to that of density among the subareas—largest in Southern New England, intermediate in Chesapeake Bight, and smallest in New York Bight. Biomass ranged from 0.02 to 3 g/m² in Southern New England, 0.08 to 1 g/m² in New York Bight, and 0.009 to 3 g/m² in Chesapeake Bight. No definite relationship was discernible between biomass and temperature range.

Echiura were not common in any of the subareas of the Middle Atlantic Bight region and were found in only the narrowest temperature class in Southern New England (0.3/m² weighing 0.2 g/m²). In New York Bight, they were found in only two classes—the narrowest, where density was 0.3/m² and biomass 0.8 g/m², and in the 20.0°–23.9° class where density was 0.5/m² and biomass, 0.5 g/m². In Chesapeake Bight, they were present in the same two classes and in roughly the same magnitudes; 0.4/m² weighing 2.5 g/m² in the narrowest class and 0.3/m² weighing 0.09 g/m² in the broader class.

Priapulida were neither broadly distributed nor plentiful in any of the subareas. They were present in only the narrowest temperature range in both Southern New England and Chesapeake Bight, and were absent entirely in the New York Bight.

Mollusca were recorded in all temperature classes in each of the subareas of the Middle Atlantic Bight region. As a group, mollusks were most abundant in Chesapeake Bight; Southern New England was second, followed by New York Bight. Because mollusks are made up of several subcomponents, a detailed analysis will be found among the several contributors to the total molluscan fauna.

Polyplacophora were more plentiful in Southern New England than in the other two subareas. In Southern New England, they were found in five temperature classes; in New York Bight, two classes; and in Chesapeake Bight, three classes. In Southern New England, the trend of increasing density as temperature range broadened was discernible. The highest density (8/m²) occurred in the broadest class, and the lowest (0.2/m²) in the narrowest, 0°–3.9°C, as well as in the 20.0°–23.9°C class. In New York Bight, in the 0°–3.9°C and 8.0°–11.9°C classes, polyplacophoran densities were 0.2/m² and 0.4/m², respectively, but in Chesapeake Bight their density ranged from 0.2/m² to 1/m² and tended to increase as temperature range narrowed. Where they were found in Chesapeake Bight, the lowest density was in 20.0°–23.9°C class and the highest density in the narrowest temperature range. Chiton biomass in the Southern New England subarea tended to follow the pattern established for density, and the smallest biomass (0.003 g/m²) was found in the narrowest range, and the largest biomass (8 g/m²) in the broadest range. In New York Bight, in both classes in which chitons occurred, the biomass was similar, 0.004 g/m². Chiton biomasses in Chesapeake Bight were nearly identical in the narrowest class (0.01 g/m²) and in the broadest (0.02 g/m²). In midrange, the biomass was 0.004 g/m².

Gastropoda were found in all temperature-range classes in each of the subareas. Both density and biomass tended to decrease as latitude decreased; greatest values for both were found in Southern New England, intermediate values in New York Bight, and lowest in Chesapeake Bight. No definite relationships was discernible between density and temperature range in any of the subareas. Gastropod density ranged from 1/m² in the 4.0°–7.9°C class to 174/m² in 20.0°–23.9°C in Southern New England, where generally lower densities occurred in the narrower ranges and higher densities in the broader ranges (see table 40). In New York Bight, gastropod density ranged from 1/m² in the 4.0°–7.9°C class to 57/m² in 20.0°–23.9°C. Here, moderately high density values occurred at both ends of the temperature-range spectrum. Density values in Chesapeake Bight ranged from 1/m² in the 16.0°–19.9°C class to 87/m² in the adjacent class, 20.0°–23.9°C. Intermediate values, tending on the lower side, were found in the other classes. Overall gastropod biomass values were comparatively low, and in Southern New England ranged from 0.01 g/m² in the 4.0°–7.9°C and 8.0°–11.9°C classes to 9 g/m² in 12.0°–15.9°C. In New York Bight, gastropod biomass ranged from 0.02 g/m² in the 4.0°–7.9°C class to 7 g/m² in the two broadest classes. Biomasses of 1 g/m² or less were found in the other classes. In Chesapeake Bight, which contained the smallest biomass of gastropods, values ranged from 0.03 g/m² in the 8.0°–11.9°C class, to 7 g/m² in 20.0°–23.9°C. In only one other class, 24.0° + C, were biomasses of more than 2 g/m.² Values in all other classes were below 1 g/m².

Bivalvia were the largest contributors of molluscan abundance and occurred in all temperature-range classes in each of the subareas of the Middle Atlantic Bight region. Greatest overall densities of

bivalves were found in Chesapeake Bight and Southern New England. The single largest average density occurred in the 20.0°–23.9°C class in Chesapeake Bight, where 1,027/m² were found. The next highest density occurred in the same class in the New York Bight. However, in this subarea, other density values were below those of similar classes in either of the two other subareas. In Southern New England, bivalve density ranged from 37/m² in the 0°–3.9°C class to 370/m² in 20.0°–23.9°C. Values below 100/m² occurred in the 16.0°–19.9°C class, but in all other classes density values were between 100/m² and 200/m². In New York Bight, which contained the lowest overall values, density exceeded 100/m² in only the two broadest classes, the previously mentioned high of 528/m² in the 20.0°–23.9°C class and 354/m² in 24.0°+C. Density values ranging from 33/m² to 84/m² occurred in the other classes in New York Bight. The density of bivalves in Chesapeake Bight was 30/m² in 0°–3.9°C and, in all other classes, was more than 100/m²; 147/m² and 163/m² occurred in the 16.0°–19.9°C and 8.0°–11.9°C classes, respectively, and more than 370/m² in the remaining three classes. A considerably different picture unfolds when considering biomass among the three subareas in the Middle Atlantic Bight region. New York Bight, on the whole, had a higher biomass than any of the other two subareas; Southern New England was second. The biomass in Chesapeake Bight, notwithstanding its leadership in density, was lowest among the three subareas. Average biomass in Southern New England ranged from 0.6 g/m² in the 0°–3.9°C class to 917 g/m² in the broadest, the 24.0°+C, class. In Southern New England, the tendency was that biomass increased as temperature range broadened, but the actual values were widely divergent. In New York Bight, average bivalve biomass ranged from 0.7 g/m² to 597 g/m² in the 0°–3.9°C class and the 20.0°–23.9°C class, respectively. However, a greater part of the remaining classes contained values that were about 100 g/m² or more, whereas in Southern New England, the tendency was for considerably smaller biomasses to occur. The biomass of bivalves in Chesapeake Bight ranged from 0.3 g/m² in the 0°–3.9°C class to 102 g/m² in the 12.0°–15.9°C class. The remaining classes contained less than 100 g/m².

Scaphopoda were most prevalent in Chesapeake Bight and were absent only in the broadest class. In New York Bight, they occupied the narrower to midrange classes and were absent from the broader range classes (16.0°–24.0°+C); in Southern New England, Scaphopoda occupied the three narrower range classes (0°–11.9°C), were absent in the next two between 12.0° and 19.9°C, were present in the 20.0°–23.9°C range, and absent in the broadest range, 24.0°+C. Density values were highest in Chesapeake Bight, where mean densities ranged from 0.4/m² to 14/m². In New York Bight, where densities were between those of the other two subareas, the range of density was from 0.6/m² to 6/m². Scaphopod densities in Southern New England ranged from 0.5/m² to 4/m². On the whole, scaphopod biomass values were largest in the Chesapeake Bight subarea. Biomass ranged from 0.004 g/m² to 0.4 g/m². In New York Bight, biomass values ranged from 0.01 g/m² to 0.08 g/m². The biomass of tusk shells in Southern New England was somewhat comparable to that in the New York Bight. Smallest biomass was 0.005 g/m² in the 20.0°–23.9°C class; in the other three classes in which tusk shells were present in Southern New England, values ranged between 0.03 and 0.09 g/m².

Cephalopoda were found only in Southern New England and only in the 4.0°–7.9°C and the 8.0°–11.9°C classes. Density values were high, 0.7/m² and 15/m² in the two classes, respectively, whereas biomass values were comparatively lower, 0.007 and 0.2 g/m².

Arthropoda density and biomass values are summations of the subcomponents of this phylum and are reflected in the crustacean abundances given below.

Pycnogonida occurred in each of the subareas of the Middle Atlantic Bight region, but were restricted in each of them to only a relatively few temperature classes. In Southern New England, pycnogonids occurred in three classes, the 12.0°–15.9°, the 16.0°–19.9°, and the 24.0°+C; in New York Bight, they were found only in the 20.0°–23.9°C class; and in Chesapeake Bight, were found in the three broad-range categories between 16.0°+, and 24.0°+C. Overall density was highest in Southern New England and ranged from 0.2/m² to 4/m², lowest in New York Bight where only 0.2/m² was found, and intermediate in Chesapeake Bight where the range was from 0.7/m² to 3/m². Pycnogonid biomass was on the whole quite low, in Southern New England the range of biomass was from 0.002 to 0.02 g/m². In New York Bight, 0.004 g/m² was found and in Chesapeake Bight, the range was from 0.003 to 0.02 g/m².

Arachnida were very sparsely distributed, occurring only in the New York Bight subarea and in only one temperature class, 20.0°–23.9°C. Density was 0.5/m² and biomass, 0.002 g/m².

Crustacea were major contributors to the macrofauna in the Middle Atlantic Bight region, occurring in all temperature-range classes in each of the subareas. Generally, both density and biomass diminished to the south, so that abundance was greatest in Southern New England, intermediate in New York Bight, and lowest in Chesapeake Bight. In Southern New England, crustacean densities were highest in the midrange classes and less in both narrowing and broadening temperature ranges, although substantial densities occurred in the latter. The range of density in Southern New England was from 11/m² to 2,226/m². In the three broadest classes (from 12°C to 24°+C), density values in Southern New England were more than 1,000/m², whereas in the narrower classes they were below 100/m². In the New York Bight, essentially the same conditions prevailed and lowest density (6/m²) was in the narrowest class, and 1,023/m² in the 12.0°–15.9°C class. In the classes between 8°C and 24°+C, excluding 12.0°–15.9°C, density values were betwen 300/m² and 600/m². Crustacean density in Chesapeake Bight ranged from 2/m² in the narrowest class to 631/m² in the 8.0°–11.9°C class. Crustacean biomass and density were similar in that largest amounts occurred in Southern New England, intermediate in New York Bight, and lowest in Chesapeake Bight. Biomass ranged from 0.08 g/m² in 0°–3.9°C, to 65 g/m² in 16.0°–19.9°C in Southern New England; somewhat smaller biomasses (10/m²–11/m²) were found in the two broadest classes, but they diminished sharply as temperature range narrowed. In New York Bight, essentially the same conditions prevailed where biomass increased as temperature range broadened. The smallest biomass occurred in the 0°–3.9°C class with 0.09 g/m², and largest, 21 g/m², in the 20.0°–23.9°C class. The 24.0°+C class biomass dropped, significantly, to 1 g/m². In the remaining classes, biomass varied from 1 to 7 g/m². The crustacean biomass in Chesapeake Bight was moderately small and ranged from 0.01 g/m² in the narrowest class to 4 g/m² in 24.0°+C. Values of less than 1 g/m² were found in the 4.0°–7.9° and the 12.0°–15.9°C classes and ranged from 2 to 3 g/m² in the other three classes.

Ostracoda were found in each of the subareas in rather limited distribution. In Southern New England, they occurred in only three temperature classes, the two broadest and the midpoint categories; in New Bight, they were relegated to one temperature class, 20.0°–23.9°C; and in Chesapeake Bight, they were found in the two broadest classes. As in other groups, greatest densities and biomasses occurred in Southern New England. The values of biomass and density were relatively low, especially in Chesapeake Bight where only traces of biomass and very low values in density were found.

Cirripedia, although not widely distributed among temperature ranges, contained significant amounts in both density and biomass, especially in Southern New England and New York Bight. In Southern New England, barnacles were found in temperature ranges from 12.0°–24.0°+C, but were relegated to two classes in New York Bight, 12.0°–15.9°C and the 20.0°–23.9°C; in Chesapeake Bight, they occurred only in the 20.0°–23.9°C class where both density and biomass were low. The highest individual density of barnacles (251/m²) was found in New York Bight in the 20.0°–23.9° class. In the 12.0°–15.9°C class, however, the density values were quite low (0.07/m²). In Southern New England, densities ranged from 0.4/m² to 116/m² in the 12.0°–15.9°C and the 16.0–19.9°C classes, respectively. Lower values occurred in the two broadest classes where the density ranged from 2/m² and 7/m². Southern New England contained the single largest biomass of barnacles, 43 g/m² in the 16.0°–19.9°C class. In the remaining three classes, less than 1 g/m² were found. In New York Bight, 14 g/m² of barnacles were recorded in 20.0°–23.9°C, and only trace amounts were found in 12.0°–15.9°C.

Copepoda did not contribute greatly to the total macrofauna of the Middle Atlantic Bight region and were sparsely distributed in only two subareas. In Southern New England, copepoda were found in the narrowest temperature-range class and in the 12.0°–15.9°C class in low densities and small biomasses. In New York Bight, they were relegated in low abundance to one class, 8.0°–11.9°C.

Nebaliacea were present only in New York Bight and Chesapeake Bight in low abundances. In New York Bight, they were found only in the 0°–3.9°C class where density was 0.06/m² and biomass was trace amounts. In Chesapeake Bight, they occurred in two classes, 16.0°–19.9°C and 20.0°–23.9°C, where densities of 0.25/m² and 0.03/m² and biomasses of 0.001 and <0.001 g/m² were found.

Cumacea were present in all temperature classes in both Southern New England and Chesapeake Bight subareas, but were absent from the 24.0°+C class in New York Bight. Density values in each of the three subareas were moderate to moderately high, whereas biomass values were moderate to moderately low. On the whole, cumaceans favored the middle temperature ranges, and in Southern New England, the average density ranged from 1/m² to

84/m². Densities in New York Bight were lower than they were in Southern New England and ranged from 0.9/m² to 25/m². In Chesapeake Bight, density ranged from 0.1/m² to 29/m². Biomass of cumaceans was greatest in Southern New England and tapered off to the south. The average biomass in Southern New England ranged from 0.01 g/m² to 3 g/m². In New York Bight, the smallest biomass was 0.01 g/m² and the largest was 0.1 g/m². In Chesapeake Bight, which contained the lowest biomass of cumaceans, the range was between 0.001 g/m² and 0.2 g/m².

Tanaidacea were restricted to the narrowest range class in each of the three subareas of the Middle Atlantic Bight region. Greatest abundance was found in Southern New England, the next greatest in Chesapeake Bight, and lowest in New York Bight. Densities (maximum 0.46/m²) and biomass (maximum 0.004 g/m²) were low in all subareas.

Isopoda occurred in all of the temperature-range classes throughout the Middle Atlantic Bight region, and greatest abundance was in Southern New England, next highest in Chesapeake Bight, and lowest in New York Bight. Densities of isopods in Southern New England ranged from 0.07/m² to 35/m². Values of density on either side of the midtemperature range diminished significantly, more so in the narrower ranges than in the broader ones. In New York Bight, the range of density values was from 0.5/m² to 26/m². Density also decreased as temperature range narrowed. In Chesapeake Bight, the same trends prevailed. The lowest density was 0.2/m² and the highest was 29/m². The largest overall biomass values occurred in Chesapeake Bight, second largest in Southern New England, and smallest in New York Bight. The largest biomass was recorded in the 16.0°–19.9°C class in Chesapeake Bight, where 1 g/m² of organisms was found. The smallest biomass in this subarea was found in the 0°–3.9°C class (only 0.002 g/m²). In the New York Bight, the smallest biomass (0.02 g/m²) occurred in 0°–3.9°C and 4.0°–7.9°C. The largest biomass in this subarea (0.8 g/m²) occurred in the 16.0°–19.9°C class. In Southern New England, as in other areas, the smallest biomass (0.02 g/m²) was recorded in the 0°–3.9°C class. The largest biomass of isopods in Southern New England was present in 16.0°–19.9°C, where 0.7 g/m² was found.

Amphipoda were found in all temperature ranges in each of the subareas; and, especially in density, amphipods were the single most numerous group among the crustaceans. Southern New England had highest densities of amphipods, followed by New York Bight and Chesapeake Bight. The density values in Southern New England ranged from 8/m² in the narrowest temperature class to 1,987/m² in the 16.0°–19.9°C class. In Southern New England, the broader classes contained considerably higher densities of amphipods than did the narrower classes. Densities in the New York Bight ranged from 5/m² in 0°–3.9°C to 974/m² in the 12.0°–15.9°C class. Densities in other classes ranged from 20/m² to 379/m². The density of amphipods in Chesapeake Bight was lowest in 0°–3.9°C, where 1/m² was found, and highest in 8.0°–11.9°C where 589/m² were found. Although amphipod biomasses were moderately high, they did not contribute as significantly to overall faunal abundance as did their densities. In Southern New England, biomass ranged from 0.04 g/m² in 0°–3.9°C to 18 g/m² in 16.0°–19.9°C. In Southern New England, larger biomasses, as well as greater densities, were found in the broader range classes. Biomass in New York Bight ranged from 0.4 g/m² in the narrowest class to 5 g/m² in the 12.0°–15.9°C class. In classes, Amphipod biomass was lower in Chesapeake Bight than in the other two subareas and ranged from 0.006 g/m² in the narrowest to 3 g/m² in the 8.0°–11.9°C class. Biomasses greater than 1 g/m² occurred in only two other classes, 20.0°–23.9°C, and 24.0° + C. In the remaining classes, biomasses were less than 1 g/m².

Mysidacea occurrence in each of the subareas was confined generally to the broader temperature ranges. In Southern New England, they occurred in only the two broadest ranges; in New York Bight, they occurred in four temperature classes: 0°–3.9°, 12.0°–15.9°C, 16.0°–19.9°C, and 20.0°–23.9°C; in Chesapeake Bight, as in Southern New England, they were in the two broadest classes. Mysid density in Southern New England was moderately high, 1/m² to 5/m². In New York Bight, density was 0.06/m² in the narrowest class, and in the remaining three classes averaged from 0.1/m² in the two narrower classes to 3/m² in the broadest. In Chesapeake Bight, mysid density in the two broadest classes was 5/m² and 6/m². The biomass of mysids was moderately low in all subareas, and, in Southern New England, in the two classes in which they occurred, was 0.01 and 0.1 g/m². In New York Bight, the smallest biomass was found in the narrowest class, where only trace amounts were found; in the remaining three classes, it ranged from 0.001 to 0.02 g/m². In Chesapeake Bight, moderately small biomasses (0.02g/m²) occurred in the two broadest classes.

Decapoda were found in all temperature ranges only in New York Bight; in both Southern New England and Chesapeake Bight, they were absent in one class. Average densities were moderately high in all subareas; overall densities were highest in Southern New England, next highest in New York Bight, and lowest in Chesapeake Bight. Decapod density in Southern New England ranged from 0.2/m² to 33/m². In the New York Bight subarea, lowest density was 0.06/m², and highest was 18/m². Chesapeake Bight density ranged from 0.4/m² to 7/m². Biomass was highest in the New York Bight subarea; smallest biomass, 0.03 g/m², occurred in the narrowest class, and largest biomass, 4 g/m², occurred in the 20.0°–23.9°C class. In Southern New England, biomass ranged from 0.004 to 4 g/m². In Chesapeake Bight, smallest biomass, 0.01 g/m², was found in the 12.0°–15.9°C class, and largest biomass, 2.1 g/m², in 24.0°+C.

Bryozoa were present in five temperature classes between 8.0° and 24.0°C in both Southern New England and New York Bight. In Chesapeake Bight, they were present in three of the classes between 12.0° and 23.9°C. Densities decreasd to the south. Densities in Southern New England tended to increase as temperature range broadened; highest density was 98/m². In New York Bight, lowest density (0.1/m²) occurred at the midpoint, 16.0°–19.9°C, of the five classes in which bryozoans were found. Values increased disproportionately on either side of this class. Density values in Chesapeake Bight increased as temperature range broadened in the three classes in which they occurred. Densities were 8/m² in both the 12.0°–15.9°C class and the 16.0°–19.9°C class, and 11/m² in the 20.0°–23.9°C class. The biomass of bryozoans in the three subareas was moderately small, and only in Southern New England did biomass values exceed 1 g/m² (ranging from 0.004 g/m² to 9 g/m²). Biomasses in the New York Bight subarea ranged from 0.001 g/m² to 0.3 g/m². In the three classes in Chesapeake Bight in which bryozoans occurred, their biomasses ranged from 0.02 to 0.3 g/m².

Brachiopoda were found in only one temperature class (16.0°–19.9°C) in Chesapeake Bight and were absent in the other two subareas. Both density and biomass of brachiopods were low, 0.1/m² density weighing 0.001 g/m².

Echinodermata as a group were significant contributors to the overall macrofauna of the Middle Atlantic Bight region and were found in all temperature ranges in each of the subareas. As a group, the density of echinoderms was highest in Southern New England and diminished to the south. However, largest biomasses were found in New York Bight, second highest in Southern New England, and lowest in Chesapeake Bight. The detailed analysis of the subcomponents of the echinoderms follows.

Holothuroidea were found in all temperature ranges in Southern New England, but not in the other two subareas. In New York Bight, they occurred in five of the seven temperature classes and were absent in the 4.0°–7.9°C and the 24.0°+C classes; in Chesapeake Bight, they occurred in six of the seven and were absent in the 8.0°–11.9°C class. Density values were highest in Southern New England, intermediate in Chesapeake Bight, and lowest in New York Bight. In Southern New England, density ranged from 0.2/m² to 12/m². In New York Bight, densities ranged from 0.06/m² to 2/m². In Chesapeake Bight, densities ranged from 0.06/m² to 10/m². The biomass of holothurians paralleled the distribution of density values; largest biomasses occurred in Southern New England, second largest in Chesapeake Bight, and smallest in New York Bight. Biomasses ranging from 0.03 g/m² to 38 g/m² occurred in Southern New England. In New York Bight, only one class contained biomass greater than 1 g/m²; that was the 0°–3.9°C class where 2 g/m² occurred. The biomass in the remaining temperature classes increased from 0.1 g/m² to 0.6 g/m² as the temperature range narrowed. Biomass of holothurians in Chesapeake Bight was highest (23 g/m²) in the 12.0°–15.9°C class, and lowest (0.05 g/m²) in the 24.0°+C class.

Echinoidea occurred in nearly all temperature-range classes in each of the subareas, and were absent from only the 24.0°+C class in Southern New England, the 0°–3.9°C class in New York Bight, and the 0°–3.9°C and 4.0°–7.9°C classes in Chesapeake Bight. Overall densities were highest in New York Bight, intermediate in Chesapeake Bight, and lowest in Southern New England. Highest density recorded in New York Bight was 108/m² in the 20.0°–23.9°C class. The next highest density (43/m²) in this class was in Chesapeake Bight, whereas density in Southern New England for this class was only 7/m². The next highest density of echinoids was 36/m² in the 16.0°–19.9°C class in New York Bight; in Chesapeake Bight in the same class, 10/m² were found, whereas 27/m² were recorded in Southern New England. The lowest overall value occurred in the 0°–3.9°C class in Southern New England where 0.2/m² was found. Biomasses of echinoids shifted somewhat, and, as in density values, greatest amounts occurred in New York Bight, but the second greatest amounts occurred in Southern New England, and smallest in

Chesapeake Bight. The largest biomass occurred in the 16.0°–19.9°C class in New York Bight, where 70 g/m² were found. Comparatively, 21 g/m² and 16 g/m² occurred in the same class in Chesapeake Bight and Southern New England, respectively. The second largest biomass occurred in the 8.0°–11.9°C class in Southern New England where 27 g/m² of organisms were found. In the same class in New York Bight, biomass was 7 g/m²; but in Chesapeake Bight, it had diminished to 0.1 g/m².

Ophiuroidea were found in all temperature-range classes in both Southern New England and Chesapeake Bight, but in New York Bight it was absent from the 16.0°–19.9°C and 24.0°+C classes. Highest densities by a substantial margin occurred in Southern New England where 349/m² and 165/m² were found in the 8.0°–11.9°C and 12.0°–15.9°C classes, respectively. In the comparable classes in Chesapeake Bight, the values were 3/m² and 90/m² and in New York Bight, 76/m² and 0.4/m². High density also occurred in the 4.0°–7.9°C class in Southern New England where 85/m² were recorded. The distribution of brittle star biomass was similar to that of density, in that largest biomasses occurred in Southern New England, second largest in New York Bight, and smallest amounts in Chesapeake Bight. Largest biomass, 25 g/m², was found in the 8.0°–11.9°C class in Southern New England, and 17 g/m² were found in the 4.0°–7.9°C class in the same subarea. In similar classes in New York Bight, the values were 3 and 2 g/m², respectively; but in Chesapeake Bight, the values were 0.04 and 0.2 g/m².

Asteroidea were present in all temperature ranges in Southern New England, which also contained the highest densities of sea stars. In New York Bight, asteroids were present in five of the seven temperature-range classes and absent from the 16.0°–19.9°C and the 24.0°+C classes; in Chesapeake Bight, they were present in six classes and absent from the 4.0°–7.9°C class. Highest densities of sea stars, 3.9/m², in Southern New England were found in 16.0°–19.9°C, and 3.1/m² in 8.0°–11.9°C and 12.0°–15.9°C; the remaining classes contained fewer than 1/m². The second highest density of sea stars, 3.5/m², was found in New York Bight in 8.0°–11.9°C class, and 1.6/m² and 1/m² in the 4.0°–7.9°C and 20.0°–23.9°C classes, respectively; fewer than 1/m² occurred in the other classes. Chesapeake Bight contained the lowest overall density of sea stars, and in no temperature class did the density exceed 0.5/m². Sea star biomass was largest in the New York Bight subarea, followed by Southern New England and Chesapeake Bight. The largest biomass, 15 g/m², occurred in the 8.0°–11.9°C class in New York Bight. The next largest biomass, 7 g/m², occurred in Southern New England in 12.0°–15.9°C. In Southern New England, only one other temperature range class, 8.0°–11.9°C, contained a moderately large biomass, 2.2 g/m². All other classes in this subarea had biomasses of sea stars less than 1 g/m². In New York Bight, four classes contained biomass in excess of 1 g/m²; these were 4.0°–7.9°C (1 g/m²), 8.0°–11.9°C (15 g/m²) 12.0°–15.9°C (3 g/m²), and 20.0°–23.9°C (6 g/m²). 0.07 g/m² occurred in the 0°–3.9°C class in this subarea. Chesapeake Bight biomasses were small. Largest in this subarea was 0.6 g/m² in the 16.0°–19.9°C class and 0.04 g/m² in the 12.0°–15.9°C. In the remaining temperature classes, the biomass of sea stars ranged from trace amounts to 0.008 g/m².

Hemichordata were sparsely distributed throughout the Middle Atlantic Bight region. They occurred in only three temperature classes in Southern New England, where densities ranged from 0.1/m² to 0.8/m² and biomass ranged from 0.001 to 0.10 g/m². In New York Bight subarea, hemichordates were found in only one temperature class, 20.0°–23.9°C, where 0.25/m² weighing 0.02 g/m² were found. In Chesapeake Bight, hemichordates were found in only the 20.0°–23.9°C class where density was 0.2/m² and biomass, 0.08 g/m².

Ascidiacea occurred in all temperature ranges in Southern New England and in all except the broadest range in New York Bight; they were present in five classes in Chesapeake Bight, and absent from the 4.0°–7.9°C and 8.0°–11.9°C classes. Greatest densities and biomass were found in Southern New England, next greatest in Chesapeake Bight, and lowest in New York Bight. Average densities in Southern New England ranged from 2/m² in 0°–3.9°C to 105/m² in 20.0°–23.9°C. On the whole, in this subarea, density increased as temperature range broadened to the 20.0°–23.9°C class and then dropped to 36/m² in the 24.0°+C class. In Chesapeake Bight, density ranged from 0.65/m² to 21/m². In New York Bight, densities ranged from 0.1/m² to 16/m². No definite relationship was discernible between density and temperature range in New York Bight. Ascidian biomass in Southern New England ranged from 0.1 g/m² in both the 0°–3.9°C and the 4.0°–7.9°C classes to 23 g/m² in both the 20.0°–23.9°C and the 24.0°+C classes. As temperature range broadened in this subarea, an increase in biomass was apparent. In Chesapeake Bight, the same relationship was seen—lowest biomass, 0.07 g/m², was recorded in the narrowest range class and highest, 15 g/m², in the broadest class. Ascidian biomass in New York Bight ranged from 0.02 g/m² to 1 g/m².

DOMINANT FAUNAL COMPONENTS

The purpose of this section is to identify and describe the taxonomic groups that constitute the principal faunal components at each sampling site station. Sites having the same dominant groups were combined to make patterns of distribution more distinct, and these patterns facilitate our understanding of the faunal composition and its distribution. The term "dominance", as used in this report, refers to the taxonomic group that, mathematically, contributed the highest number of individuals or greatest total accumulated wet weight. Again, it has been necessary to express the results in both density and biomass, because of the marked differences revealed by each.

In numbers of individuals, six taxonomic groups were dominant: Bivalvia, Annelida, Echinoidea, Ophiuroidea, Crustacea, and the bathyal group. All except the bathyal group are composed of a single taxonomic component; the bathyal group is an assemblage of several taxonomic groups, including such diverse forms as Pogonophora, Anthozoa, Sipunculida, Echiura, and Holothuroidea. In biomass, the dominant components were: Holothuroidea, Bivalvia, Annelida, Echinoidea, Ophiuroidea, and the bathyal group.

BAYS AND SOUNDS

Dominant faunal components in the bays and sounds were characterized by their diversity. Many sites relatively close to one another, even adjacent stations, supported faunas of totally different dominant forms.

In numbers of individuals, three faunal groups commonly constituted the principal faunal components in the bays and sounds: Crustacea, Annelida, and Bivalvia (fig. 123). In the Southern New England subarea, Crustacea was the group most widely distributed. In New York Bight and Chesapeake Bight, the dominant components were more equally divided among all three groups: Crustacea, Annelida, and Bivalvia.

In biomass, only two taxonomic groups were important as dominant components: Annelida and Bivalvia (fig. 124). In all geographic areas, these two groups were more or less equally distributed in the bays and sounds.

CONTINENTAL SHELF

Six groups were important as dominant taxa on the Continental Shelf: Bivalvia, Annelida, Crustacea, Echinoidea, Ophiuroidea, and Holothuroidea. Each of these groups (except Ophiuroidea) differed markedly in geographic distribution and area occupied when their dominance in terms of density was compared to their dominance in biomass. There were few, but profound, differences in composition of dominant taxa evaluated according to density as compared with biomass. Taxonomic groups that were dominant in both density and biomass were: Bivalvia, Annelida, Echinoidea, and Ophiuroidea.

In number of individuals, dominant taxa (fig. 123) were Bivalvia, Annelida, Echinoidea, Ophiuroidea, and Crustacea. Crustacea was by far the most important group in areal coverage. This group was particularly prominent in Southern New England and New York Bight. Even in Chesapeake Bight, Crustacea was the most widespread group, but was not overwhelmingly so as it was in the two northern subareas. Annelida was dominant in moderate-size areas throughout the Middle Atlantic Bight. Bivalvia and Echinoidea were dominant mainly in New York Bight and Chesapeake Bight. Ophiuroidea was the principal component only in the outer-shelf areas in Southern New England and northern New York Bight.

In biomass (fig. 124), the distributional pattern of dominant taxons was strikingly different from that described above for the number of individuals. In the Southern New England subarea, Annelida and Bivalvia were the groups having the greatest geographic coverage. Holothuroidea and Ophiuroidea were important in moderately small areas of the mid- and outer-shelf regions. In New York Bight, Bivalvia was the major group and Echinoidea was moderately important in the southern part. Ophiuroidea dominated only in a small area along the Outer Continental Shelf in Southern New England and the northern part of New York Bight. In Chesapeake Bight, Echinoidea was the most widely distributed group, and Bivalvia and Annelida were the dominant forms in moderate-size areas.

CONTINENTAL SLOPE

Dominant taxa on the Continental Slope were limited primarily to Bivalvia, Annelida, and the bathyal group.

In number of individuals, the faunas on the Continental Slope in Southern New England and New York Bight were dominated about equally by Bivalvia and Annelida (fig. 123). Farther south in Chesapeake Bight, the bathyal group was dominant in the deeper part of the slope. The bathyal group, Bivalvia, and Annelida constituted the major components in this subarea.

In biomass, the dominant taxa were Annelida, particularly along the upper slope, and the bathyal group, especially on the lower slope (fig. 124).

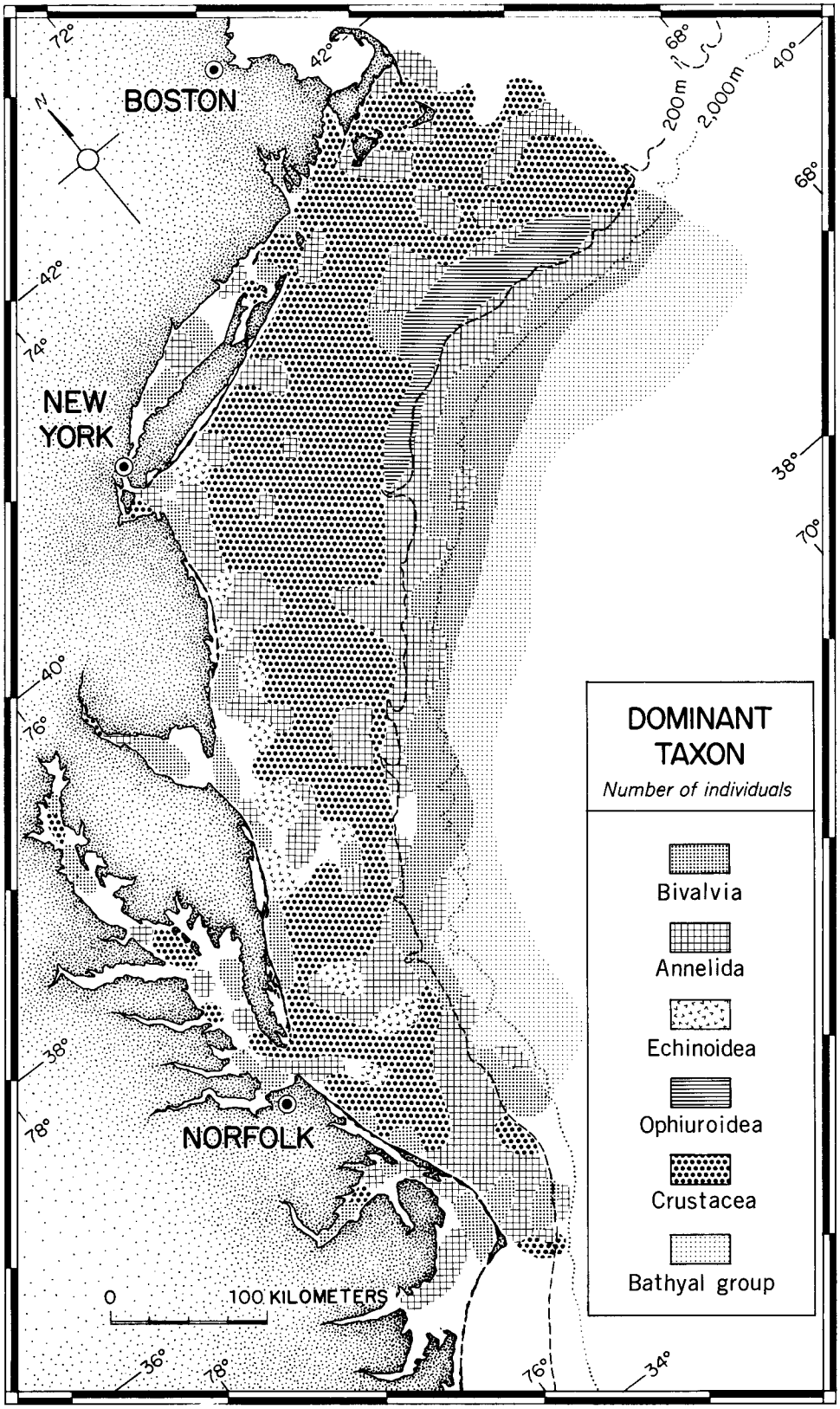

FIGURE 123.—Geographic distribution of the number of individuals for each dominant taxon in the entire Middle Atlantic Bight region.

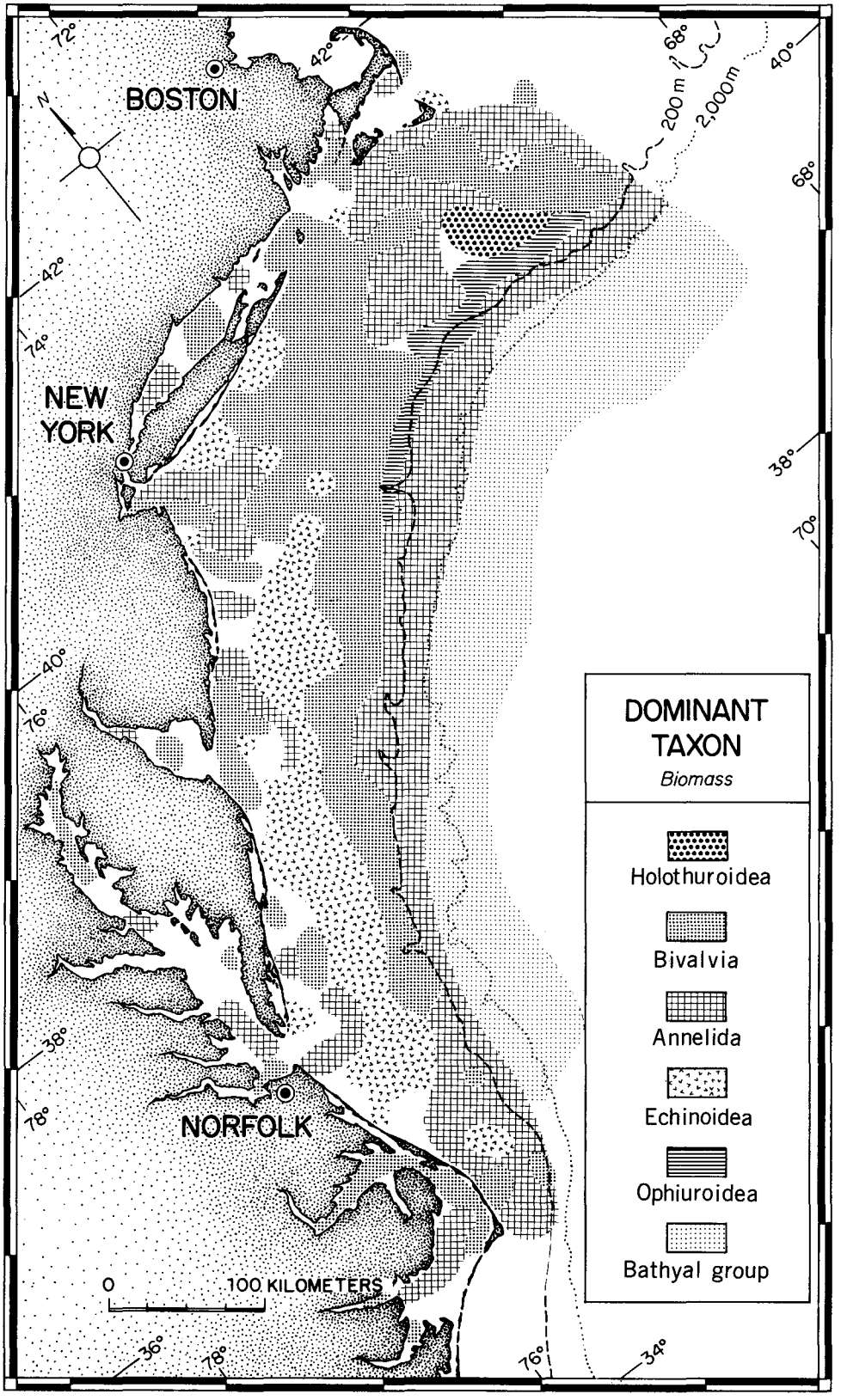

FIGURE 124.—Geographic distribution of the biomass for each dominant taxon in the entire Middle Atlantic Bight region.

CONTINENTAL RISE

Dominant taxa on the Continental Rise were limited to three major groups: Bivalvia, the bathyal group, and Annelida.

In number of individuals, only two groups constituted the principal components: Bivalvia and the bathyal group. Bivalvia were dominant in a moderately large area in the shallower parts of the Continental Rise (fig. 123), and the bathyal group was dominant in a large area including the deeper parts of the rise.

In biomass, also, only two groups were dominant: Annelida and the bathyal group (fig. 124). Annelida contributed the principal biomass component in a relatively small and narrow geographic area in the shallower parts of the Continental Rise. The bathyal group, on the other hand, was dominant over a large geographic area, including all the deepwater parts of the rise.

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REFERENCES CITED

Adams, C. B., 1839, Observations on some species of the marine shells of Massachusetts, with descriptions of five new species: Boston Journal Natural History, v. 2, no. 2, p. 262–288.

Agassiz, E. C., and Agassiz, Alexander, 1865, Seaside studies in natural history. Marine animals of Massachusetts Bay. Radiates: Boston, Ticknor and Fields, 155 p.

Aller, B. B., 1958, Publications of the United States Bureau of Fisheries 1871–1940: U.S. Fish and Wildlife Service, Special Scientific Report, Fisheries no. 284, 202 p.

Ayers, J. C., 1951, A preliminary report upon the state of our knowledge of the waters in and around New York Harbor, Appendix B, Bibliography, *in* Ayers, John C., and others, The Hydrography of the New York Area: Ithaca, N.Y., Cornell Univ. Contract N6 ONR 264, task 15.

Barnes, R. D., 1974, Invertebrate zoology (3rd ed.): Philadelphia, London, Toronto, W. B. Saunders Co., 870 p.

Bigelow, H. B., 1933, Studies of the waters on the Continental Shelf, Cape Cod to Chesapeake Bay; I. The cycle of temperature: Massachusetts Institute of Technology and Woods Hole Oceanographic Institution, Papers in Physical Oceanography, and Meteorology, v. 2, no. 4, p. 1–135.

Bigelow, H. B., and Sears, Mary, 1935, Studies of the waters of the Continental Shelf, Cape Cod to Chesapeake Bay: II, Salinity: Massachusetts Institute of Technology and Woods Hole Oceanographic Institution, Papers in Physical Oceanography and Meteorology, v. 4, no. 1, 94 p.

Boesch, D. F., 1972, Species diversity of marine macrobenthos in the Virginia area: Chesapeake Science, v. 13, p. 206–211.

——— 1973, Classification and community structure of macrobenthos in the Hampton Roads area, Virginia: Marine Biology, v. 21, no. 3, p. 226–244.

Bumpus, D. F., 1965, Residual drift along the bottom on the Continental Shelf in the Middle Atlantic Bight area: Limnology and Oceanography, v. 10, Supp., p. R50–R53.

Bumpus, D. F., and Lauzier, L. M., 1965, Surface circulation on the Continental Shelf off eastern North America between Newfoundland and Florida: American Geographical Society, Serial Atlas of the Marine Environment, Folio 7.

Bumpus, D. F., Lynde, R. E., and Shaw, D. M., 1973, Physical oceanography, *in* Saila, S. B., program coordinator, Coastal and offshore environmental inventory, Cape Hatteras to Nantucket Shoals: Rhode Island Univ., Graduate School of Oceanography Marine Publication Series No. 2 (Occasional Publication no. 5), p. 1–1 to 1–72.

Burbanck, W. D., Pierce, M. E., and Whiteley, G. C., Jr., 1956, A study of the bottom fauna of Rand's Harbor, Massachusetts: An application of the ecotone concept: Durham, N.C., Duke Univ. Press, Ecological Monographs, v. 26, no. 3, p. 213–243.

Chase, Joseph, 1959, Wind-induced changes in the water column along the East Coast of the United States: Journal of Geophysical Research, v. 64, no. 8, p. 1013–1022.

Churgin, James, and Halminski, S. J., 1974, Temperature, salinity, oxygen, and phosphate in waters off United States, *in* v. 1, Western North Atlantic: U.S. National Oceanographic Data Center, Key to Oceanographic Records Documentation no. 2, p. 1–166.

Colton, J. B., Jr., and Stoddard, R. R., 1972, Average monthly sea-water temperatures, Nova Scotia to Long Island, 1940–1959: American Geographical Society, Serial Atlas of the Marine Environment, Folio 21.

——— 1973, Bottom-water temperatures on the Continental Shelf, Nova Scotia to New Jersey: U.S. National Marine Fisheries Service, NOAA Technical Report, NMFS CIRC 376, 55 p.

D'Agostino, A., and Colgate, W., 1973, The Benthic organisms of the New York Bight, September and November 1971—a limited study of species and sediments: New York Ocean Science Lab. Tech. Rept. No. 0017, v. 2, pt. 6, p. 189–205.

Dean, David, 1975, Raritan Bay macrobenthos survey, 1957–1960: National Oceanic and Atmospheric Administration (NOAA), U.S. National Marine Fisheries Service NMFS Data Report 99, 51 p.

Dean, David, and Haskin, H. H., 1964, Benthic repopulation of the Raritan River estuary following pollution abatement: Limnology and Oceanography, v. 9, no. 4, p. 551–563.

Desor, Edouard, 1851, On echinoderms: Boston Society Natural History Proceedings, v. 3, (1848–1851), p. 65–68.

Emery, K. O., 1966, The Atlantic Continental Shelf and Slope of the United States–geologic background: U.S. Geological Survey Professional Paper 529–A, 23 p.

——— 1968, Relict sediments on continental shelves of the world: American Association of Petroleum Geologists Bulletin, v. 52, no. 3, p. 445–464.

Emery, K. O., and Merrill, A. S., 1964, Combination camera and bottom grab: Oceanus, v. 10, no. 4, p. 2–5.

Emery, K. I., Merrill, A. S., and Trumbull, J. V. A., 1965, Geology and biology of the sea floor as deduced form simultaneous photographs and samples: Limnology and Oceanography, v. 10, no. 1, p. 1–21.

Emery, K. O., and Schlee, J. S., 1963, The Atlantic Continental Shelf and Slope, a program for study: U.S. Geological Survey Circular 481, 11 p.

Emery, K. O.. and Uchupi, Elazar, 1965, Structure of Georges Bank: Marine Geology, v. 3, no. 5, p. 349–358.

——— 1972, Western North Atlantic Ocean: Topography, rocks, structure, water, life, and sediments: American Association of Petroleum Geologists Memoir 17, 532 p.

Franz, D. R., and Hendler, G. L., 1971, Benthic ecology of a shallow bay: Macrobenthos [abs.]: Coastal Shallow Water Resources Conference, 2d, Baton Rouge; Newark, Del.; and Los Angeles, Calif., October 1971, Southern California Univ. Press, p. 78.

George, R. Y., and Menzies, R. J., 1973, Deep sea faunal zonation of benthos along Beaufort Bermuda transact in the northwestern Atlantic: Royal Society Edinburg Proceedings, 1971–1972, v. 73, sec. B, Biology, p. 183–194.

Haedrich, R. L., Rowe, G. T., and Polloni, P. T., 1975, Zonation and faunal composition of epibenthic populations on the Continental Slope south of New England: Journal Marine Research, v. 33, p. 191–212.

Hathaway, J. C., ed., 1966, Data file, continental margin program, Atlantic Coast of the United States—v. 1, Sample collection data: Woods Hole Oceanographic Institution Reference 66–8, 184 p.

——— 1971, Data file, continental margin program, Atlantic Coast of the United States—v. 2, Sample collection and analytical data: Woods Hole Oceanographic Institution Reference 71–15, 496 p.

Hollister, C. D., 1973, Atlantic Continental Shelf and Slope of the United States—texture of surface sediments from New Jersey to southern Florida: U.S. Geological Survey Professional Paper 529–M, 23 p.

Holme, N. A., and McIntyre, A. D., 1971, Methods for the study of marine benthos: England, Oxford and Edinburg, Blackwell Scientific Publication IBP [International Biological Programme] Handbook 16, 334 p.

Hülsemann, Jobst, 1967, The continental margin off the Atlantic coast of the United States—Carbonate in sediments, Nova Scotia to Hudson Canyon: Sedimentology, v. 8, no. 2, p. 121–145.

Kaplan, E. H., Welker, J. R., and Kraus, M. G., 1974, Some effects of dredging on populations of macrobenthic organisms: U.S. National Oceanic and Atmospheric Administration Fishery Bulletin, v. 72, no. 2, p. 445–480.

Ketchum, B. H., and Corwin, Nathaniel, 1964, The persistence of "winter" water on the Continental Shelf south of Long Island, New York: Limnology and Oceanograhy, v. 9, no. 4, p. 467–475.

Kinner, Peter, Maurer, Don, and Leathem, Wayne, 1974, Benthic invertebrates in Delaware Bay: animal-sediment associations of the dominant species: International Revenue Gesamten Hydrobiologie, v. 59, no. 5, p. 685–701.

Leathem, W., Kinner, P., Mauerer, D., Biggs, R., and Treasure, W., 1973, Effect of spoil on disposal on benthic invertebrates: Marine Pollution Bulletin, v. 4, no. 8, p. 122–125.

Lee, R. E., 1944, A quantitative survey of the invertebrate bottom fauna in Menemsha Bight: Woods Hole, Mass., Marine Biological Laboratory Biological Bulletin, v. 86, no. 2, p. 83–97.

Leidy, Joseph, 1855, Contributions toward a knowledge of the marine invertebrate fauna of the coasts of Rhode Island and New Jersey: Natural Sciences Philadelphia Journal, v. 3, 2d ser., reprint, p. 2–19, pl. 10, 11.

Livingstone, Robert Jr., 1965, A preliminary bibliography with KWIC index on the ecology of estuaries and coastal areas of the eastern United States: U.S. Fish and Wildlife Service, Special Scientific Report, Fisheries no. 507, 352 p.

Maurer, D., Biggs, R., Leathem, W., Kinner, P., Treasure, W., Otley, M., Watling, L., and Klemas, V., 1974, Effect of spoil disposal on benthic communities near the mouth of Delaware Bay: Delaware Univ., Report Delaware River Bay Authority, 200 p.

McGrath, R. A., 1974, Benthic macrofaunal census of Raritan Bay—Preliminary results: Hudson River Environmental Society, Inc., Hudson River Ecology Symposium, 3d, Bear Mountain, N.Y., 40 p.

Menzies, R. J., George, R. Y., and Rowe, G. T., 1973, Abyssal environment and ecology of the world oceans: New York, J. Wiley and Sons, 488 p.

Menzies, R. J., Smith, Logan, and Emery, K. O., 1963, A combined underwater camera and bottom grab—A new tool for investigation of deep-sea benthos: International Revue Gesamten Hydrobiologie, v. 48, no. 4, 529–545.

Milliman, J. D., 1973, Marine geology *in* Coastal and offshore environmental inventory, Cape Hatteras to Nantucket Shoals: Univ., Graduate School of Oceanography, Rhode Island, Marine Publication Series no. 3 (Occasional Publication, no. 6), p. 10–1–10–91.

O'Connor, J. S., 1972, The benthic macrofauna of Moriches Bay, New York: Woods Hole, Mass., Marine Biological Laboratory, Biological Bulletin, v. 142, no. 1, p. 84–102.

Palmer, H. D., and Lear, D. W., eds., 1973, Environmental survey of an interim ocean dump site, Middle Atlantic Bight, Cruise Report, 1–5 May 1973: U.S. Environmental Protection Agency, Region II., EPA 902–9–001–A, 134 p.

Parker, R. H., 1974, The study of benthic communities, a model and a review: Amsterdam and New York, Elsevier Oceanography Series, v. 9, 260 p.

Pearce, J. B., 1972, The effects of solid waste disposal on benthic communities in the New York Bight, *in* Ruivo, Mario, ed., Marine pollution and sealife: Surrey, England, Fishing News (Books) Ltd., p. 404–411.

——— 1975, The temporal and spatial distribution of benthic macroinvertebrates in the New York Bight [abs.]: The Middle Atlantic Continental Shelf and New York Bight Special Symposium, New York, N.Y., November 1975, p. 54–56.

Pearce, J. B., Rogers, Leslie, James, Thomas, Carracciolo, Janice, Halsey, Martha, and McNulty, Knee, 1976, Distribution and abundance of benthic organisms in the outer New York Bight and proposed alternate disposal sites, June 1974 and February 1975: National Oceanic and Atmospheric Administration, NOAA Data Report ERL MESA–10, 68 p.

Phelps, D. K., 1964, Distribution of benthic invertebrates in relationship to the environment of Charlestown Pond. Progress report: Environmental relationships of benthos in salt ponds: Rhode Island Univ., Narragansett Marine Laboratory, Ref. 64–3, p. 19–54.

Phillips, F. X., 1972, The ecology of the benthic macroinvertebrates of Barnegat Bay, New Jersey [Abs.]: Dissertation Abstracts International, v. 32, no. 9, p. 5148–B.

Pratt, S. D., 1973, Benthic fauna, *in* S. B. Saila, Coordinator, Coastal and offshore environmental inventory, Cape Hatteras to Nantucket Shoals. Rhode Island Univ. Graduate School of Oceanography Marine Publication Series No. 2 (Occasional Publication no. 5), p. 5–1 to 5–70.

Rhoads, D. C., 1963, Rates of sediment reworking by *Yoldia limatula* in Buzzards Bay, Massachusetts, and Long Island Sound: Journal Sedimentary Petrology, v. 33, no. 3, p. 723–727.

Ross, D. A., 1970, Atlantic Continental Shelf and Slope of the United States—heavy minerals of the continental margin from southern Nova Scotia to northern New Jersey: U.S. Geological Survey Professional Paper 529–G, 40 p.

Rowe, G. T., 1973, The effects of pollution on the dynamics of the benthos of New York Bight: Thalassia jugoslavica, v. 7, no. 1, p. 353–359.

Rowe, G. T., and Menzel, D. W., 1971, Quantitative benthic samples from the deep Gulf of Mexico with some comments on the measurement of biomass: Bulletin of Marine Science, v. 21, no. 2, p. 556–566.

Rowe, G. T., and Menzies, R. J., 1969, Zonation of large benthic invertebrates in the deep-sea off the Carolinas: Deep-Sea Research, v. 16, p. 531–537.

Saila, S. B. (Project coordinator), 1973, Coastal and offshore environmental inventory, Cape Hatteras to Nantucket Shoales: Rhode Island Univ., Graduate School of Oceanography Marine Publication Series no. 2 (Occasional Publication no. 5), p. 0–1 to 8–138.

Sanders, H. L., 1956, The biology of marine bottom sediments, *in* Oceanography of Long Island Sound 1952–1954: Yale Univ., Bingham Oceanographic Collection Bulletin, v. 15, p. 345–414.

——— 1958, Benthic studies in Buzzards Bay. I. Animal-sediment relationships: Limnology and Oceanography, v. 3, no. 3, p. 245–258.

——— 1960, Benthic studies in Buzzards Bay. III. The structure of the soft-bottom community: Limnology and Oceanography, v. 5, no. 2, p. 138–153.

Sanders, H. L., and Hessler, R. R., 1969, Ecology of the deep-sea benthos: Science, v. 163, p. 1419–1424.

Sanders, H. L., Hessler, R. R., and Hampson, G. R., 1965, An introduction to the study of deep-sea benthic faunal assemblages along the Gay Head-Bermuda transact: Deep-Sea Research, v. 12, no. 6, p. 845–867.

Schlee, John, 1973, Atlantic Continental Shelf and Slope of the United States—sediment texture of the northeastern part: U.S. Geological Survey Professional Paper 529–L, 64 p.

Schlee, John, and Pratt, R. M., 1970, Atlantic Continental Shelf and Slope of the United States—gravels of the northeastern part: U.S. Geological Survey Professional Paper 529–H, 39 p.

Smith, W., and McIntyre, A. D., 1954, A spring-loaded bottom sampler: Marine Biological Association United Kingdom Journal, v. 33, p. 257–264.

Steimle, F. W., and Stone, R. B., 1973, Abundance and distribution of inshore benthic fauna off southwestern Long Island, N.Y.: National Oceanic and Atmosphere Administration (NOAA) Technical Report National Marine Fisheries Service, SSRF–673, 50 p.

Stickney, A. P., and Stringer, L. D., 1957, A study of the invertebrate bottom fauna of Greenwich Bay, Rhode Island: Ecology, v. 38, no. 1, p. 111–122.

Stone, R. B., 1963, A quantitative study of the benthic fauna in lower Chesapeake Bay with emphasis on animal-sediment relationships: Williamsburg, Va., College of William and Mary, School of Marine Science, M.S. thesis. p.? Marine Ecoystems Analysis Program Affairs, Environment Research Lab.

Stubblefield, W. L., Dicken, Michael, and Swift, D. J. P., 1974, Reconnaissance of bottom sediments on the inner and central New Jersey shelf (MESA Data Report): National Oceanic and Atmospheric Administration, Marine Ecosystems Analysis Report no. 1, 39 p.

Sumner, F. B., Osburn, R. C., and Cole, L. J., 1913, A biological survey of the waters of Woods Hole and vicinity: U.S. Bureau of Fisheries Bulletin, v. 31, pt. 1, sec. 1, p. 1–442, 227 charts.

Swift, D. J. P., Duane, D. B., and McKinney, T. F., 1973, Ridge and swale topography of the Middle Atlantic Bight: Secular response to the Holocene hydraulic regime: Marine Geology, v. 15, no. 4, p. 227–247.

Tenore, K. R., 1972, Macrobenthos of the Pamlico River Estuary, North Carolina: Durham, N.C., Duke Univ. Press, Ecological Monographs, v. 42, p. 51–69.

Thorson, Gunnar, 1957, Bottom communities (sublittoral or shallow shelf), *in* Hedgpeth, J. W., ed., Treatise on marine ecology and paleoecology: Geological Society of America, Memoir 67, v. 1, p. 461–534.

Trumbull, J. V. A., 1972, Atlantic Continental Shelf and Slope of the United States—sand-size fraction of bottom sediments, New Jersey to Nova Scotia: U.S. Geol. Survey Prof. Paper 529–K, 45 p.

U.S. National Marine Fisheries Service, 1972, The effects of waste disposal in the New York Bight: NMFS Middle Atlantic Coastal Fisheries Center Technical Report 9, 749 p.

U.S. National Oceanic and Atmospheric Administration, 1974, Bibliography of the New York Bight, Part 1—List of citations: NOAA, U.S. Environmental Data Service, Marine Ecosystems Analysis Program, 184 p.

U.S. National Oceanic and Atmospheric Administration, 1974, Bibliography of the New York Bight, Part 2—Indexes: NOAA, U.S. Environmental Data Service, Marine Ecosystems Analysis Program, 493 p.

Verrill, A. E., 1866, On the polyps and echinoderms of New England, with descriptions of new species: Boston Society of Natural History Proceedings, v. 10, p. 333–357.

——— 1873, Results of recent dredging expeditions on the coast of New England: Am. Jour. of Sci. and Arts, 3d ser., v. 5, p. 98–106.

Walford, L. A., and Wicklund, R. I., 1968, Monthly sea temperature structure from the Florida Keys to Cape Cod: American Geographical Society, Serial Atlas of the Marine Environment, Folio 15.

Watling, L., Leathem, W., Kinner, P., Wethe, C., and Maurer, D., 1974, An evaluation of sewage sludge dumping on the benthos off Delaware Bay: Marine Pollution Bull., v. 5, p. 39–42.

Watling, Les, and Maurer, Don, eds., 1975, Ecological studies on benthic and plankton assemblages in lower Delaware Bay: Delaware Univ., College of Marine Studies, National Science Foundation, 630 p.

Wigley, R. L., and Emery, K. O., 1967, Benthic animals, particularly *Hyalinoecia* (Annelida) and *Ophiomusium* (Echinodermata), in sea-bottom photographs from the Continental Slope *in* J. B. Hersey, ed., Deep Sea Photography: Johns Hopkins Oceanographic Studies no. 3, p. 235–249.

Wigley, R. L., and McIntyre, A. D., 1964, Some quantitative comparisons of offshore meiobenthos and macrobenthos south of Martha's Vineyard: Limnology and Oceanography, v. 9, no. 4, p. 485–493.

Wigley, R. L., and Stinton, F. C., 1973, Distribution of macroscopic remains of recent animals from marine sediments off Massachusetts: U.S. National Oceanic and Atmospheric Administration Fishery Bulletin, v. 71, n. 1, p. 1–40.

Yentsch, A. E., Carriker, M. R., Parker, R. H., and Zullo, V. A., 1966, Marine and estuarine environments, organisms and geology of the Cape Cod region, and indexed bibliography, 1665–1965: Plymouth, Mass., Leyden Press, Inc., 178 p.