center, Woods Hole Laboratory, National Marine Fisheries Service, NOAA, Woods Hole, MA 02543.

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## METHODS

During the summers of 1983 through 1985, the JOHNSON-SEA-LINK manned submersible systems were used to survey the megafauna at 29 stations in the Gulf of Maine (Fig. 1; App. Table 1). In 1983, locations in the outer Gulf, Georges Basin and the area northward toward Truxton Swell, were sampled; in 1984, the stations in the middle of the Gulf and Jordan Basin were visited. In 1985, a series of stations running from the center of Jordan Basin to the northeast towards the Bay of Fundy were to be sampled. Unfortunately, weather limited available diving time in 1985 and forced diving operations inshore toward the Nova Scotian coast after only three stations were sampled. The purpose of the study was to document offshore lobster habitat; therefore, dive site selection was based on commercial trap fishery information as well as on National Marine Fisheries Service data from their biannual groundfish trawl surveys of lobster catches.

Submersible dives at each station followed a standard protocol, with the diver-scientist recording observations on a cassette tape or video camera as well as collecting surficial sediment samples over the course of a transect. In addition to these data, 35 mm color photographs were taken automatically at 10 to 15 s intervals throughout the dive.

In the laboratory, a minimum of 200 randomly chose photographs from each dive, or all photos taken during the entire dive if <200 frames total, were individually examined and the megafauna identified and enumerated. The

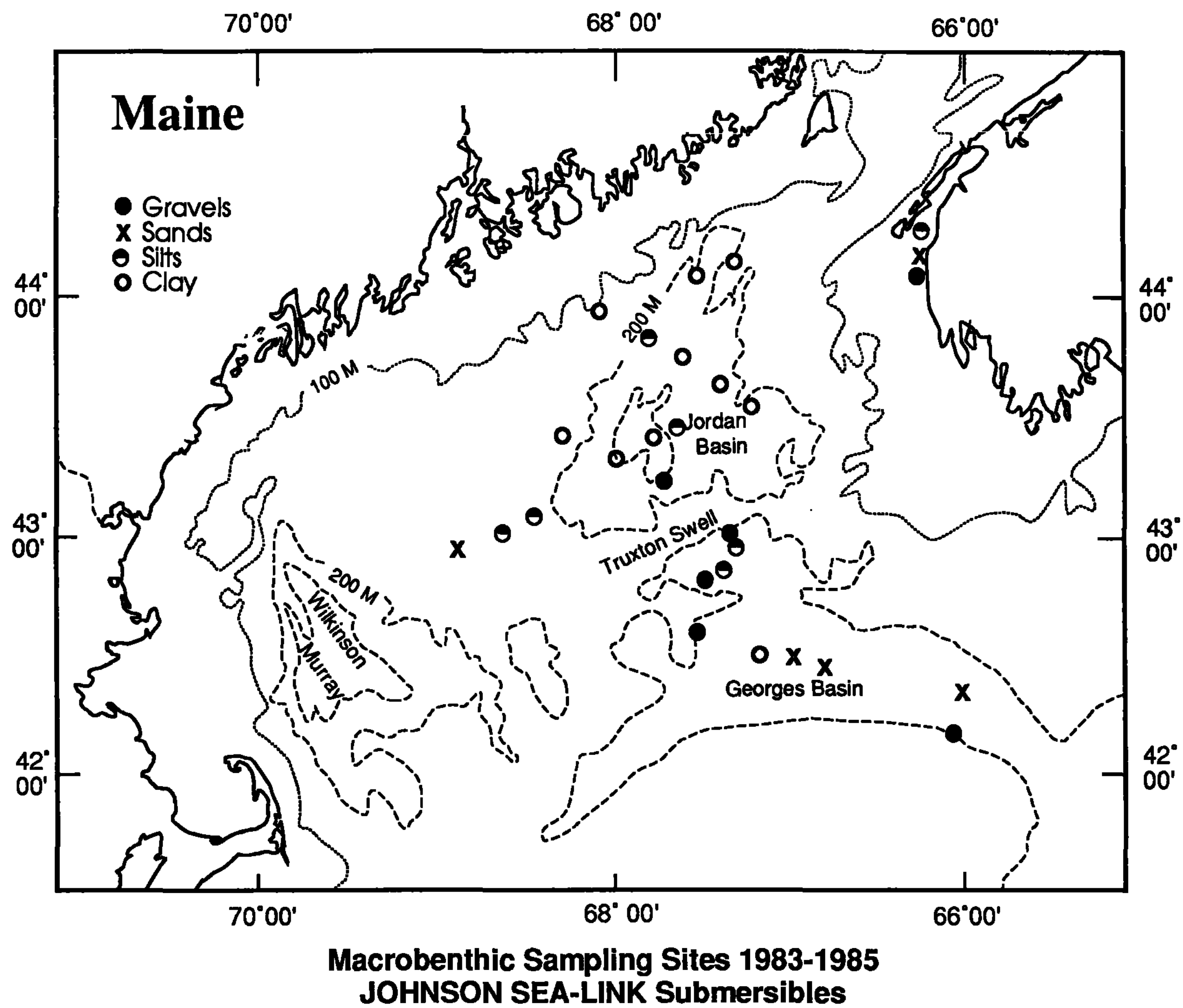


FIGURE 1.—Dive site locations for 29 dives constituting the megafaunal survey, 1983–85, using the JOHNSON-SEA-LINK submersible systems.

categories of megafauna, representing a variety of taxonomic levels, that could be resolved in the photographs are listed in Appendix Table 2. From one to seven sediment samples, collected on each dive, were analyzed by the U.S. Geological Survey for surficial grain size analysis. The statistical parameters for this analysis were calculated by the method of moments (Krumbein and Pettijohn 1938), while the average sediment types for each dive were classified and are described using the terminology of Folk (1980).

## RESULTS

Sediment types are shown in Figure 1 at the 29 dive locations. The general sediment pattern, from south to north, is a gradation of coarse to fine sediments. Georges Basin is, generally, sandy along its midsection, changing into a gravelly area towards Truxton Swell. Jordan Basin, which is north of Georges Basin, is dominated by finer silts and clays.

A total of 5,714 color photographs (35 mm slides) were examined from the 29 submersible dives. Over 27,000 individual organisms were counted. The overall taxonomic ranking, based on the percentage of total numbers observed for the top 18 taxonomically distinct groups, is shown in Figure 2. These 18 groups represent 96% of all the organisms counted. From the figure, it is clear that there are only five numerically dominant taxa representing two phyla, the Echinodermata and the Cnidaria. Ophiuroidea and Asteroidea are the dominant echinoderms, while ceriantharian anemones, sea pens of the genus *Pennatula*, and rock (*Bolocera*) anemones account for the dominant cnidarians.

If the same data are examined on a year and location basis, there are, again, very few dominant groups. In addition to the echinoderms and cnidarians observed in all three years, arthropods (pandalid shrimp) were reasonably abundant in 1984 in the middle Gulf and southern Jordan Basin area, while invertebrate tubes (polychaetes or amphipods) occurred at the stations, visited in 1985, in central Jordan Basin and to the northeast (Table 1). The year and area breakdown, like the overall ranking, demonstrates a simple picture for the softer sediment megafaunal communities in the Gulf of Maine. Seven taxonomically distinct groups account for 97 to 99% of all the biota observed.

The relation between sediment type and animal abundance is shown in Figure 3 and detailed in Appendix Table 1. Of interest is the substrate specificity of the various groups. Sea pens, *Pennatula* (most likely *P. aculeata*, Langton, pers. obs.), occurred in clay and silts as well as gravel. They were, however, most common in silt reaching a maximum density of 1.20 animals $m^{-2}$. They occurred in gravel at only 2 stations compared to 10 stations with

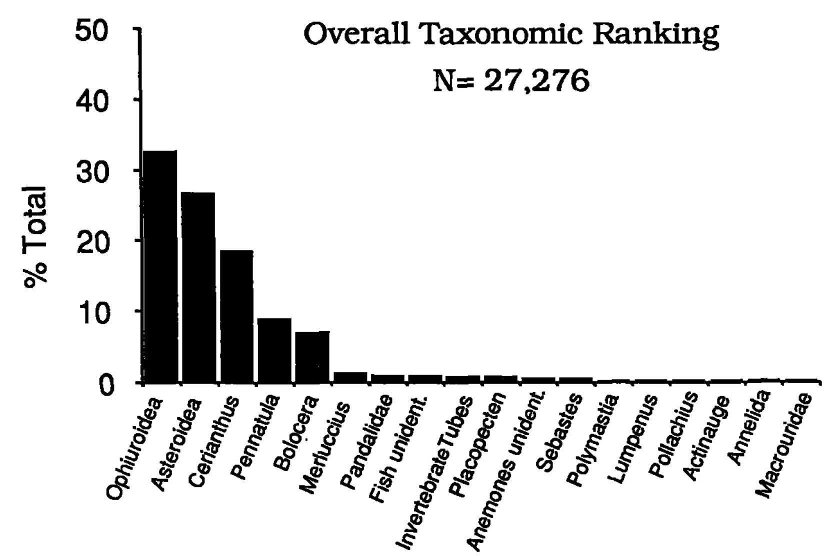


FIGURE 2.—Overall taxonomic ranking, expressed as percentage of the total number of organisms observed (N = 27,276), for 29 submersible dives in the Gulf of Maine from 1983 through 1985.

TABLE 1.—Breakdown of the major groups of benthic organisms, expressed as the percentage of number of total organisms observed, for each of the three years of the survey. These seven groups account for 97 to 99% of all megafaunal animals observed in the areas surveyed for any given year.

| | % of major groups by year and location | | |
|---|---|---|---|
| Groups | 1983 Georges Basin Truxton Swell | 1984 Mid-Gulf, Southern Jordan Basin | 1985 Central Jordan Basin to the northeast |
| Pennatula | 38.0 | 28.0 | 4.0 |
| Cerianthus | 38.3 | 5.0 | 10.3 |
| Bolocera | 10.1 | – | 1.3 |
| Invertebrate tubes (Polychaete or Amphipod) | – | – | 2.1 |
| Pandalidae | – | 1.2 | – |
| Asteroidea | 6.5 | 2.5 | 11.5 |
| Ophiuroidea | 2.8 | 62.2 | 67.9 |
| Total % | 97.5 | 98.9 | 97.1 |

| | muds | | | | | sands | | | | | | | gravels | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | cM | M | M-Z | Z | sZ | (g) sM | gM | (s) gM | (g) mS | gmS | S | (g) S | g S | msG | sG | B |
| *Pennatula* | | 0.54 | 0.10 | 1.20 | | 0.03 | 0.13 | | 0.09 | 0.01 | | | | 0.07 | | |
| *Bolocera* | 0.03 | | | | | | | | | | 0.03 | | | 0.17 | 0.14 | |
| *Cerianthus* | | | 0.01 | 0.12 | | | 0.13 | 0.24 | 1.12 | 0.32 | | | | | | |
| *Placopecten* | | | | | | | | | | | | | 0.01 | | | |
| *Pandalidae* | | 0.01 | | | | 0.03 | 0.04 | | | 0.01 | | | | | | |
| *Asteroidea* | 0.02 | + | | + | 0.02 | 0.01 | | | 0.01 | 0.09 | 0.16 | | | 0.04 | 0.14 | 0.17 |
| *Ophiuroidea* | | 0.47 | 0.26 | 0.11 | | | 1.01 | 0.20 | 0.74 | 0.29 | | 1.23 | | | | |
| *Merluccius* | 0.01 | | | | | | | | | | | | | | | |
| *Lumpenus* | | | | | 0.01 | | | | | | | | | | | |
| *Invert. Tubes* | | | | | | | | | | 0.01 | | 0.04 | | | | |

FIGURE 3.—Occurrence of dominant megafaunal groups associated with substrate type. Data is expressed as numbers of individuals per square meter of bottom for each sediment type. Only taxa that had a density of ≥0.01 animals per squre meter in any one sediment type are included in the figure. The actual density is given when it equals or exceeds the 0.01 value while a "+" indicates presence but at a density of <0.01 animal per square meter. The sediment types follow the terminology of Folk (1980) and are cM = clayey mud, M = mud, M-Z = Mud-Silt, Z = Silt, sZ = sandy silt, (g)sM = slightly gravelly sandy mud, gM = gravelly mud, (s)gM = slightly sandy gravelly mud, (g)mS = slightly gravelly muddy sand, gmS = gravelly muddy sand, S = sand, (g)S = slightly gravelly sand, gS = gravelly sand, msG = muddy sandy gravel, sG = sandy gravel, and B = boulder field.

clay and silt substrates. *Cerianthus* sp. (probably *C. borealis*, see Shepard et al. 1986), a burrowing anemone, was also not especially substrate specific. It was found over the entire gradation of sandy substrates as well as some of the silts, although it reached its highest density (1.12 $m^{-2}$) in slightly gravelly muddy sand. *Bolocera tuediae*, on the other hand, is an anemone that attaches to hard, rocky, substrates. Consequently, it was observed in areas of gravel and sand at a maximum density of 0.17 $m^{-2}$. On the sandy substrates, these anemones, as well as the few animals observed on clayey mud, were often found attached to a rock outcrop or loose boulder rather than directly to the finer sediment. The sea scallop, *Placopecten magellanicus*, was restricted to gravelly sand while pandalid shrimp occurred on finer sands and muds; both at relatively low densities, 0.01 and ≤0.04 $m^{-2}$, respectively. Asteroidea which include a variety of genera (e.g., *Asterias*, *Hippasteria*, *Henricia*, *Cros-*

*saster*, and *Solaster*) occurred over virtually all substrate types but were more prevalent on coarser sediments, reaching a maximum density of 0.17 $m^{-2}$ in a bouldery area. In contrast, Ophiuroidea did not occur on gravel substrates in significant numbers but did occur on slightly gravelly sand at high density (1.23 $m^{-2}$) as well as on the finer sands and muds. Only two fish species occurred in sufficient density to demonstrate any substrate specificity. The silver hake, *Merluccius bilinearis*, was observed resting on the bottom on fine mud sediments, while the snake blenny, *Lumpenus lumpretaeformis*, was observed on sandy silt.

## DISCUSSION

This study is the first, broad scale, megafaunal survey in the Gulf of Maine using manned submersibles. Previous submersible work was limited to four DSRV *Alvin* dives in Wilkinson and Murray Basins in 1971 and 1972, described by Rowe et al. (1975). The study by Rowe et al. reported that pandalid shrimp and ophiuroids were the numerically dominant megafaunal animals observed along several transects in these basins. From the present work, it is clear that ophiuroids are numerically dominant throughout the central and eastern Gulf on the finer sediments (Figs. 2, 3). Pandalid shrimp, on the other hand, ranked only seventh in abundance in the present work (Fig. 2). Perhaps the abundance of shrimp observed by Rowe et al. (1975) reflected the high population levels, and correspondingly high catches, of *Pandalus borealis* that occurred in the Gulf of Maine in the late 1960s and early 1970s (Shumway et al. 1985).

The description of the megafauna in the Gulf of Maine that emerges from this study is not complex. Relatively few taxa, or taxonomic groups, from two phyla dominated the megabenthos on a numerical basis (Fig. 2; App. Table 1). These two phyla (Echinodermata and Cnidaria) are different from the dominants identified from macrobenthic surveys in the Gulf, as might be expected, owing to the methodological differences and scales of resolution. Theroux and Wigley (fn. 1), for example, reported molluscs, annelids, and crustaceans to be the numerical dominants, based on a more extensive and geographically restricted analysis of the Emery et al. (1965) survey, using surface deployed sampling gear. Watling et al. (1988) identified annelids, crustaceans, and echinoderms as the numerically dominant groups based primarily on surface deployed box core samples. Neither ceriantharians nor pennatulids, the numerical dominants in this study, are adequately sampled with a 0.1 $m^2$ box core (Watling[2]). Rowe et al. (1975) also noted significant differences between core samples and visual counts, while other studies specifically comparing submersibles and photographic transects with other sampling gear have shown substantial differences when conducting a faunal census (Wigley and Theroux 1970; Uzmann et al. 1977; Theroux 1984).

The distribution of megafaunal animals is related to sediment type in the Gulf of Maine (see Figure 3 and Appendix Table 1). Watling et al. (1988) also identified substrate, together with the temperature range of the overlying water mass, as major factors resulting in seven discrete macrobenthic species assemblages in the Gulf of Maine. Their analysis is based on both box core and submersible sampling. Zoogeographic studies on specific megafaunal components in the Gulf of Maine are rare, only three taxonomic groups occurring in this geographic region have been investigated (Wigley 1960; Haynes and Wigley 1969; Franz et al. 1981; Shepard et al. 1986). In these three instances the various environmental factors, including sediment type, that potentially control the animals distributional patterns have been examined. Shepard et al. (1986), for example, completed an extensive study of Ceriantharia off the northeast coast of the United States. Geographic and bathymetric zonation was attributed primarily to temperature and secondarily to food supply and sediment type. They found *Cerianthus* to be tolerant of a wide range of temperature (8°–16°C) and to occur on most substrates except gravel and coarse shifting sand. In the present study ceriantharians were also found to have little substrate fidelity although there was a noticeable absence from areas of boulders and gravel (Fig. 3). Pandalid shrimp, on the other hand, have been shown to have a stronger affinity for sediment type (Wigley 1960). Unfortunately the species of shrimp could not be identified in the photographs we examined so a detailed comparison with Wigley's results on the four species of Pandalidae occurring in the Gulf of Maine is not possible. Nevertheless, Haynes and Wigley

[2]L. Watling, Darling Marine Center, University of Maine, Walpole, ME 04573, pers. commun. 1988.

(1969), as well as Bigelow and Schroeder (1939) in an earlier study, have both noted a strong affinity between organically rich sediment and the occurrence of the Gulf's largest pandalid, *Pandalus borealis*. The observed occurrence of shrimp in our photographs corresponds to substrates containing silt and, generally, finer grained materials (Fig. 3), thus, once again, confirming the relationship between pandalid shrimp and, presumably, high organic sediments in the Gulf of Maine. In the last of the three groups, for which there is information relating distributional patterns to the environment, Franz et al. (1981) identified temperature as the major controlling factor of asteroid distribution. Their study identified 15 different species of seastar in the Gulf of Maine which they assigned to 3 zoogeographic groups. These species have a variety of substrate requirements. In our study temperature varied little between dive locations, depth, and year (App. Table 1), whereas sediment type did. This variation in substrate is reflected in Figure 3 where asteroids are shown to occur on almost all sediment types. Although sediment type is obviously not the only factor that determines a species occurrence, it is important when considering the patterns of species distribution throughout the Gulf of Maine and should be evaluated on a species specific level.

## ACKNOWLEDGMENTS

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APPENDIX TABLE 1.—Summary of data for 29 submersible dives conducted using the JOHNSON-SEA-LINK submersible systems from 1983—85 in the Gulf of Maine. Mean percentage of sediment composition categories: G = gravel; SA = sand; SI = silt; CL = clay. "Most abundant animals" includes any group where 10 or more individuals were counted in the photographs from each dive.

| Date (Mo/day) | JSL I or II Dive # | Dive location Lat. N | Long. W | Max. depth (m) | Bottom temp. (°C) | Sediment $\bar{x}$% composition G SA SI CL | No. of sediment samples | Most abundant animals (#m$^{-2}$) |
|---|---|---|---|---|---|---|---|---|
| 1983 | | | | | | | | |
| 8/3 | 1407 | 42°58.48′ | 67°31.18′ | 226 | 8.8 | 0/46/35/19 | 1 | 0.024 *Bolocera*<br>0.023 Asteroidea<br>0.005 *Merluccius*<br>0.004 Fish unid. |
| 8/3 | 1408 | 42°58.48′ | 67°31.18′ | 229 | 8.7 | 0/33/44/23 | 1 | 0.030 *Bolocera*<br>0.013 Asteroidea<br>0.012 *Merluccius* |
| 8/4 | 1409 | 43°01.30′ | 67°32.12′ | 201 | 8.8 | 38/45/12/5 | 4 | 0.214 *Pennatula*<br>0.044 *Bolocera*<br>0.028 Asteroidea |
| 8/4 | 1410 | 43°04.12′ | 67°43.24′ | 153 | 8.2 | 36/50/10/4 | 3 | 0.115 *Bolocera*<br>0.047 Asteroidea<br>0.008 *Polymastia* |
| 8/5 | 1413 | 42°45.18′ | 67°37.30′ | 206 | 8.9 | 44/45/8/3 | 5 | 0.346 *Bolocera*<br>0.043 Asteroidea<br>0.021 *Pollachius* |
| 8/6 | 1414 | 42°28.18′ | 67°20.06′ | 323 | 8.7 | 0/5/64/31 | 2 | 2.408 *Pennatula*<br>0.243 *Cerianthus*<br>0.008 Macrouridae<br>0.007 Asteroidea |
| 8/6 | 1415 | 42°26.24′ | 67°07.36′ | 381 | 8.6 | 5/41/37/17 | 5 | 0.238 *Cerianthus*<br>0.204 Ophiuroidea |
| 8/7 | 1416 | 42°08.30′ | 66°09.00′ | 177 | 8.1 | 61/38/<1/<1 | 4 | 0.085 *Bolocera*<br>0.013 Asteroidea |
| 8/8 | 1418 | 42°14.30′ | 66°09.00′ | 264 | 7.3 | 10/89/<1/<1 | 7 | 0.010 *Placopecten* |
| 8/8 | 1419 | 42°23.42′ | 66°52.48′ | 351 | 7.9 | 4/52/26/18 | 5 | 2.234 *Cerianthus*<br>0.179 *Pennatula*<br>0.010 Asteroidea |
| 8/10 | 1422 | 42°32.00′ | 67°38.00′ | 171 | 8.7 | 38/53/<1/2 | 5 | 0.254 Asteroidea<br>0.201 *Bolocera* |
| 1984 | | | | | | | | |
| 7/17 | 880 | 42°51.31′ | 68°54.04′ | 144 | 6.9 | 13/68/13/6 | 2 | 0.327 *Cerianthus*<br>0.182 Asteroidea<br>0.009 *Sebastes* |
| 7/18 | 881 | 42°58.11′ | 68°44.25′ | 205 | 7.3 | 3/32/39/26 | 3 | 0.034 Pandalidae<br>0.032 *Pennatula*<br>0.010 Asteroidea |
| 7/18 | 882 | 43°03.16′ | 68°32.43′ | 181 | 7.0 | 7/29/39/25 | 3 | 1.009 Ophiuroidea<br>0.126 *Pennatula*<br>0.125 *Cerianthus*<br>0.039 Pandalidae |

APPENDIX TABLE 1.—*Continued.*

| Date (Mo/day) | JSL I or II Dive # | Dive location Lat. N | Long. W | Max. depth (m) | Bottom temp. (°C) | Sediment $\bar{x}$% composition G SA SI CL | No. of sediment samples | Most abundant animals (#m$^{-2}$) |
|---|---|---|---|---|---|---|---|---|
| 1984—*Continued* | | | | | | | | |
| 7/19 | 883 | 43°48.31′ | 67°54.22′ | 174 | 7.3 | 0/<1/64/36 | 1 | 2.418 *Pennatula*<br>0.021 *Merluccius*<br>0.017 Pandalidae |
| 7/19 | 885 | 43°20.55′ | 68°24.46′ | 194 | 7.8 | 0/<1/56/44 | 3 | 0.973 Ophiuroidea<br>0.302 *Pennatula*<br>0.009 Pandalidae |
| 7/20 | 887 | 43°17.45′ | 67°55.44′ | 231 | 7.9 | 0/<1/57/43 | 3 | 0.594 Ophiuroidea<br>0.116 *Pennatula*<br>0.012 Pandalidae |
| 7/20 | 888 | 43°22.32′ | 67°43.52′ | 270 | 8.1 | 0/<1/58/42 | 3 | 0.555 Ophiuroidea<br>0.214 *Pennatula* |
| 7/21 | 889 | 43°54.01′ | 68°05.32′ | 180 | 7.4 | 0/<1/60/40 | 2 | 0.603 *Pennatula*<br>0.025 Asteroidea |
| 7/21 | 890 | 43°43.01′ | 67°43.06′ | 236 | 9.2 | 0/<1/56/44 | 2 | 1.183 Ophiuroidea<br>0.019 Invert. tubes |
| 7/21 | 891 | 43°37.26′ | 67°31.29′ | 227 | 8.3 | 0/<1/69/31 | 2 | 0.221 Ophiuroidea |
| 7/22 | 892 | 43°27.19′ | 67°31.48′ | 224 | 8.0 | 3/19/53/26 | 2 | 1.472 Ophiuroidea |
| 7/22 | 893 | 43°30.27′ | 67°18.35′ | 220 | 9.2 | 0/7/59/34 | 2 | 0.123 *Pennatula* |
| 1985 | | | | | | | | |
| 6/25 | 1093 | 43°58.14′ | 67°26.52′ | 187 | 7.9 | 15/37/36/12 | 3 | 0.584 Ophiuroidea<br>0.304 *Cerianthus*<br>0.027 Invert. tubes<br>0.021 *Pennatula*<br>0.011 Pandalidae |
| 6/25 | 1094 | 44°04.22′ | 67°35.45′ | 201 | 8.2 | 0/2/65/32 | 1 | 0.260 Ophiuroidea<br>0.096 *Pennatula*<br>0.009 *Cerianthus* |
| 6/26 | 1095 | 44°08.13′ | 67°26.52′ | 242 | 8.9 | 1/7/61/31 | 4 | 1.225 Ophiuroidea<br>0.037 Invert.<br>0. tubes |
| 6/27 | 1096 | 44°16.13′ | 66°16.47′ | 52 | 9.1 | 0/39/55/6 | 1 | 0.021 Asteroidea<br>0.011 *Lumpenus* |
| 6/27 | 1097 | 44°09.52′ | 66°13.37′ | 23 | 8.7 | <1/97/2/<1 | 1 | 0.156 Asteroidea<br>0.026 *Bolocera* |
| 6/28 | 1098 | 44°03.28′ | 66°13.57′ | 18 | 9.6 | boulders | — | 0.169 Asteroidea |

APPENDIX TABLE 2.—Listing of the categories of megafauna that could be resolved and identified in the 35 mm photographs. The actual area of sea floor photographed in each frame was 7.0 $m^2$.

| | |
|---|---|
| Macrophytes | Echinodermata |
| Porifera | Echinoidea |
| Orange colonial forms | *Echinarachnius parma* |
| White colonial forms | Asteroidea |
| Yellow colonial forms | Ophiuroidea |
| Stalked sponges | Vertebrata |
| Sponge, unidentified | *Myxine glutinosa* |
| *Polymastia* | *Omochelys cruentifer* |
| Cnidaria | *Merluccius bilinearis* |
| Hydroids | *Gadus morhua* |
| *Tubularia* | *Melanogrammus aeglefinus* |
| *Pennatula* | *Pollachius virens* |
| *Bolocera* | *Urophycis* sp. |
| *Actinauge* | *Brosme brosme* |
| *Cerianthus* | Macrouridae |
| Anemones, unidentified | Flatfish |
| Brachiopoda | *Sebaster fasciatus* |
| Mollusca | *Myoxocephalus* sp. |
| Gastropoda (Welks) | *Aspidophoroides monopterygius* |
| *Placopecten magellanicus* | *Lumpenus lumpretaeformis* |
| Annelida | Blenny, unidentified |
| Invertebrate tubes | *Leptoclinus maculatus* |
| (Polychaete or Amphipod) | *Macrozoarces americanus* |
| Arthropoda | *Lophius americanus* |
| Pandalidae | Fish, unidentified |
| *Homarus americanus* | |
| *Pagarus* sp. | |
| *Cancer* sp. | |