A SEASONAL STUDY OF THE BENTHIC FAUNA IN MORICHES BAY

by

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Introduction

On 15 January 1980, a breach in the barrier beach just east of the inlet to Moriches Bay was opened by a strong winter storm. This event, which increased the rate of exchange between Moriches Bay and the ocean, potentially changed the spatial and temporal distribution of environmental factors such as temperature, salinity, dissolved oxygen, nutrients, and tidal level. At the time, concerns raised about the increased danger of flooding and alteration of the regional ecology led to the decision to close the breach. Work was initiated in October, and the breach was closed by mid-December 1980.

Benthic fauna represent a diverse assemblage of life habits and feeding types, are fairly immobile, and are very sensitive to environmental change. These characteristics make the benthos an ideal component of the ecosystem to examine in order to assess the impacts of a disturbance. At the time of the breach, however, little was known of the state of the benthic fauna in Moriches Bay. Townes (1939) collected benthic samples in Great South Bay, Moriches Bay, and in a number of other estuarine and coastal regions around Long Island during 1938. The results of his study were reported in the form of an annotated inventory of the species encountered, but no quantitative data were given.

The only prior quantitative study of the benthic fauna in Moriches Bay was reported by O'Connor (1972). In his study, bottom samples were collected between April 1969 and June 1970 using a 0.05 m^2 Ponar grab. Two replicate samples were taken at each of 72 stations. Station locations were distributed for the most part randomly throughout the bay. Bottom types were found to range from silt-clay to sand, and fairly distinct animal-sediment associations were identified. Based on his results, O'Connor concluded that benthic abundance and biomass in Moriches Bay was lower than that found in comparable estuaries. While not documented in his study, he attributed this to low summer oxygen concentrations associated with large influxes of nutrients and organic matter. Despite evidence of stress, primarily anthropogenic in origin, O'Connor also concluded that species composition had not changed drastically since Townes' (1939) study.

This report gives the results of a seasonal benthic study of Moriches Bay. Sampling was carried out from May 1981, corresponding to the first major recruitment period after closure of the breach, to May 1982. The goals of this study were to: 1) assess the general state of the benthos in the bay, 2) document for the first time the seasonal changes in the benthic fauna, 3) compare the existing benthic fauna to prior studies, and 4) determine if any evidence existed indicating a breach related impact.

Methods

1. Sampling Procedures

Benthic samples were collected during four seasonal cruises aboard the R/V SIOME. A total of 11 stations were sampled on each cruise. The exact sampling dates were 14 May 1981, 11-12 August 1981, 19 November 1981, and 27 May 1982. A winter sampling was not possible because of ice.

Figure 1 shows the location of each sampling station. In this figure, each station is designated by a number code that will be used throughout this report. Station locations were chosen to provide a representative coverage of different habitats within the bay. Stations were located based on visual navigation aids.

Benthic samples were taken using a 0.04 square meter Shipek grab. Three replicate grabs per station were collected on each cruise for biological study. A portion of an additional grab was saved untreated for sediment analysis. Bottom temperature and salinity was measured with a Beckman (Model RS#5) inductive probe and thermistor temperature sensor.

Grab samples for biological study were wet-sieved onboard immediately after collection. Sieves were constructed of 1 mm diameter Nitex screening. After washing, all material retained on the screen (e.g., animals, detritus, sand, gravel, shell fragments, etc.) was transferred to labelled sample jars. These samples were preserved in 10% buffered formalin and stained with rose bengal.

2. Laboratory Procedures

In the laboratory, biological samples were rewashed using a 1 mm screen and transferred to 70% ethyl alcohol. Samples were then analyzed using a two stage process. In the first stage, animals were picked from the sediments, detritus, etc. under an illuminated magnifier and sorted to phylum level. In the second stage, individual organisms were identified to species level whenever possible, and the total for each taxa enumerated. All data were initially entered on log sheets and later transferred to a computer.

For the sediment grain size analysis, each sample was homogenized, and a subsample of approximately 40 g was put into a 100 ml volumetric flask. Distilled water at room temperature was used to wash down any material adhering to the glass above the etched capacity line. The flask was gently agitated by hand to remove air bubbles trapped within the sediment and filled with distilled water to the capacity line. The flask with sediment and water was then weighed on a Mettler PC400 balance. The contents of the flask was next washed onto a 63 micron screen and thoroughly wet sieved to remove the silt-clay fraction of the sample. The material remaining on the screen (i.e., the sand and gravel fractions) was, using the same procedure as above, transferred back into the flask and weighed. The weight of the silt-clay fraction (W_{s-c}) was computed from the two successive weighings using the following formula:

$$W_{s-c} = \frac{x_1 - x_2}{(1 - \rho_w / \rho_{s-c})}$$

where x_1 and x_2 are the two weight measurements, ρ_w is the density of the water, and ρ_{s-c} is the density of the silt-clay fraction (2.65 g/cc). The derivation

of this equation and a discussion of the accuracy of this technique for obtaining the weight of the silt-clay fraction may be found in Cerrato (1983).

The sand and gravel fractions remaining in the flask were washed through a combination of a 2 mm mesh sieve and a 63 micron mesh sieve. The gravel and sand fractions separated during this process were dried in an oven at 60 degrees C, cooled to room temperature, and weighed. Mass percentages of the three particle size categories were calculated as percentages of the total subsample weight.

Organic content of the samples was measured as the weight loss after combustion at 450 degrees C for at least four hours. A 5-10 g subsample of dried sediment was used. All grain size and organic content data were initially entered on log sheets and later transferred to a computer.

3. Data Analysis

A number of derived parameters or indices (abundance, species richness, Shannon-Wiener diversity, equitability, and rarefaction diversity) were computed from the biological data. To maintain consistency throughout, nonenumerable species (e.g., colonial organisms such as sponges and hydrozoans) were excluded from all computations. The occurrence of these taxa is reported on the data sheets at the end of this report.

Abundances are reported as the number of individuals per square meter. These estimates were obtained by dividing the sample results by the sampling unit area (0.04 m^2). Species richness is presented as the number of species per 0.04 m^2. Because the relationship between the number of species and sampling unit area is nonlinear, normalization to a standard unit such as number per square meter is not possible for this parameter. Station maps in the results section represent per sample values of abundance and species richness averaged for each station.

Three indices of diversity were used to analyze the biological data. The first index is the Shannon-Wiener information function:

$$H'(s) = \sum_{i=1}^{s} p_i \log_2 p_i$$

where s is the total number of species and p_i is the proportion of individuals in the sample belonging to the ith species (i = 1, 2,3,...,s). Shannon-Wiener diversity measures both species richness (i.e., the number of species in a sample) and the distribution of individuals among species (termed evenness or equitability). This index has a minimum value of 0, and the higher the value of H', the more diverse the assemblage. Diversity was computed for each sample in the study. Station maps in the results section represent average per sample values for that station.

The second index of diversity is the equitability or evenness function:

$$V' = H'(s)/H'_{max}$$

where $H'_{max} = \log_2 s$. This index has a range from 0 to 1. The higher the value of V', the more evenly individuals in a sample are distributed among the s

species. Equitability was computed for each sample, and station maps in the results section represent average per sample values for that station.

The third index of diversity is Hurlbert's (1971) modification of the rarefaction technique. Given the observed species-abundance distribution, the rarefaction method predicts the expected number of species in a random subsample of size m taken without replacement. The combinatoric function for rarefaction diversity is of the form:

$$E[S_m|N] = \sum_{i=1}^{s}\left[1 - \frac{\binom{N - N_i}{m}}{\binom{N}{m}}\right]$$

where

$$\binom{N - N_i}{m} = \frac{(N-N_i)!}{(N-N_i-m)!m!}$$

$$\binom{N}{m} = \frac{N!}{(N-m)!m!}$$

and where N_i is the number of individuals of species i, N is the total number of individuals in the sample, and S_m is a random variable representing the number of species in a subsample of size m. Rarefaction diversity was computed using the sum of the three replicates from each station.

Cluster analysis was carried out to determine the degree of faunal similarity among the various stations. The similarity measure chosen was the Bray-Curtis index. This measure has the form:

$$S_{jk} = 1 - \left\{\frac{\sum_{i=1}^{s}|Y_{ij} - Y_{ik}|}{\sum_{i=1}^{s}(Y_{ij} + Y_{ik})}\right\}$$

where Y_{ij} is the score for the ith species in the jth sample, Y_{ik} is the score for the ith species in the kth sample, and S_{jk} is the similarity between the jth and kth sample. Values of S_{jk} range from 0 (no species in common) to 1 (identical scores for all species). S_{jk} was computed using the average of the replicate grabs at each station.

With the Bray-Curtis measure, species with high, variable scores largely determine the similarity value while species with low scores are relatively unimportant (Boesch, 1977). The use of untransformed abundances as species scores biases the similarity measure in favor of the abundant species in the samples. To resolve this problem, similarities between stations were computed with species scores (i.e., Y_{ij} and Y_{ik} in the above formula) consisting of fourth root transformed abundances. The fourth root transformation has the effect of scaling down or reducing the contribution of the abundant species (Field, et al., 1982).

Applying the Bray-Curtis measure, similarity matrices consisting of all pairwise station comparisons were computed. Cluster analyses based on these matrices were carried out on a Univac 1100 using program P1M in the BMDP statistical library. This program performed a sequential, agglomerative, hierarchical, and non-overlapping cluster analysis of the variables. The linkage rule used was group average sorting. Choices made for similarity measure, data transformation, clustering algorithm, and sorting strategy were based on a review of the methods most often recommended in the numerical ecology literature (e.g., Clifford and Stephensen, 1975; Field, et al., 1982; Boesch, 1977; Jeffers, 1978; Legendre and Legendre, 1983).

Results

1. Water Quality Parameters

Station depths for each cruise are given in Figures 2-5. Depths range from 2 to 12 feet. Average station depth was approximately 5 feet. This agrees fairly closely with the overall average depth of Moriches Bay (4 feet) reported by O'Connor (1972).

a. Temperature

In May 1981, bottom temperatures in the study area ranged from 10.72 to 17.46° C (Figure 6). The average temperature for all stations was 14.20° C. Temperature generally increased with distance from the inlet. The eastern half of the bay (15.10° C) was on the average about 1.65° warmer than the western portion (13.45° C).

For the August 1981 cruise, temperatures ranged from 24.47 to 27.48° C (Figure 7). This was the smallest difference in the range of temperatures observed during the four sampling periods. The average temperature for all stations was 25.78° C. Temperature again increased with distance from the inlet. A temperature difference of 1.59° was found between the eastern (24.92° C) and western (26.51° C) portions of the bay. In this case, however, the eastern half of the bay was cooler than the western portion.

During the November 1981 cruise, temperature ranged from 4.65 to 8.77° C and averaged 6.88° C overall (Figure 8). Average temperature in the eastern half of the bay (8.36° C) was 2.71° warmer than the average for the western portion (5.65° C). Station temperatures in the eastern half of the bay increased somewhat away from the inlet. Conversely, in the western half of the bay, temperature tended to decrease with distance from the inlet.

Temperatures during the May 1982 cruise ranged from 13.00° to 20.29° C (Figure 9). This was the largest temperature range observed during the four cruises. The average temperature for all stations was 16.16° C. As in several prior cruises, station temperatures generally increased with distance from the inlet. The eastern half of the bay (15.85° C) was on the average 3.24° cooler than the western half (19.09° C). Interestingly, the average temperature in the eastern half of the bay was very similar between May 1981 (15.10° C) and May 1982 (15.85° C). On the other hand, the average for the western half of the bay differed considerably between May 1981 (13.45° C) and May 1982 (19.09° C).

b. Salinity

Bottom salinities for May 1981 ranged from 25.89 to 31.02 ppt (Figure 10). The average salinity for this cruise was 29.15 ppt. Salinity tended to decrease somewhat with distance from the inlet. Lowest values were found in Seatuck Cove and the Forge River. On average, the eastern half of the bay (29.25 ppt) had a slightly higher salinity than the western portion (29.06 ppt), but the difference (0.19 ppt) was minimal.

During the August 1981 cruise, salinities ranged from 26.27 to 31.56 ppt, and the overall average was 29.69 ppt (Figure 11). Salinity at all stations in the eastern half of the bay exceeded 30 ppt, and no gradients were apparent. In the western half of the bay, salinity tended to decrease with distance from the

inlet. The lowest value was found in the Forge River. Average salinity in the eastern half of the bay (30.92 ppt) was 2.25 ppt higher than in the western portion (28.67 ppt).

For November 1981, salinity ranged from 20.62 to 31.07 ppt (Figure 12). This is the greatest range in values observed during the four cruises. The average salinity for all stations was 28.14 ppt. The lowest value of salinity was recorded at the mouth of the Forge River at station 5. On the day that the samples were taken, a steady 10 knot wind was blowing from the northwest and is probably responsible for the low salinity values recorded at both of the Forge River stations. Excluding station 5 at the mouth of the Forge River, salinity in the western half of the bay tended to decrease with distance from the inlet. In the eastern half of the bay, salinity also decreased somewhat with distance from the inlet. Average salinity in the eastern half of the bay (30.02 ppt) was 3.45 ppt higher than in the western portion (26.57 ppt).

In May 1982, salinity ranged from 26.60 to 30.05 ppt (Figure 13). This was the smallest range in values during any of the four cruises. The average salinity for all stations was 28.31 ppt. Salinity generally decreased with distance from the inlet. Average salinity in the eastern half of the bay (29.09 ppt) was 1.44 ppt higher than in the western portion (27.65 ppt). Average salinity in the eastern half of the bay was very similar between May 1981 (29.25 ppt) and May 1982 (29.09 ppt). Conversely, the average for the western half of the bay differed, with the value for May 1981 (29.06 ppt) being somewhat higher than May 1982 (27.65 ppt). This pattern corresponds to that found in temperature.

2. Sediment Characteristics

A total of 44 samples were analyzed for grain size distribution and organic content. The results are given in Figures 14-29.

a. Percent Gravel

Gravel content in the surficial sediments ranged from 0 to 3.06% in May 1981 (Figure 14). Gravel contents were generally less than 1% at most stations. Exceptions were the two stations located near the inlet (stations 7 and 8).

During August 1981, values of percent gravel ranged from 0 to 3.34% (Figure 15). Some gravel was found at all but one station (3). Highest percent gravel was again found at station 7 near the inlet.

Percent gravel in November 1981 ranged from 0.07 to 3.26% (Figure 16). The majority of stations had gravel contents greater than 1%. Lowest values were in Narrow Bay, the Forge River, and Seatuck Cove.

In May 1982, gravel contents varied from 0 to 17.42% (Figure 17). The highest value for any of the four cruises was observed at station 7 near the inlet. Percent gravel at the remaining stations never exceeded 3%.

b. Percent Sand

Sand content in May 1981 ranged from 4.95 to 98.62% (Figure 18). Lowest values were found at stations within and near Seatuck Cove and the Forge River. Stations within the main portion of the bay generally had sand contents above

90%. The exception to this was station 3 (84.40%).

In August 1981 (Figure 19), percent sand ranged from 6.23 to 97.66%. Stations near the inlet and along the barrier island all had sand contents exceeding 90%. Percent sand was generally low along the northern side of the bay, and lowest values were found in the Forge River and Seatuck Cove.

For the November 1981 cruise (Figure 20), sand content ranged from 5.69 to 96.11%. In the western half of the bay, sand content was generally greater than 90% with the exception of station 4 in the Forge River. Most stations in the eastern half of the bay had fairly low sand contents except for station 7 near the inlet.

Percent sand in May 1982 ranged from 3.73 to 97.94% (Figure 21). Stations within the main portion of the bay generally had high sand contents. Exceptions to this were station 11 near Fire Island to the east of the inlet and station 7 near the inlet. While sand content at station 7 was low (81.32%), gravel content at this station was exceptionally high (17.42%). Lowest values for percent sand were found at stations within and near Seatuck Cove and the Forge River.

c. Percent Silt-Clay

Silt-clay contents for all cruises are given in Figures 22-25. Since the gravel content at most stations was low, the distributional patterns for silt-clay are generally opposite that found for percent sand. During most cruises, silt-clay contents were usually low at stations near the inlet and along the barrier island. Percent silt-clay was usually high along the northern side of the bay, with the highest values always found in Seatuck Cove and the Forge River. The November 1981 cruise was an exception to this north-south pattern. During this cruise, stations in the eastern half of the bay had generally high silt-clay contents, while those in the western portion tended to be sandy. Exceptions were station 4 in the western portion and station 7 in the eastern half of the bay.

d. Percent Organic Content

During the four cruises, organic contents ranged from 0.10 to 16.09% (Figures 26-29). As might be expected, there was a positive relationship between the amount of fine grained material and the organic content in the sediments (Figure 30). High silt-clay sediments had correspondingly high organic contents. In general, high organic content sediments were found within and near the Forge River and Seatuck Cove.

e. Sediment Classifications

O'Connor (1972) presented the results of his analysis of the benthic fauna by grouping stations together into several separate habitats, each based on sediment type. Stations in his study were grouped according to the following classification scheme: 1) sandy sediments (>75% sand and gravel), 2) transitional sediments (25 to 80% silt-clay), and 3) silt-clay sediments (>80% silt-clay). Because one of the goals in the present study is to compare the results of the 1981-82 survey to O'Connor's study, the same classification system will be adopted. O'Connor (1972) also designated dredged channels as a separate habitat, but channel areas were not sampled in the 1981-82 survey.

In Table 1, stations for each cruise are classified by sediment type. Note that the sediment type varies between cruises for some of these stations (especially station 5). This was due to the natural patchiness of the seafloor and because stations were located based on visual navigational aids.

3. Biological Characteristics

Three replicate grabs at each of the sampling stations were collected and analyzed during every cruise. From these samples, a total of 76024 animals representing 141 taxa were obtained. A complete list of species is given in Table 2. Of the 141 taxa, 51 (36%) were Polychaetes, 44 (31%) were Crustacea, 14 (10%) were Bivalvia, and 12 (9%) were Gastropoda. The remaining 20 taxa were distributed among 11 groups: Porifera, Cnidaria, Platyhelminthes, Nemertea, Nematoda, Ectoprocta, Sipuncula, Oligochaeta, Pantopoda, Echinoderma, and Chordata.

Station summaries are reported in detail in this section. Information on individual grab samples is, however, tabulated in Appendix A. Abundance, species richness, Shannon-Wiener diversity, and equitability results for each sample may be found in Appendix B.

a. Species Composition

As will be seen below, two species, the blue mussel Mytilus edulis and the amphipod Ampelisca abdita, were exceptionally abundant and tended to obscure the numerical contribution of the rest of the benthos. To examine the relative abundance of other species, the percent composition of the fauna was tabulated without these two dominants. Those species representing 1% or more of the remaining fauna are given in Table 3.

During May 1981, a total of 32493 individuals from 91 taxa were collected. The blue mussel Mytilus edulis and the tubiculous amphipod Ampelisca abdita were the most abundant species, representing 76% and 6%, respectively, of the total fauna. Mytilus edulis was exceptionally abundant at stations 7 and 8 near the inlet (Figure 31). Almost all of the individuals collected were recently set juveniles. At stations 7 and 8, individuals tended to be concentrated in troughs of sand waves, giving the bottom a somewhat speckled appearance. Mussels were also abundant in the sandy sediments at stations 2 and 3. Interestingly, some were even found in the silt-clay sediments at station 4 in the Forge River. Ampelisca abdita was collected at all but two stations in the bay (Figure 32). This species was abundant at the silt-clay stations (4, 5, and 10) of the Forge River and Seatuck Cove. It was also taken in high numbers at sandy stations (1 and 3) along Fire Island.

Other abundant species during May 1981 included two spionid polychaetes, Polydora ligni and Prionospio heterobranchia, and three amphipod species, Corophium acherusicum, Corophium insidiosium, and Lysianopsis alba. All but Lysianopsis alba build soft mud- or sand-covered tubes. Polydora ligni was highly abundant in the Forge River and occurred for the most part in the western half of the bay (Figure 33). Prionospio heterobranchia was found primarily in the southern half of the study area at all sandy stations except those near the inlet (Figure 34). Both Corophium acherusicum (Figure 35) and Corophium insidiosium (Figure 36) were abundant at station 4 in the Forge River. Corophium acherusicum was the more widely distributed of the two species and

occurred at most stations in the western half of the bay. Lysianopsis alba was abundant in the western half of the bay, especially at stations 1, 2, and 3 (Figure 37). This species was collected at all but two stations.

In August 1981, a total of 5868 individuals and 95 taxa were identified. A few individuals of Mytilus edulis were found, but this species represented a minor component of the benthos at this time (Figure 38). The most abundant species was Ampelisca abdita, representing 44% of the total fauna (Figure 39). This species was exceptionally abundant in Seatuck Cove (station 10) and common at stations 1, 2, and 5. Interestingly, it was almost absent from station 4 in the Forge River.

Other abundant species in August 1981 included two omnivorous polychaetes, Lubrineris tenuis and Nereis arenaceodonta, the spionid polychaete Prionospio heterobranchia, and the amphipod Lysianopsis alba. Lubrineris tenuis was abundant in Seatuck Cove and was collected at all sampling locations except station 4 in the Forge River (Figure 40). Nereis arenaceodonta was distributed primarily in the sandy areas along the southern half of the study area (Figure 41). As in May 1981, Prionospio heterobranchia was abundant along the southern half of the bay except near the inlet (Figure 42). Lysianopsis alba was the most ubiquitous of the abundant species (Figure 43). It was found at all stations, but no other general pattern in its distribution was evident.

For November 1981, 12336 individuals from 99 taxa were collected. Mytilus edulis was found at only one station (Figure 44). Thus, the large spring recruitment of this species did not result in a successful set in the soft sediments of the bay. Ampelisca abdita was again the numerically dominant species, representing 59% of all of the individuals taken (Figure 45). This species was exceptionally abundant at the mouth of Seatuck Cove (station 9) and at station 11. It was also very common at station 4 in the Forge River and at station 8.

Several other species were also abundant during November 1981. These include two capitellid polychaetes, Heteromastus filiformis and Capitella capitata, the spionid polychaete Prionospio heterobranchia, and the amphipod Lysianopsis alba. Heteromastus filiformis was very common at stations 3, 8, and 9, but it occurred at all sampling locations except station 7 near the inlet (Figure 46). Capitella capitata also occurred at all sampling locations except station 7 (Figure 47). It was found, however, in highest numbers at station 10 in Seatuck Cove. As in prior cruises, Prionospio heterobranchia was abundant at all sandy stations except near the inlet (Figure 48). Highest numbers were collected at stations 2 and 3. Lysianopsis alba was again abundant in the bay and was collected at all but the two stations near the inlet (Figure 49). Highest numbers occurred at stations 9 and 11.

During May 1982, a total of 25327 individuals from 70 taxa were collected. As in 1981, a large set of juvenile Mytilus edulis was present (Figure 50). They were exceptionally abundant at the two stations near the inlet (7 and 8) and at station 11. Mussels occurred at all sampling localities except station 1. Abundances in the eastern half of the bay were generally much higher than in the western portion. Ampelisca abdita was exceptionally abundant at the two stations in Seatuck Cove (9 and 10), and this species was also common in the Forge River (4 and 5) and at station 11 (Figure 51). Mytilus edulis and Ampelisca abdita represented 77% and 17%, respectively, of the total fauna collected during the cruise.

Several other species were also abundant in May 1982. These included the carnivorous polychaete Nephtys picta, the bivalve Tellina agilis, and the tubiculous amphipods Lysianopsis alba and Microdeutopus gryllotalpa. Nephtys picta and Tellina agilis were found at all of the sandy stations but were most abundant at stations 7 and 8 near the inlet (Figures 52 and 53). As in all of the previous cruises, Lysianopsis alba was again abundant throughout the study area (Figure 54). This species was collected at all but two stations, and it occurred in highest numbers at station 7 near the inlet. The amphipod Microdeutopus gryllotalpa reached highest numbers at stations 4 and 5 in the Forge River (Figure 55). This species, however, was present at all stations in the eastern half of the bay but was absent from the sandy areas in the western portion.

b. Abundance

The spatial pattern in abundance for the May 1981 cruise is given in Figure 56. Average station abundances ranged from 2975 to 123100 animals per square meter. The average abundance for the entire study area was 24616 individuals per m^2. Abundances were highest at the two sampling locations near the inlet (stations 7 and 8). This was due to the high numbers of Mytilus edulis found at these sites. Excluding the two dominant species, Mytilus edulis and Ampelisca abdita, the average abundance for the remaining taxa was 4365 individuals per square meter.

During the August 1981 cruise, abundances ranged from 1333 to 18000 individuals per square meter (Figure 57). The overall average abundance for the bay was 4445 animals per m^2. High abundances were found at station 10 in Seatuck Cove and stations 1, 2, and 5 in the western half of the bay. The high values at these stations were due primarily to one dominant species, Ampelisca abdita. Excluding Ampelisca abdita and Mytilus edulis, the average abundance was 2447 animals per square meter.

In November 1981, the average abundance for the study area was 9345 individuals per square meter, and station values ranged from 1375 to 41567 animals per m^2 (Figure 58). Highest abundances were found at locations with transitional or silt-clay sediments (stations 4, 8, 9, and 11) with the exception of station 10 in Seatuck Cove. The high values at these stations were due to the presence of the dominant Ampelisca abdita. After excluding the contribution of Ampelisca abdita and Mytilus edulis, the average station abundance was 3791 individuals per square meter.

For May 1982, abundances ranged from 742 to 75700 individuals per square meter (Figure 59). The average abundance for the study area was 19187 individuals per m^2. Abundances were much higher in the eastern half of the bay than in the western portion. High values at stations 7, 8, and 11 were due primarily to Mytilus edulis. On the other hand, Ampelisca abdita was abundant at stations 9 and 10. Excluding Mytilus edulis and Ampelisca abdita, the average abundance for the remaining taxa was 1276 animals per square meter. This residual abundance is substantially lower than the comparable value observed in May 1981.

c. Species Richness

For the May 1981 cruise, the average number of species per 0.04 m^2 ranged

from 11 to 33 (Figure 60). The overall average for the study area was about 20 species per 0.04 m^2. Values for this parameter were highest at stations 1, 2, and 3.

The spatial pattern for species richness in August 1981 is given in Figure 61. The overall average was about 19 species per 0.04 m^2, and values for this parameter ranged from 10 to 30 species per 0.04 m^2. Stations 1, 2, and 3 continued to have the highest average number of species.

During November 1981, the average number of species per 0.04 m^2 ranged from 11 to 31 (Figure 62). The average value of species richness was about 21 per 0.04 m^2. Highest average number of species were found at stations 6 and 9. As in the prior cruises, values for this parameter were also high at stations 2 and 3.

In May 1982, a general decline in species richness was observed (Figure 63). Average station values ranged from 10 to 16 species per 0.04 m^2. The overall average number of species per 0.04 m^2 was 13. This baywide average was substantially lower than any of the previous cruises.

d. Shannon-Wiener Diversity

Average Shannon-Wiener diversity values for each station during May 1981 are given in Figure 64. Diversity values ranged from 0.10 to 3.45. Diversity was lowest at stations 7 and 8 near the inlet. This was due to the dominance of juvenile Mytilus edulis at these locations. This parameter was high and exceeded 3.00 at four sampling localities (stations 1, 3, 6, and 9). Average diversity for all stations was 2.34.

In the August 1981 cruise, diversity values at individual stations ranged from 1.46 to 4.05 (Figure 65). Six sampling locations had values exceeding 3.00 (stations 1, 2, 3, 8, 9, and 11). Diversity was lowest in Seatuck Cove (station 10) and at the two locations in the Forge River (stations 4 and 5). Average diversity for the study area was 2.89.

During November 1981, values of diversity ranged from 1.33 to 4.19 (Figure 66). Diversity was highest at locations characterized by sandy sediments (stations 1, 2, 3, 5, 6, and 7). Lowest values occurred at stations 9 and 11. The overall average for this parameter was 2.67.

Average diversity values in May 1982 are shown in Figure 67. Values for this parameter ranged from 0.28 to 3.14. Diversity was generally low in the eastern half of the bay. This was due to the high numbers of Mytilus edulis and Ampelisca abdita found at these sampling stations. The overall average diversity for this cruise was 1.89. This baywide average was somewhat lower than any prior cruise.

e. Equitability

In May 1981, equitability values ranged from 0.03 to 0.80, and the overall average was 0.54 (Figure 68). Lowest values were found at two of the stations (7 and 8) dominated by Mytilus edulis. Stations 6 and 9 had the highest values for this parameter.

Equitability in August 1981 was fairly high at most locations with the

exception of station 10 in Seatuck Cove and station 5 at the mouth of the Forge River (Figure 69). The range in equitability values was from 0.32 to 0.84. The overall average for this parameter was 0.72.

On the November 1981 cruise, equitability ranged from 0.28 to 0.86, and the average for all stations was 0.63 (Figure 70). Highest values were found at stations 6 and 7. Low values for this parameter occurred at stations 9 and 11.

During May 1982, equitability was generally low in the eastern half of the bay (Figure 71). As in the case for diversity at this time, this was primarily due to the high abundances of Mytilus edulis and Ampelisca abdita at the stations in this half of the bay. Equitability ranged from 0.08 to 0.89 during this cruise, and the average for all stations was 0.54.

f. Rarefaction Diversity

The rarefaction method allows diversity comparisons to be made between stations in a manner independent of the number of individuals collected. At a given number of individuals, a station with a higher expected number of species relative to another is considered to be more diverse. Rarefaction curves for each cruise are presented in Figures 72-75.

In May 1981, three distinct station groups were apparent (Figure 72). The most diverse group consisted of sampling locations in sandy (stations 1, 2, 3, 6, and 11) and transitional (station 9) sediments. The intermediate group consisted of stations 4, 5, and 10, all of which were characterized by silt-clay sediments. Lowest diversities were found in the third group (stations 7 and 8). Samples from these two stations, located near the inlet, were dominated by high numbers of Mytilus edulis.

For the August 1981 cruise, no clear station groups were apparent (Figure 73). However, stations 1, 2, and 3 in sandy sediments had the highest diversity. Lowest diversity was found at station 4, characterized by transitional sediments, and at station 10 in silt-clay.

Rarefaction curves for November 1981 are given in Figure 74. With the exception of station 7 near the inlet, sampling locations in sandy sediments (stations 1, 2, 3, 5, and 6) had the highest diversity. Low values of diversity in silt-clay (stations 4 and 10) and transitional (stations 8, 9, and 11) sediments are due mainly to dominance by Ampelisca abdita.

For May 1982, rarefaction curves suggest the presence of two station groups (Figure 75). Lowest diversities were found at locations dominated by either Mytilus edulis or Ampelisca abdita (stations 7, 8, 9, and 11). The second group consisted of all the remaining stations, and no particular trend with sediment type was observed. The number of species collected at a station was generally lower at this time than during prior cruises.

g. Cluster Analysis

In this section, the degree of faunal similarity among stations will be examined. The first step in this analysis was to compute similarity values based on the Bray-Curtis index for each pairwise combination of stations. This was done for each cruise using species scores consisting of fourth root transformed abundances. The results were represented in a standard matrix form.

The next step in this process was to carry out a cluster analysis on the similarity matrices. Results are given in Figures 76-79. In these figures, station groupings are presented in the form of dendrograms or tree diagrams to illustrate the sequence of clusters formed. The vertical and diagonal lines determine the clusters. Station identification codes are listed at the bottom of the dendrogram. The numbers appearing in parentheses after the station codes are unimportant and simply represent the order in which stations were entered as input. Brackets with roman numerals define clusters of stations. The numbers superimposed on the dendrogram are the scaled similarity values between each pair of stations. The last number in each column is the scaled similarity value between that station and the one immediately to the right, the second number from the bottom is with the second station to the right, etc. Codes denoting the sediment type at each station are listed above the dendrogram.

For the May 1981 cruise, four station groups are apparent (Figure 76). One of these consists of stations 1, 2, and 3 (cluster I). All stations within this group were characterized by sandy sediments. All of the abundant species except Corophium insidiosium were present at these stations. Prionospio heterobranchia and Lysianopsis alba reached their highest numbers at these stations. In addition, these three stations had the highest species richness values in the study area.

The second group (cluster II) in Figure 76 consisted of stations 6, 9, and 11. Two of the stations in this group were sandy, and the third was characterized by transitional sediments. The third group (cluster III) in Figure 77 was composed of all of the silt-clay stations (4, 5, and 10). The remaining group (cluster IV) had only two stations (7 and 8). Both stations were sandy and dominated by Mytilus edulis. Most of the other abundant species were conspicuously low or absent from these two stations.

In August 1981, four station groups were again present (Figure 77). Stations 1, 2, 3, and 11, all of which were characterized by sandy sediments, formed one group (cluster I). A second large group (cluster III) consisted of stations near the inlet (6, 7, 8, and 9). This group had a mixture of sandy and transitional stations. The two remaining groups were small and were associated with stations in the Forge River and Seatuck Cove. Cluster II consisted of stations 5 and 10. Cluster IV was composed of a single station (4).

In November 1981, one large and three small station groups were present (Figure 78). The large group (cluster I) included all of the sandy stations (1, 2, 3, 5, and 6) except for station 7. This station formed its own group (cluster IV). The second largest group (cluster II) consisted of stations with transitional sediments (8, 9, and 11). Both stations in the remaining group (cluster III) had silt-clay sediments.

For the May 1982 cruise, two large and two small station groups were found (Figure 79). One large group (cluster I) consisted of four sandy stations (1, 2, 3, and 6). The two remaining sandy stations made up cluster II. The second large group (cluster IV) included stations characterized by transitional (5, 9, and 11) and silt-clay (10) sediments. The remaining group (cluster III) was composed of a single silt-clay station (4).

Discussion

1. State of the Benthic Fauna

The stations in this study were representative of the very diverse habitats found in Moriches Bay. Sediment types ranged from 96% silt-clay to 98% sand. Sandy sediments were generally found near the inlet and along the barrier beach. In the northern portion of the bay, sediments were muddier, and very high silt-clay contents were usually found in the Forge River and Seatuck Cove. This general distribution was similar to that found by Nichols (1964).

A distinct relationship was observed in this study between sediment type and the benthic fauna. This is best seen by examining the results of the cluster analyses (Figures 76-79). Four station groups or clusters were formed during each cruise. The composition of these groups tended to follow the simple sediment classification scheme used in this study. While there were variations in the way that the stations grouped from season to season, sandy and silt-clay stations were never classified together in the same cluster. This suggests that the faunal assemblages present in these two sediment types were never very similar. The stations with transitional sediments seemed to have a mixed faunal assemblage that was intermediate between the two endmember sediment types. With the exception of November 1981, when all the stations with transitional sediments were in a single group, these stations clustered with silt-clay or sand stations.

Temperature and salinity also varied spatially within the bay. As one might expect, values of these parameters changed with distance from the inlet. In addition, average temperature and salinity often differed between the western and eastern halves of the bay. Both of these patterns can be ascribed to the effect of the inlet, freshwater inputs from the rivers and creeks, and the exchange of water between Moriches Bay and Great South Bay.

Proximity to the inlet is reflected to some extent in the results of the cluster analyses. For example, stations 7 and 8 which are located nearest to the inlet, grouped together in three of the four cruises, and during August 1981, all of the stations surrounding the inlet (i.e., 6, 7, 8, and 9) formed a distinct station cluster. In the eastern half of the bay during May 1982, abundances were higher and diversity and equitability lower than in the western portion. This corresponds to observed east-west differences in temperature and salinity during this period. East-west differences in the benthos were not apparent during the other cruises. However, such a trend could easily have been masked by the strong animal-sediment associations present.

Table 4 lists values of abundance, species richness, diversity, and equitability averaged for each cruise. The most notable feature in this table is the very high abundances recorded during each seasonal survey. Table 5 compares these results to several nearshore environments. Abundances in the current study were higher than that found in many local areas including Raritan Bay, Flushing Bay, Bowery Bay, Newark Bay, New York Harbor, Port Jefferson Harbor, and the south shore of Long Island. Even excluding the two dominants, Mytilus edulis and Ampelisca abdita, average abundances in Moriches Bay were higher than most of these nearshore areas with the exception of the May 1982 sampling. This observation, combined with the fact that 141 separate taxa were identified in the current study, suggests that Moriches Bay had a rich and diverse benthic fauna during 1981-82.

2. Seasonal Changes in the Benthos

The benthic fauna showed considerable variations in abundance with season. Much of this change is due to fluctuations in the two dominant species Mytilus edulis and Ampelisca abdita. Variations in the numbers of Mytilus edulis were especially notable. This species was exceptionally abundant in the spring and virtually absent during the summer and fall.

Excluding the effects of the two dominant species, both the abundance (Table 4) and the percent composition (Table 3) of the remaining fauna showed substantial changes with season. Approximately 26% of the taxa documented in this study occurred during only one of the four cruises. Additionally, only about one-third (34%) of the taxa were collected in all four of the seasonal cruises.

3. Historical Comparisons

In this section, an attempt will be made to compare the results of the current survey to Townes (1939) and O'Connor (1972). The extent to which comparisons can be made are limited by several factors. First, many taxa are difficult to identify, and differences between studies may exist solely due to misclassifications. This is especially a problem with amphipods and a number of polychaete genera. Second, neither Townes (1939) nor O'Connor (1972) provide enough information to assemble a complete list of those species that they collected in Moriches Bay. In addition to Moriches Bay, Townes also collected in Great South Bay, Northport Bay, Peconic Bay, Smithtown Bay, and Noyack Bay. Many of his citations are listed simply as common or abundant "in the bays", and it is not clear whether all of these species were actually taken in Moriches Bay. O'Connor (1972) lists only species which had an average biomass ≥ 0.5 g/m^2 or which averaged ≥ 10 individuals/m^2. A final factor limiting comparisons is that neither investigator reported abundances of individual species.

a. Comparison to Townes (1939)

The annotated list of taxa found in Townes (1939) was examined in detail for the incidence of species in Moriches Bay. Seventy-five species were cited in Townes (1939) as either occurring in Moriches and/or Great South Bay, common or abundant "in the bays", or widespread in Long Island waters. These citations were compared to the results of the 1981-82 survey.

Of the 75 taxa, 61 species (or at least a species of the same genus) were found during the 1981-82 survey. The 14 taxa listed in Townes (1939) but not collected in the current study included 2 polychaetes, 5 amphipods, an isopod, 4 decapod crustaceans, a gastropod, and a bivalve. The largest discrepancy is with the amphipods. The five species not found in 1981-82 are Monoculodes edwardsi, Idunella sp., Ampithoe longimana, Ampithoe valida, and Cerapus tubularis. Townes, however, states that all five were collected in Great South Bay, and there is no indication in his report that they ever occurred in Moriches Bay.

The four decapod crustaceans not found in 1981-82 are the southern commercial shrimp Penaeus sp., the shore shrimps Palaemonetes vulgaris and Palaemonetes carolinus, and the grass shrimp Hippolyte pleuracantha. To collect samples, Townes used not only an Ekman grab but also took beach seines, trawls,

and plankton tows. All of these shrimp are epifaunal and quite mobile. They occur close to shore in shallow water and among aquatic plants. Based on personal experience, a grab sampler is very inefficient at collecting mobile epifauna. In addition, only one sampling location (station 11) had significant amounts of aquatic vegetation. These factors, in part, may explain the absence of these taxa in the 1981-82 survey.

The five remaining species collected by Townes but not found in the current survey are the polychaetes Lepidonotus squamatus and Arabella opalina, the isopod Aegathoa oculata, the gastropod Polinices duplicata, and the bivalve Mya arenaria. Lepidonotus squamatus is a scale worm belonging to the family Polynoidae. While not collected in 1981-82, two other species (Harmothoe imbricata and Harmothoe extenuata) from the same family were taken during the survey. Townes found the other polychaete, Arabella opalina, only in Great South Bay. The isopod Aegathoe oculata is actually not a proper species but is the young of some unknown cymothoid isopod (Schultz, 1969). It is a parasite on squid and fishes. Finally, the moon snail Polynices duplicata and the soft shelled clam Mya arenaria were likely missed by chance during the 1981-82 survey. Both are common in the south shore bays, and one of my graduate students often collects soft shelled clams from an intertidal site just east of the inlet.

Given the uncertainties in some of Townes' annotations and his use of several different sampling devices, the agreement in species composition is quite good. Overall, there does not appear to be any drastic differences in the benthic fauna between 1938 and 1981-82.

b. Comparison to O'Connor (1972)

The information in O'Connor (1972) allows two types of comparisons to be made. The first of these will be a comparison of species composition. In the second analysis, abundances of major taxa will be compared with the results of the 1981-82 study.

Table IV in O'Connor (1972) contains a list of species which had average biomasses ≥ 0.5 g/m^2 or which averaged ≥ 10 individual/m^2. This list includes, therefore, only species dominant by weight or number and is not complete. Of the 36 species cited by O'Connor, 32 were present during 1981-82 in Moriches Bay. Those not found in 1981-82 were the polychaete Goniadella gracilis and the gastropods Urosalpinx cinerea, Bittium alternatum, and Hydrobia totteni. Goniadella gracilis is a carnivorous worm belonging to the family Goniadae. While this species was not collected in 1981-82, a related species in the same family, Glycinde solitaria, was taken. The oyster drill, Urosalpinx cinerea, is common throughout the bays along the south shore and was probably not collected by chance. Hydrobia totteni is a small deposit feeding gastropod common in salt marsh pools. This type of habitat was not sampled during the 1981-82 survey. The snail Bittium alternatum is generally found in eelgrass habitats. Station 11 was the only sampling locality with significant amounts of submerged aquatic vegetation. Thus, limited sampling in this type of habitat may be the reason for its absence in 1981-82.

Table I in O'Connor (1972) lists the abundances of major taxonomic groups for each sediment type. Values for sand, transitional, and silt-clay sediments taken from O'Connor (1972) are shown in Table 6 of this report. Also given in Table 6 are comparable abundances obtained in 1981-82.

In a majority of comparisons, abundances were higher in 1981-82 than during O'Connor's 1969-70 survey. Notable exceptions to this were the abundances of gastropods and holothurians in all three sediment types and for 7 of the 10 taxonomic groups in silt-clay sediments. Overall abundances in the 1981-82 study were 3 to 5 times higher than found by O'Connor.

Based on the comparisons made, it appears that the species composition found by O'Connor was quite similar to the results of the current study. In contrast, overall abundances were substantially higher in 1981-82 than during the period of O'Connor's survey (1969-70).

4. Breach Impact

In addition to the monitoring carried out in this study, a complete assessment of the impact of the 1980 breach would have required benthic sampling just prior to the event and during the time that the breach was open in order to establish baseline levels and transient changes. This was not possible. There are, however, several pieces of evidence of a circumstantial nature documented in the current study that do suggest that the benthos was undergoing a period of change in a manner consistent with the occurrence of a recent environmental disturbance.

Physical distrubances of the seafloor are common in shallow nearshore areas. They are created by natural processes such as storm waves and tidal scour and by anthropogenic activities such as dredging, dredge spoil disposal, raking, and trawling. Recovery of the benthos from a disturbance is not haphazard but follows a successional sequence that has been documented by many investigators (e.g., McCall, 1977; Rhoads, et al., 1978). Within days of the disturbance, a number of species with high colonization and reproductive abilities enter the area. These are generally termed opportunists. As time passes, other species enter or at least become dominant, and early sucessional species are outcompeted, cropped down by predators, or adversely affected by depleted resources or biogenically induced changes in the habitat. Species which become dominant in late succession are termed equilibrium species. During succession, abundances increase dramatically within a period of weeks after the disturbance, and levels generally exceed that of undisturbed areas. This is due to the highly productive opportunists colonizing the area. As succession proceeds, opportunistic species decline in numbers, and abundances tend to decrease gradually over a period of a year or more after the disturbance. Other community indices, such as species richness and diversity, may also be changing substantially in time.

In a review of the literature, Pearson and Rosenberg (1978) provide an annotated list of opportunistic species which were found to be "dominant or prominent in areas polluted or enriched by organic material". While the primary emphasis of their review was to consider the response of the benthos to organic enrichment, Pearson and Rosenberg state that "the majority of species associated with the early stages of succession following gross organic enrichment of an area are those also associated with successions following any major environmental disturbance". In addition, they observe that the only true "enrichment opportunists" on their list are Capitella capitata and possibly Streblospio benedicti, Scolelepis fuliginosa, and the polychaetes in the family Dorvilleidae. For the most part then, Pearson and Rosenberg's table is an extensive (although not complete) listing of general opportunistic taxa.

Of the 28 genera (and several higher taxonomic groups excluding oligochaetes) listed by Pearson and Rosenberg, 19 were found in Moriches Bay during 1981-82. This is a remarkably high proportion considering the fact that they reviewed the literature from both North America and Europe. Seasonal abundances of these 19 taxa are given in Table 7.

Moriches Bay is a shallow coastal lagoon subjected to a variety of natural and anthropogenic disturbances even excluding the breach. This may explain in part the large number of opportunists present. It is notable, however, that most of the opportunists underwent substantial declines between May 1981, the first major period of recruitment following closure of the breach, and May 1982. In fact, 12 of the 19 taxa in Table 7 were lower in abundance in May 1982 than at any other time during the study. Many of these taxa were ubiquitous and were found at all 11 stations sometime during the study, eliminating the possibility of a very localized event.

Additionally, average species richness, diversity, and equitability values (Table 4) were lower in May 1982 than at any other time during the survey. Excluding the contribution of the dominants Mytilus edulis and Ampelisca abdita, the average abundance of the remaining taxa was also lowest in May 1982. This decline in community indices is also suggestive of a period of change.

The occurrance and general decline of so many opportunists and the apparent changes in community indices between May 1981 and May 1982 is suggestive of the pattern of succession or recovery from a recent environmental disturbance. While the evidence is circumstantial, and no baseline conditions are available for comparison, the opening and subsequent closure of the breach during 1980 is a potential cause.

Summary

This report presents the results of a seasonal benthic survey conducted in Moriches Bay. A total of 132 biological and 44 sediment samples were collected along with information on bottom temperature and salinity between May 1981 and May 1982. Biological data were analyzed in terms of species composition, abundance, species richness, Shannon-Wiener diversity, equitability, and rarefaction diversity. In addition, faunal similarity among stations was examined using cluster analysis. The principal results and conclusions of this study were:

1) Surficial sediments at the stations sampled ranged from 96% silt-clay to 98% sand. Sand stations were generally found along the barrier beach and near the inlet. Sediments were muddier along the northern portion of the bay, and the highest silt-clay contents were usually found at stations in the Forge River and Seatuck Cove.

2) Both temperature and salinity generally changed with distance from the inlet. In addition, the eastern and western halves of the bay often had different average temperature and salinity values.

3) A total of 76024 animals representing 141 distinct taxa were obtained from the biological samples. There were two numerically dominant species, the blue mussel Mytilus edulis and the amphipod Ampelisca abdita. Mytilus edulis represented 58% and Ampelisca abdita 21% of the total number of animals collected. Other abundant species included the polychaetes Heteromastis filiformis, Capitella capitata, Tharyx acutus, Lubrineris tenuis, Nephtys picta, Polydora ligni, and Prionospio heterobranchia, the bivalve Tellina agilis, and the amphipods Corophium acherusicum, Corophium insidiosium, Lysianopsis alba, and Microdeutopus gryllotalpa.

4) Average seasonal abundances were high and exceeded comparable values found in most local nearshore environments. This is in contrast to the conclusion reached by O'Connor (1972) for Moriches Bay. High abundances, combined with the fact that 141 separate taxa were identified, suggest that Moriches Bay had a rich and diverse benthic fauna during 1981-82.

5) The results of the cluster analyses suggest the presence of distinguishable faunal assemblages associated with sand and with silt-clay sediments. Stations with transitional sediments had a mixed faunal assemblage that was intermediate between the two endmember sediment types.

6) Cluster analyses also showed that the benthic assemblages at stations near the inlet were somewhat different than stations with similar sediment types but further away. This is consistent with changes in temperature and salinity with distance from the inlet. With the exception of May 1982, however, there were no obvious east-west differences in the benthos corresponding to observed east-west patterns in temperature and salinity.

7) Benthic abundances varied considerably with season. Much of this change was due to fluctuations in the two dominant species Mytilus edulis and Ampelisca abdita.

8) Species composition in 1981-82 was quite similar to that found by Townes (1939) and by O'Connor (1972). In contrast to this, benthic abundances in 1981-

82 were 3 to 5 times higher than that found by O'Connor (1972).

9) Based on the large number of opportunistic species present, their general decline between 1981 and 1982, and other trends in community indices, the benthic fauna in Moriches Bay was apparently undergoing a period of substantial change. The observed pattern was consistent with that found during succession or recovery from a recent environmental disturbance. While the evidence is circumstantial, the opening and subsequent closure of the breach during 1980 is a possible cause.

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Table 1. Station Classification by Sediment Type

Station	May 1981	August 1981	November 1981	May 1982
1	S	S	S	S
2	S	S	S	S
3	S	S	S	S
4	S-C	T	S-C	S-C
5	S-C	T	S	T
6	S	S	S	S
7	S	S	S	S
8	S	T	T	S
9	T	T	T	T
10	S-C	S-C	S-C	S-C
11	S	S	T	T

Total Number of Samples in Each Group:

Sediment Type	May 1981	August 1981	November 1981	May 1982
S	21	18	18	18
T	3	12	9	9
S-C	9	3	6	6

Key: S = Sandy Sediments (>75% Sand)

T = Transitional Sediments (25% to 80% Silt-Clay)

S-C = Silt-Clay Sediments (>80% Silt-Clay)

SPECIES LIST - MORICHES BAY

PORIFERA
- Unidentified sponge sp.

CNIDARIA
- Anthozoa
  - Diadumene leucolena
  - Epizoanthus incrustatus
  - Gorgonian octocoral spp.
  - Haloclava producta
  - Tealia felina (tent.)
  - Unidentified anemone sp.
- Hydrozoa
  - Unidentified hydroid spp.

PLATYHELMINTHES
- Unidentified flatworm spp.

NEMERTEA
- Unidentified nemertean spp.

NEMATODA
- Unidentified nematode spp.

ECTOPROCTA
- Unidentified bryozoan spp.

SIPUNCULA
- Phascolopsis gouldii

ANNELIDA
- Oligochaeta
  - Unidentified oligochaete spp.
- Polychaeta
  - Ampharetidae
    - Asabellides oculata
  - Arabellidae
    - Drilonereis longa
  - Capitellidae
    - Heteromastus filiformis
    - Capitella capitata
  - Chaetopteridae
    - Spiochaetopterus oculatus
  - Cirratulidae
    - Tharyx acutus
  - Dorvilleidae
    - Stauronereis rudolphi
  - Flabelligeridae
    - Pherusa affinis
  - Glyceridae
    - Glycera americana
    - Glycera dibranchiata
  - Goniadidae
    - Glycinde solitaria
  - Hesionidae
    - Podarke obscura
  - Lumbrinereidae
    - Lubrineris tenuis
  - Magelonidae
    - Magelona riojai
  - Maldanidae
    - Clymanella torquata
    - Maldanid spp.
  - Nephtyidae
    - Nephtys picta
  - Nereidae
    - Nereis arenaceodonta
    - Nereis pelagica
    - Nereis succinea
    - Nereis spp.
    - Platynereis dumerilii
  - Orbiniidae
    - Hoploscoloplos fragilis
    - Hoploscoloplos robustus
    - Scoloplos acutus
  - Paraonidae
    - Paraonis fulgens
  - Pectinariidae
    - Pectinaria gouldii
  - Phyllodocidae
    - Eteone longa
    - Eumida sanguinea
    - Mystides borealis
    - Paranaitis speciosa
    - Phyllodoce arenae
  - Polynoidae
    - Harmothoe extenuata
    - Harmothoe imbricata
  - Sabellidae
    - Potamilla neglecta
    - Sabella microphthalma
  - Serpulidae
    - Hydroides dianthus
  - Spionidae
    - Dispio uncinata
    - Polydora ligni
    - Prionospio heterobranchia
    - Pygospio elegans
    - Scolecolepides viridis
    - Scolecolepis squamata
    - Spiophanes bombyx
    - Streblospio benedicti
    - Spionidae spp. imm.
  - Syllidae
    - Brania clavata
    - Exogone dispar
    - Parapionosyllis longicirrata
  - Terebellidae
    - Amphitrite affinis
    - Polycirris eximius
    - Polycirris spp.
    - Terebellidae spp.

MOLLUSCA
- Gastropoda
  - Acteonidae
    - Acteon punctostriatus

Retusidae
Retusa canaliculata
Calytraeidae
Crepidula convexa
Crepidula fornicata
Crepidula plana
Muricidae
Eupleura caudata
Atyidae
Haminoea solitaria
Naticidae
Lunatia heros
Columbellidae
Mitrella lunata
Nassariidae
Nassarius trivittatus
Pyramidellidae
Odostomia producta
Turbonilla spp. (juv.)
Bivalvia
Kelliidae
Aligena elevata
Arcidae
Anadara transversa
Solenidae
Ensis directus
Cardiidae
Laevicardium mortoni
Lyonsiidae
Lyonsia hyalina
Veneridae
Gemma gemma
Mercenaria mercenaria
Leptonidae
Mysella planulata
Mytilidae
Mytilus edulis
Nuculidae
Nucula annulatus
Petricolidae
Petricola pholadiformis
Solemyacidae
Solemya velum
Mactridae
Spisula solidissima
Tellinidae
Tellina agilis

ARTHROPODA

Pantopoda
Anoplodactylus lentus
Crustacea
Amphipoda
Haustoriidae
Acanthohaustorius millsi
Ampeliscidae
Ampelisca abdita
Ampelisca verrilli
Bateidae
Batea catharinensis
Caprellidae
Caprellidae spp.(damaged)
Corophiidae
Corophium acherusicum
Corophium acutum
Corophium insidiosium
Corophium lacustre
Erichthonius brasiliensis
Unciola dissimilis
Unciola serrata
Ampithoidae
Cymadusa compta
Gammaridae
Elasmopus laevis
Gammarus annulatus
Gammarus lawrencianus
Gammarus mucronatus
Melita nitida
Aoridae
Lembos smithi
Microdeutopus gryllotalpa
Lilljeborgiidae
Listriella barnardi
Lysianassidae
Lysianopsis alba
Photidae
Microprotopus ranei
Stenothoidae
Parametopella cypris
Phoxocephalidae
Paraphoxus spinosus
Phoxocephalus holbolli
Rhepoxynuis epistomus
Isopoda
Anthuridae
Cyathura polita
Idoteidae
Edotea montosa
Erichsonella attenuata
Idotea balthica
Decapoda
Portunidae
Callinectes sapidus
Crangonidae
Crangon septemspinosa
Larval Brachyuran crab
Majidae
Libinia dubia
Xanthidae
Neopanope texana
Portunidae

Table 2 (Continued)

Ovalipes ocellatus
Paguridae
Pagarus longicarpus
Cirripedia
Balanus amphitrite
Mysidacea
Heteromysis formosa
Tanaidacea
Leptochelia rapax
Cumacea
Leucon americanus
Oxyurostylis smithi
Ostracoda
Ostracod spp.

ECHINODERMATA

Stelleroidea
Asterias forbesii
Holothuroidea
Leptosynapta spp.

CHORDATA

Ascidiacea
Mogula manhattensis
Unidentified tunicate spp.
Vertebrata
Syngnathus fuscus (pipefish)

Table 3. Percent Composition of the Fauna Representing 1% or More of the Total Number of Individuals Remaining after Excluding *Mytilus edulis* and *Ampelisca abdita*.

	May 1981	August 1981	November 1981	May 1981
Nemertea				
Unidentified nemertean		1	1	
Nematoda				
Unidentified nematode	1		1	1
Annelida				
Unidentified oligochaete	1	1	1	
Asabellides oculata				1
Heteromastis filiformis	4	5	11	4
Capitella capitata	5	4	5	5
Tharyx acutus	3	4	7	3
Glycinde solitaria			1	
Podarke obscura	1	1		
Lubrineris tenuis	5	10	5	3
Clymanella torquata	1	3	1	1
Nepthys picta			2	15
Nereis arenaceodonta	5	6	3	4
Nereis pelagica			4	
Nereis succinea				4
Hoploscoloplos fragilis		1		1
Hoploscoloplos robustus	1	2		2
Scoloplos acutus	1	1	2	3
Eteone longa				1
Polydora ligni	7	2	1	
Prionospio heterobranchia	14	8	8	2
Pygospio elegans				1
Scolecolepides viridis	4	1		4
Scolecolepis squamata		2		3
Spiophanes bombyx				1
Streblospio benedicti	1	1	5	5
Exogone dispar	3	1	4	
Amphitrite affinis		1		
Gastropoda				
Acteocina canaliculata		1		
Bivalvia				
Gemma gemma		1	2	3
Laevicardium mortoni		1		
Petricola pholadiformis		1		
Solemya velum	1	2		
Tellina agilis	1	2	2	8
Amphipoda				
Ampelisca verrilli			1	
Caprellidae spp.(damaged)			1	
Corophium acherusicum	9			
Corophium insidiosium	6	5		1
Corophium lacustre		2	1	1
Cymadusa compta		1		
Elasmopus levis	1	3	1	
Gammarus lawrencianus	1		1	1
Lysianopsis alba	8	7	12	6
Melita nidita			1	
Microdeutopus gryllotalpa	5	4	2	8
Paraphoxus spinosus	3	2	2	2
Rhepoxynuis epistomus		1		1
Isopoda				
Cyathura polita	1	2		
Decapoda				
Neopanope texana		1	1	
Misc. Arthropoda				
Balanus amphitrite		3		
Leptochelia rapax	1			
Leucon americanus			1	
Ostracod spp.			1	1
Chordata				
Mogula manhattensis		3		
NUMBER OF SPECIES	27	37	31	30

Table 4. Values of Abundance, Species Richness, Diversity, and Equitability Averaged for Each Cruise.

	May 1981	August 1981	November 1981	May 1982
Abundance (# animals per m^2)	24616	4445	9345	19187
Abundance without *Mytilus edulis* and *Ampelisca abdita* (# animals per m^2)	4365	2447	3791	1276
Species Richness (# species per 0.04 m^2)	20	19	21	13
Shannon-Wiener Diversity	2.34	2.89	2.67	1.89
Equitability	0.54	0.72	0.63	0.54

Table 5. Abundances of Benthic Invertebrates Compared to Some Local Nearshore Environments.

	Mean Abundance ($\#/m^2$)	Reference
Current Study		
May 1981	24,616	
August 1981	4,445	
November 1981	9,345	
May 1982	19,187	
All Cruises	14,398	
Newark Bay	1,670	Cerrato (1986)
Raritan Bay	795	Cerrato and Bokuniewicz (1985)
Newark Bay (Shoal off Port Newark Terminal)	273	" "
Flushing Bay	590	" "
Bowery Bay	127	" "
New York Harbor		
West Bank	536	Cerrato and Scheier (1983)
Old Orchard Shoal	400	Gandarillas and Brinkhuis (1981)
Romer Shoal	400	" "
East Bank	250	" "
East Bank	5,406	Woodward and Clyde (1975a,b)
Lower Bay	110	McGrath (1974)
Lower Bay	766	Walford (1971)
Port Jefferson Harbor	3,413	Klein (1976)
Moriches Bay	5,402	O'Connor (1972)
South Shore of Long Island		
(9 - 18 m)	1,630	Cerrato (1983)
(5 - 25 m)	1,521	Steime and Stone (1973)
Southern New England (0-24 m)	2,429	Wigley and Theroux (1981)
New York Bight (0-24 m)	2,430	" "
Chesapeake Bight (0-24 m)	1,742	" "

Table 6. Abundances (#/m^2) of Major Taxonomic Groups Obtained in 1981-82 Compared to the Results in O'Connor (1972).

1. **O'Connor (1972):**

	Sand	Transitional	Silt-Clay
Nemertea	8	11	12
Polychaeta	557	501	317
Gastropoda	462	541	269
Bivalvia	4136	486	76
Amphipoda	189	1253	662
Decapoda	22	54	15
Other Crustacea	24	25	13
Echinodermata	0	0	<1
Holothuroidea	3	5	13
Tunicata	0	5	50
Other Taxa	1	2	5
Total	5402	2978	1433

---

2. **Current Study:**

	Sand	Transitional	Silt-Clay
Nemertea	13	30	10
Polychaeta	1908	1312	2009
Gastropoda	19	16	33
Bivalvia	13901	2447	43
Amphipoda	1065	8736	5908
Decapoda	26	13	4
Other Crustacea	97	138	114
Echinodermata	0	<1	0
Holothuroidea	<1	0	1
Tunicata	<1	73	1
Other Taxa	62	52	35
Total	17091	12817	8159

Table 7. Seasonal Abundances (#/m^2) of Opportunistic Genera in Moriches Bay.

	May 1981	August 1981	November 1981	May 1982
Capitella	227	106	180	65
Polydora	295	48	55	2
Streblospio	45	17	208	64
Scolelepis (=Scolecolepis)	14	48	9	37
Nereis	231	161	277	94
Heteromastis	195	118	409	47
Eteone	12	5	14	2
Podarke	41	19	5	4
Eumida	0	5	11	0
Anaitides (=Phyllodoce)	4	2	2	1
Prionospio	610	193	309	30
Scoloplos	95	72	110	78
Solemya	23	50	10	3
Mytilus	18731	34	8	14741
Goniadidae	14	9	23	3
Corophium	652	175	37	22
Nephtys	2	1	65	188
Pygospio	0	2	0	13
Lubrineris	213	251	181	35

FIGURE 1

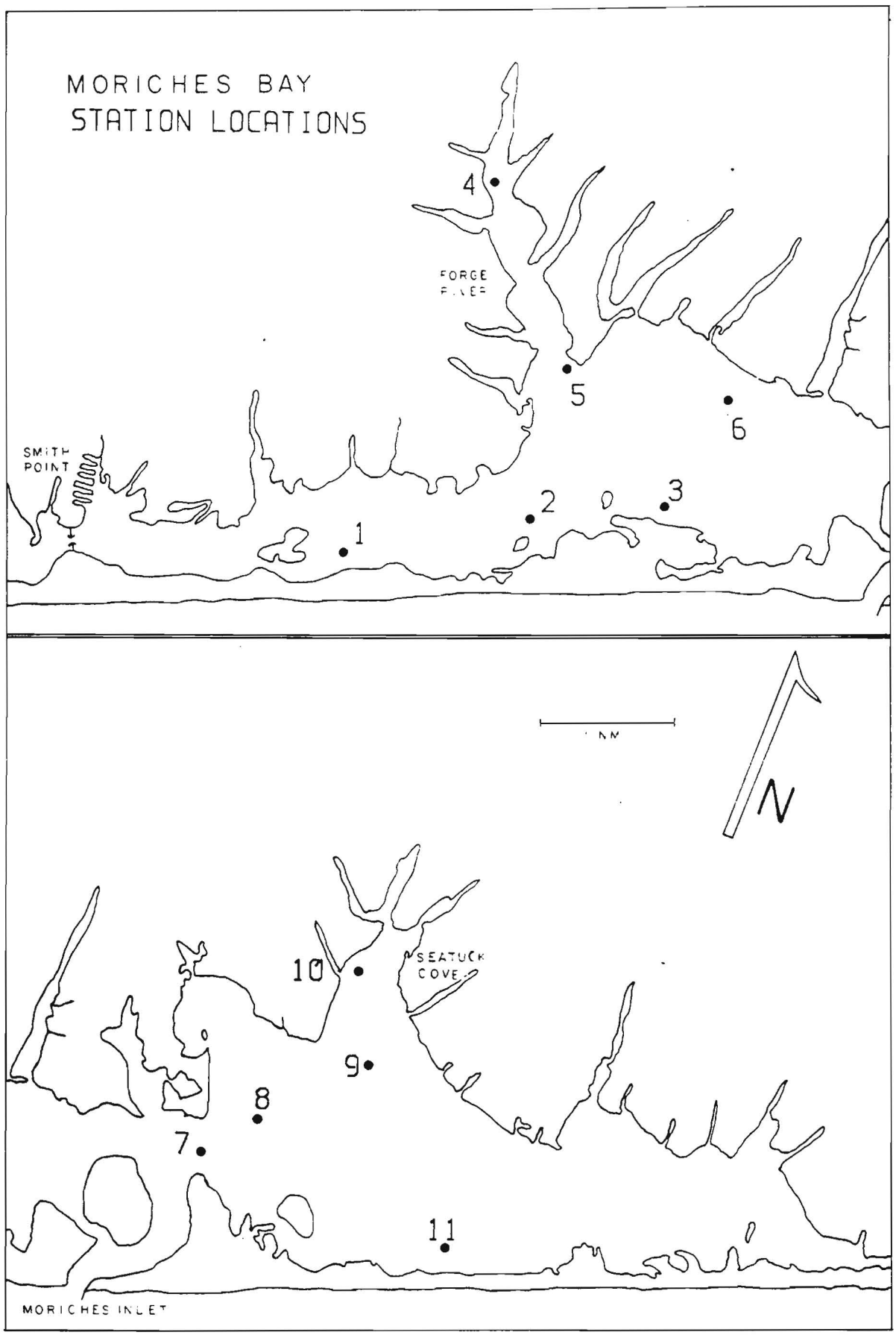

MORICHES BAY
STATION LOCATIONS
4
FORGE
5
6
SMITH
POINT
1
2
3
1M
N
10
SEATUCK
COVE
9
8
7
11
MORICHES INLET

FIGURE 2

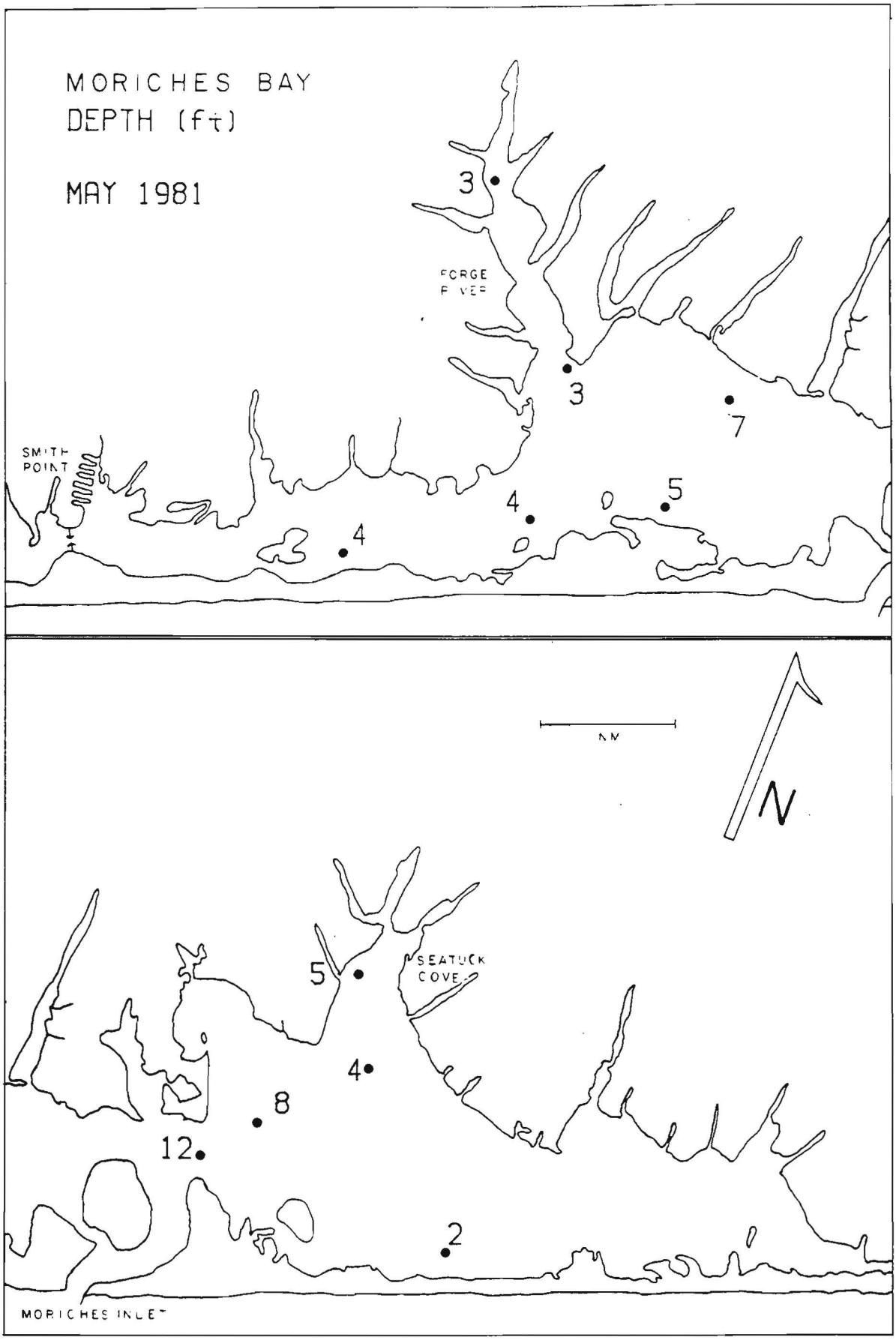

MORICHES BAY
DEPTH (ft)
MAY 1981
3
FORGE
RIVER
3
7
SMITH
POINT
4
4
5
1M
N
5
SEATUCK
COVE
4
8
12
2
MORICHES INLET

FIGURE 3

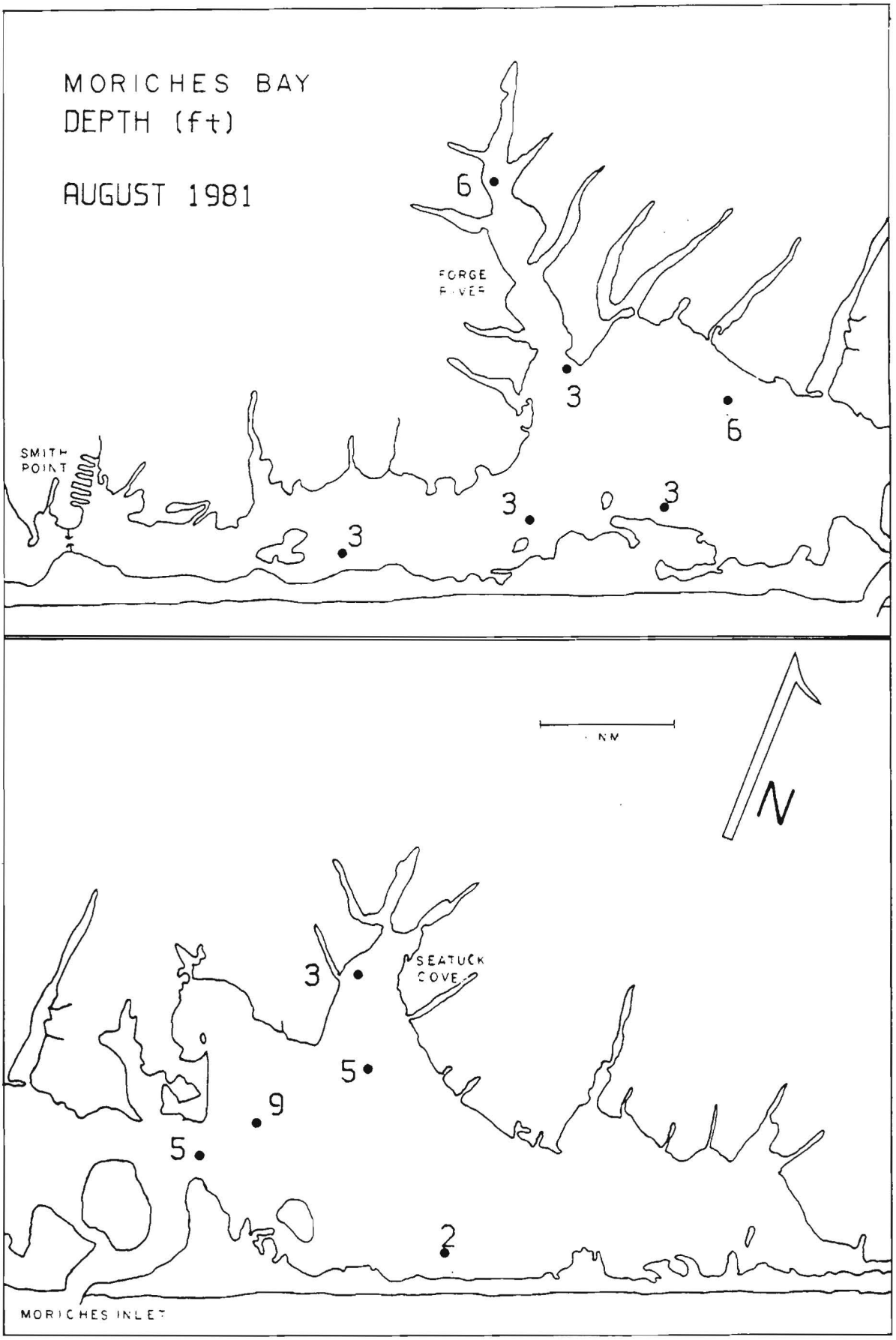

MORICHES BAY
DEPTH (ft)
AUGUST 1981
6
FORGE
RIVER
3
6
SMITH
POINT
3
3
3
1 NM
N
SEATUCK
COVE
3
5
9
5
2
MORICHES INLET

FIGURE 4

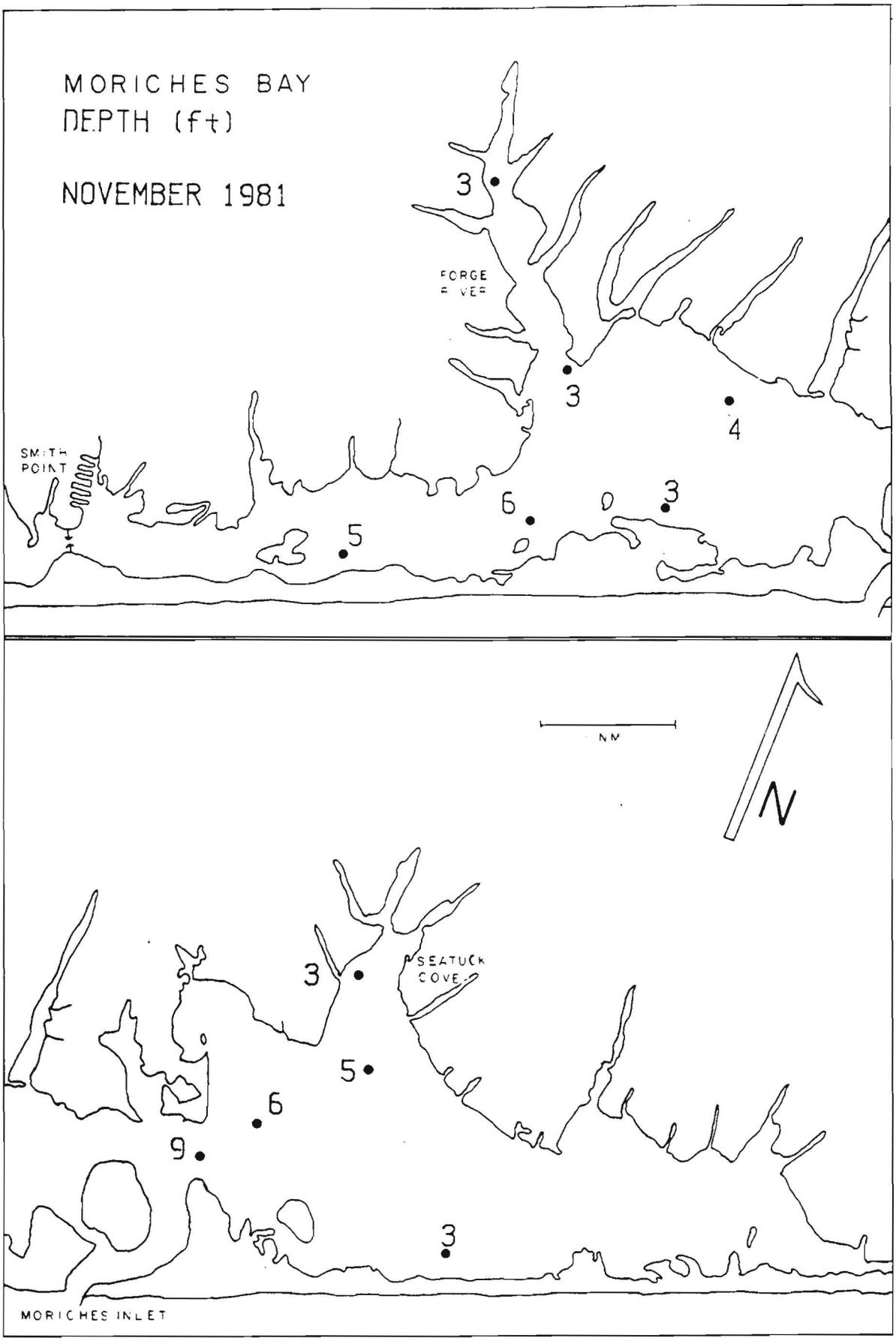

MORICHES BAY
DEPTH (ft)
NOVEMBER 1981
3
FORGE
RIVER
3
4
SMITH
POINT
6
3
5
NM
N
3
SEATUCK
COVE
5
6
9
3
MORICHES INLET

FIGURE 5

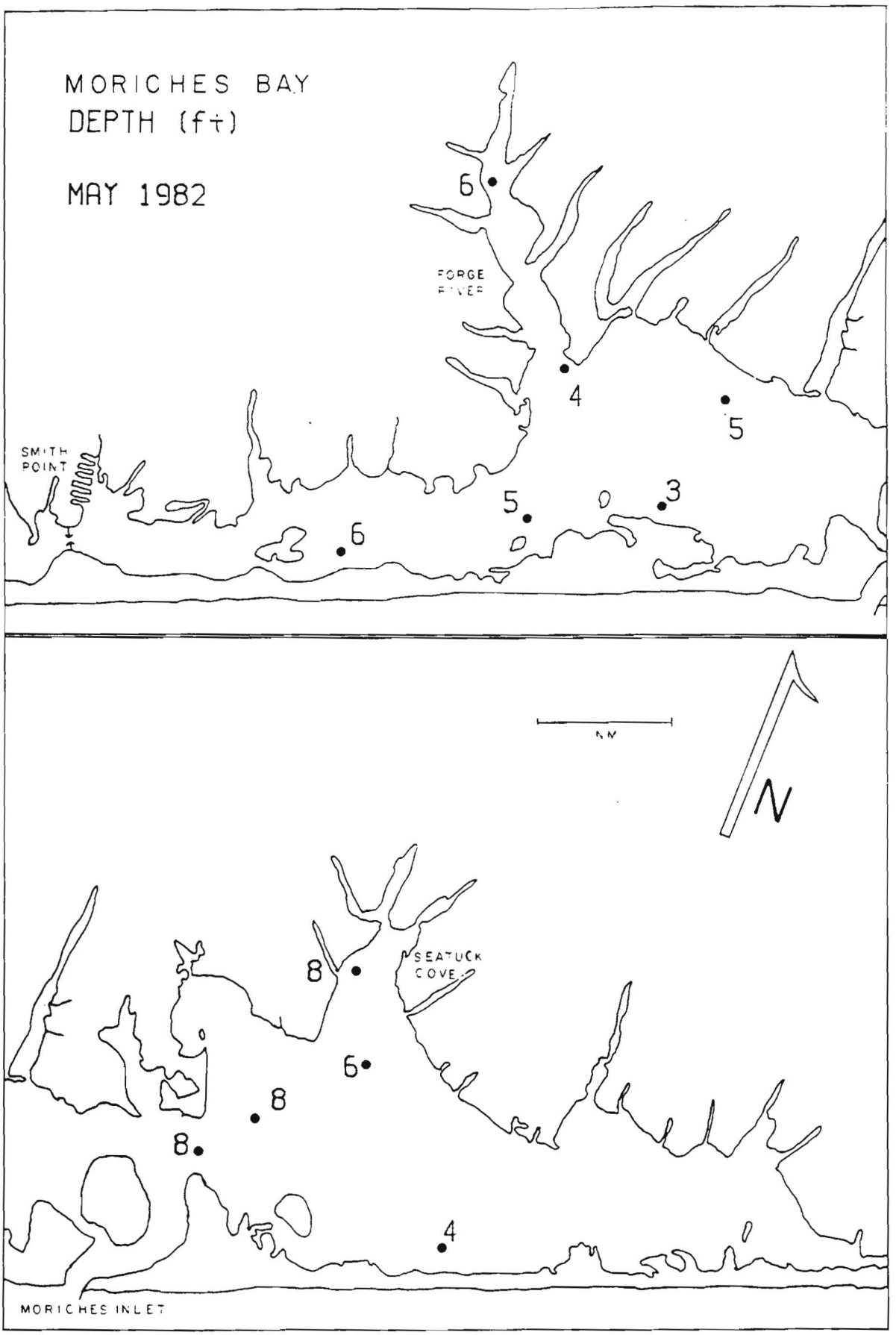

MORICHES BAY
DEPTH (ft)
MAY 1982
6
FORGE RIVER
4
5
SMITH POINT
5
3
6
1 NM
N
8
SEATUCK COVE
6
8
8
4
MORICHES INLET

FIGURE 6

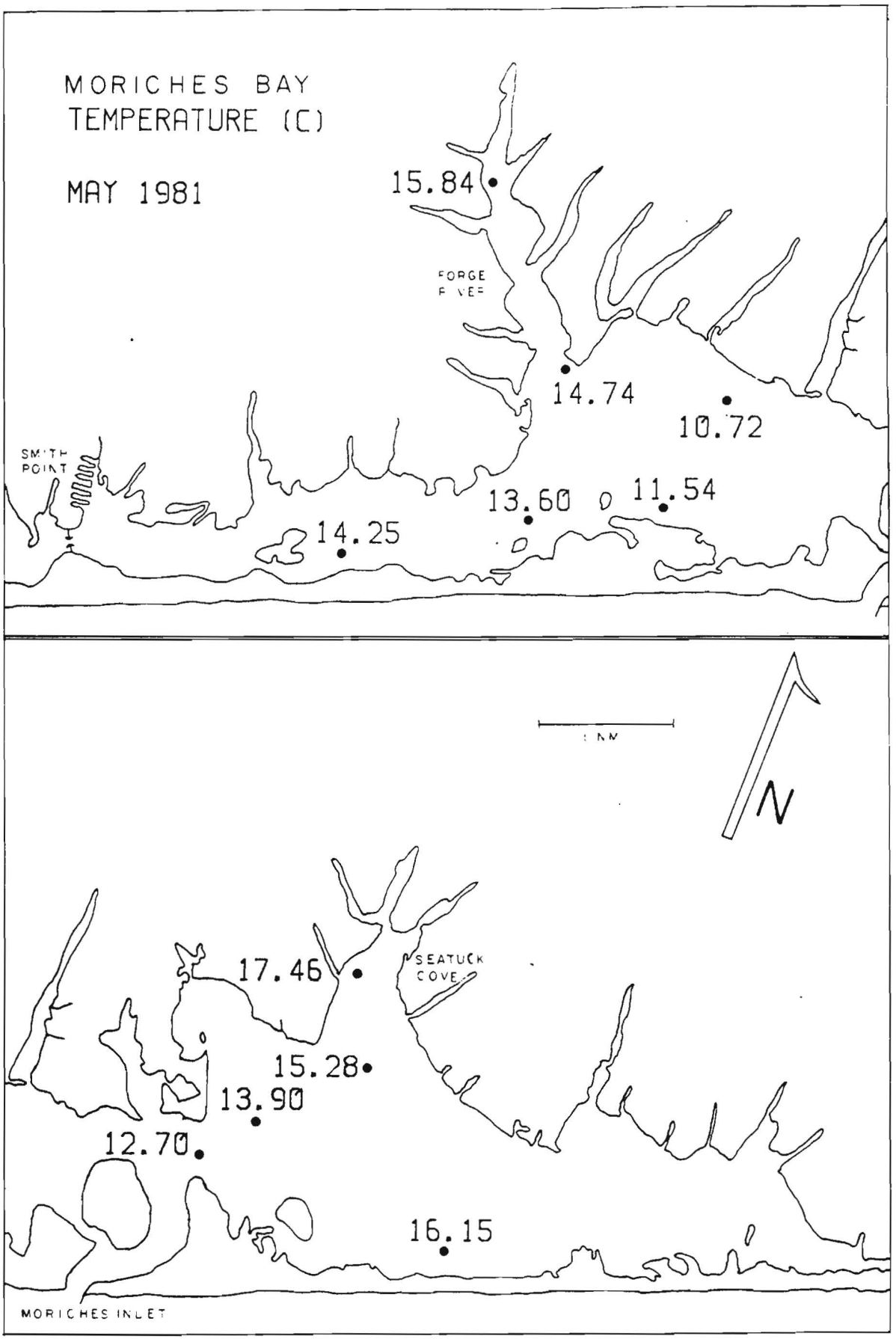

MORICHES BAY
TEMPERATURE (C)
MAY 1981
15.84
FORGE
14.74
10.72
SMITH
POINT
13.60
11.54
14.25
1 NM
N
SEATUCK
COVE
17.46
15.28
13.90
12.70
16.15
MORICHES INLET

FIGURE 7

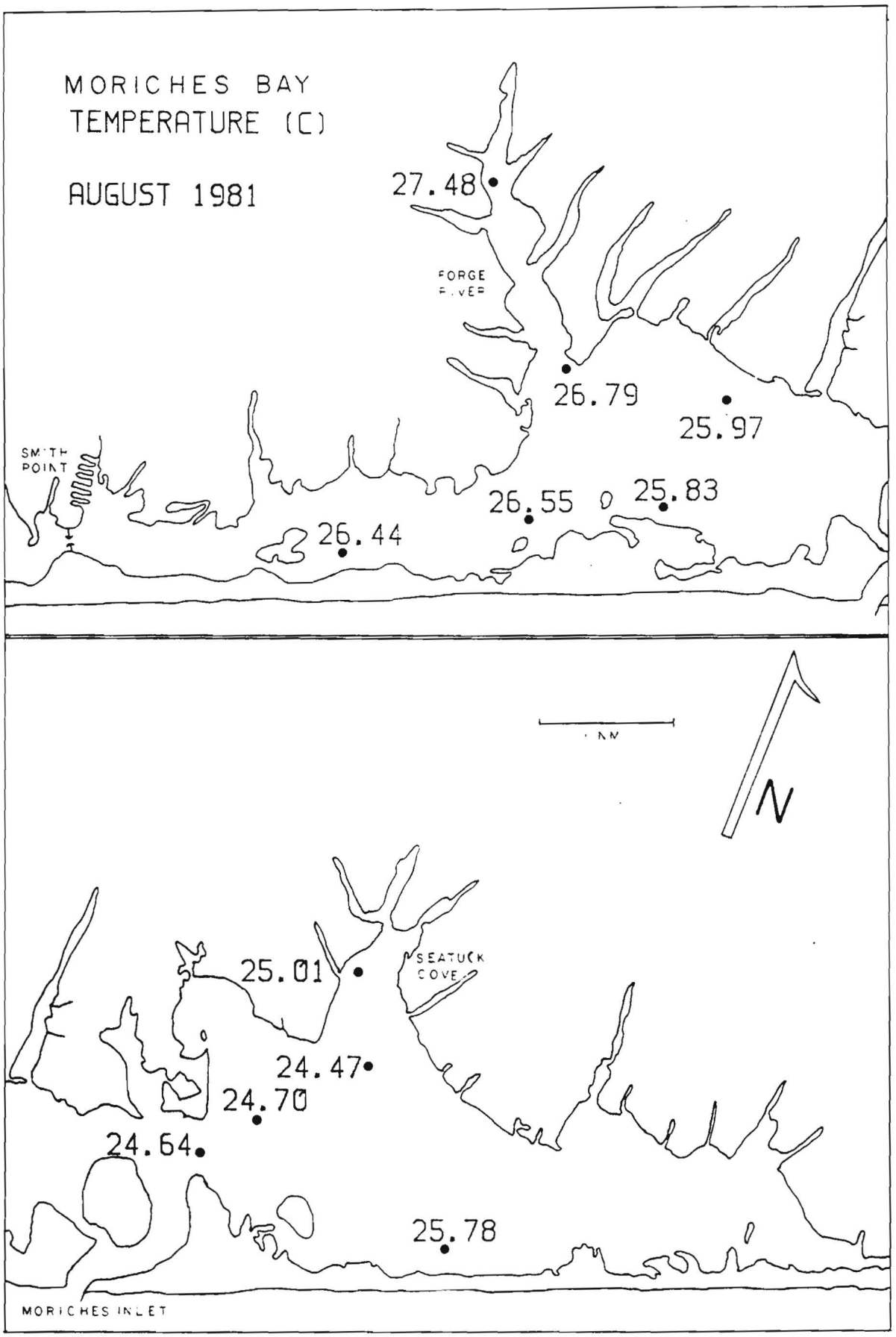

MORICHES BAY
TEMPERATURE (C)
AUGUST 1981
27.48
FORGE
RIVER
26.79
25.97
SMITH
POINT
26.55
25.83
26.44
1 NM
N
25.01
SEATUCK
COVE
24.47
24.70
24.64
25.78
MORICHES INLET

FIGURE 8

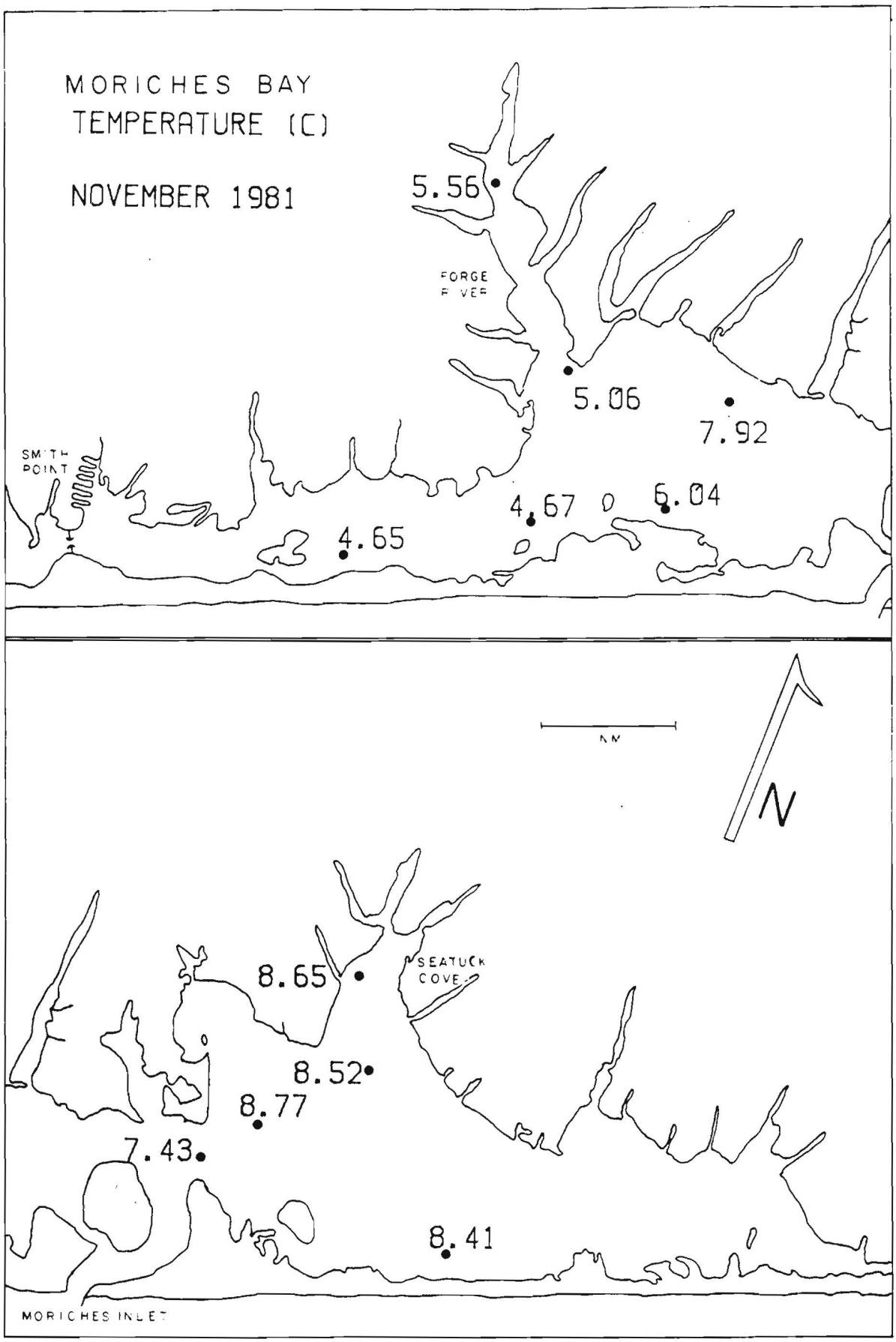

MORICHES BAY
TEMPERATURE (C)
NOVEMBER 1981
5.56
FORGE
RIVER
5.06
7.92
SMITH
POINT
4.67
6.04
4.65
1 NM
N
8.65
SEATUCK
COVE
8.52
8.77
7.43
8.41
MORICHES INLET

FIGURE 9

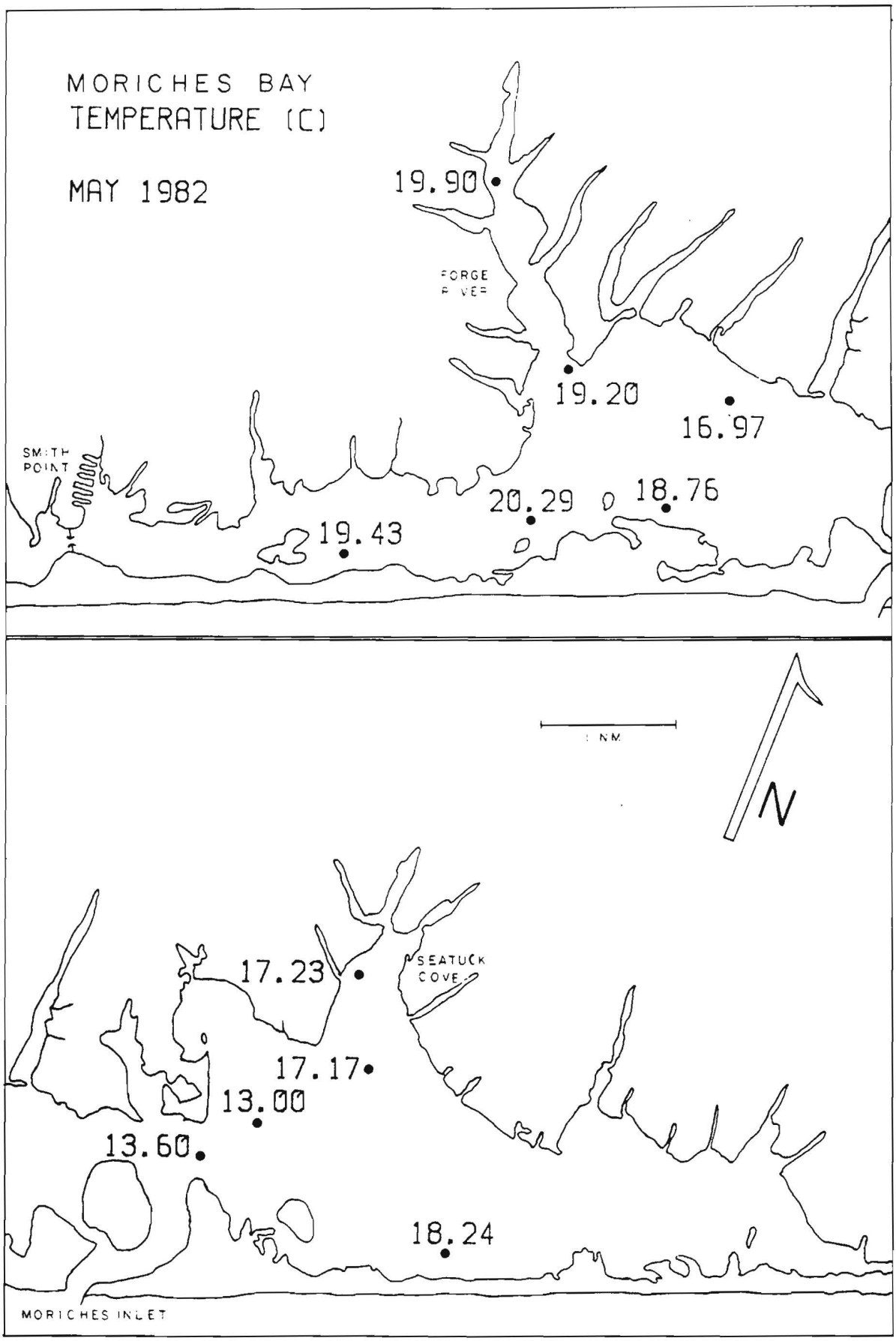

MORICHES BAY
TEMPERATURE (C)
MAY 1982
19.90
FORGE
RIVER
19.20
16.97
SMITH
POINT
20.29
18.76
19.43
1 NM
N
17.23
SEATUCK
COVE
17.17
13.00
13.60
18.24
MORICHES INLET

FIGURE 10

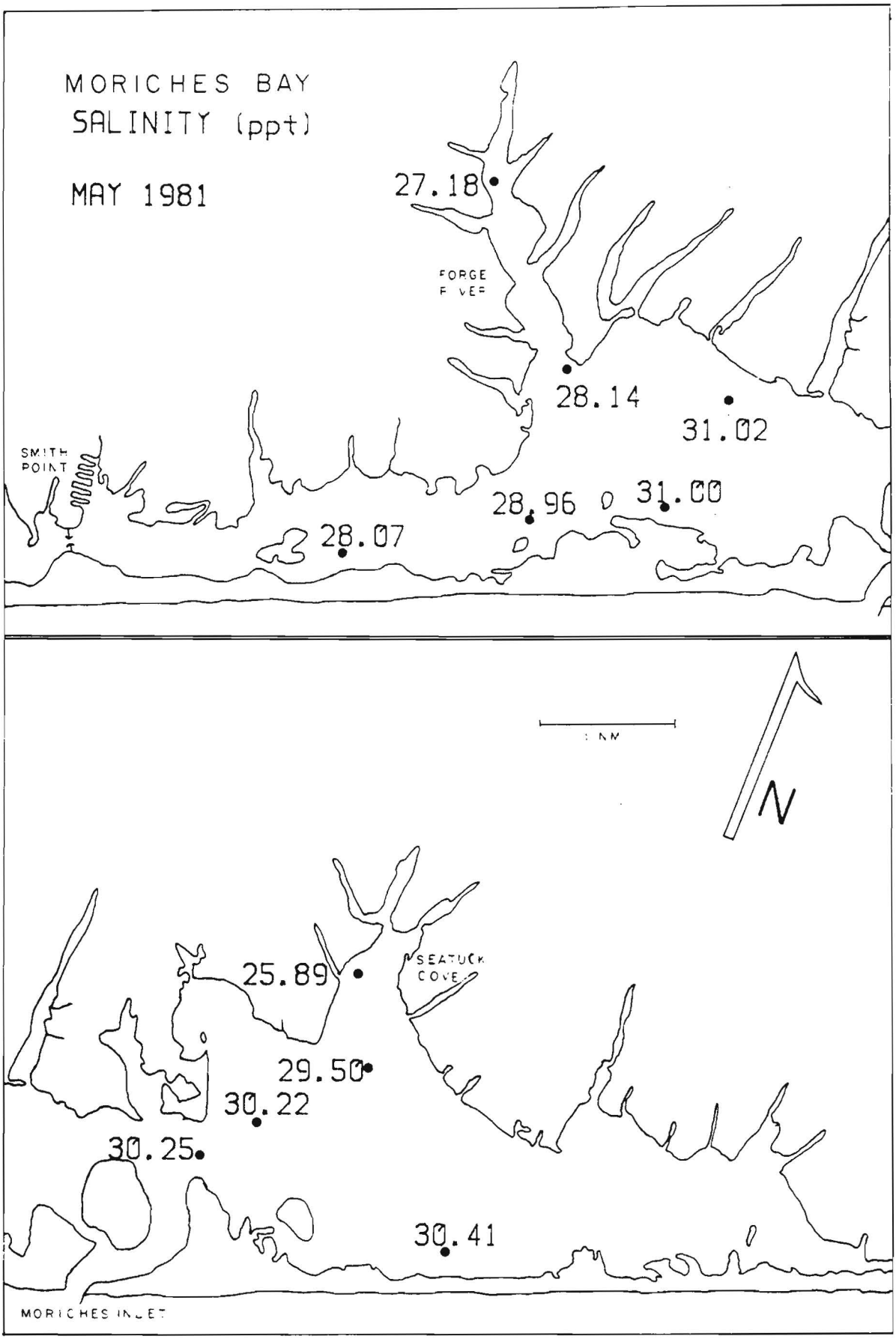

MORICHES BAY
SALINITY (ppt)
MAY 1981
27.18
FORGE
RIVER
28.14
31.02
SMITH
POINT
28.96
31.00
28.07
1 NM
N
25.89
SEATUCK
COVE
29.50
30.22
30.25
30.41
MORICHES INLET

FIGURE 11

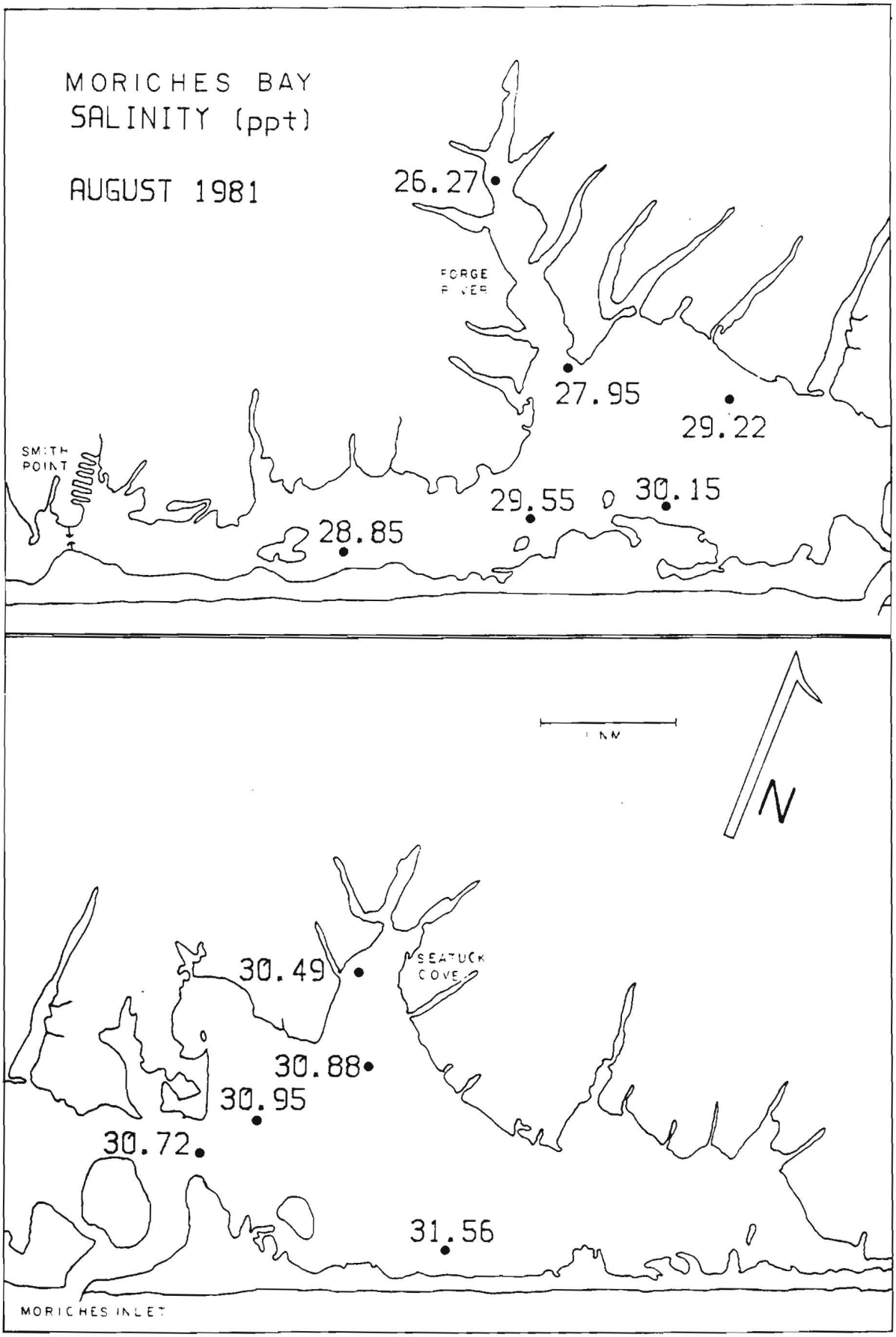

MORICHES BAY
SALINITY (ppt)
AUGUST 1981
26.27
FORGE
RIVER
27.95
29.22
SMITH
POINT
29.55
30.15
28.85
1 NM
N
30.49
SEATUCK
COVE
30.88
30.95
30.72
31.56
MORICHES INLET

FIGURE 12

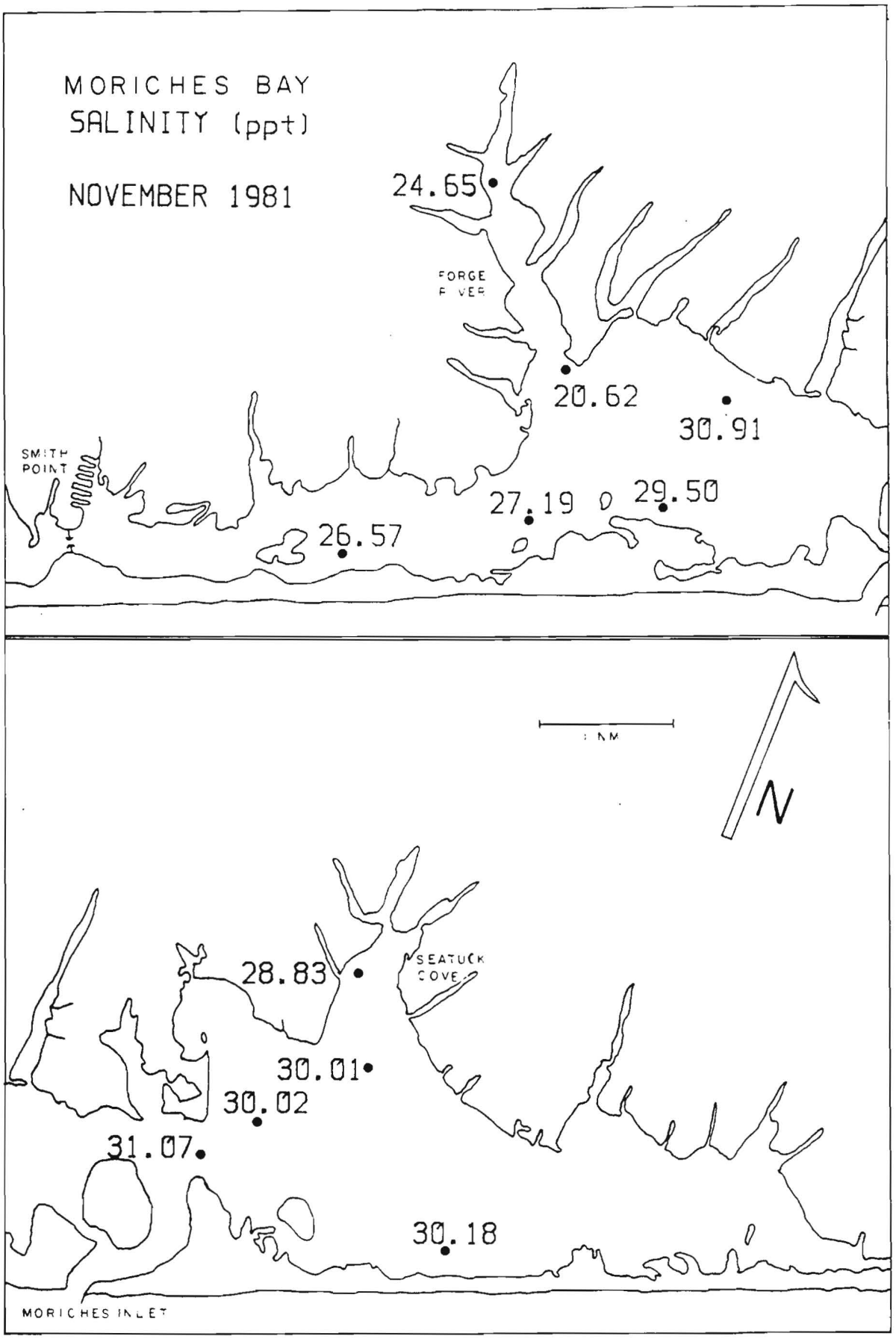

MORICHES BAY
SALINITY (ppt)
NOVEMBER 1981
24.65
FORGE
RIVER
20.62
30.91
SMITH
POINT
27.19
29.50
26.57
1 NM
N
28.83
SEATUCK
COVE
30.01
30.02
31.07
30.18
MORICHES INLET

FIGURE 13

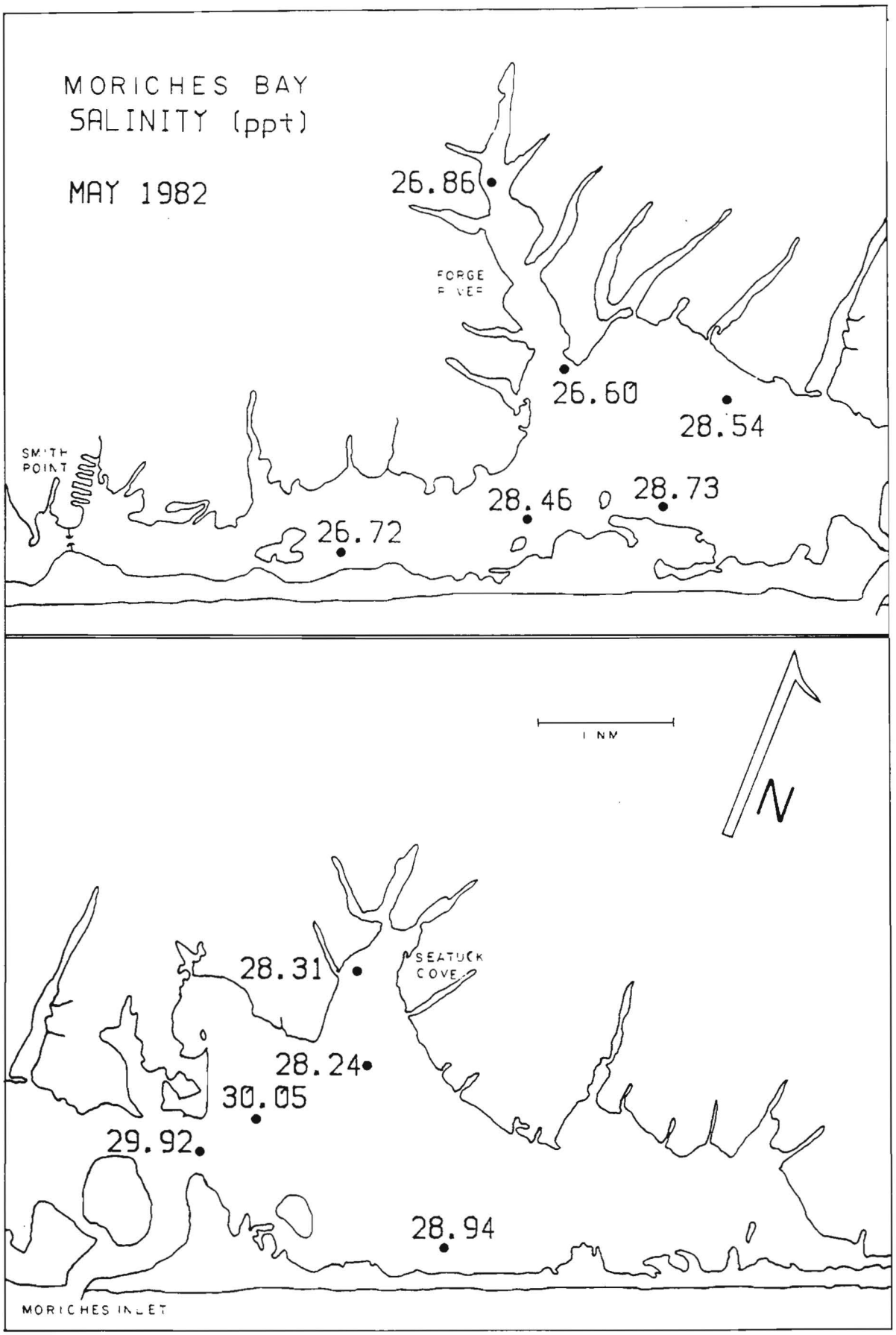

MORICHES BAY
SALINITY (ppt)
MAY 1982
26.86
FORGE
RIVER
26.60
28.54
SMITH
POINT
28.46
28.73
26.72
1 NM
N
28.31
SEATUCK
COVE
28.24
30.05
29.92
28.94
MORICHES INLET

FIGURE 14

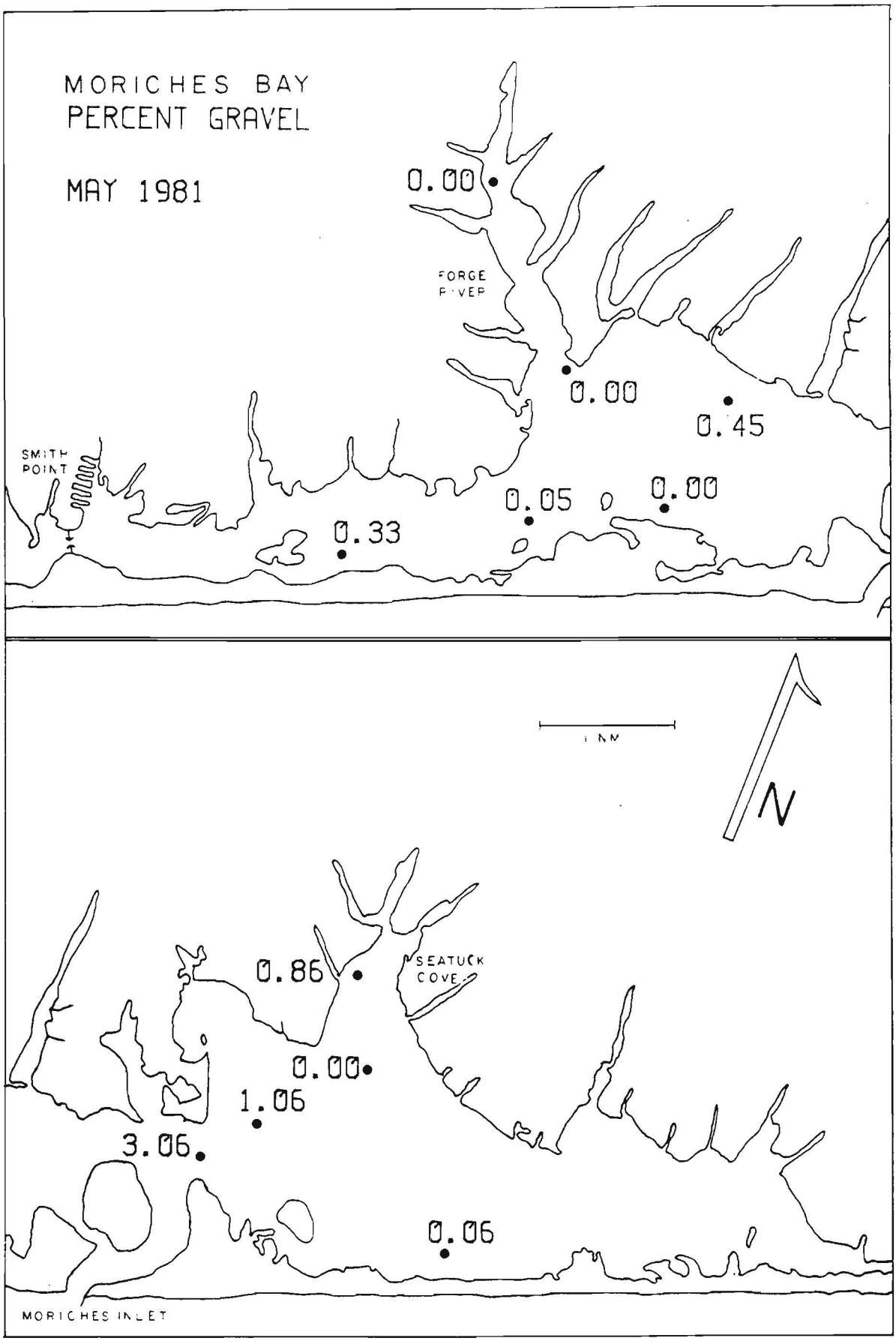

MORICHES BAY
PERCENT GRAVEL
MAY 1981
0.00
FORGE RIVER
0.00
0.45
SMITH POINT
0.05
0.00
0.33
1 NM
N
0.86
SEATUCK COVE
0.00
1.06
3.06
0.06
MORICHES INLET

FIGURE 15

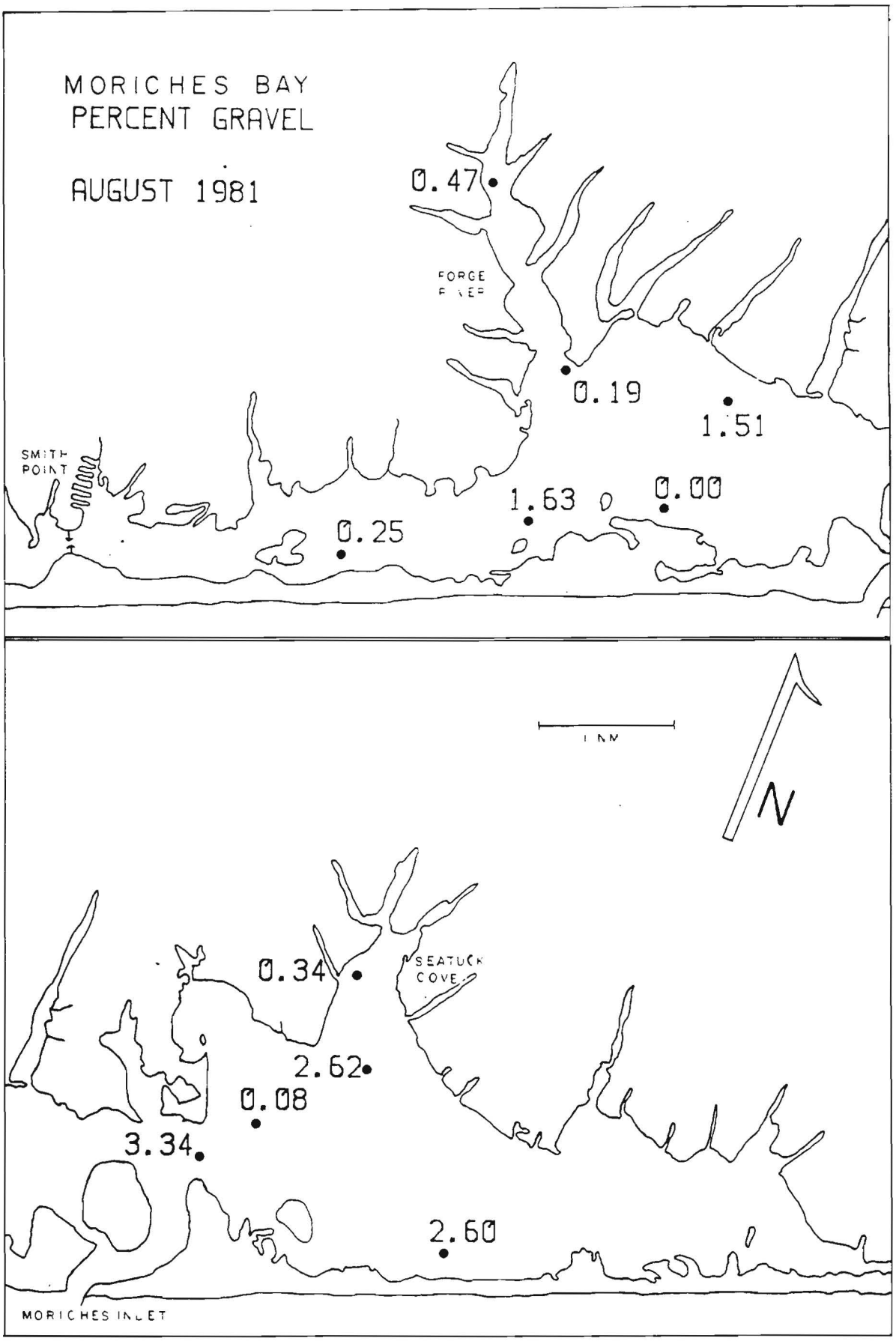

MORICHES BAY
PERCENT GRAVEL
AUGUST 1981
0.47
FORGE
0.19
1.51
SMITH
POINT
1.63
0.00
0.25
1 NM
N
0.34
SEATUCK
COVE
2.62
0.08
3.34
2.60
MORICHES INLET

FIGURE 16

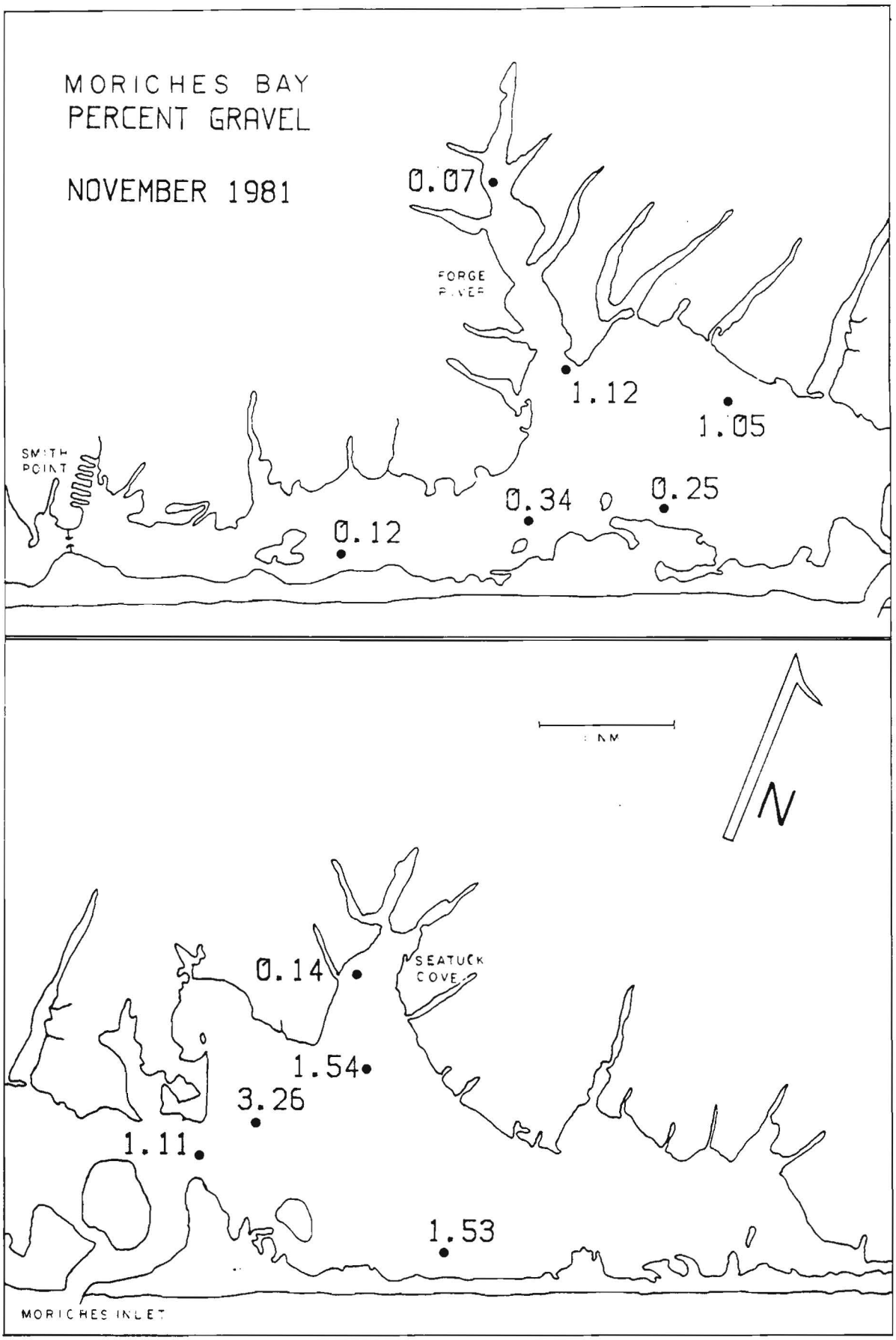

MORICHES BAY
PERCENT GRAVEL
NOVEMBER 1981
0.07
FORGE
RIVER
1.12
1.05
SMITH
POINT
0.34
0.25
0.12
1 NM
N
0.14
SEATUCK
COVE
1.54
3.26
1.11
1.53
MORICHES INLET

FIGURE 17

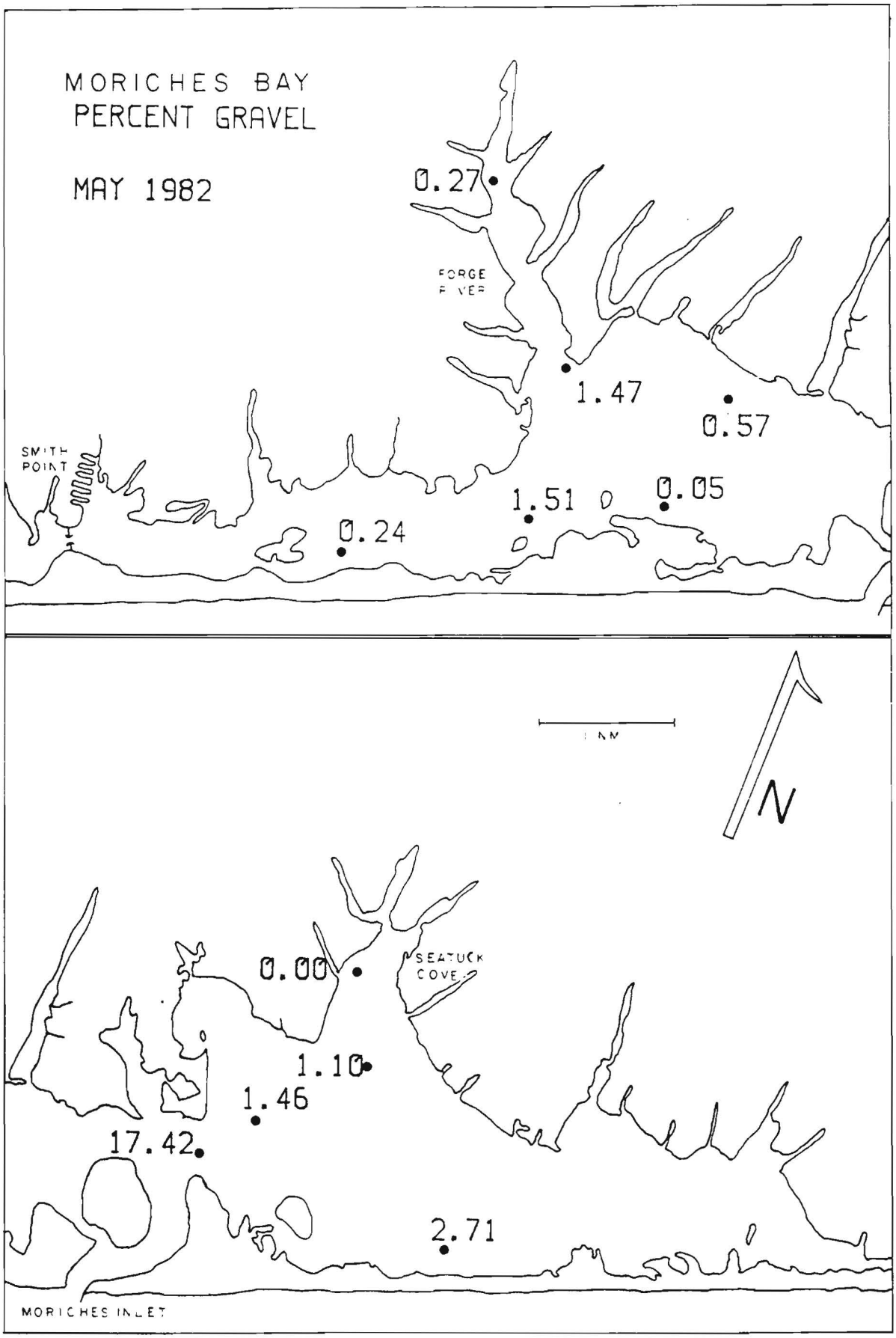

MORICHES BAY
PERCENT GRAVEL
MAY 1982
0.27
FORGE
RIVER
1.47
0.57
SMITH
POINT
1.51
0.05
0.24
1 NM
N
0.00
SEATUCK
COVE
1.10
1.46
17.42
2.71
MORICHES INLET

FIGURE 18

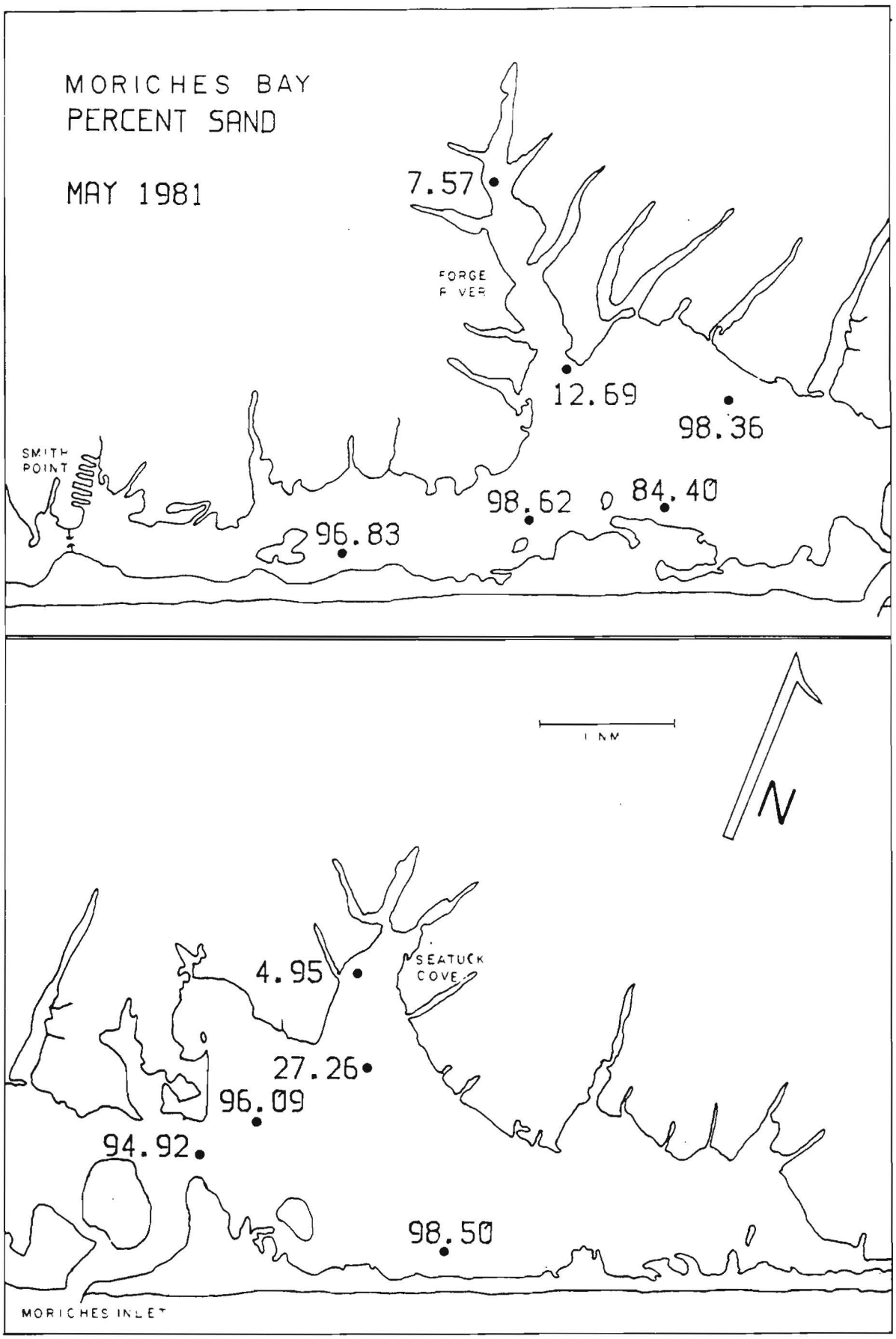

MORICHES BAY
PERCENT SAND
MAY 1981
7.57
FORGE
RIVER
12.69
98.36
SMITH
POINT
98.62
84.40
96.83
1 NM
N
SEATUCK
COVE
4.95
27.26
96.09
94.92
98.50
MORICHES INLET

FIGURE 19

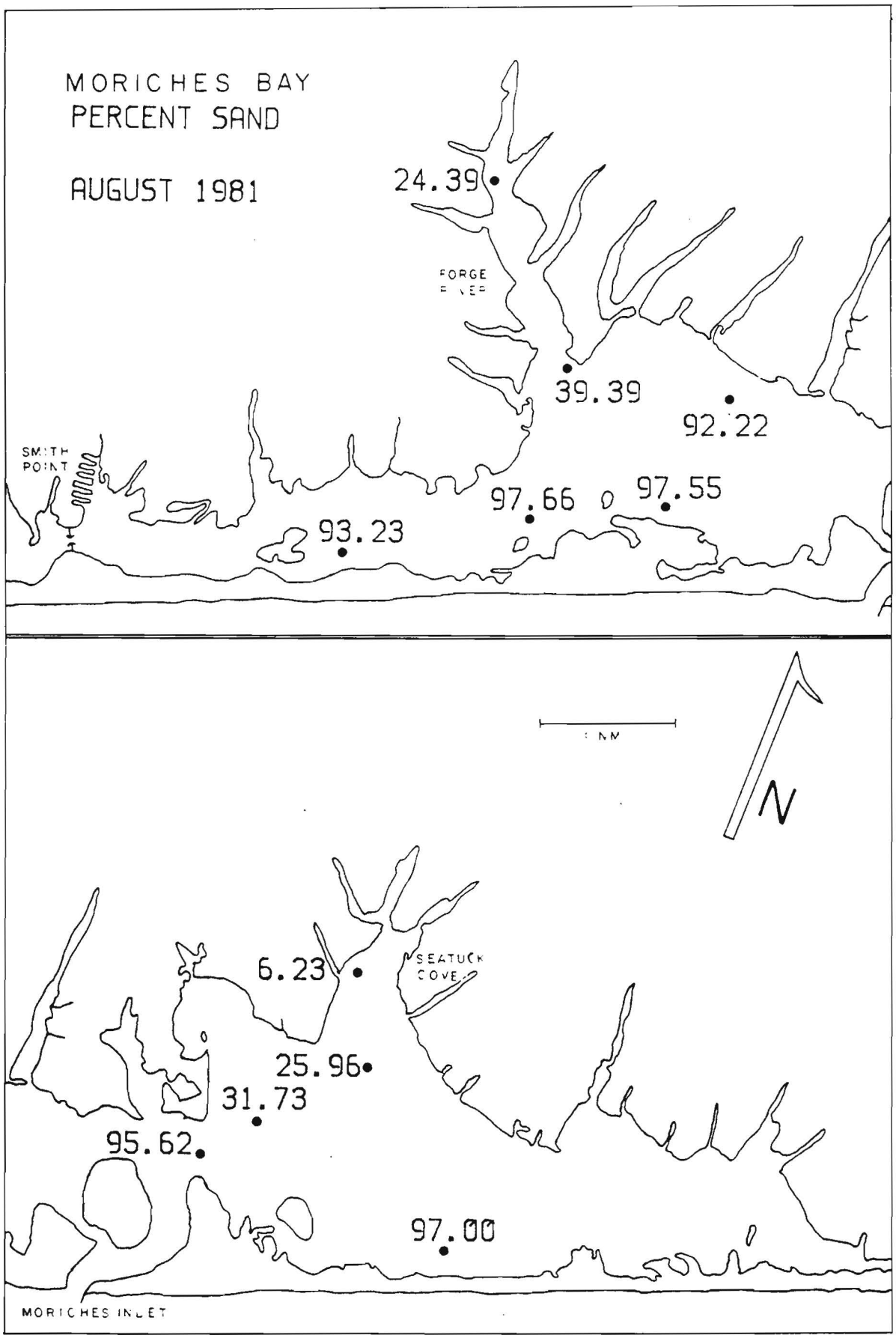

MORICHES BAY
PERCENT SAND
AUGUST 1981
24.39
FORGE
39.39
92.22
SMITH
POINT
97.66
97.55
93.23
1 NM
N
6.23
SEATUCK
COVE
25.96
31.73
95.62
97.00
MORICHES INLET

FIGURE 21

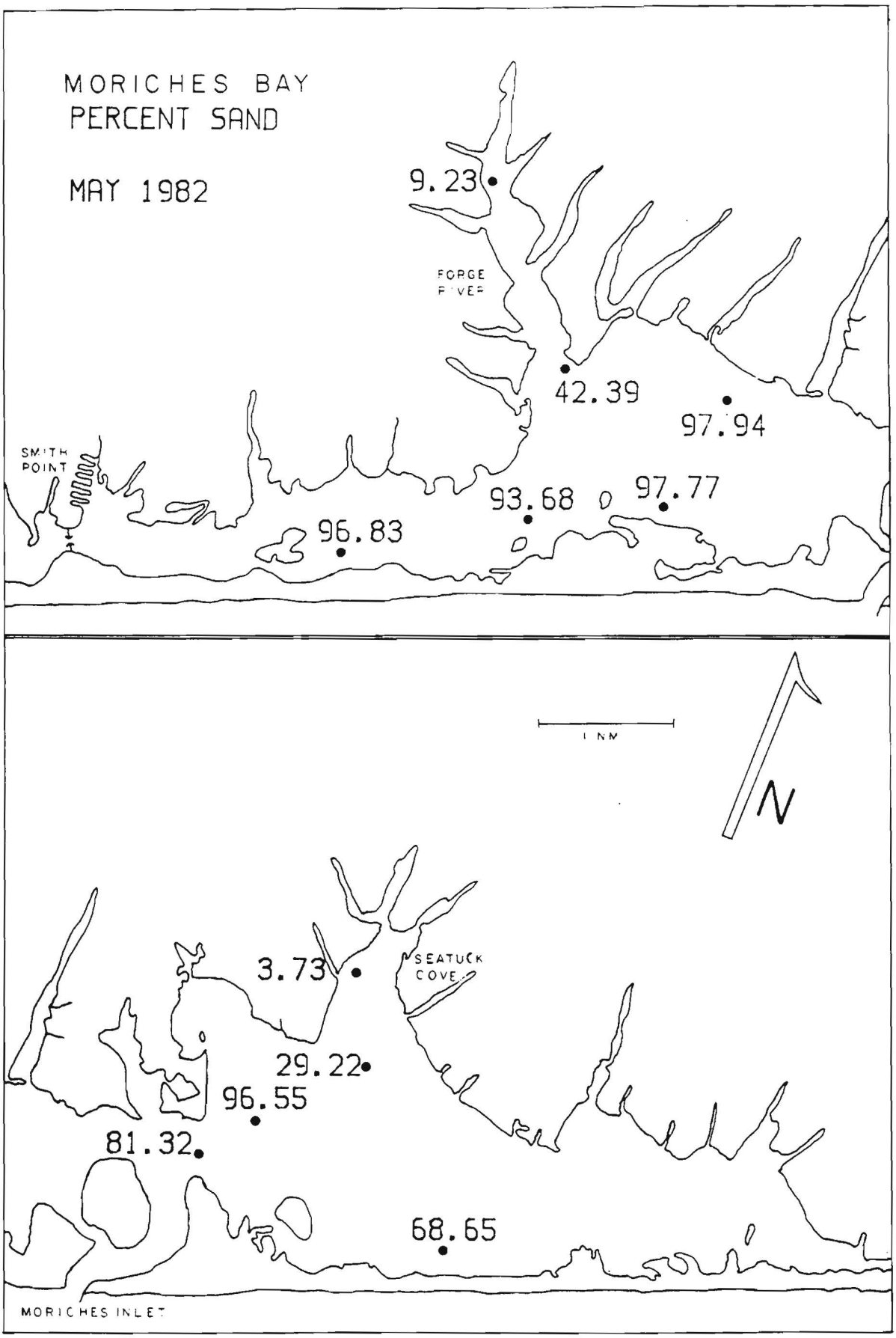

MORICHES BAY
PERCENT SAND
MAY 1982
9.23
FORGE
RIVER
42.39
97.94
SMITH
POINT
93.68
97.77
96.83
1 NM
N
SEATUCK
COVE
3.73
29.22
96.55
81.32
68.65
MORICHES INLET

FIGURE 22

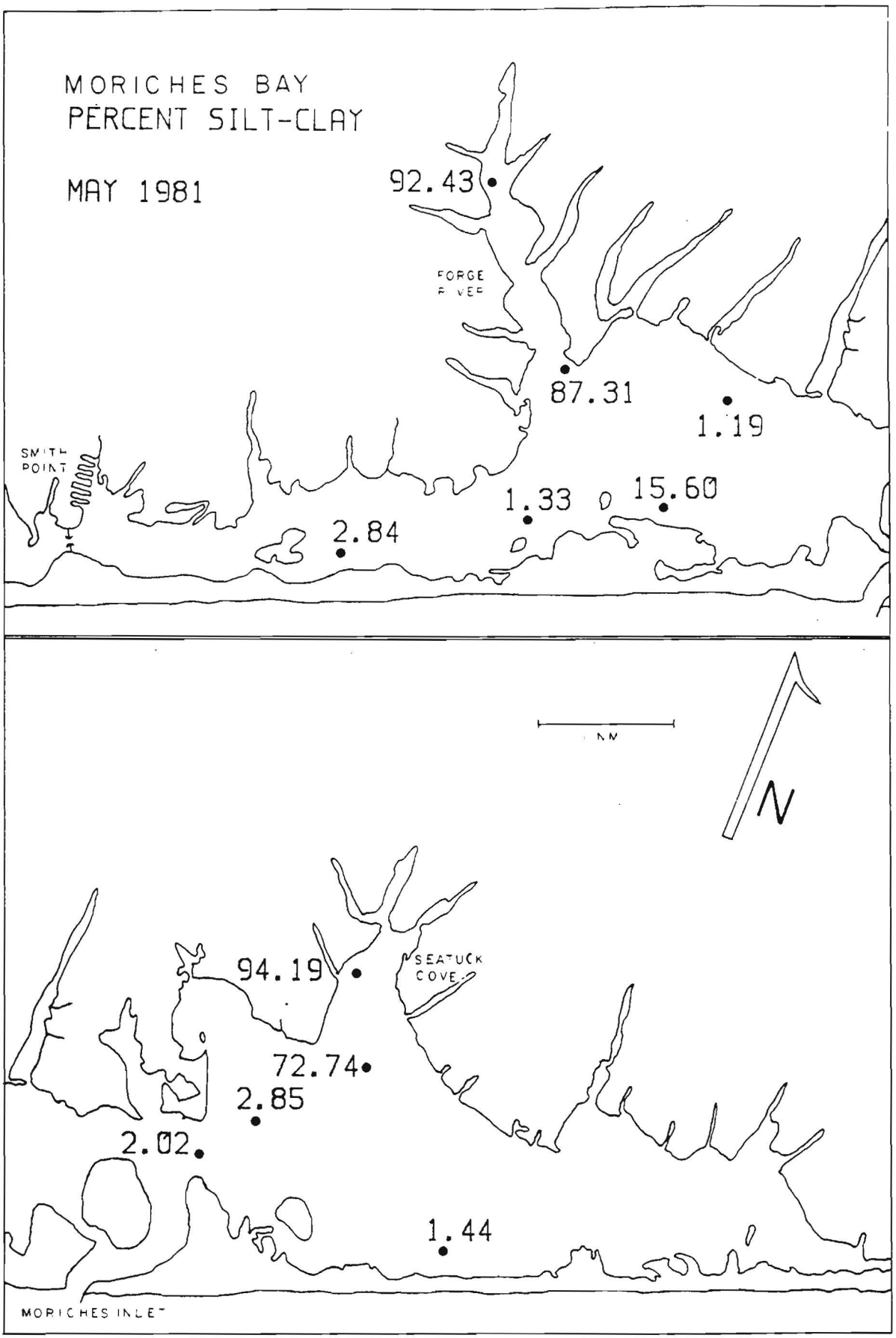

MORICHES BAY
PERCENT SILT-CLAY
MAY 1981
92.43
FORGE
87.31
1.19
SMITH
POINT
1.33
15.60
2.84
1 NM
N
94.19
SEATUCK
COVE
72.74
2.85
2.02
1.44
MORICHES INLET

FIGURE 23

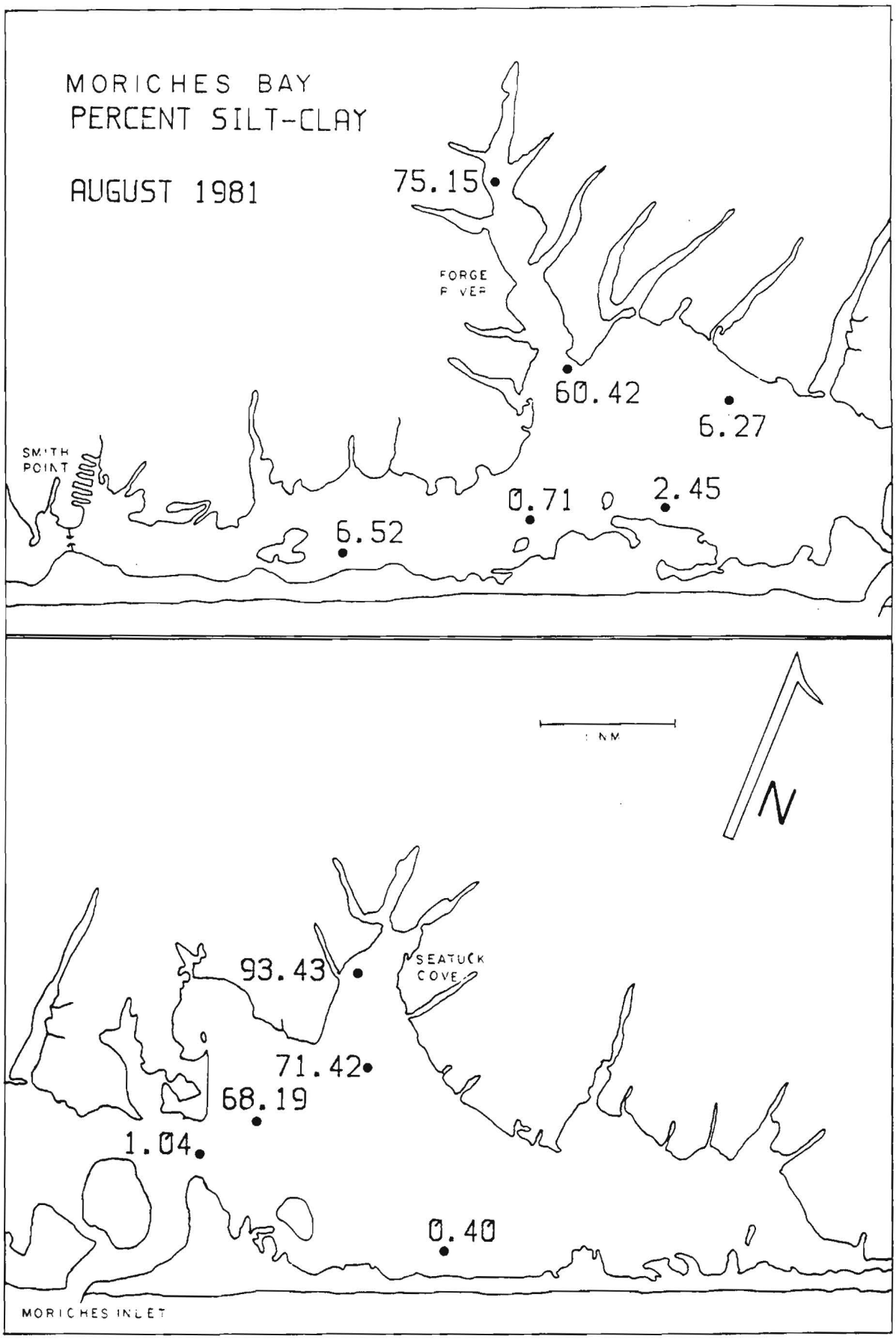

MORICHES BAY
PERCENT SILT-CLAY
AUGUST 1981
75.15
FORGE
RIVER
60.42
6.27
SMITH
POINT
0.71
2.45
6.52
1 NM
N
93.43
SEATUCK
COVE
71.42
68.19
1.04
0.40
MORICHES INLET

FIGURE 24

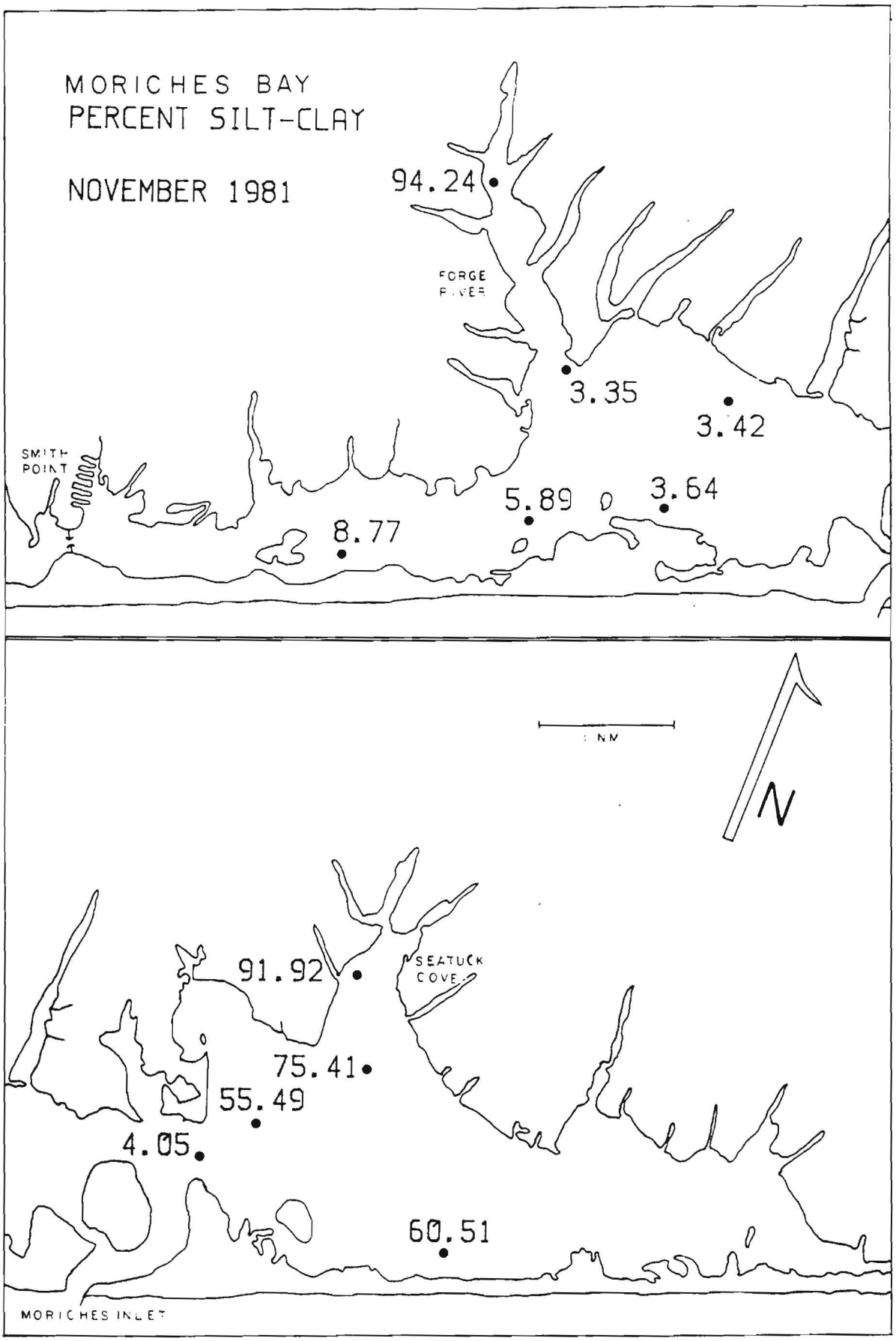

MORICHES BAY
PERCENT SILT-CLAY
NOVEMBER 1981
94.24
FORGE
RIVER
3.35
3.42
SMITH
POINT
5.89
3.64
8.77
1 NM
N
91.92
SEATUCK
COVE
75.41
55.49
4.05
60.51
MORICHES INLET

FIGURE 25

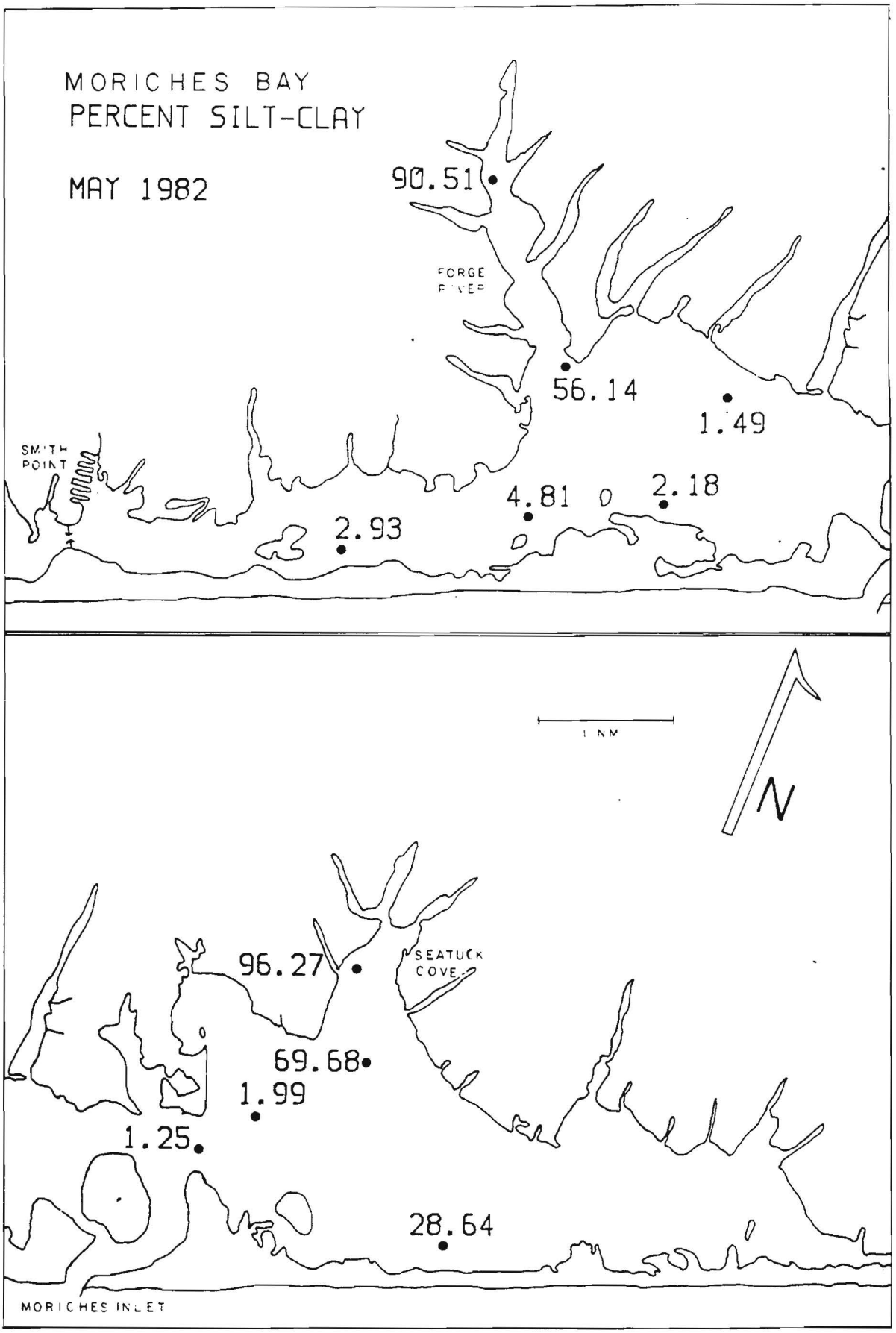

MORICHES BAY
PERCENT SILT-CLAY
MAY 1982
90.51
FORGE RIVER
56.14
1.49
SMITH POINT
4.81
2.18
2.93
1 NM
N
96.27
SEATUCK COVE
69.68
1.99
1.25
28.64
MORICHES INLET

FIGURE 26

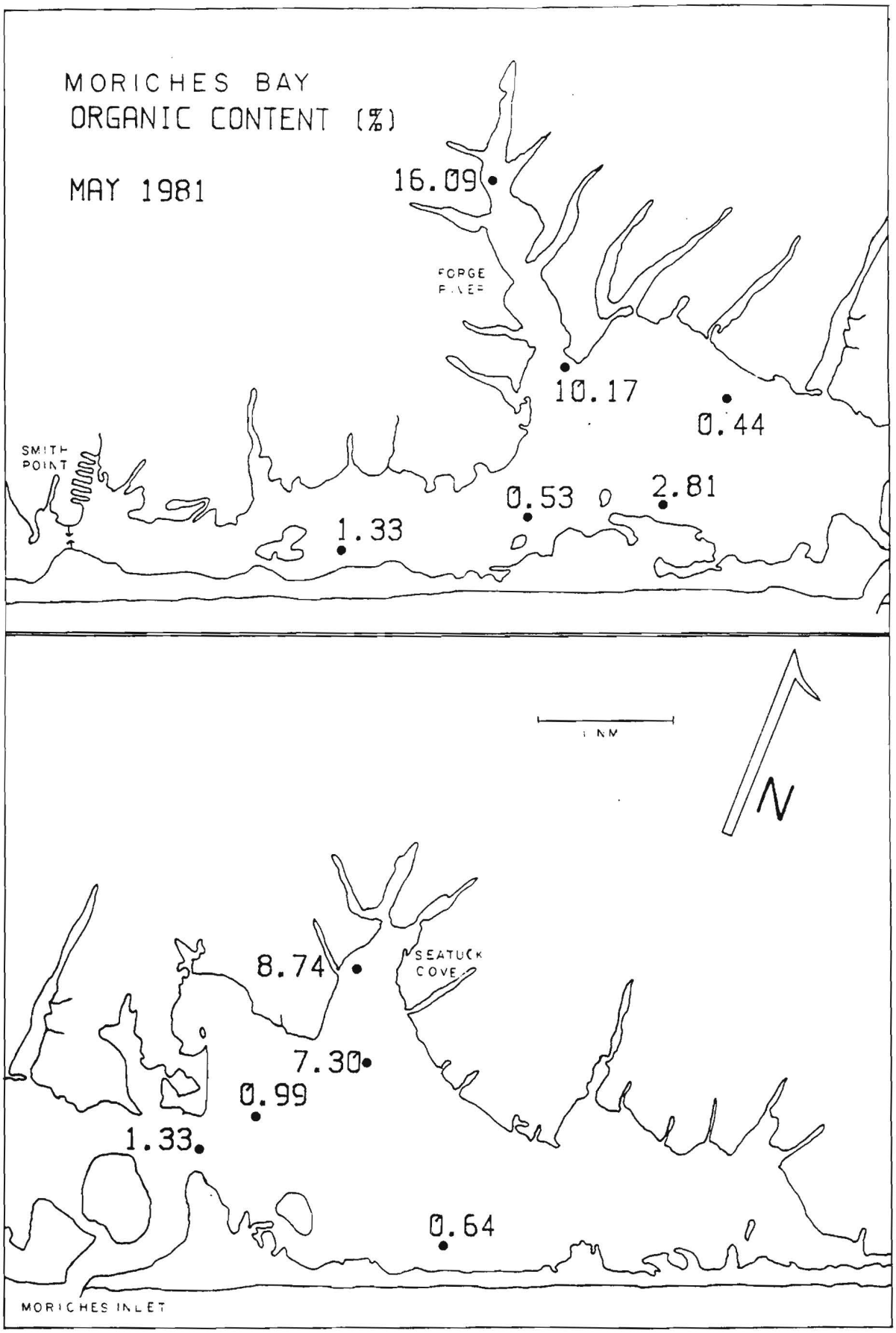

MORICHES BAY
ORGANIC CONTENT (%)
MAY 1981
16.09
FORGE
RIVER
10.17
0.44
SMITH
POINT
0.53
2.81
1.33
1 NM
N
8.74
SEATUCK
COVE
7.30
0.99
1.33
0.64
MORICHES INLET

FIGURE 27

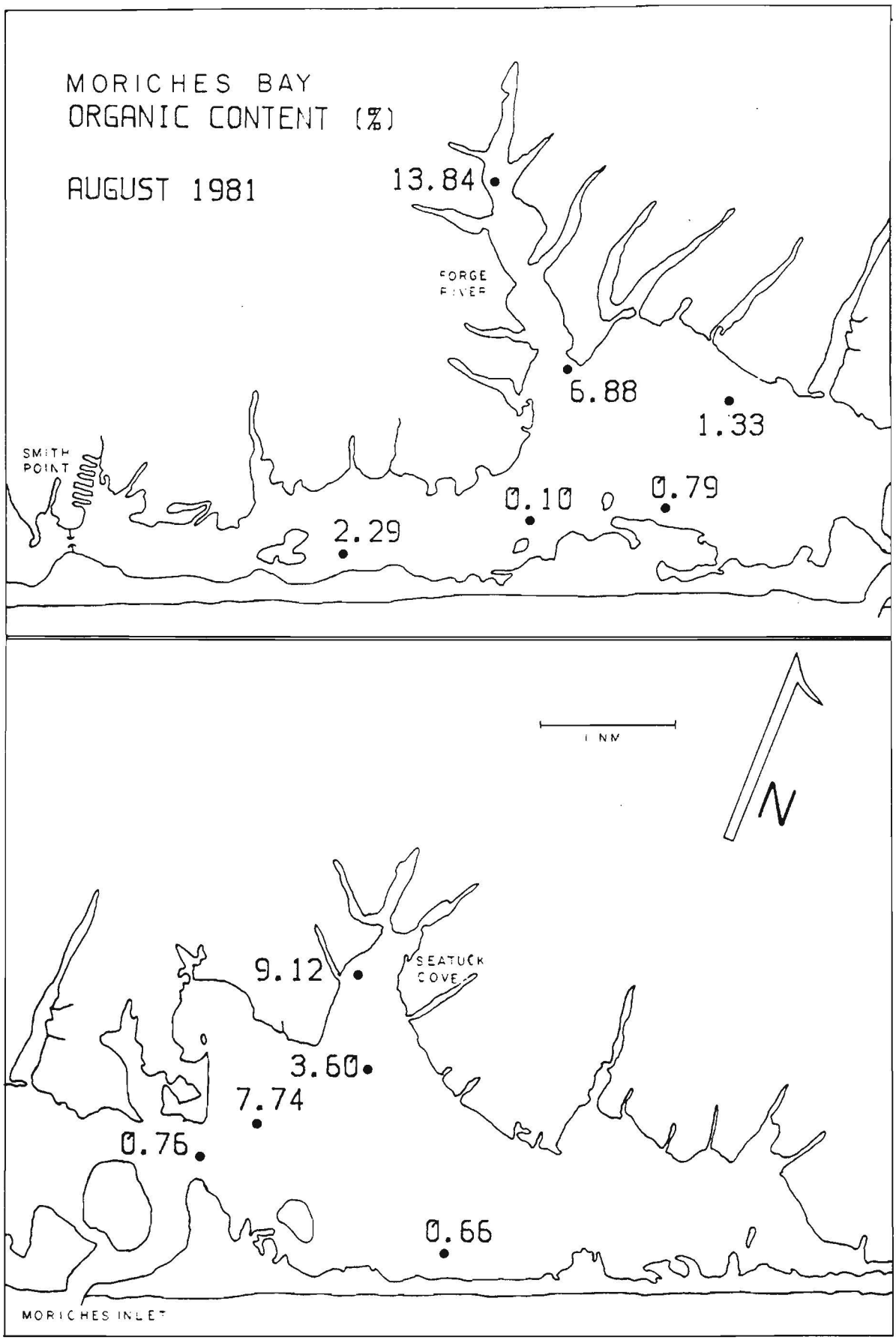

MORICHES BAY
ORGANIC CONTENT (%)
AUGUST 1981
13.84
FORGE RIVER
6.88
1.33
SMITH POINT
0.10
0.79
2.29
1 NM
N
9.12
SEATUCK COVE
3.60
7.74
0.76
0.66
MORICHES INLET

FIGURE 28

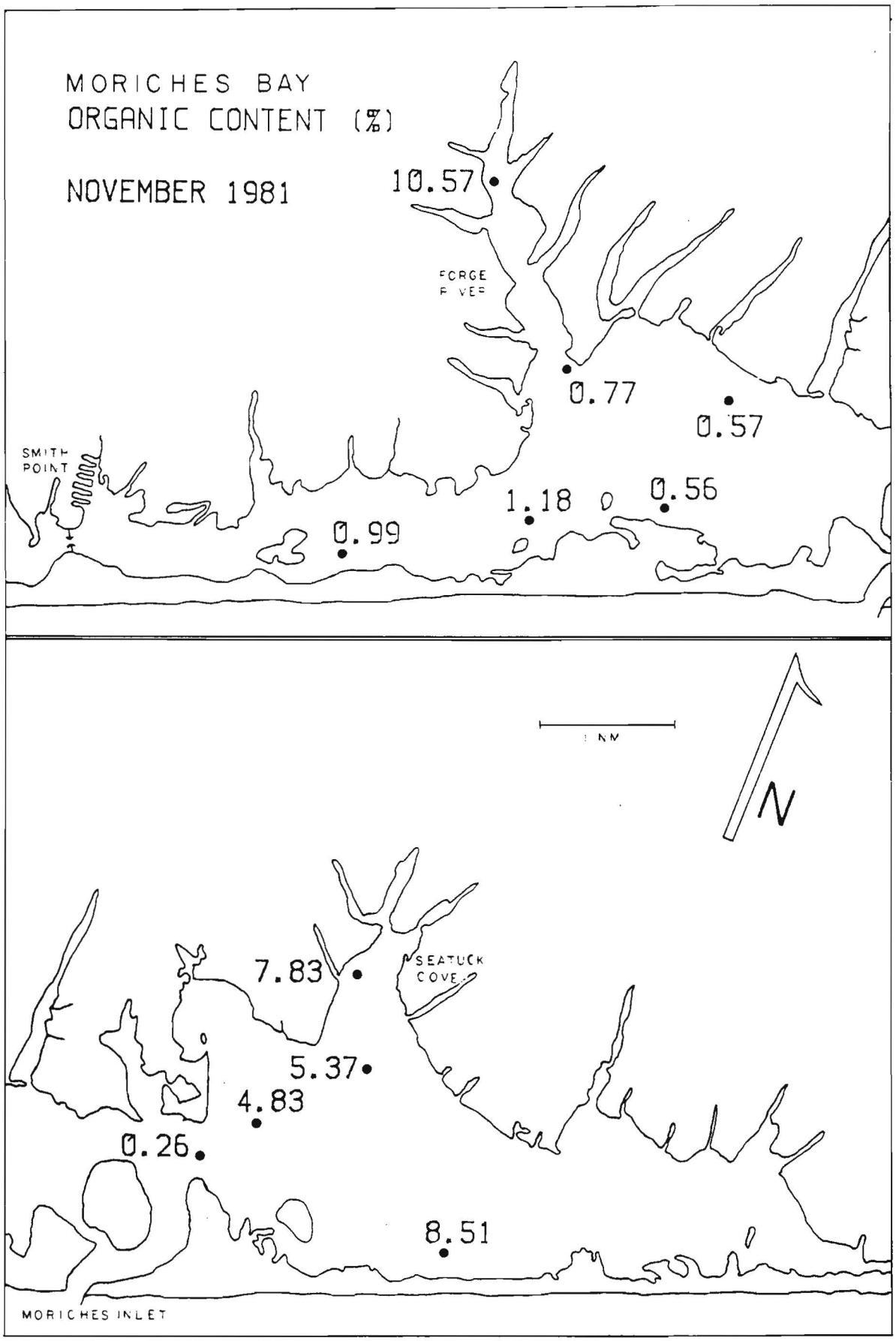

MORICHES BAY
ORGANIC CONTENT (%)
NOVEMBER 1981
10.57
FORGE
RIVER
0.77
0.57
SMITH
POINT
1.18
0.56
0.99
1 NM
N
7.83
SEATUCK
COVE
5.37
4.83
0.26
8.51
MORICHES INLET

FIGURE 29

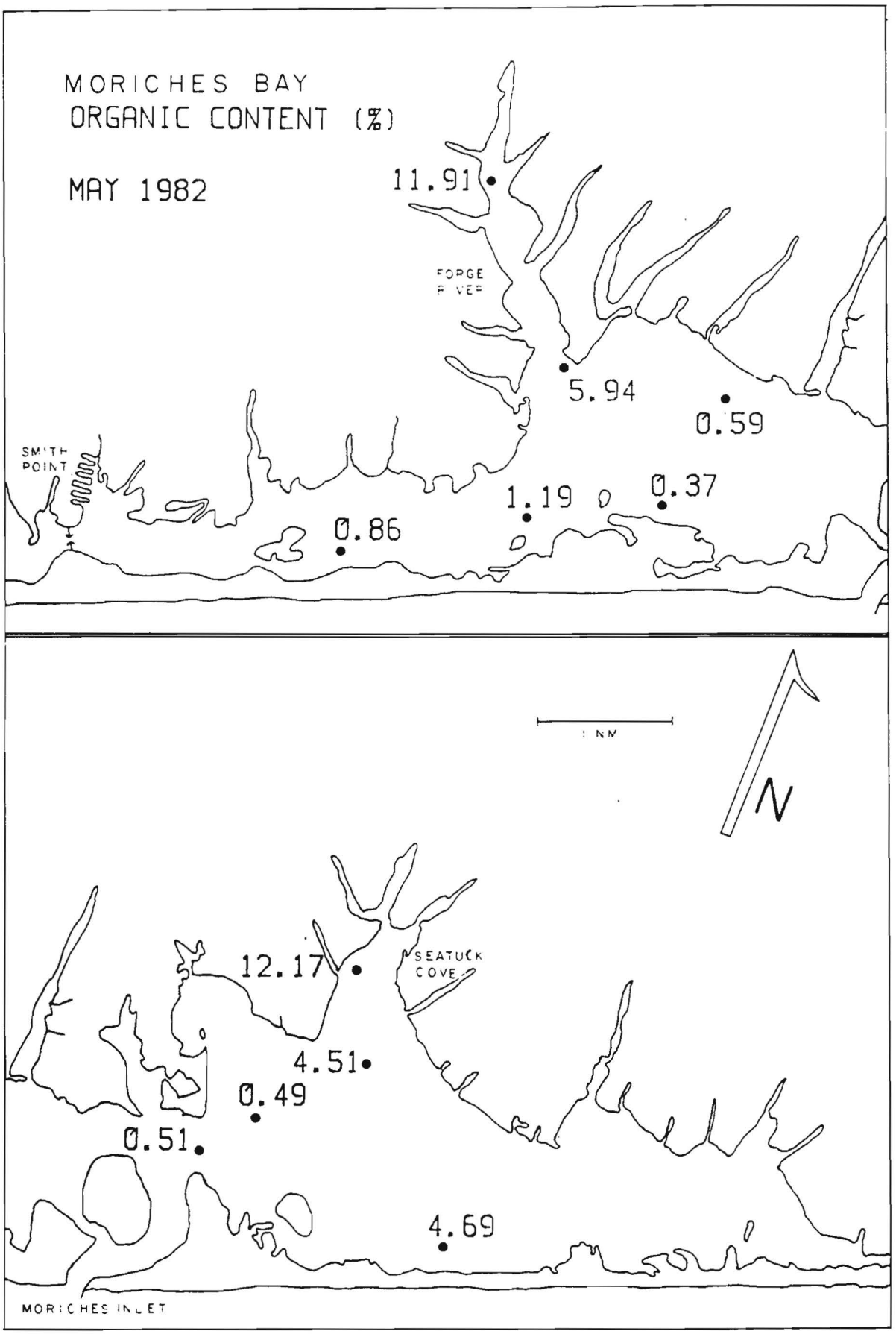

MORICHES BAY
ORGANIC CONTENT (%)
MAY 1982
11.91
FORGE
RIVER
5.94
0.59
SMITH
POINT
1.19
0.37
0.86
1 NM
N
12.17
SEATUCK
COVE
4.51
0.49
0.51
4.69
MORICHES INLET

FIGURE 30

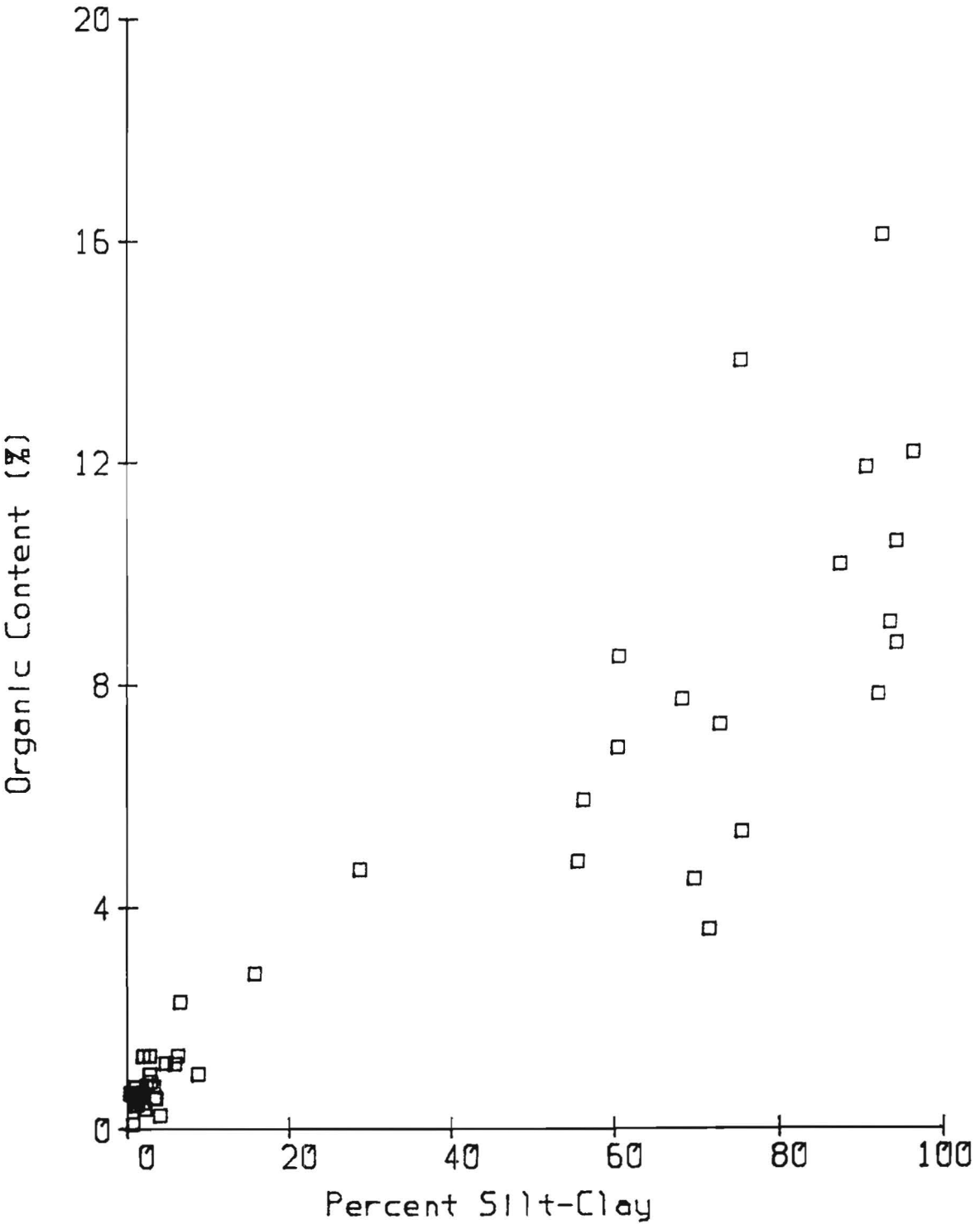

20
16
12
8
4
0
Organic Content (%)
0
20
40
60
80
100
Percent Silt-Clay

FIGURE 31

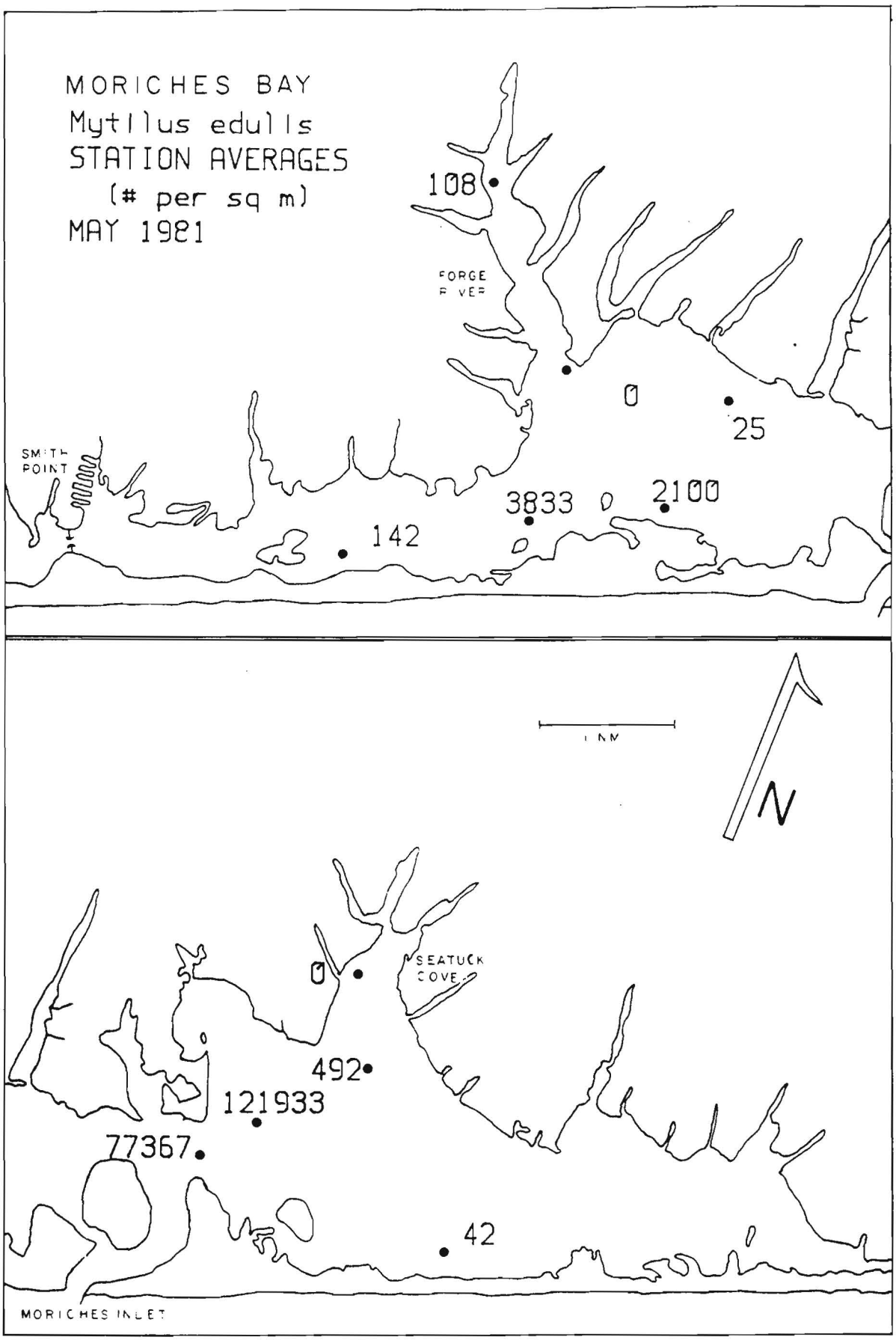

MORICHES BAY
Mytilus edulis
STATION AVERAGES
(# per sq m)
MAY 1981
108
FORGE
RIVER
0
25
SMITH
POINT
3833
2100
142
1 NM
N
0
SEATUCK
COVE
492
121933
77367
42
MORICHES INLET

FIGURE 32

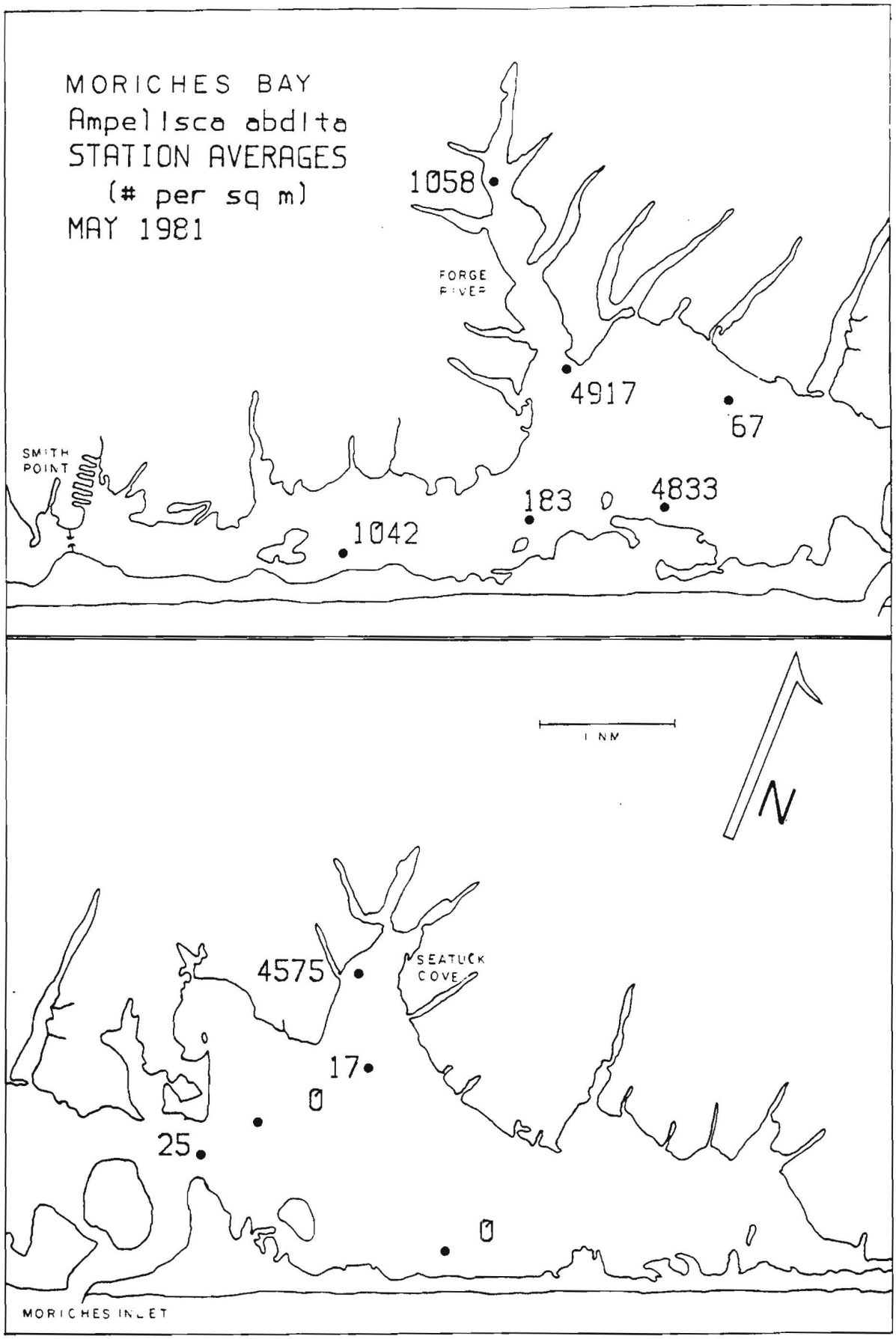

MORICHES BAY
Ampelisca abdita
STATION AVERAGES
(# per sq m)
MAY 1981
1058
FORGE RIVER
4917
67
SMITH POINT
183
0
4833
1042
1 NM
N
4575
SEATUCK COVE
17
0
25
0
MORICHES INLET

FIGURE 33

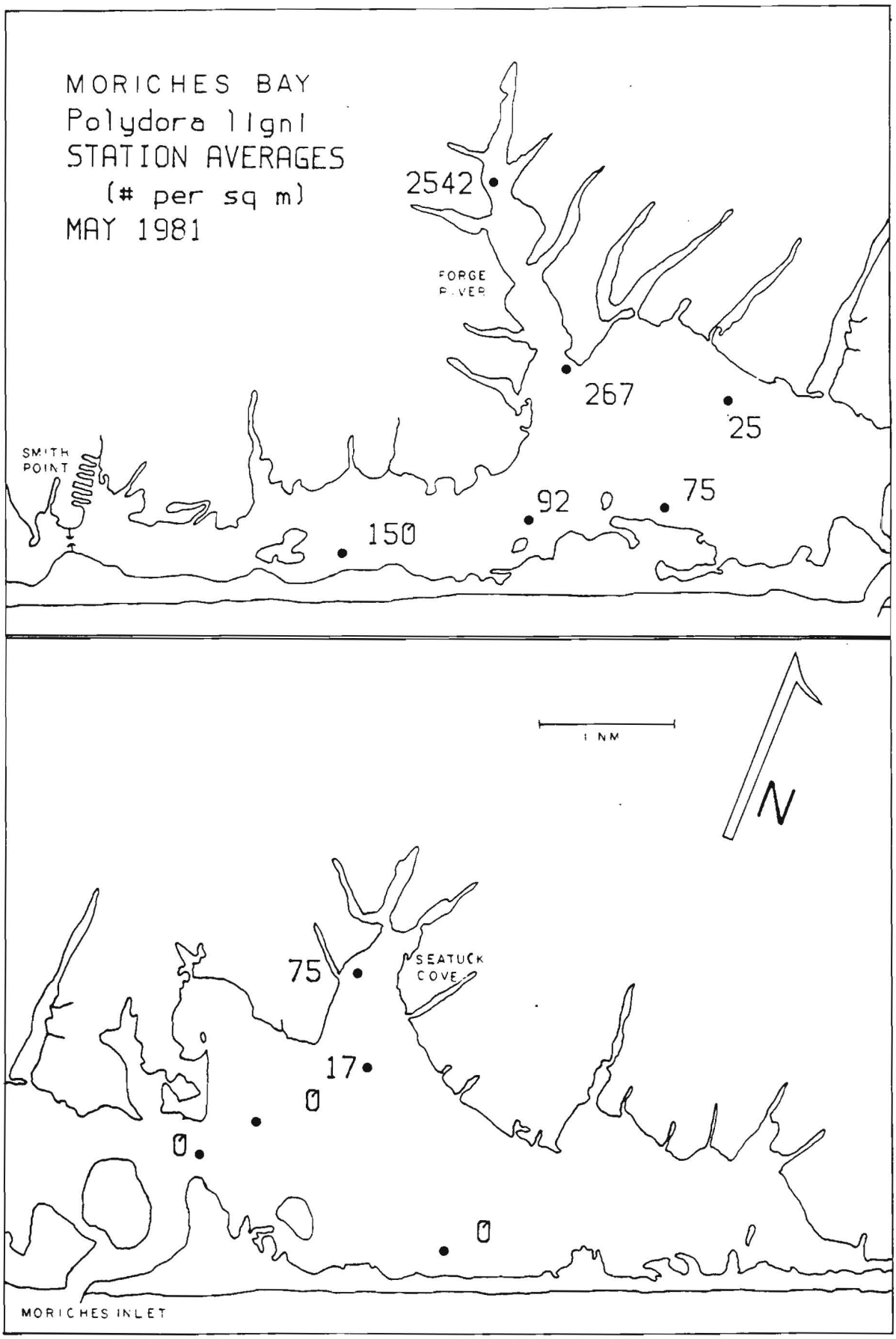

MORICHES BAY
Polydora ligni
STATION AVERAGES
(# per sq m)
MAY 1981
2542
FORGE RIVER
267
25
SMITH POINT
92
75
150
1 NM
N
75
SEATUCK COVE
17
0
0
0
MORICHES INLET

FIGURE 34

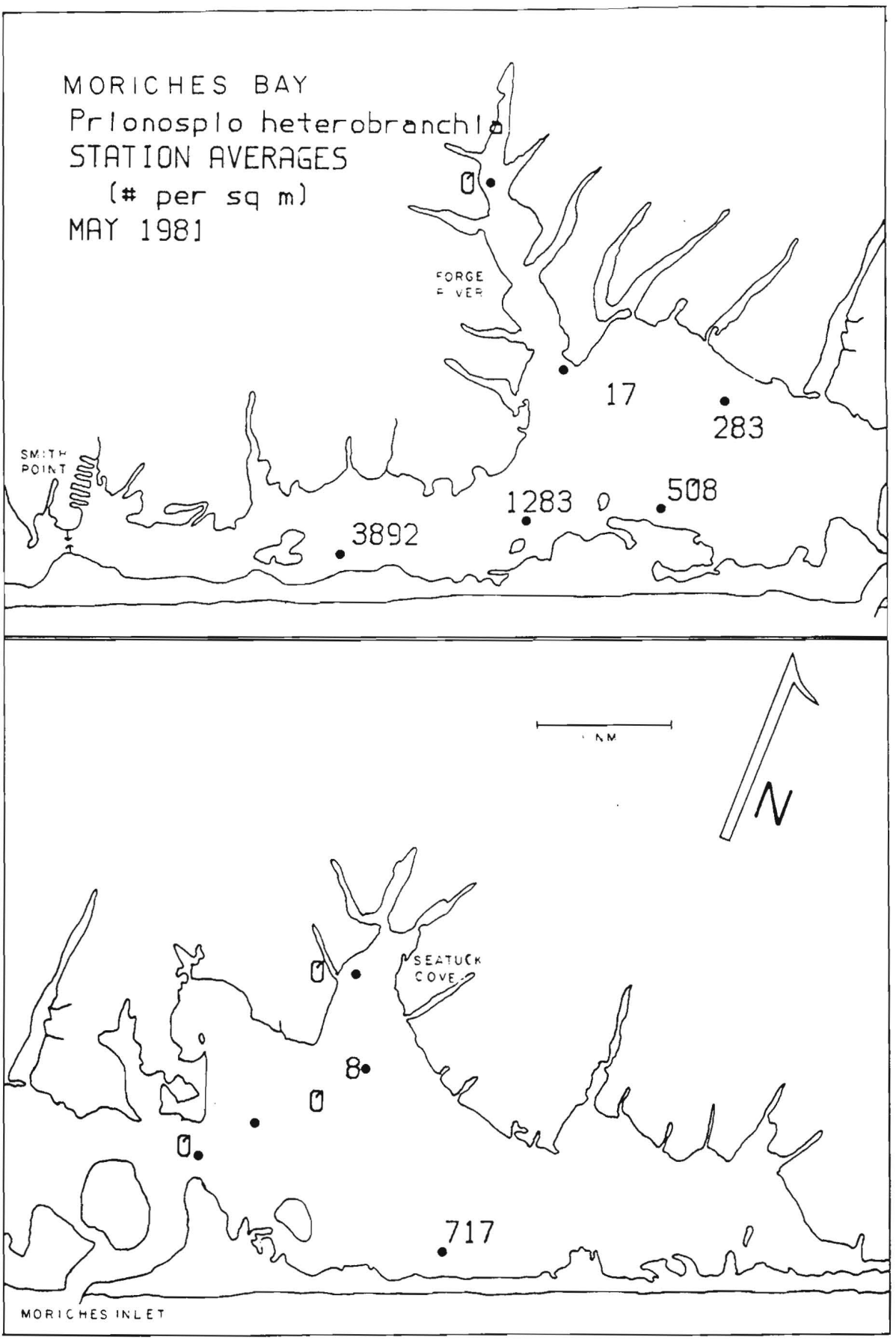

MORICHES BAY
Prionospio heterobranchia
STATION AVERAGES
(# per sq m)
MAY 1981
FORGE
RIVER
SMITH
POINT
0
17
283
1283
0
508
3892
1 NM
N
SEATUCK
COVE
0
8
0
0
717
MORICHES INLET

FIGURE 35

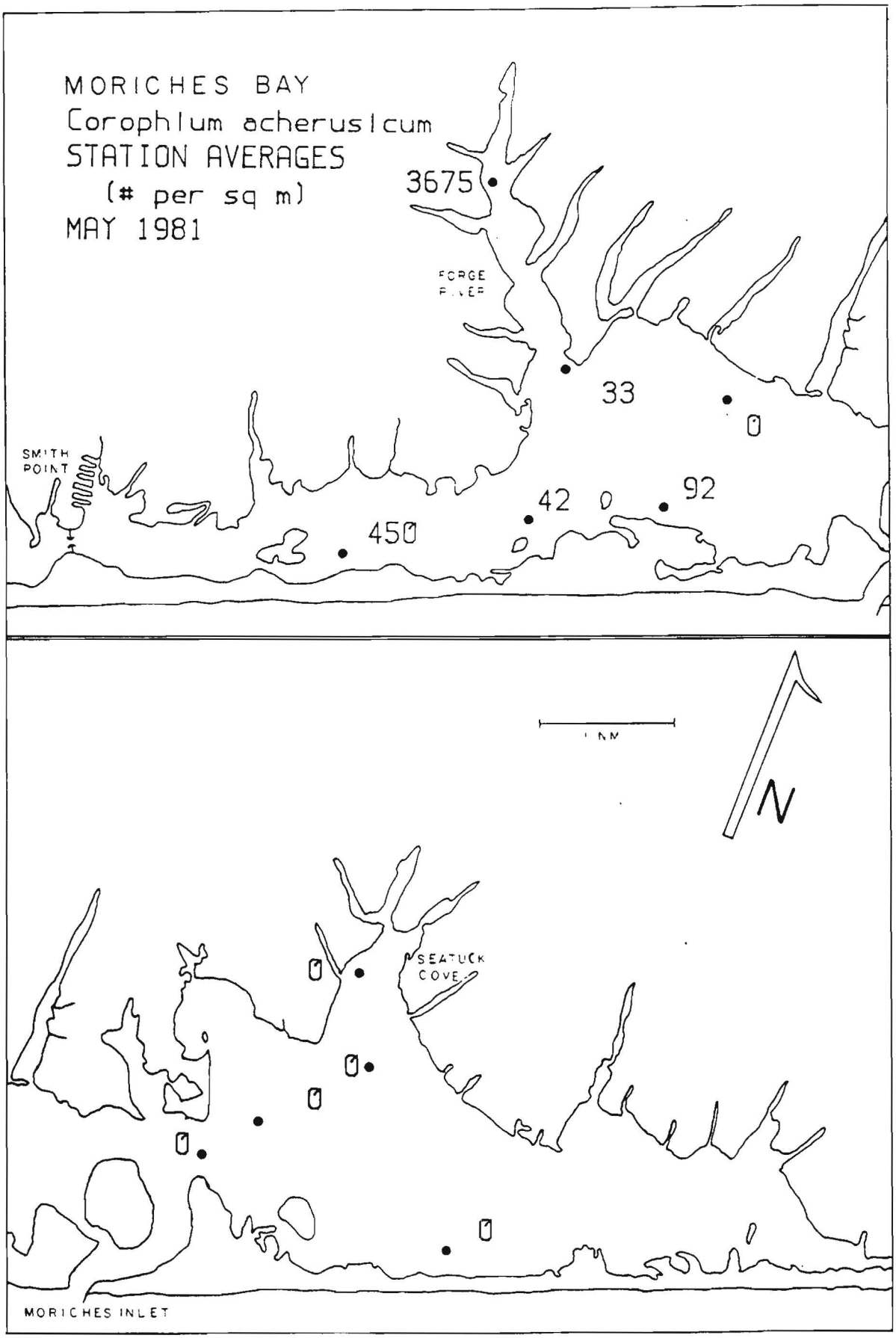

MORICHES BAY
Corophium acherusicum
STATION AVERAGES
(# per sq m)
MAY 1981
3675
FORGE
33
0
SMITH
POINT
42
0
92
450
1 NM
N
SEATUCK
COVE
MORICHES INLET

FIGURE 36

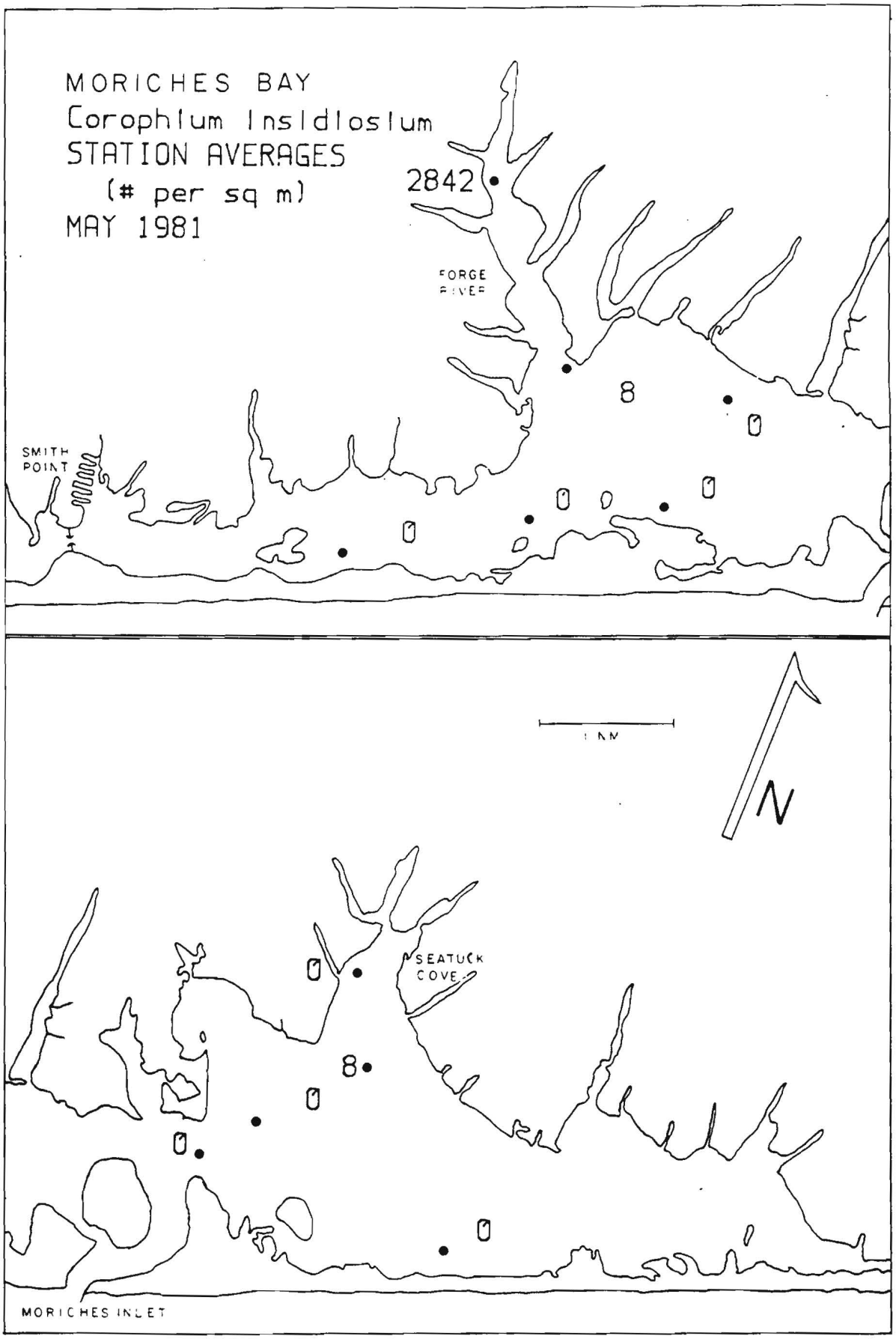

MORICHES BAY
Corophium Insidiosum
STATION AVERAGES
(# per sq m)
MAY 1981
2842
FORGE RIVER
8
SMITH POINT
1 NM
N
SEATUCK COVE
8
MORICHES INLET

FIGURE 37

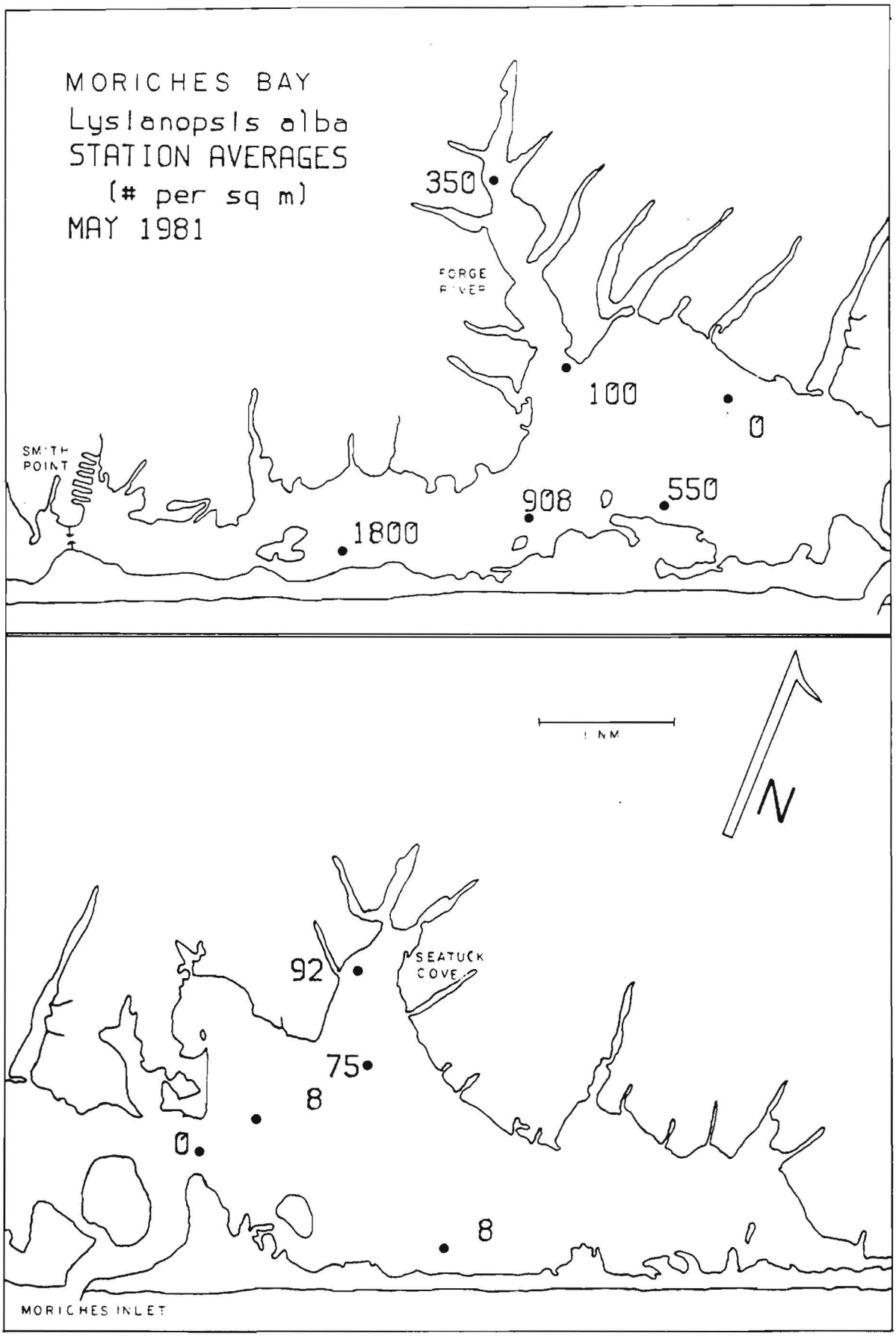

MORICHES BAY
Lysianopsis alba
STATION AVERAGES
(# per sq m)
MAY 1981
350
FORGE RIVER
100
0
SMITH POINT
908
550
1800
1 NM
N
92
SEATUCK COVE
75
8
0
8
MORICHES INLET

FIGURE 38

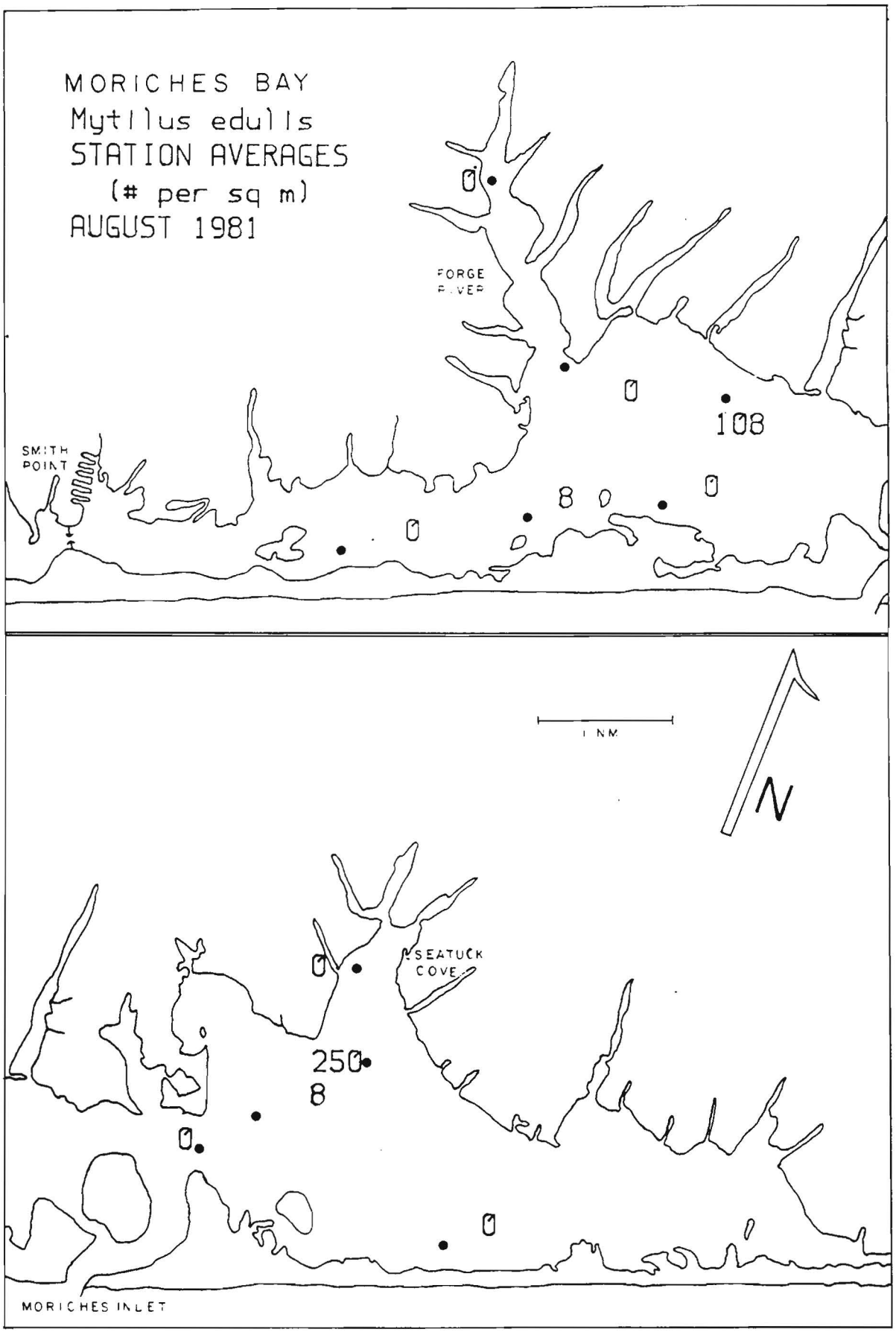

MORICHES BAY
Mytilus edulis
STATION AVERAGES
(# per sq m)
AUGUST 1981
FORGE RIVER
SMITH POINT
0
108
8
0
0
0
1 NM
N
SEATUCK COVE
250
8
0
0
MORICHES INLET

FIGURE 39

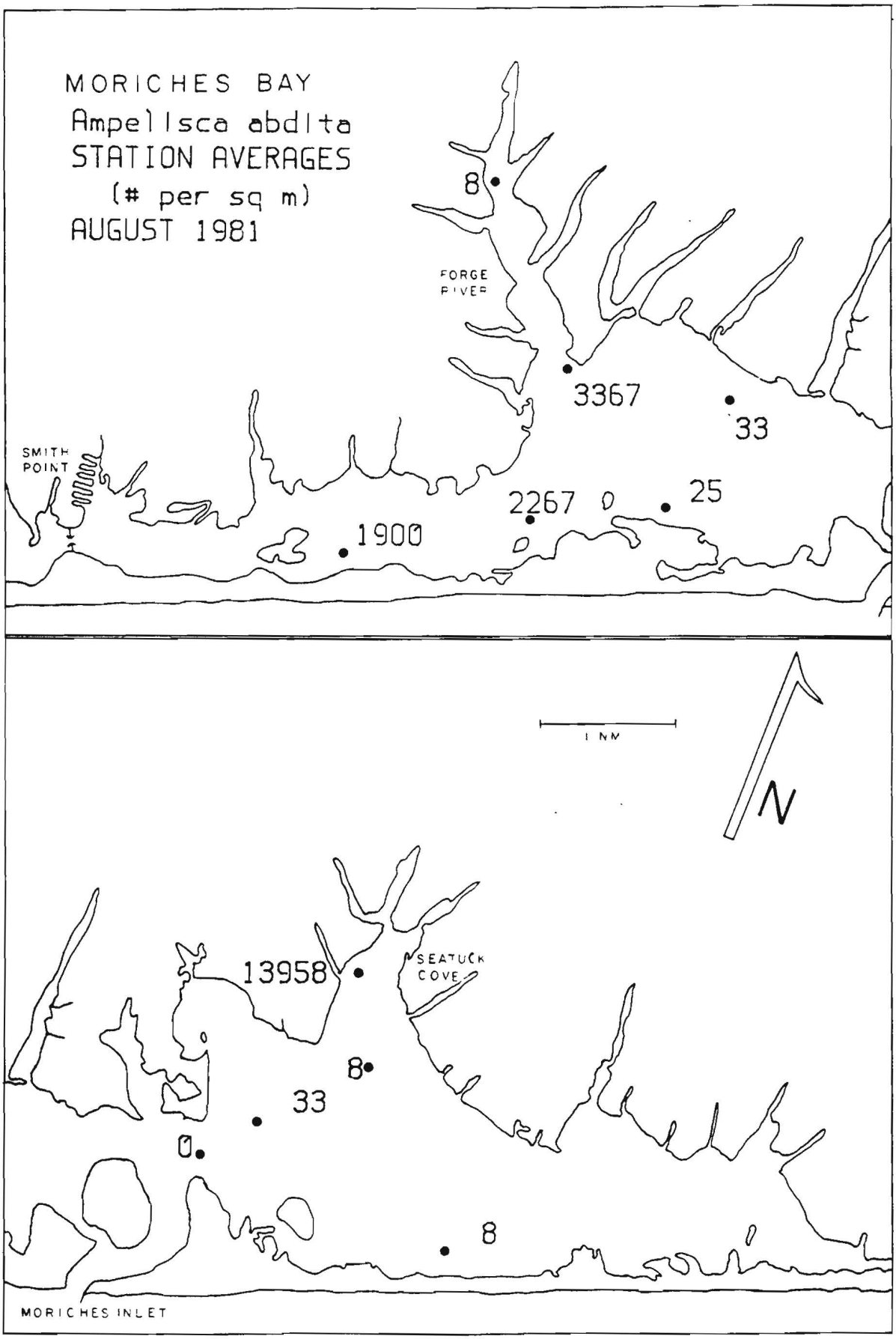

MORICHES BAY
Ampelisca abdita
STATION AVERAGES
(# per sq m)
AUGUST 1981
8
FORGE RIVER
3367
33
SMITH POINT
2267
0
25
1900
1 NM
N
13958
SEATUCK COVE
8
33
0
8
MORICHES INLET

FIGURE 40

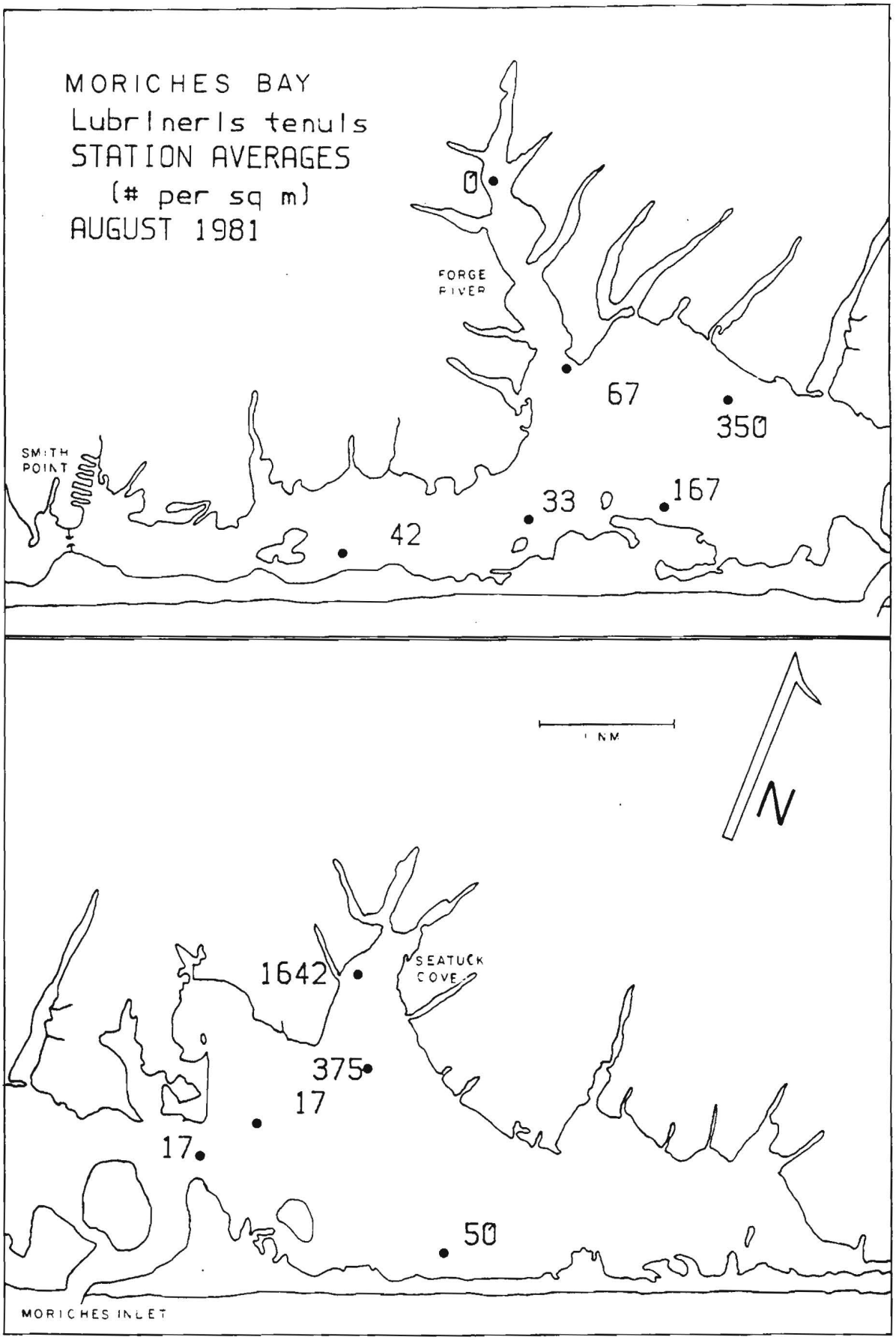

MORICHES BAY
Lubrinerls tenuls
STATION AVERAGES
(# per sq m)
AUGUST 1981
FORGE RIVER
SMITH POINT
0
67
350
33
167
42
1642
SEATUCK COVE
375
17
17
50
1 NM
N
MORICHES INLET

FIGURE 41

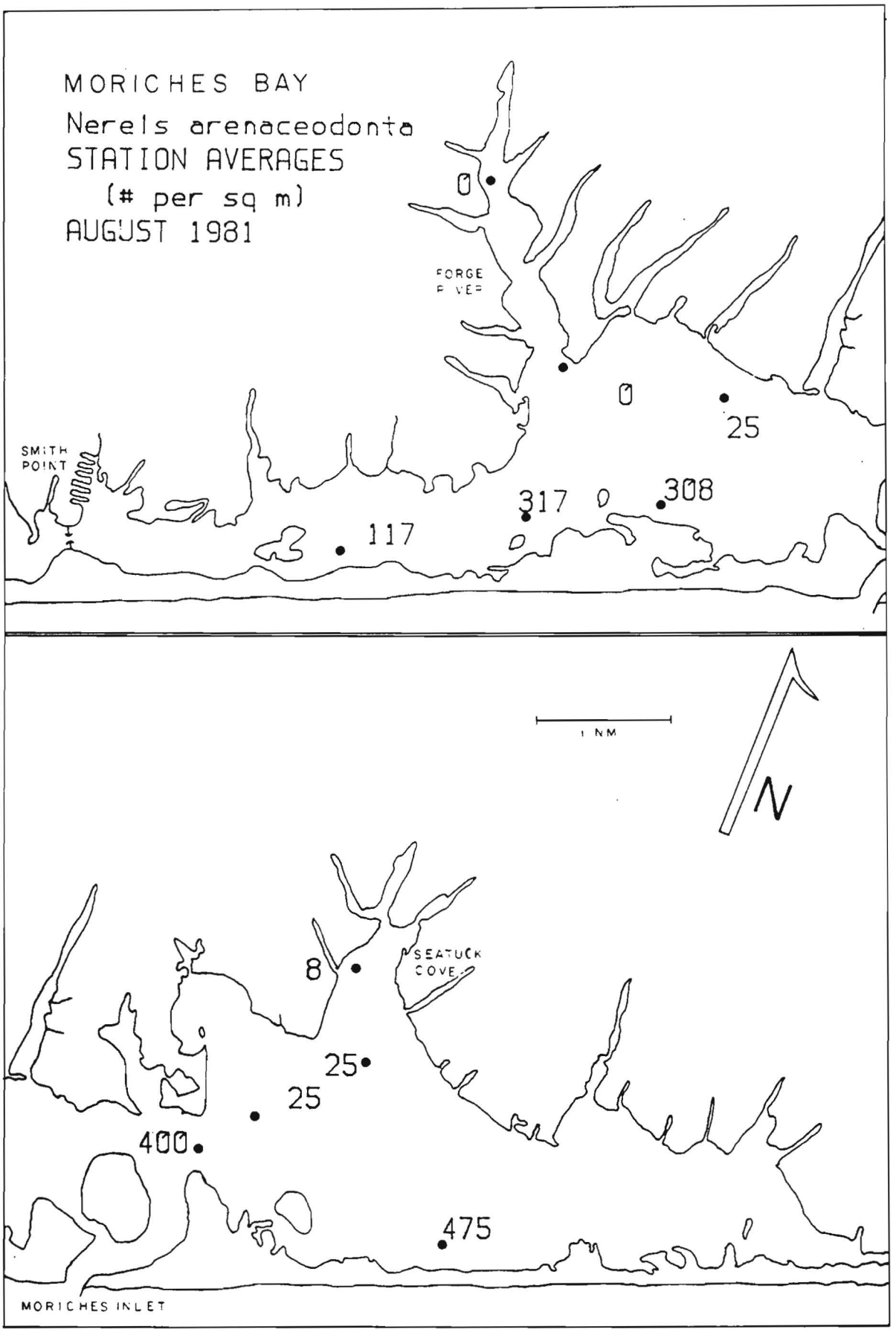

MORICHES BAY
Nereis arenaceodonta
STATION AVERAGES
(# per sq m)
AUGUST 1981
0
FORGE
RIVER
0
25
SMITH
POINT
317
308
117
1 NM
N
SEATUCK
COVE
8
25
25
400
475
MORICHES INLET

FIGURE 42

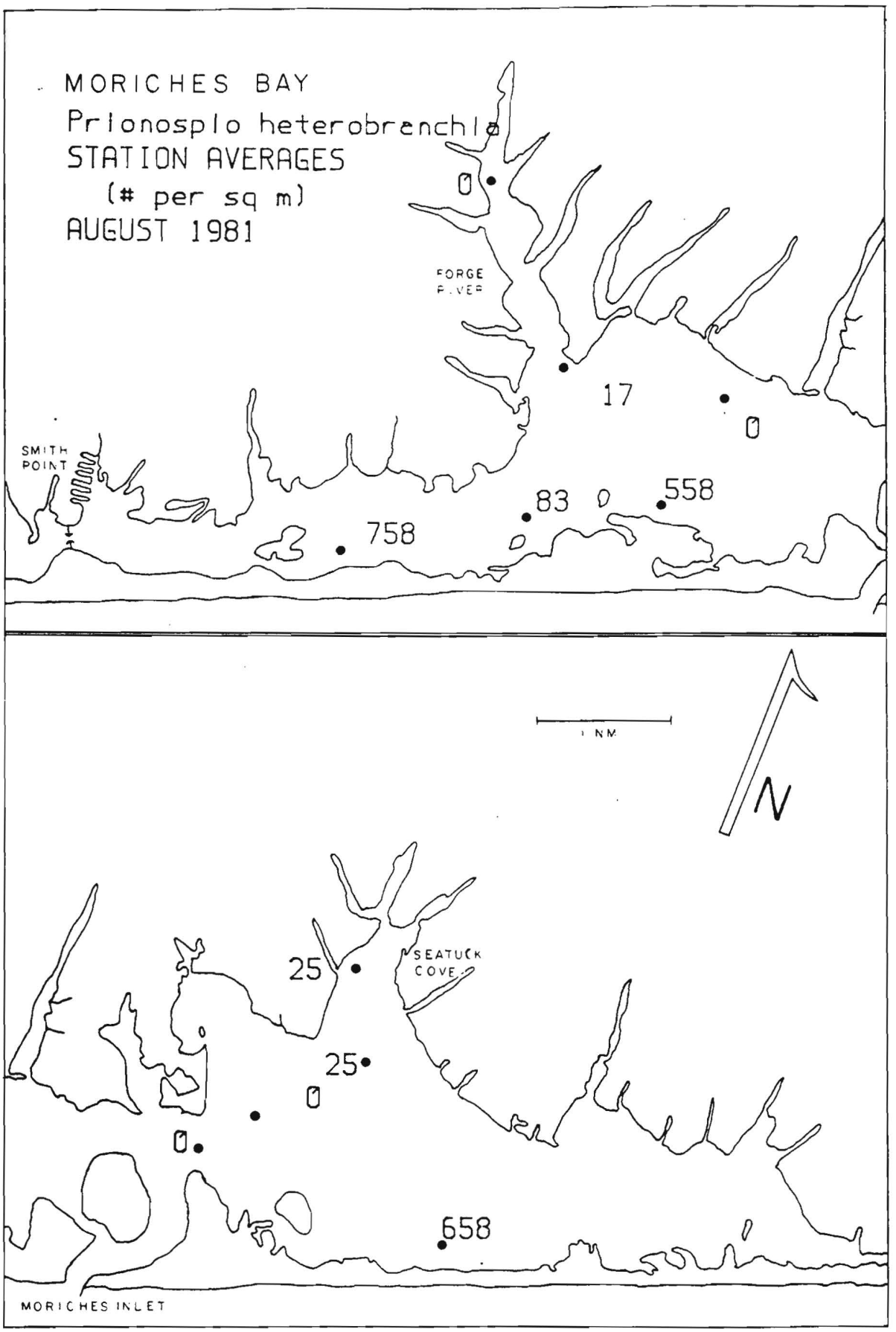

MORICHES BAY
Prionospio heterobranchia
STATION AVERAGES
(# per sq m)
AUGUST 1981
FORGE RIVER
SMITH POINT
0
17
0
83
558
758
1 NM
N
SEATUCK COVE
25
25
0
0
658
MORICHES INLET

FIGURE 43

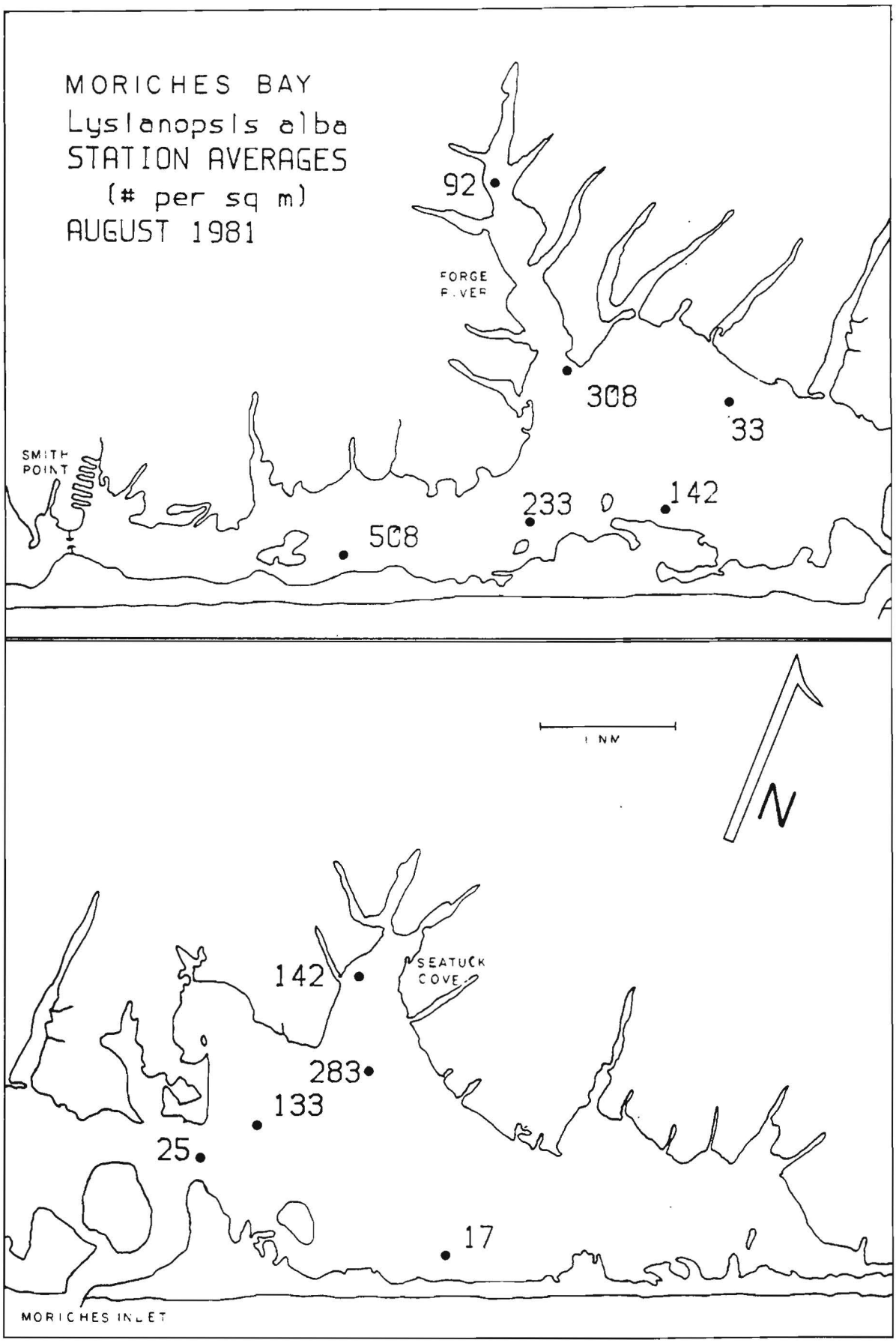

MORICHES BAY
Lysianopsis alba
STATION AVERAGES
(# per sq m)
AUGUST 1981
92
FORGE
RIVER
308
33
SMITH
POINT
233
142
508
1 NM
N
142
SEATUCK
COVE
283
133
25
17
MORICHES INLET

FIGURE 44

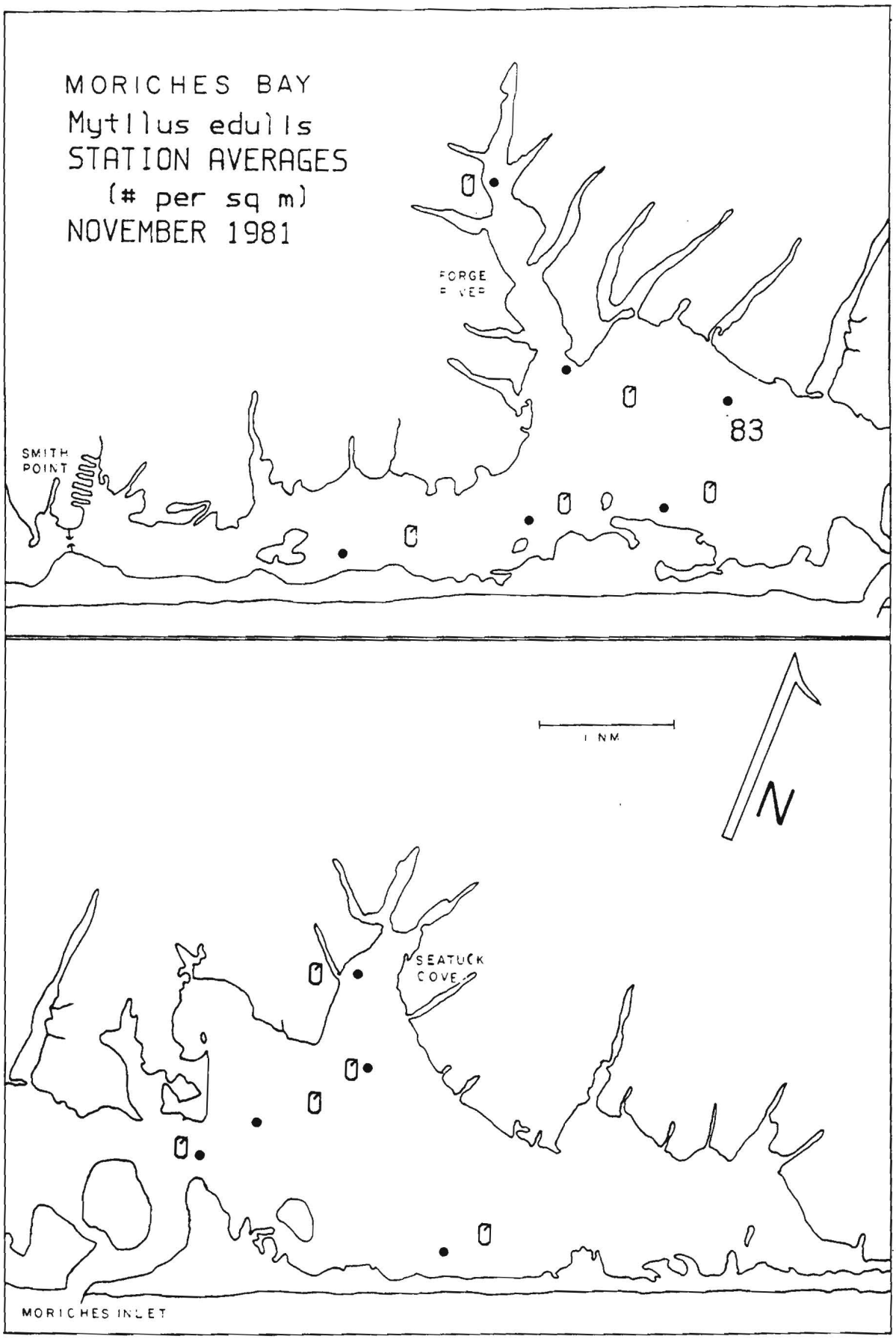

MORICHES BAY
Mytilus edulis
STATION AVERAGES
(# per sq m)
NOVEMBER 1981
FORGE
RIVER
83
SMITH
POINT
1 NM
N
SEATUCK
COVE
MORICHES INLET

FIGURE 45

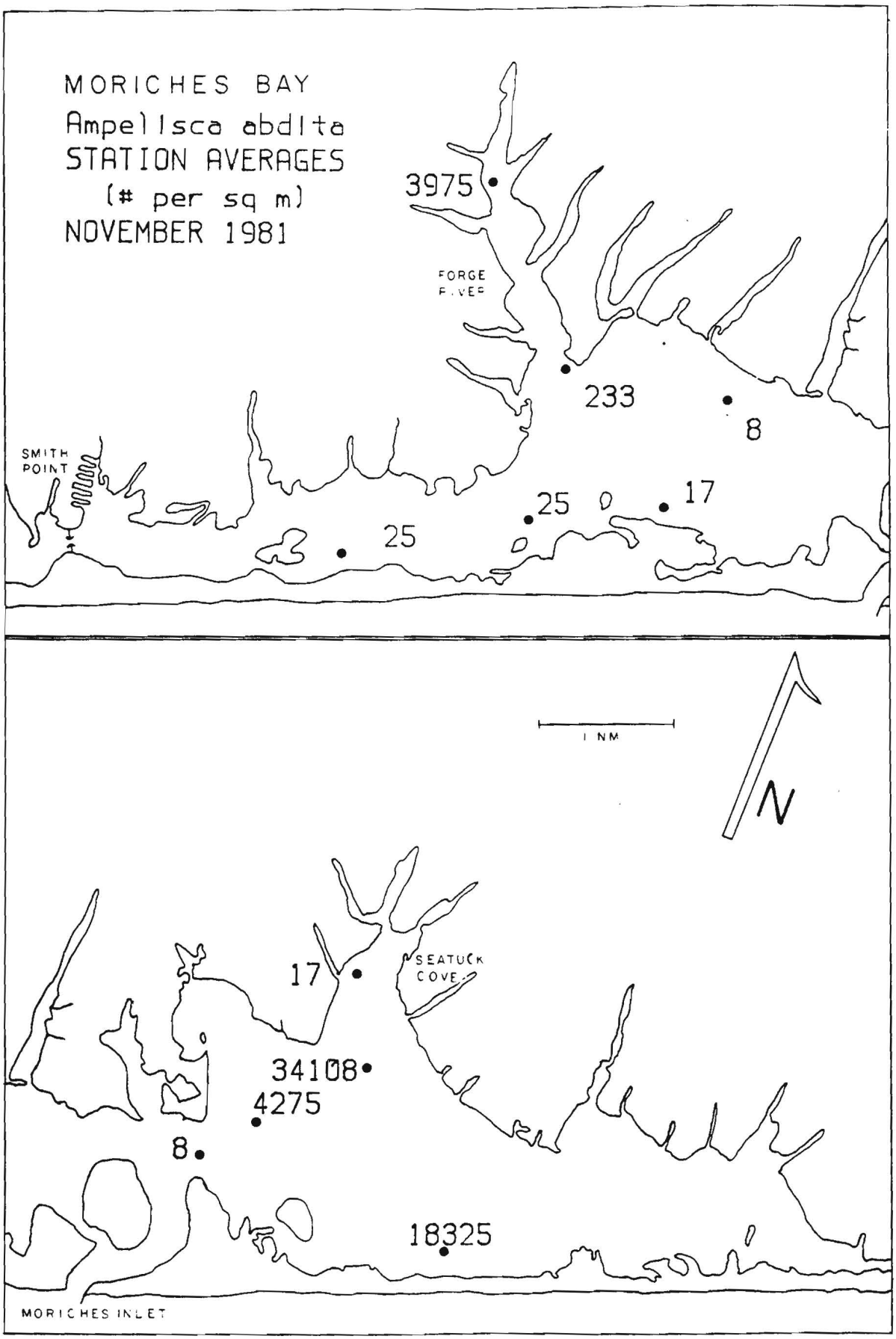

MORICHES BAY
Ampelisca abdita
STATION AVERAGES
(# per sq m)
NOVEMBER 1981
3975
FORGE
RIVER
233
8
SMITH
POINT
25
25
17
1 NM
N
17
SEATUCK
COVE
34108
4275
8
18325
MORICHES INLET

FIGURE 46

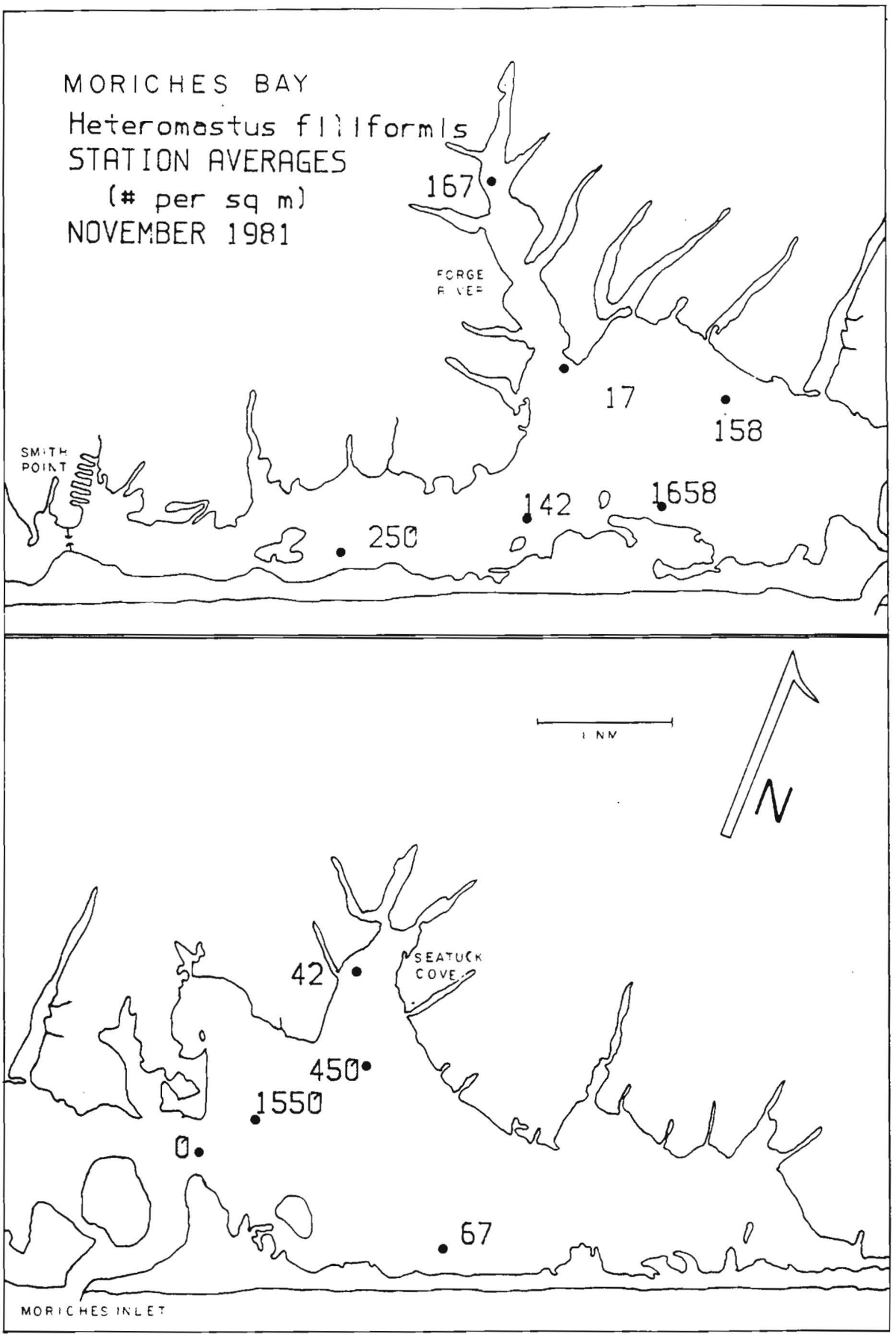

MORICHES BAY
Heteromastus filiformis
STATION AVERAGES
(# per sq m)
NOVEMBER 1981
167
FORGE RIVER
17
158
SMITH POINT
142
1658
250
1 NM
N
42
SEATUCK COVE
450
1550
0
67
MORICHES INLET

FIGURE 47

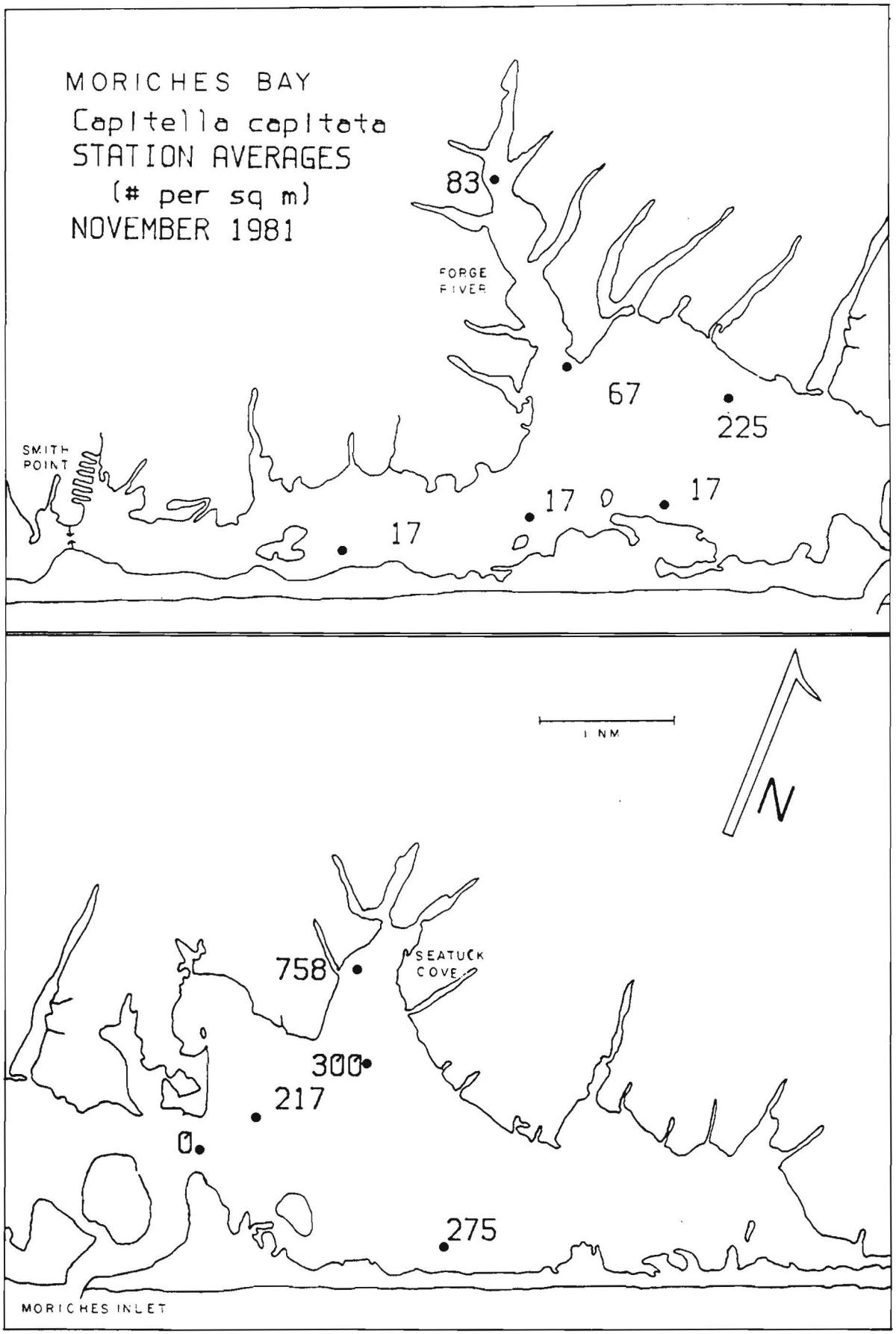

MORICHES BAY
Capitella capitata
STATION AVERAGES
(# per sq m)
NOVEMBER 1981
83
FORGE RIVER
67
225
SMITH POINT
17
17
17
1 NM
N
758
SEATUCK COVE
300
217
0
275
MORICHES INLET

FIGURE 48

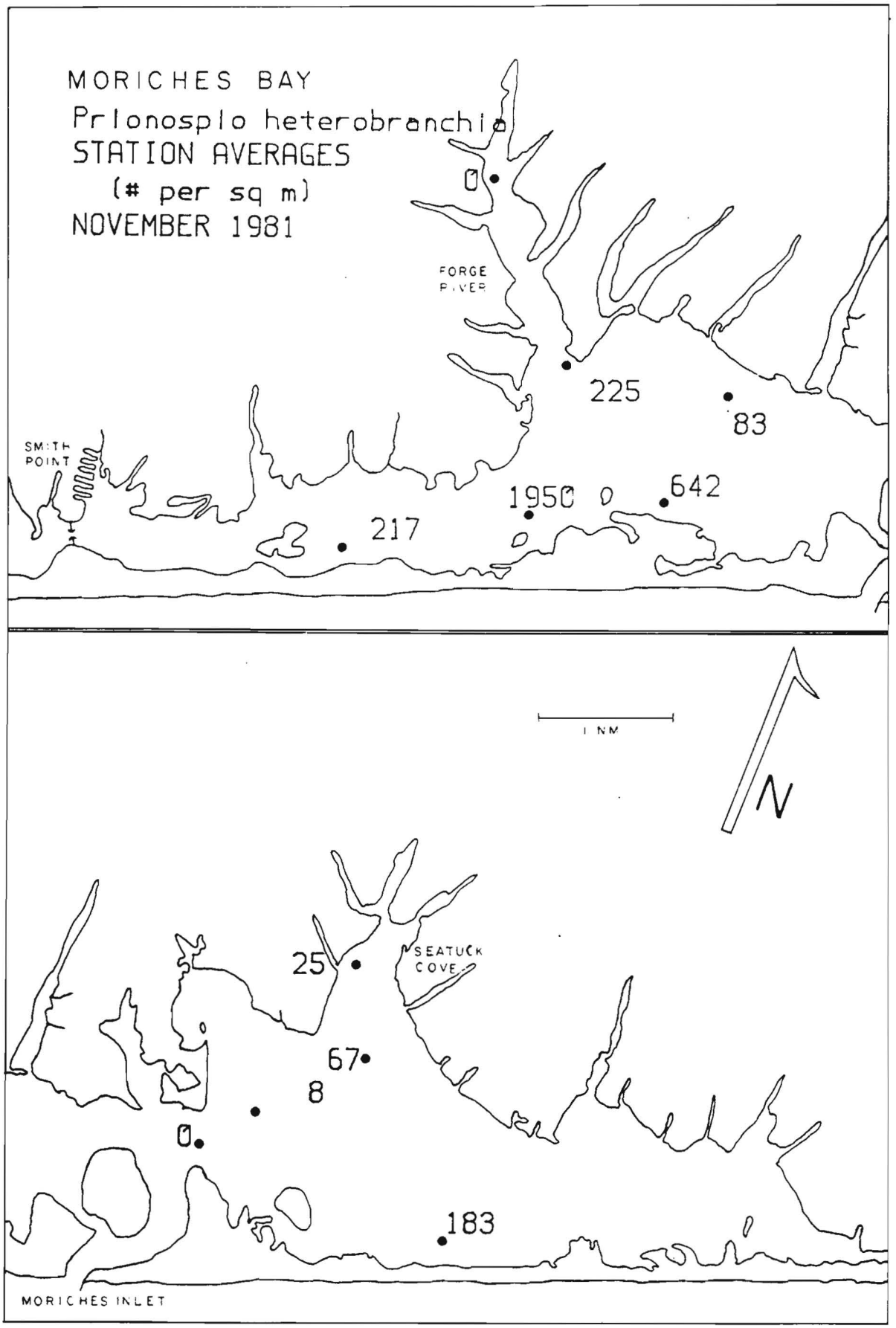

MORICHES BAY
Prionospio heterobranchia
STATION AVERAGES
(# per sq m)
NOVEMBER 1981
FORGE RIVER
SMITH POINT
0
225
83
1950
642
217
1 NM
N
SEATUCK COVE
25
67
8
0
183
MORICHES INLET

FIGURE 49

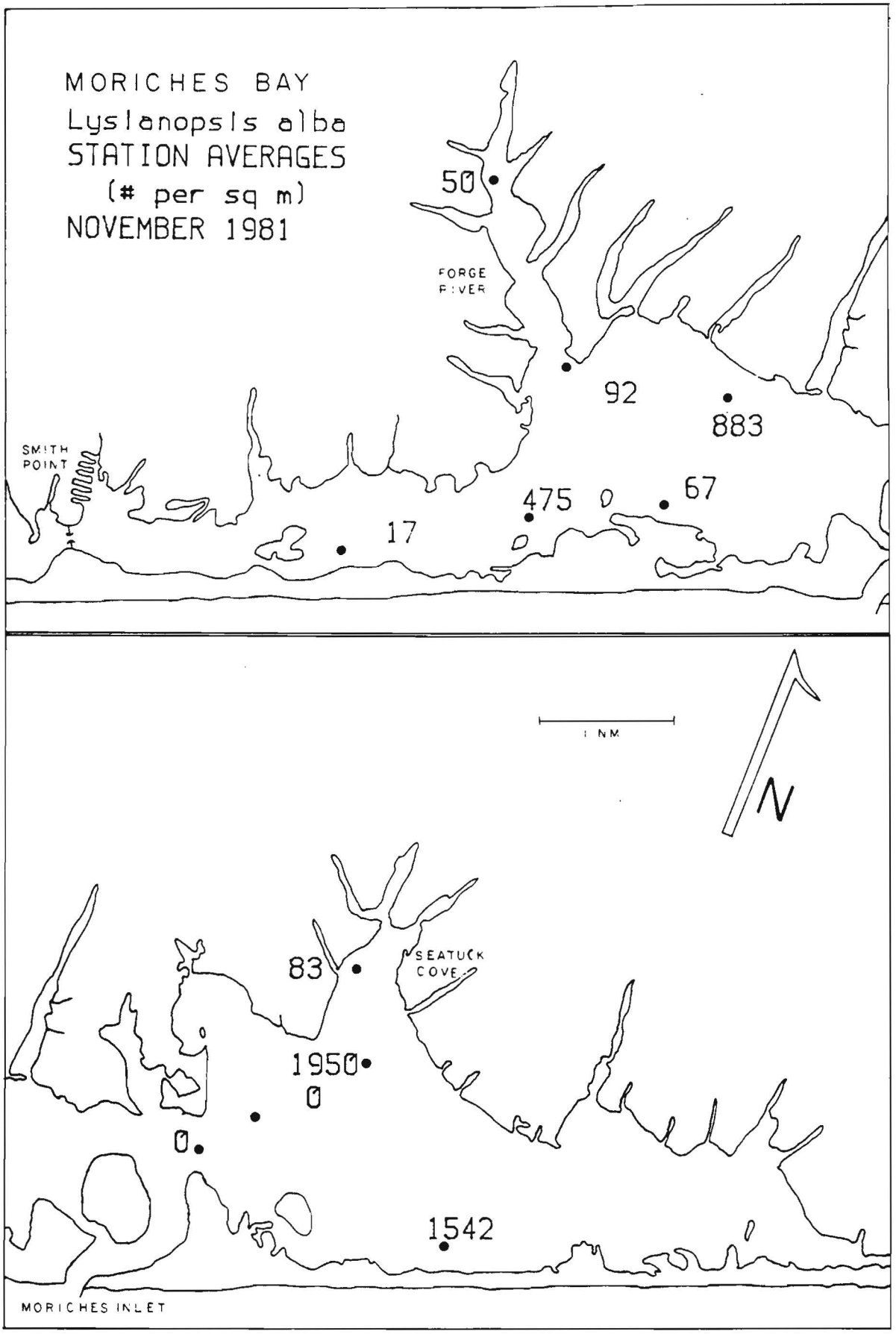

MORICHES BAY
Lyslanopsis alba
STATION AVERAGES
(# per sq m)
NOVEMBER 1981
50
FORGE RIVER
92
883
SMITH POINT
475
67
17
1 NM
N
83
SEATUCK COVE
1950
0
0
1542
MORICHES INLET

FIGURE 50

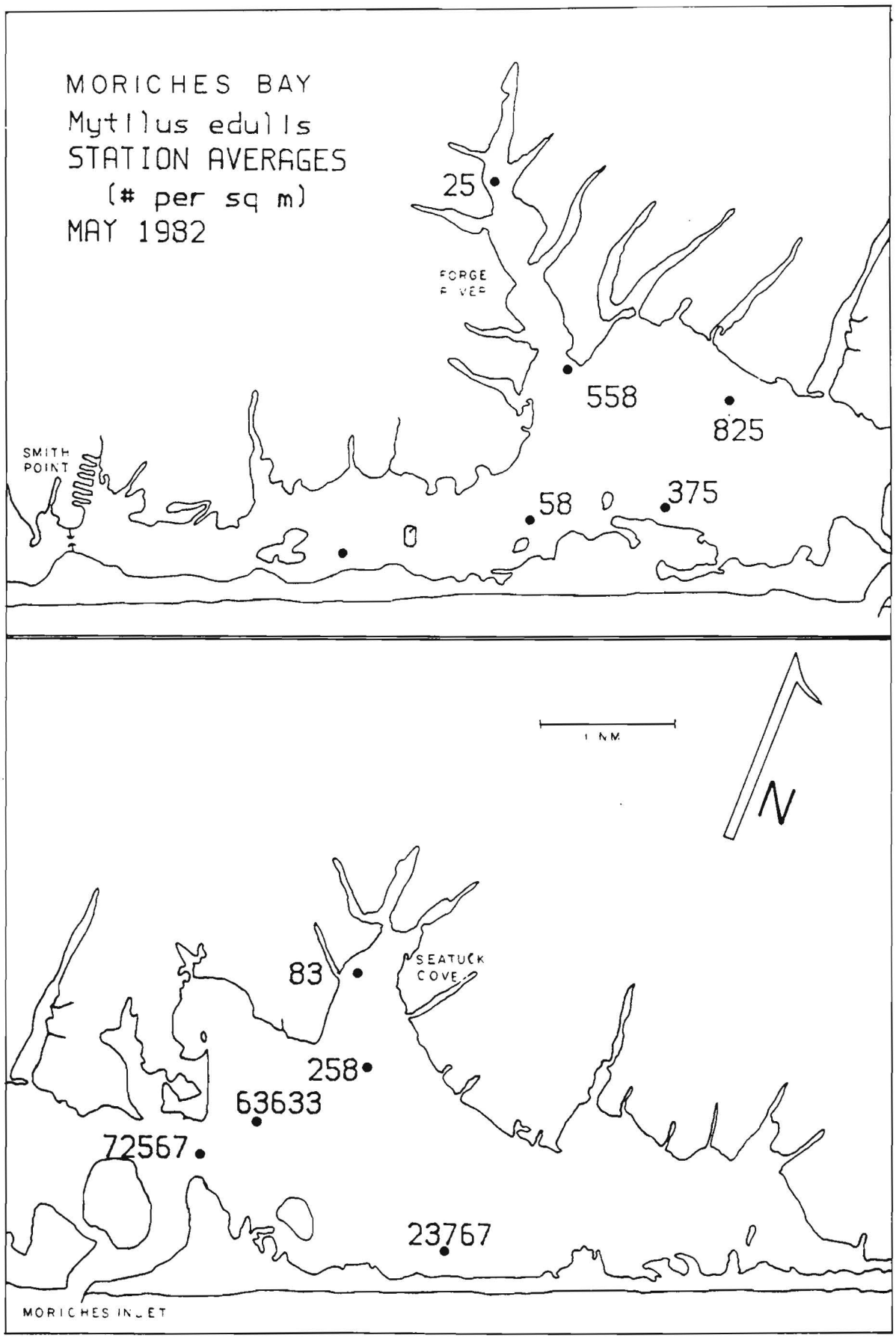

MORICHES BAY
Mytilus edulis
STATION AVERAGES
(# per sq m)
MAY 1982
25
FORGE
RIVER
558
825
SMITH
POINT
58
375
0
1 NM
N
83
SEATUCK
COVE
258
63633
72567
23767
MORICHES INLET

FIGURE 51

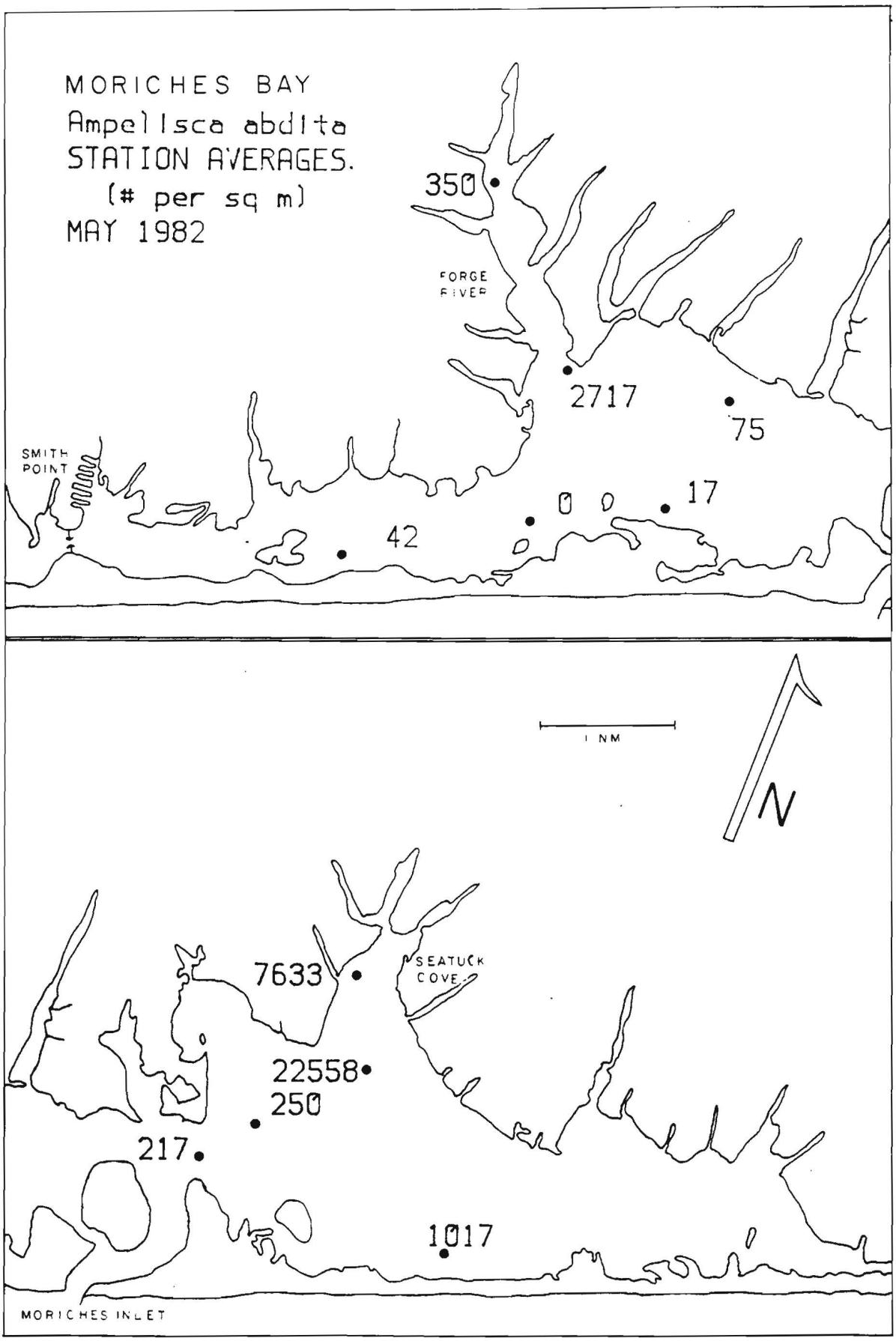

MORICHES BAY
Ampelisca abdita
STATION AVERAGES.
(# per sq m)
MAY 1982
350
FORGE RIVER
2717
75
SMITH POINT
17
42
1 NM
N
7633
SEATUCK COVE
22558
250
217
1017
MORICHES INLET

FIGURE 52

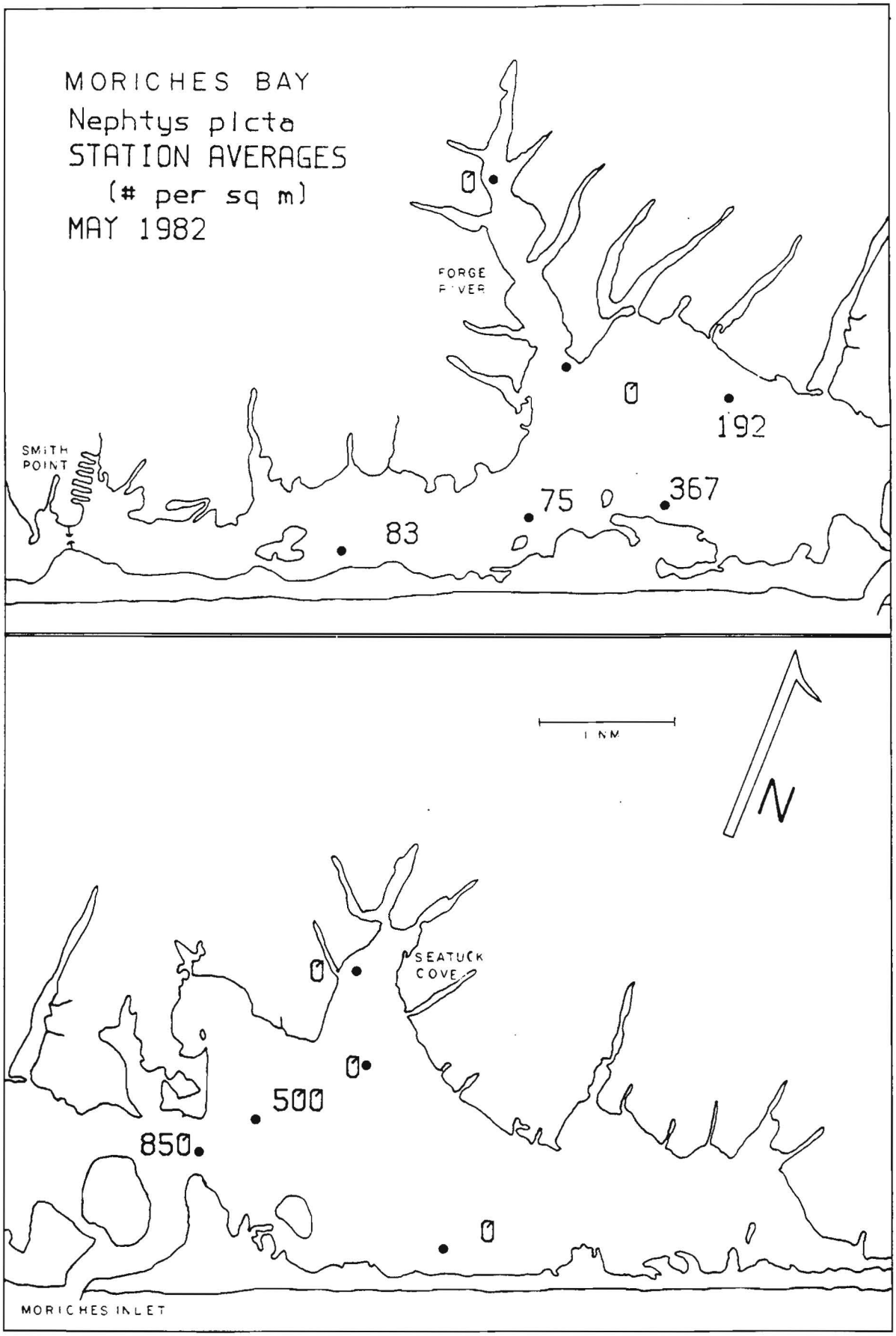

MORICHES BAY
Nephtys picta
STATION AVERAGES
(# per sq m)
MAY 1982
FORGE RIVER
SMITH POINT
0
192
75
0
367
83
1 NM
N
SEATUCK COVE
0
0
500
850
0
MORICHES INLET

FIGURE 53

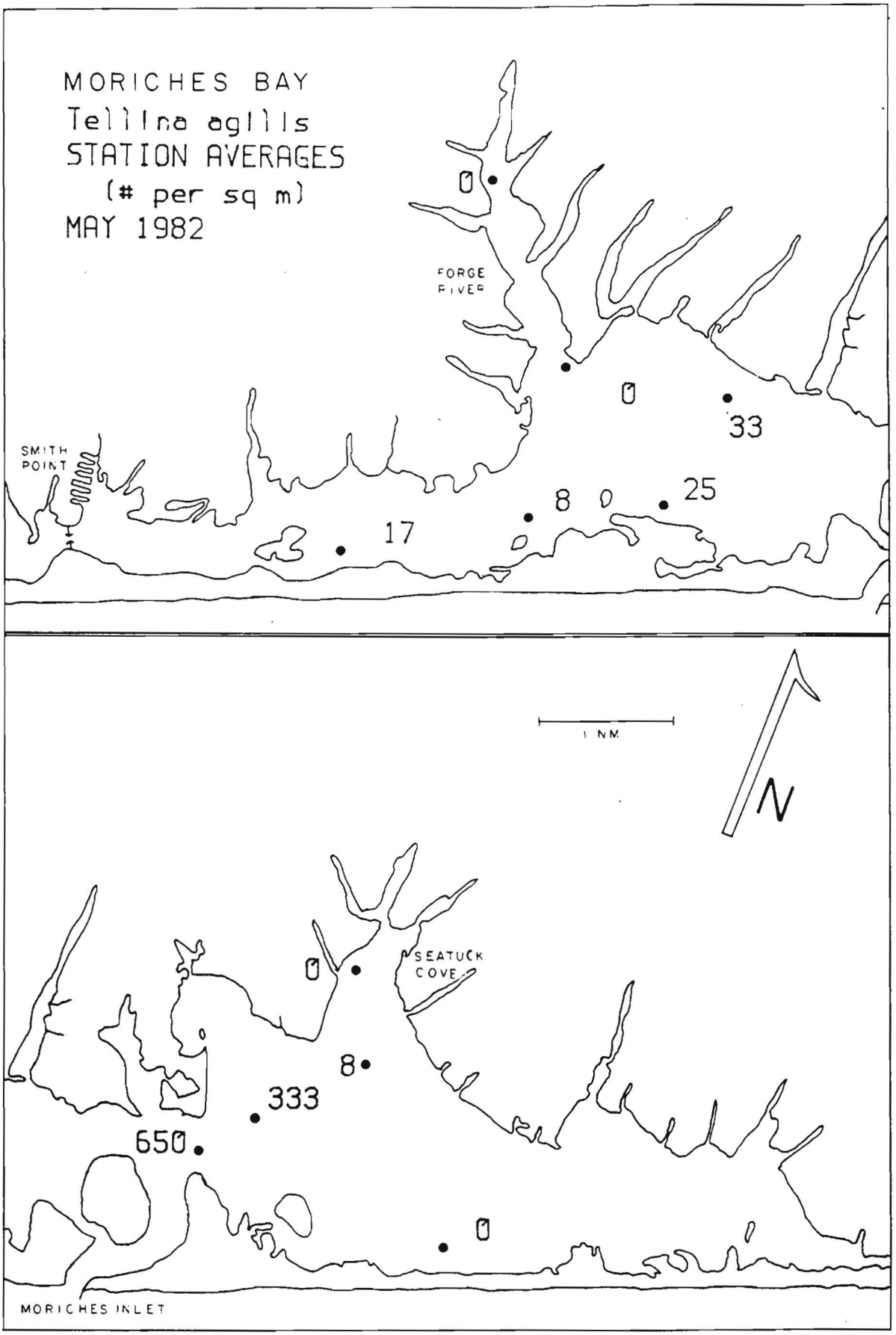

MORICHES BAY
Tellina agilis
STATION AVERAGES
(# per sq m)
MAY 1982
FORGE RIVER
SMITH POINT
0
0
33
8
0
25
17
1 NM
N
SEATUCK COVE
0
8
333
650
0
MORICHES INLET

FIGURE 54

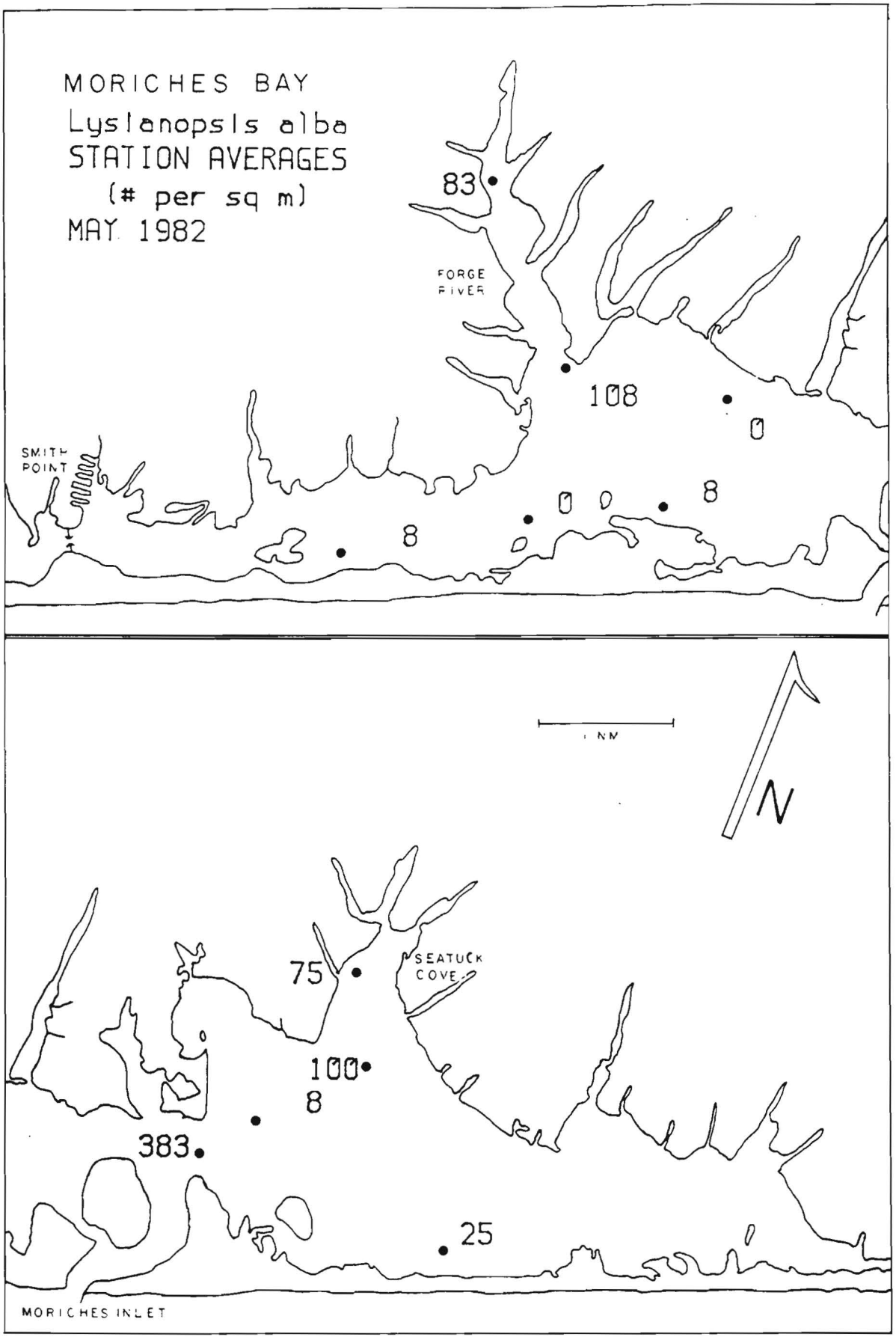

MORICHES BAY
Lyslanopsis alba
STATION AVERAGES
(# per sq m)
MAY 1982
83
FORGE RIVER
108
0
SMITH POINT
0
0
8
8
1 NM
N
75
SEATUCK COVE
100
8
383
25
MORICHES INLET

FIGURE 55

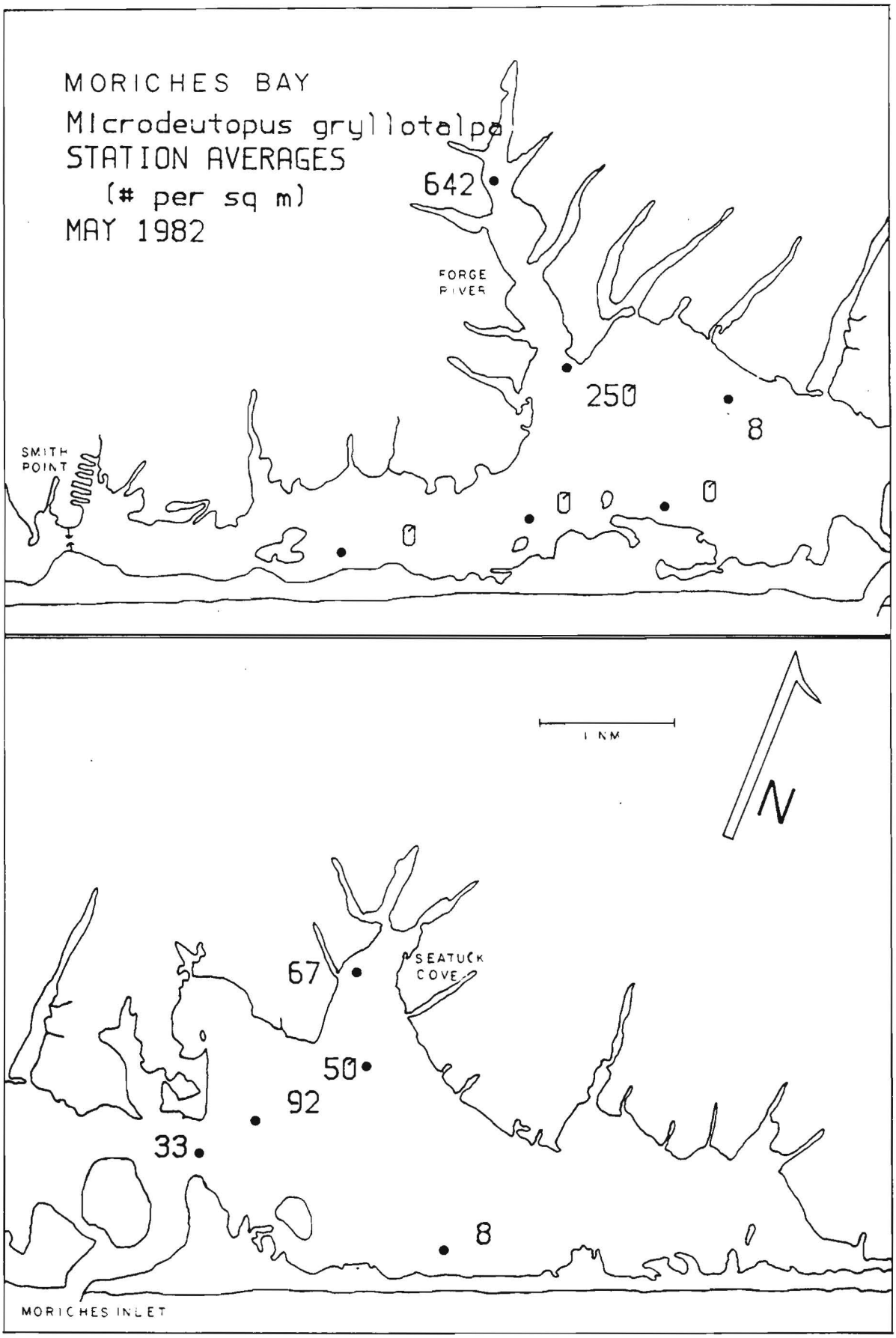

MORICHES BAY
Microdeutopus gryllotalpa
STATION AVERAGES
(# per sq m)
MAY 1982
642
FORGE RIVER
250
8
SMITH POINT
0
0
0
0
0
1 NM
N
67
SEATUCK COVE
50
92
33
8
MORICHES INLET

FIGURE 56

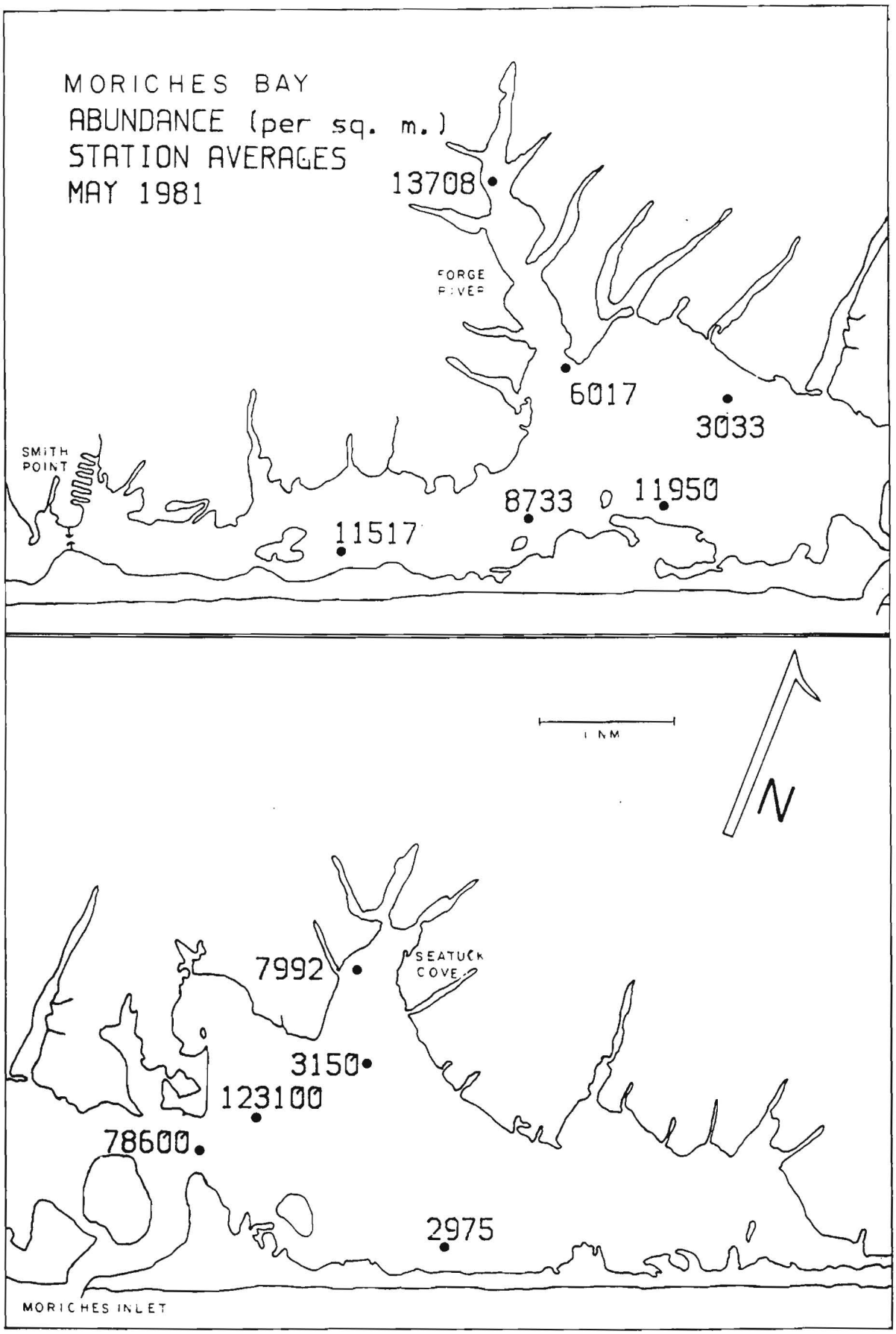

MORICHES BAY
ABUNDANCE (per sq. m.)
STATION AVERAGES
MAY 1981
13708
FORGE RIVER
6017
3033
SMITH POINT
8733
11950
11517
1 NM
N
7992
SEATUCK COVE
3150
123100
78600
2975
MORICHES INLET

FIGURE 57

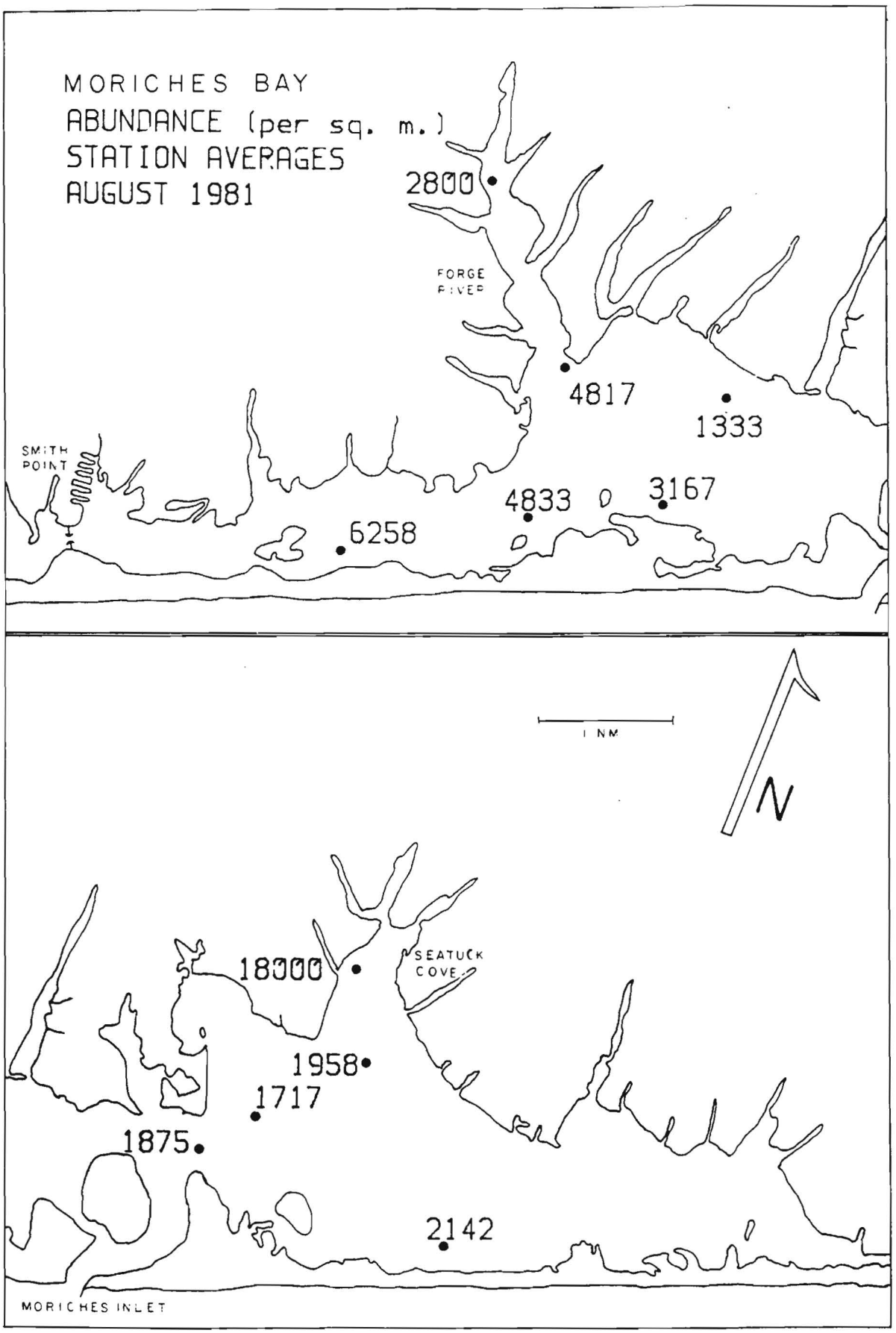

MORICHES BAY
ABUNDANCE (per sq. m.)
STATION AVERAGES
AUGUST 1981
2800
FORGE RIVER
4817
1333
SMITH POINT
4833
3167
6258
1 NM
N
18000
SEATUCK COVE
1958
1717
1875
2142
MORICHES INLET

FIGURE 58

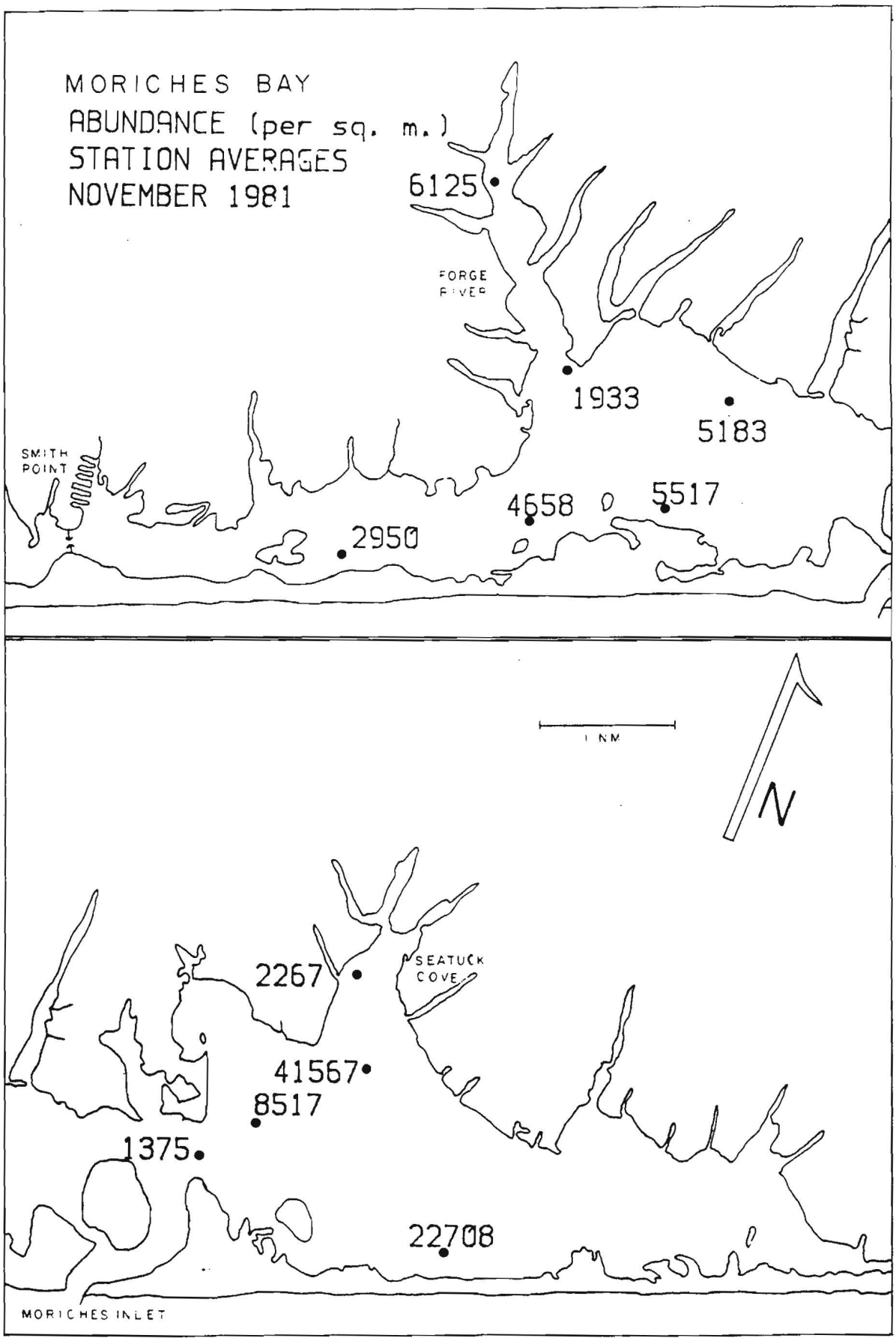

MORICHES BAY
ABUNDANCE (per sq. m.)
STATION AVERAGES
NOVEMBER 1981
6125
FORGE RIVER
1933
5183
SMITH POINT
4658
5517
2950
1 NM
N
2267
SEATUCK COVE
41567
8517
1375
22708
MORICHES INLET

FIGURE 59

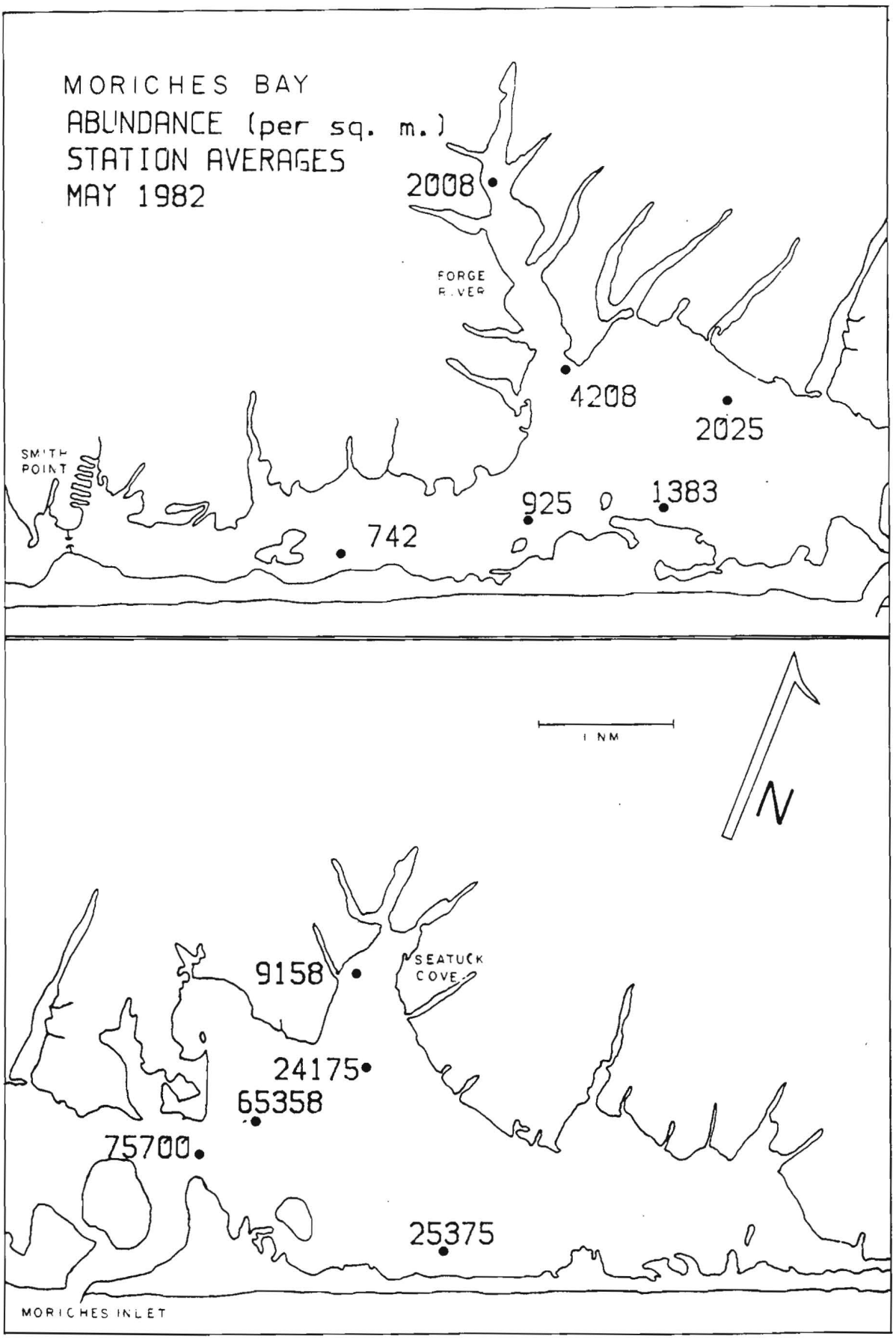

MORICHES BAY
ABUNDANCE (per sq. m.)
STATION AVERAGES
MAY 1982
2008
FORGE RIVER
4208
2025
SMITH POINT
925
1383
742
1 NM
N
9158
SEATUCK COVE
24175
65358
75700
25375
MORICHES INLET

FIGURE 60

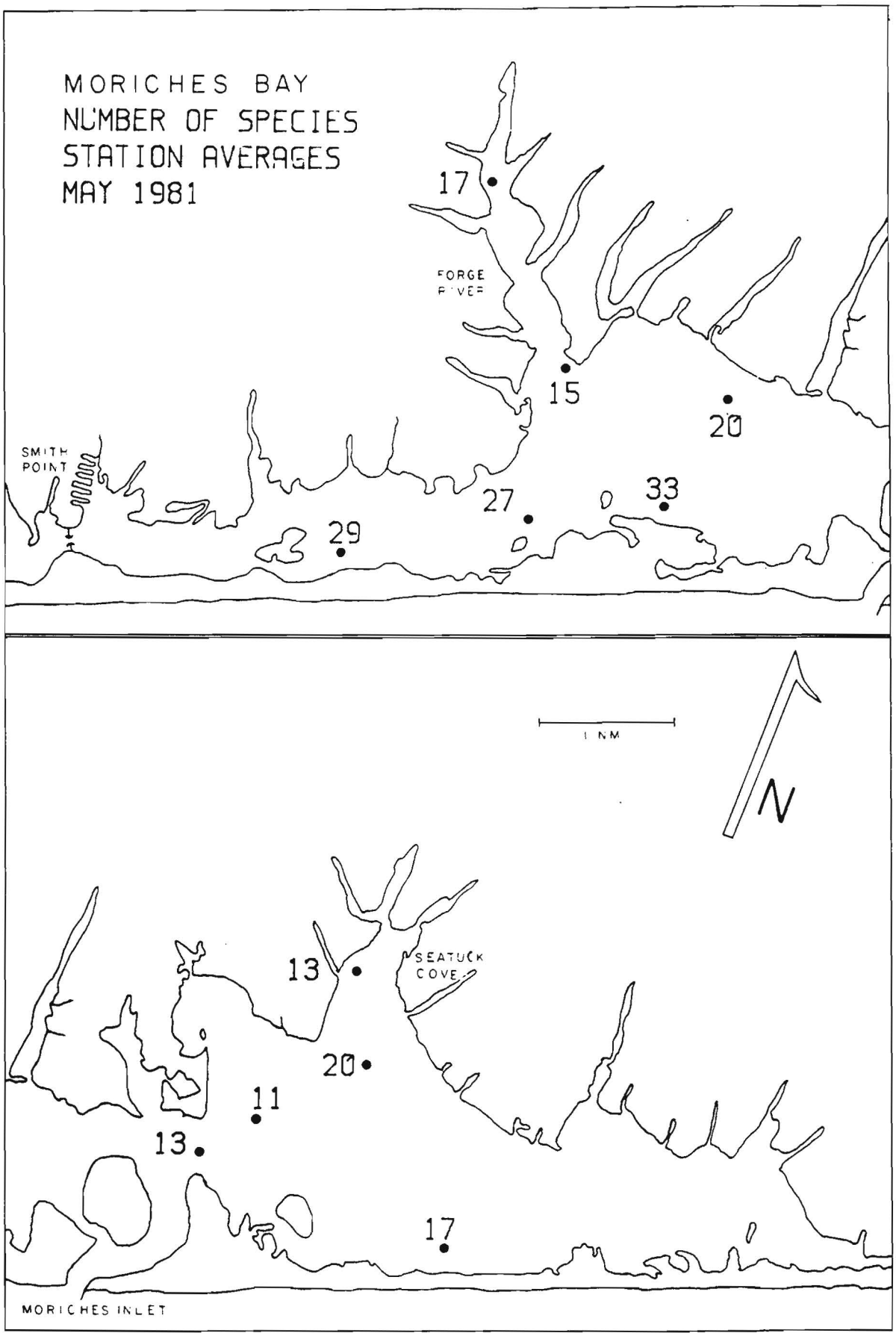

MORICHES BAY
NUMBER OF SPECIES
STATION AVERAGES
MAY 1981
17
FORGE
RIVER
15
20
SMITH
POINT
27
33
29
1 NM
N
13
SEATUCK
COVE
20
11
13
17
MORICHES INLET

FIGURE 61

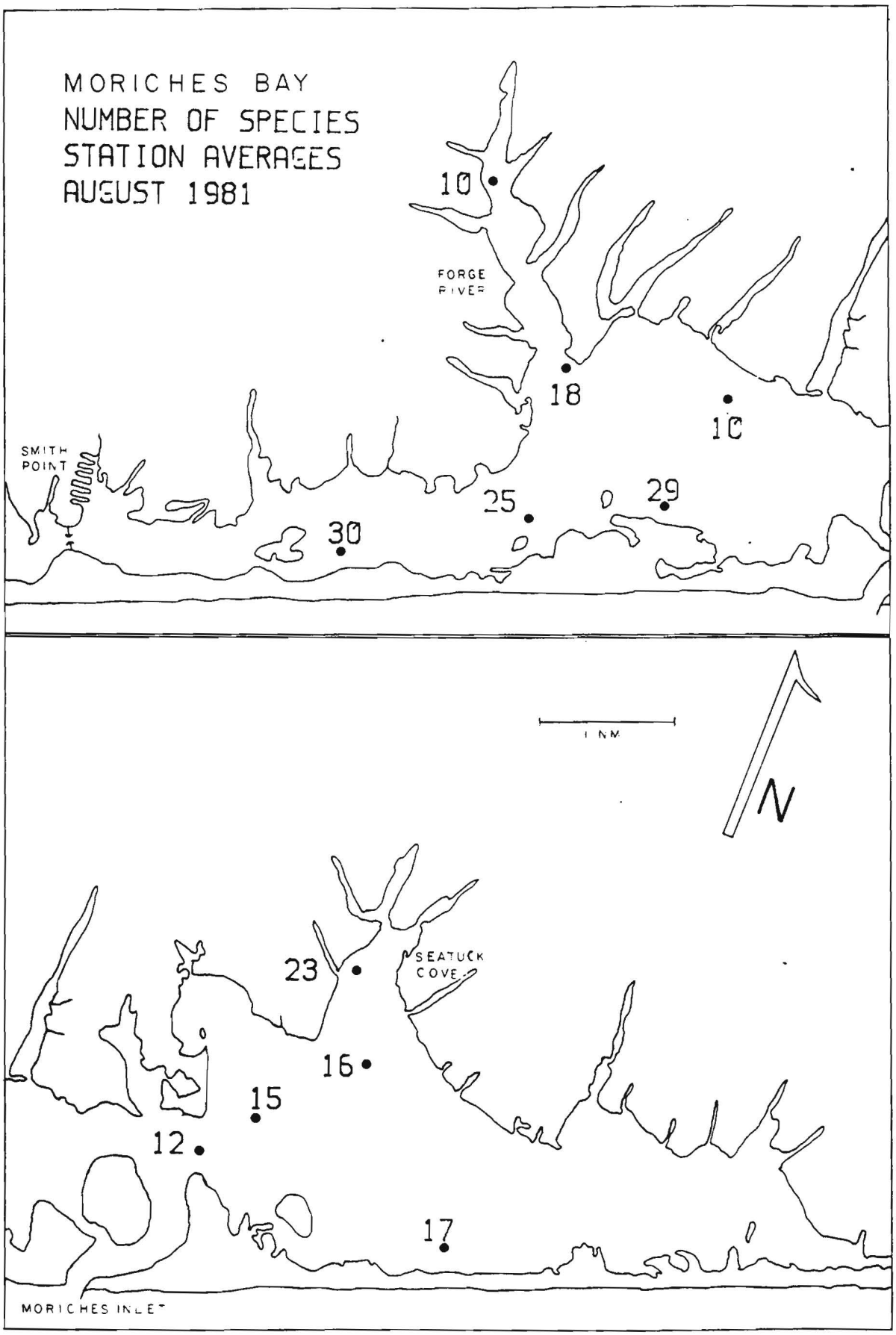

MORICHES BAY
NUMBER OF SPECIES
STATION AVERAGES
AUGUST 1981
10
FORGE RIVER
18
1C
SMITH POINT
25
29
30
1 NM
N
23
SEATUCK COVE
16
15
12
17
MORICHES INLET

FIGURE 62

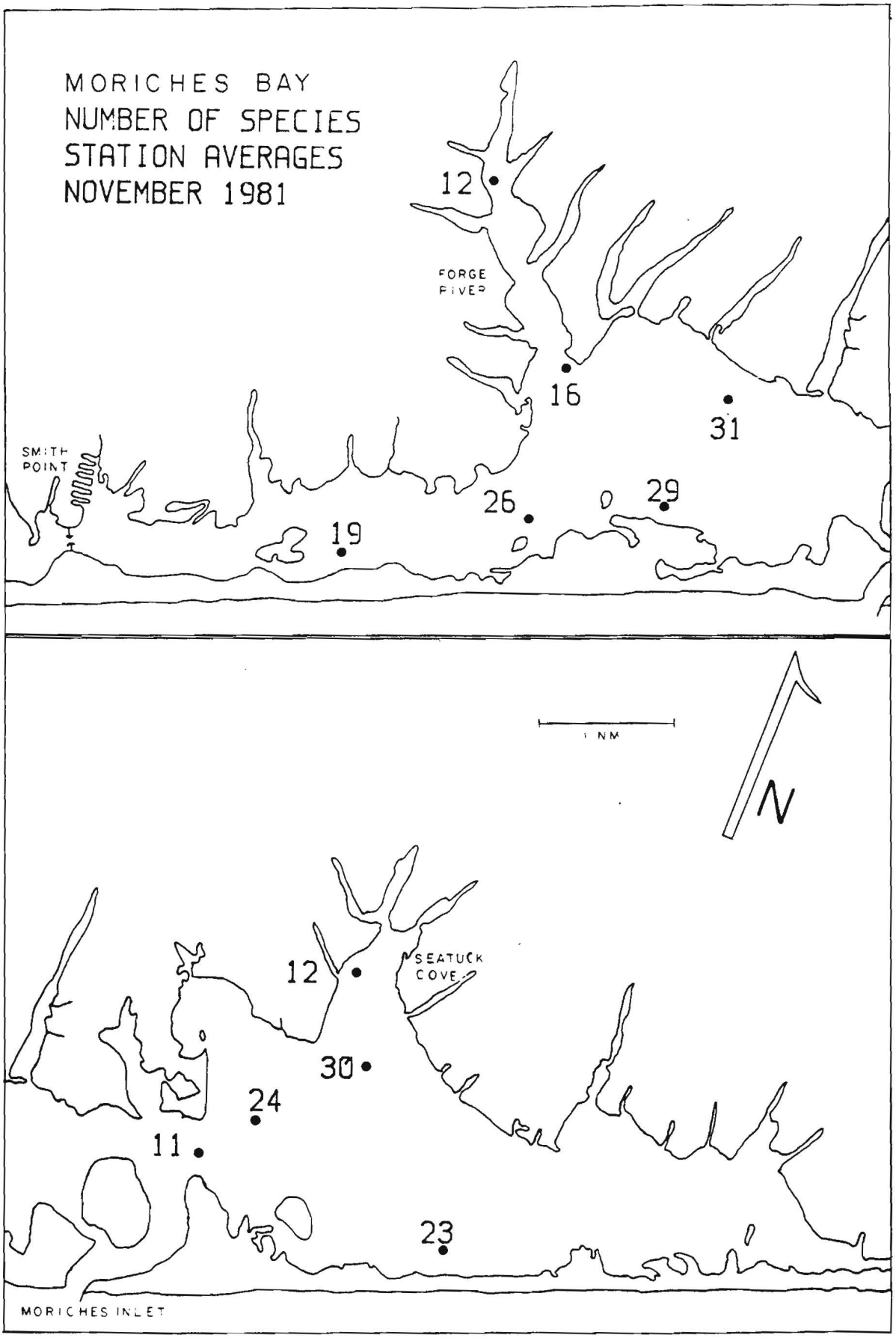

MORICHES BAY
NUMBER OF SPECIES
STATION AVERAGES
NOVEMBER 1981
12
FORGE RIVER
16
31
SMITH POINT
26
29
19
1 NM
N
12
SEATUCK COVE
30
24
11
23
MORICHES INLET

FIGURE 63

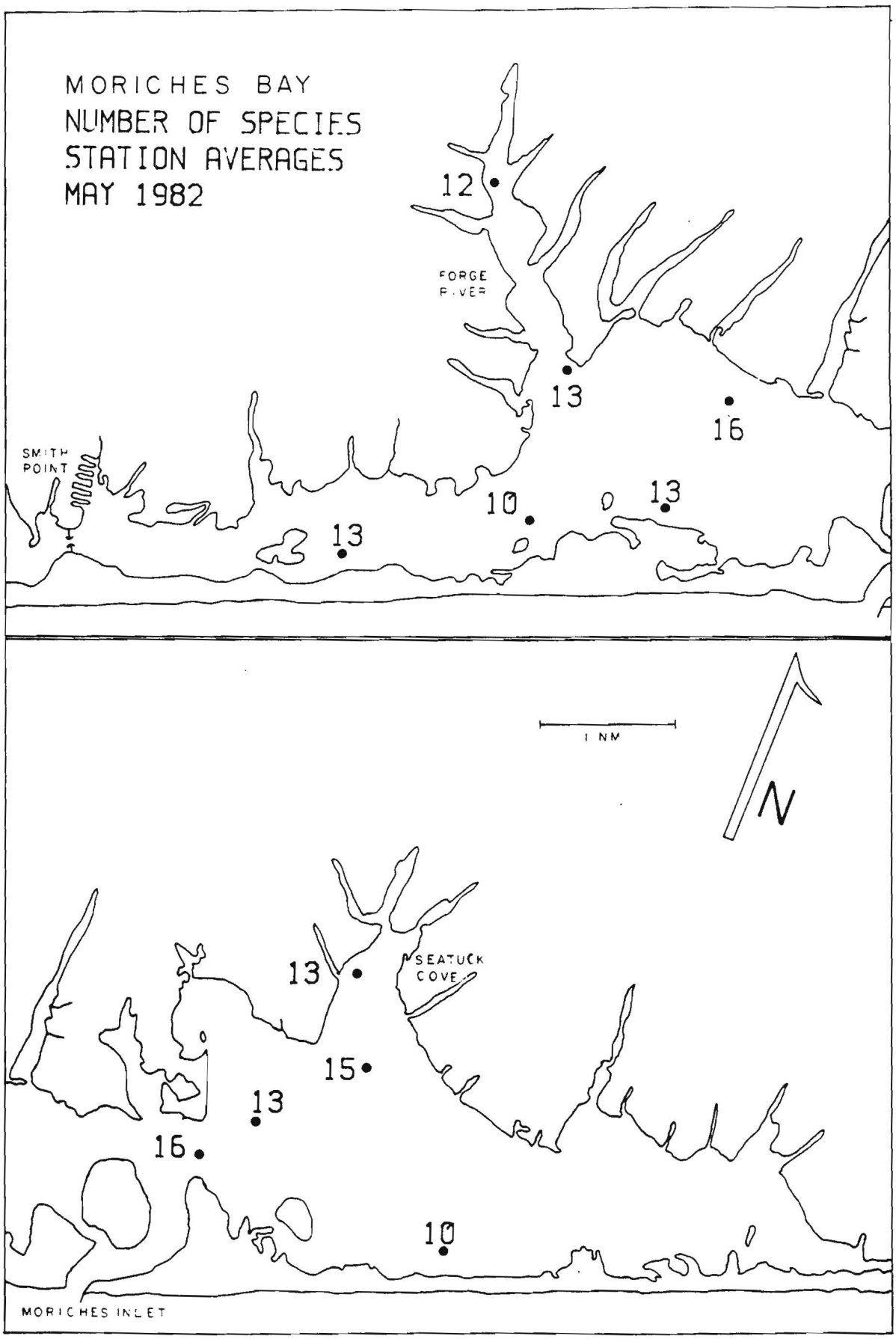

MORICHES BAY
NUMBER OF SPECIES
STATION AVERAGES
MAY 1982
12
FORGE
RIVER
13
16
SMITH
POINT
10
13
13
1 NM
N
SEATUCK
COVE
13
15
13
16
10
MORICHES INLET

FIGURE 64

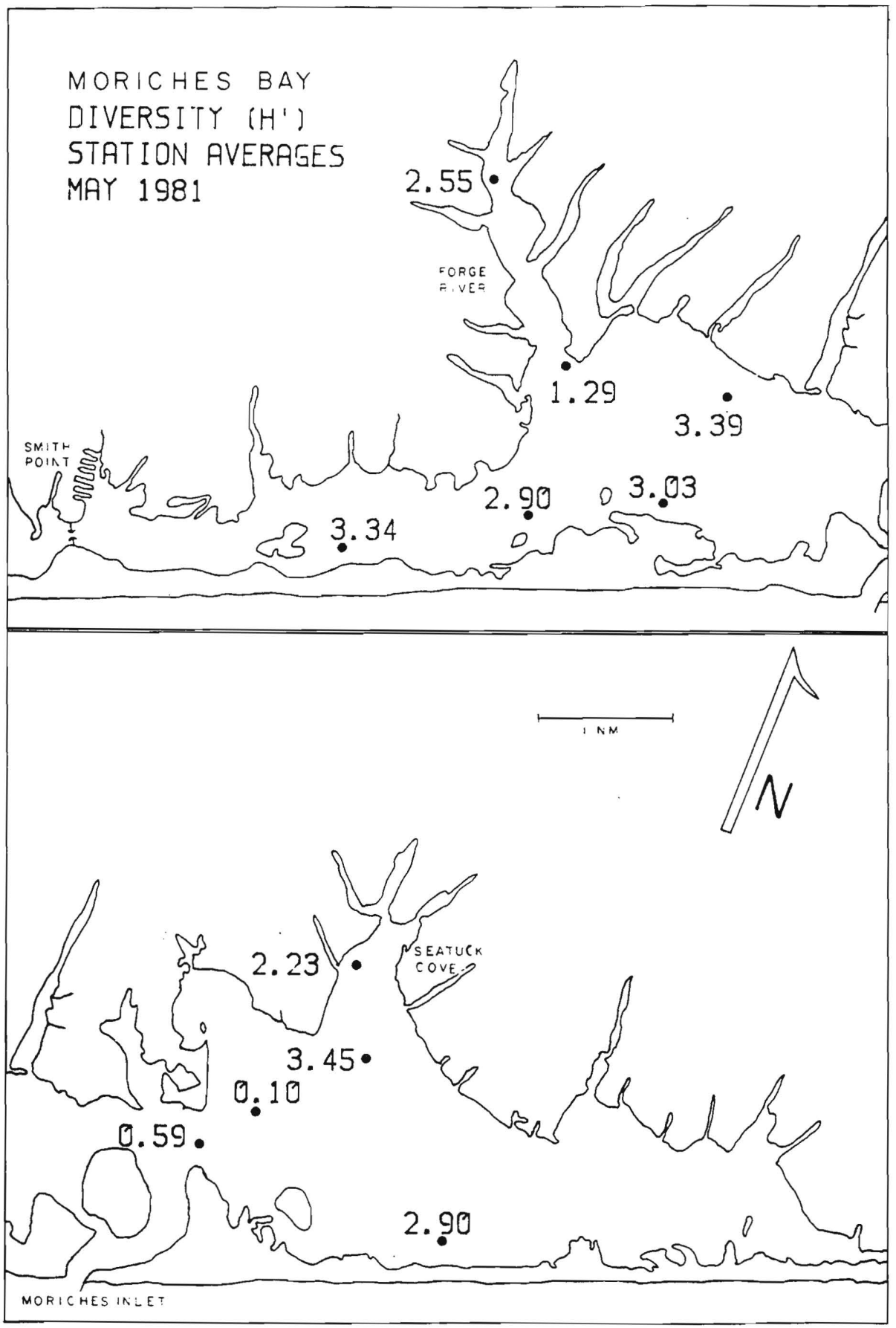

MORICHES BAY
DIVERSITY (H')
STATION AVERAGES
MAY 1981
2.55
FORGE RIVER
1.29
3.39
SMITH POINT
2.90
3.03
3.34
1 NM
N
2.23
SEATUCK COVE
3.45
0.10
0.59
2.90
MORICHES INLET

FIGURE 65

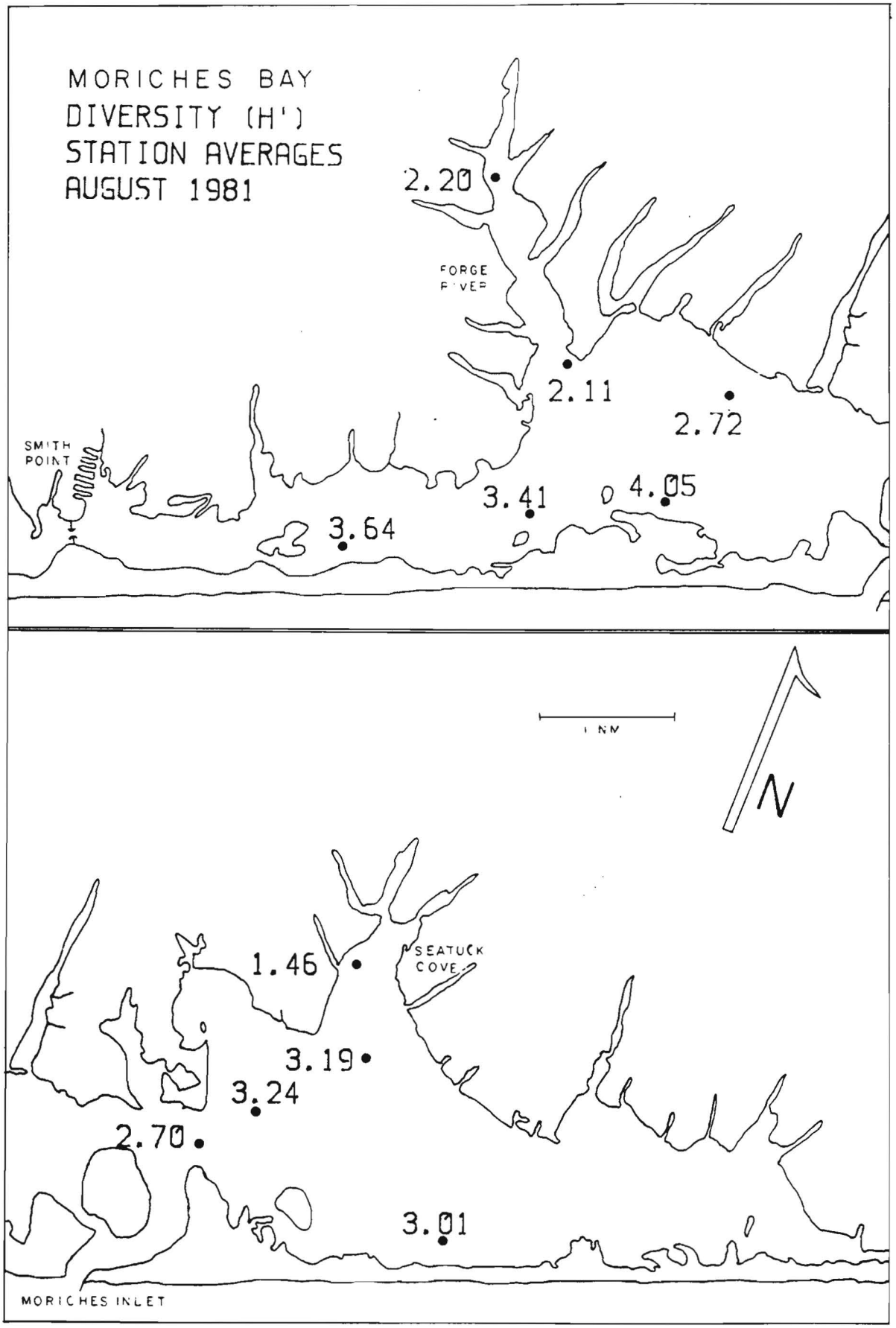

MORICHES BAY
DIVERSITY (H')
STATION AVERAGES
AUGUST 1981
2.20
FORGE
RIVER
2.11
2.72
SMITH
POINT
3.41
4.05
3.64
1 NM
N
1.46
SEATUCK
COVE
3.19
3.24
2.70
3.01
MORICHES INLET

FIGURE 66

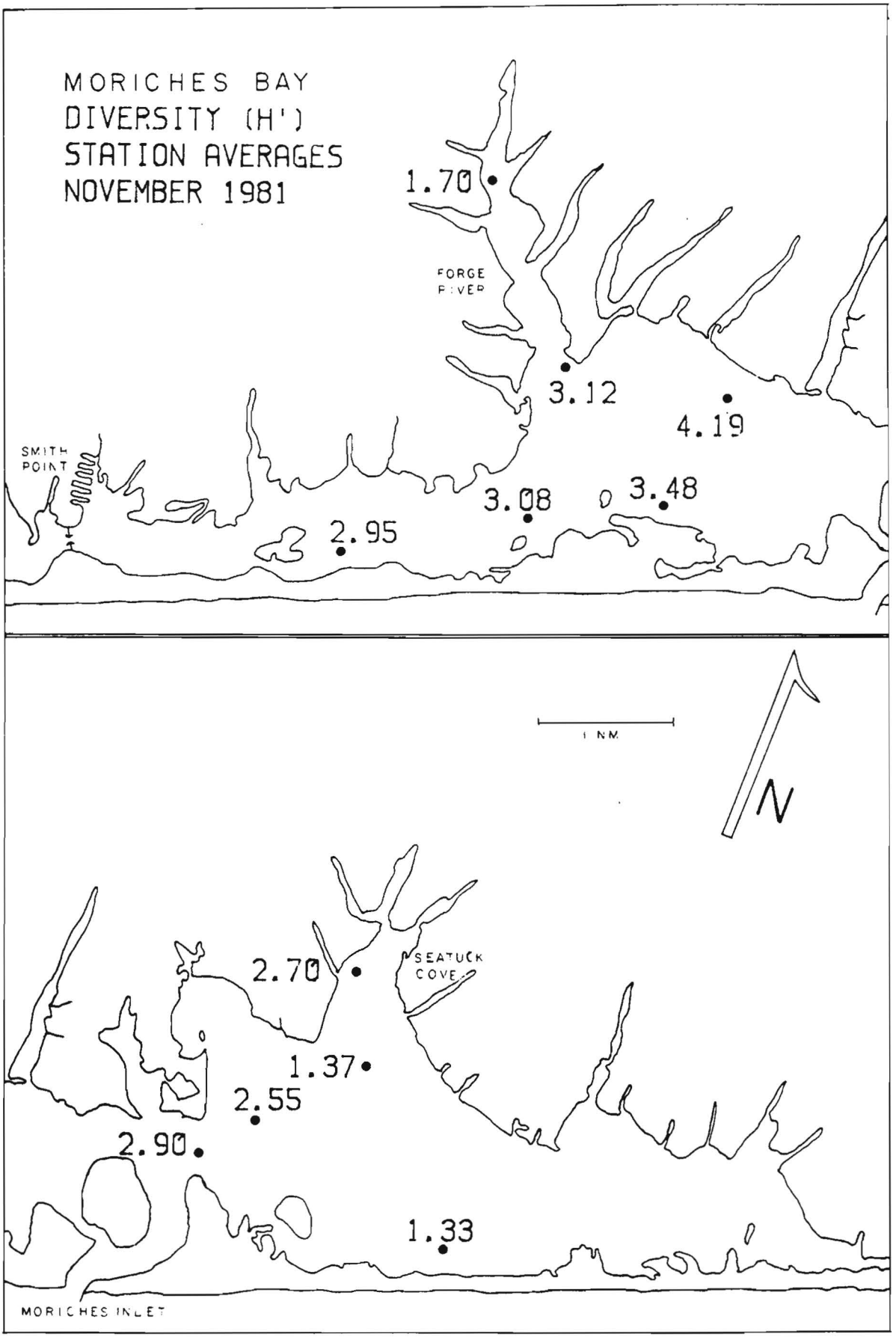

MORICHES BAY
DIVERSITY (H')
STATION AVERAGES
NOVEMBER 1981
1.70
FORGE RIVER
3.12
4.19
SMITH POINT
3.08
3.48
2.95
1 NM
N
2.70
SEATUCK COVE
1.37
2.55
2.90
1.33
MORICHES INLET

FIGURE 67

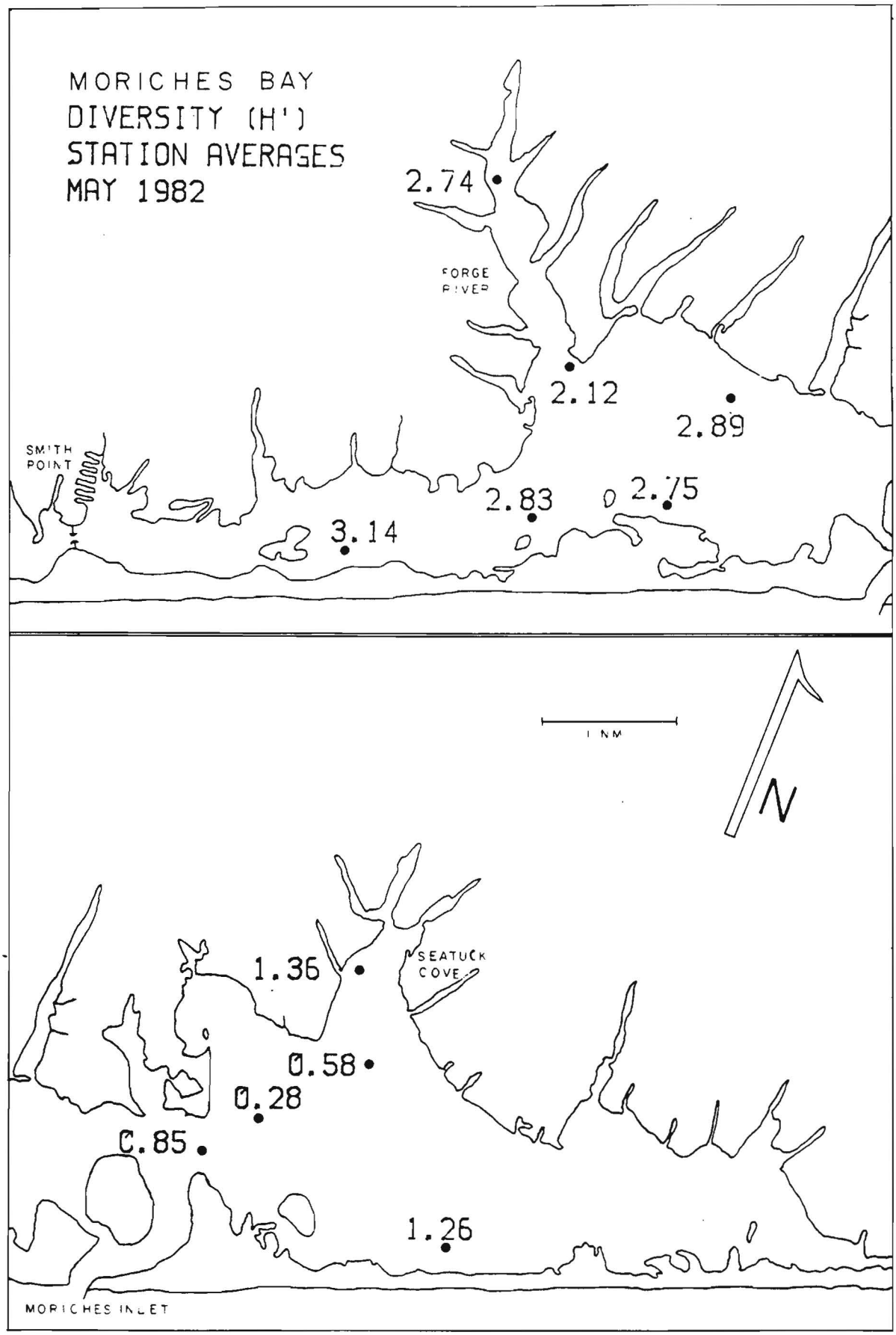

MORICHES BAY
DIVERSITY (H')
STATION AVERAGES
MAY 1982
2.74
FORGE RIVER
2.12
2.89
SMITH POINT
2.83
2.75
3.14
1 NM
N
SEATUCK COVE
1.36
0.58
0.28
0.85
1.26
MORICHES INLET

FIGURE 68

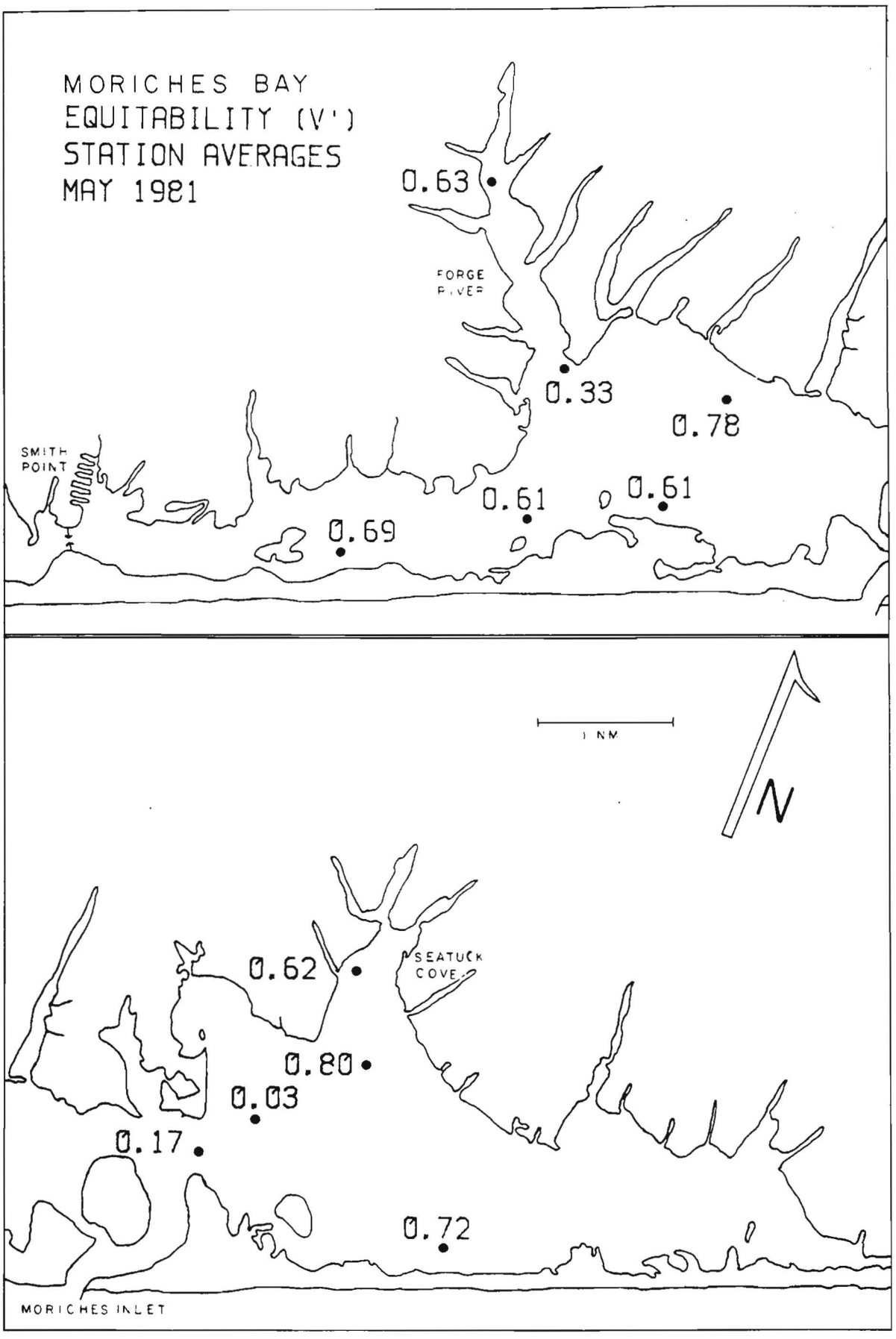

MORICHES BAY
EQUITABILITY (V')
STATION AVERAGES
MAY 1981
0.63
FORGE
RIVER
0.33
0.78
SMITH
POINT
0.61
0.61
0.69
1 NM
N
0.62
SEATUCK
COVE
0.80
0.03
0.17
0.72
MORICHES INLET

FIGURE 69

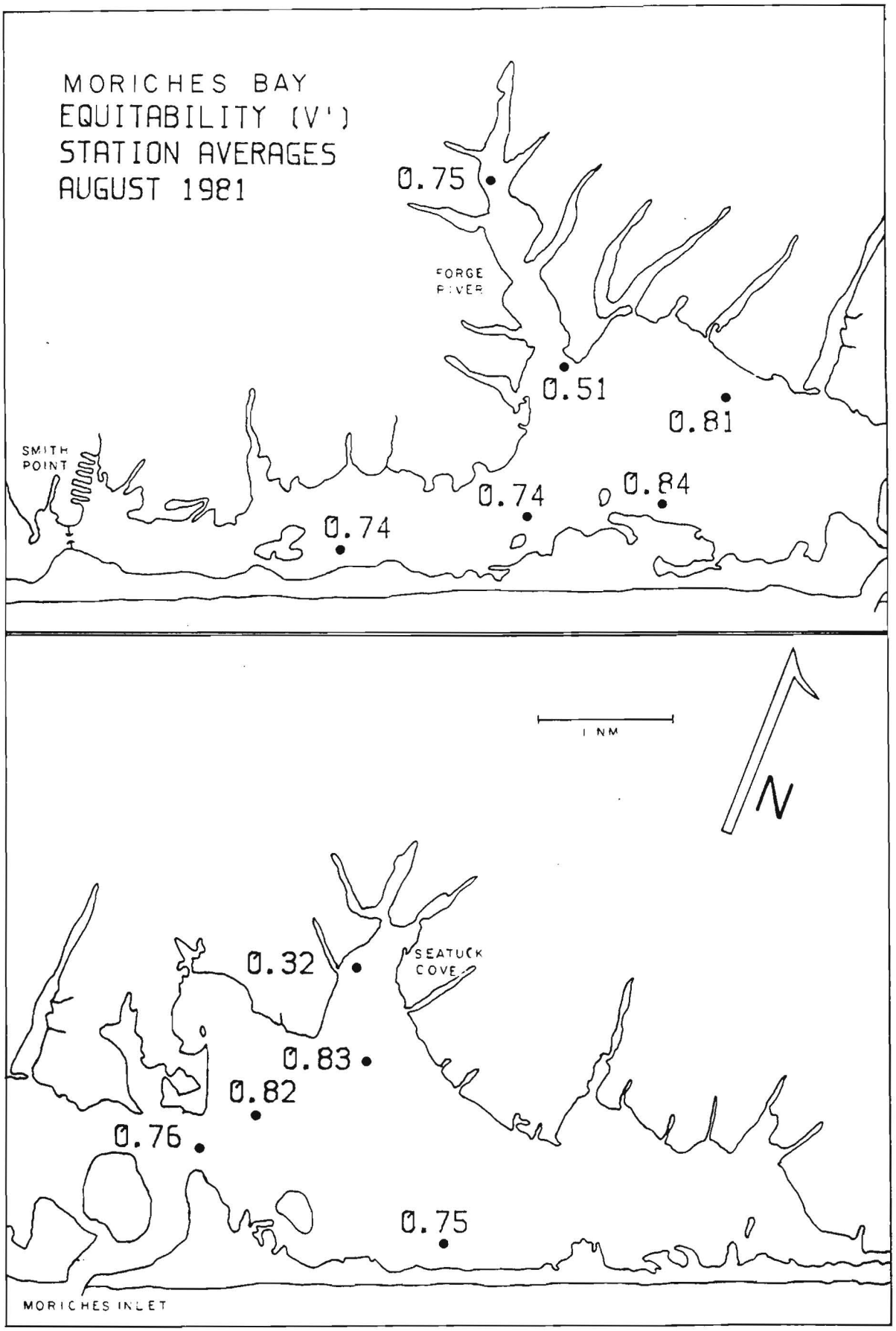

MORICHES BAY
EQUITABILITY (V')
STATION AVERAGES
AUGUST 1981
0.75
FORGE RIVER
0.51
0.81
SMITH POINT
0.74
0.84
0.74
1 NM
N
0.32
SEATUCK COVE
0.83
0.82
0.76
0.75
MORICHES INLET

FIGURE 70

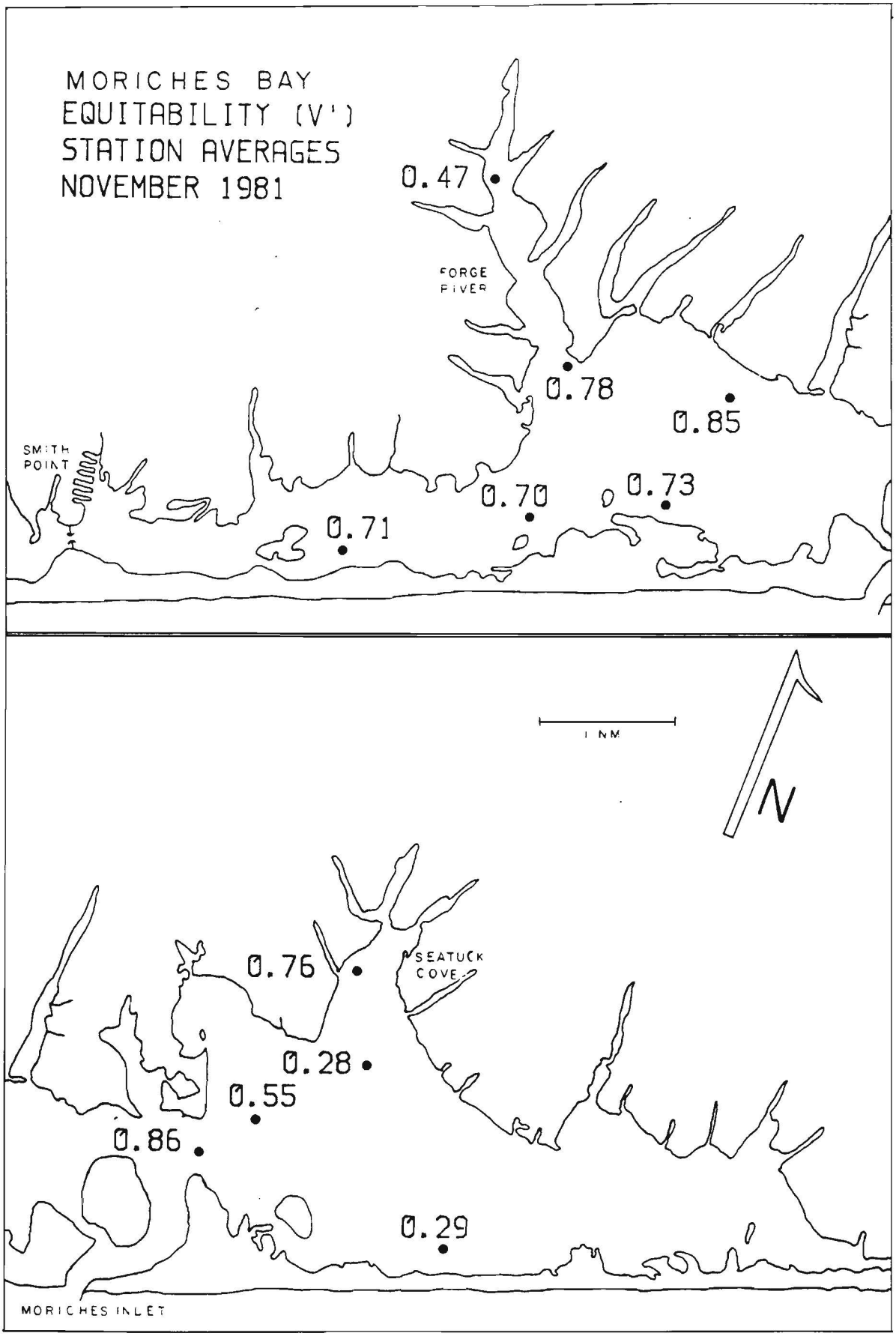

MORICHES BAY
EQUITABILITY (V')
STATION AVERAGES
NOVEMBER 1981
0.47
FORGE RIVER
0.78
0.85
SMITH POINT
0.70
0.73
0.71
1 NM
N
0.76
SEATUCK COVE
0.28
0.55
0.86
0.29
MORICHES INLET

FIGURE 71

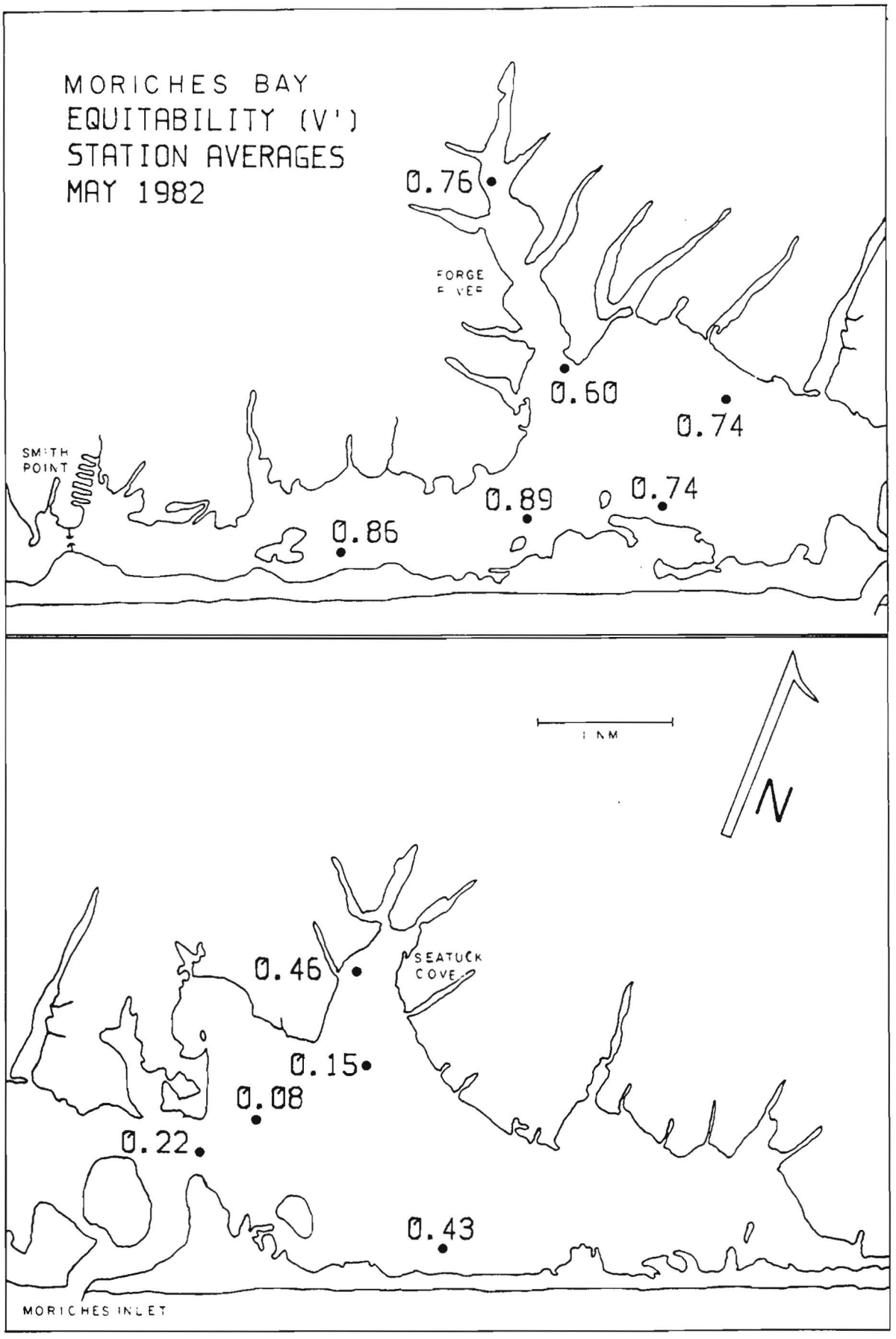

MORICHES BAY
EQUITABILITY (V')
STATION AVERAGES
MAY 1982
0.76
FORGE
0.60
0.74
SMITH
POINT
0.89
0.74
0.86
1 NM
N
SEATUCK
COVE
0.46
0.15
0.08
0.22
0.43
MORICHES INLET

FIGURE 72

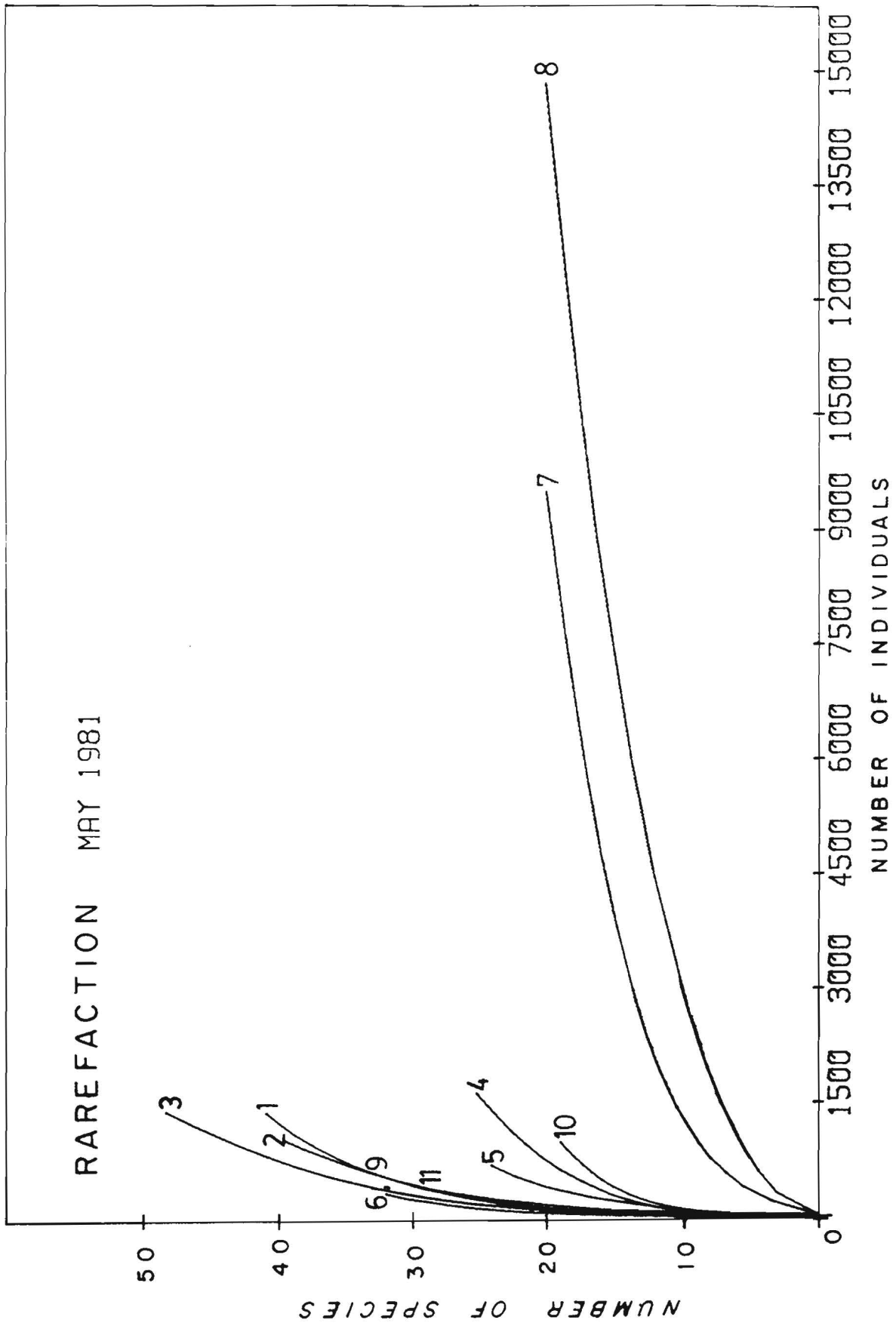

RAREFACTION MAY 1981
NUMBER OF SPECIES
NUMBER OF INDIVIDUALS
0
1500
3000
4500
6000
7500
9000
10500
12000
13500
15000
10
20
30
40
50
1
2
3
4
5
6
7
8
9
10
11

FIGURE 73

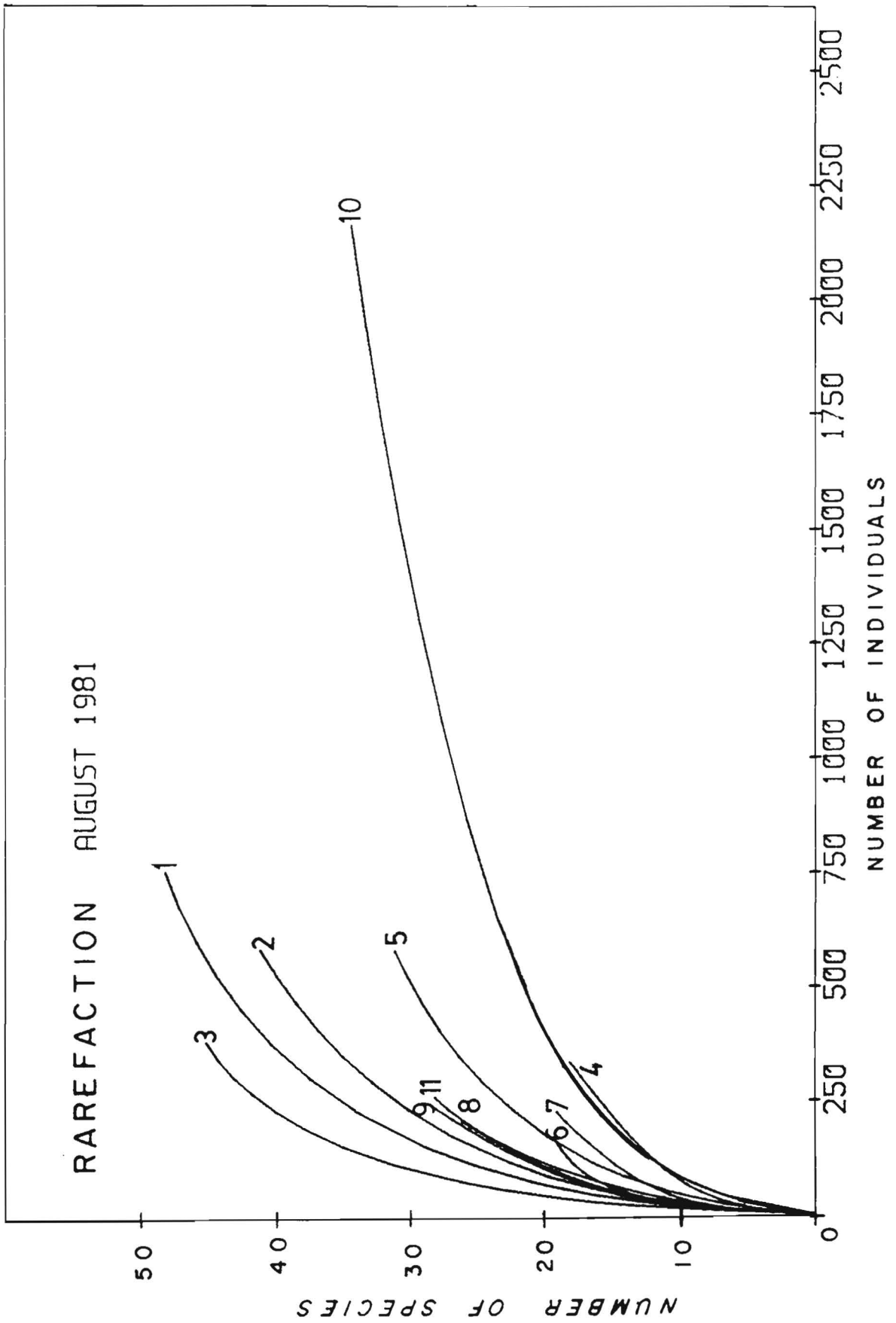

RAREFACTION AUGUST 1981
NUMBER OF SPECIES
NUMBER OF INDIVIDUALS
0
10
20
30
40
50
250
500
750
1000
1250
1500
1750
2000
2250
2500
1
2
3
4
5
6
7
8
9
10
11

FIGURE 74

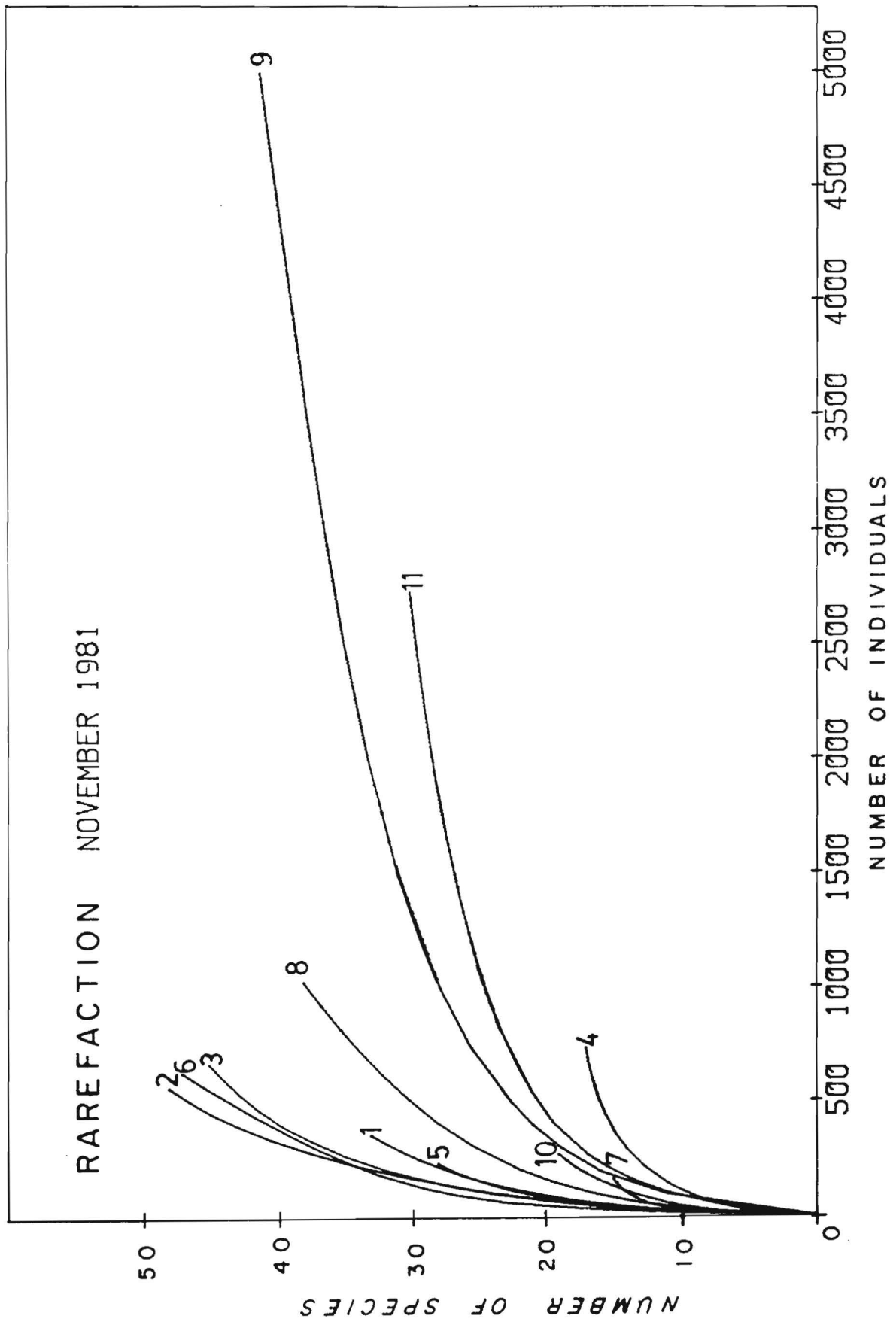

RAREFACTION NOVEMBER 1981
NUMBER OF SPECIES
NUMBER OF INDIVIDUALS
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
10
20
30
40
50
1
2
3
4
5
6
7
8
9
10
11

FIGURE 75

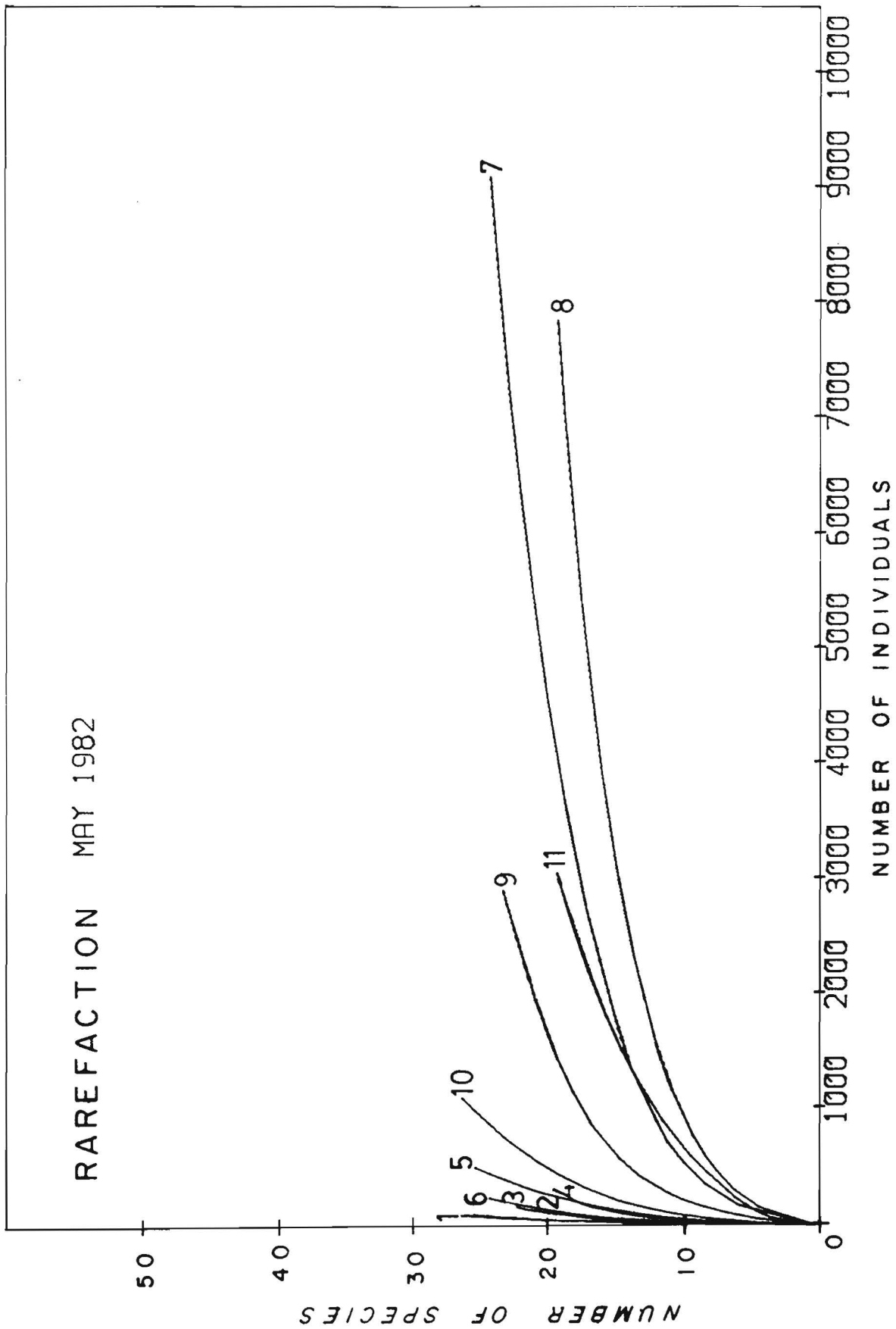
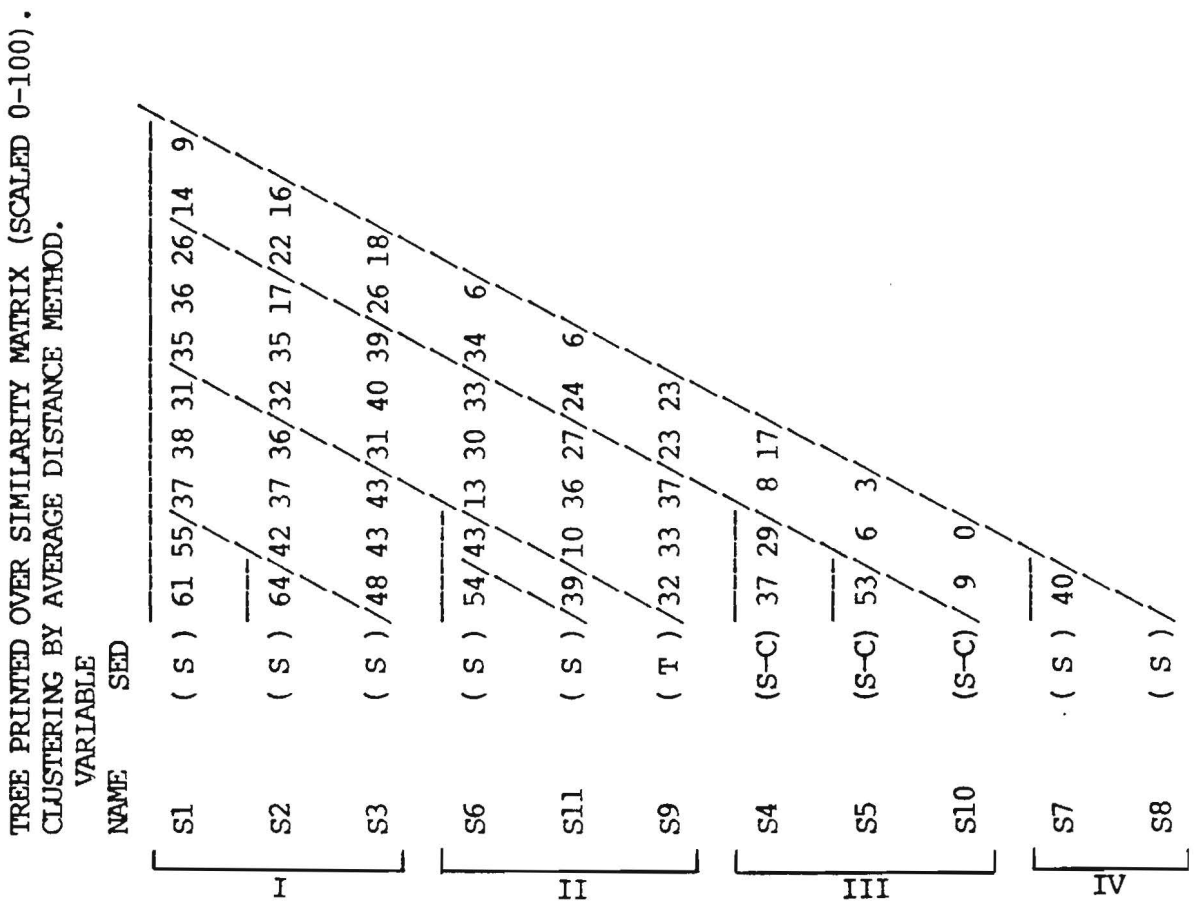

RAREFACTION MAY 1982
NUMBER OF SPECIES
NUMBER OF INDIVIDUALS
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
10
20
30
40
50
1
2
3
4
5
6
7
8
9
10
11

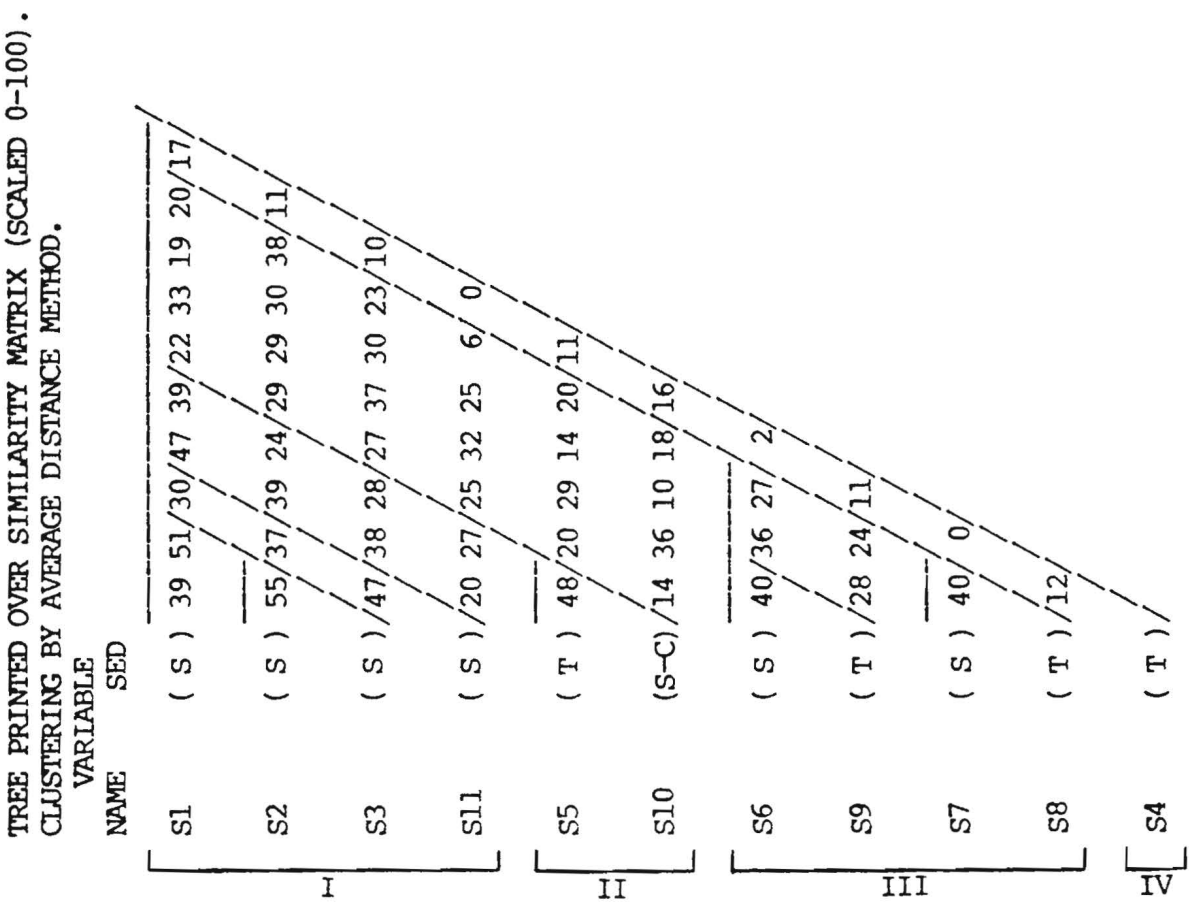
FIGURE 76



THE VALUES IN THIS TREE HAVE BEEN SCALED 0 TO 100
ACCORDING TO THE FOLLOWING TABLE

VALUE ABOVE	SIMILARITY	VALUE ABOVE	SIMILARITY
0	.085	50	.542
5	.131	55	.588
10	.176	60	.634
15	.222	65	.680
20	.268	70	.725
25	.314	75	.771
30	.359	80	.817
35	.405	85	.863
40	.451	90	.908
45	.497	95	.954

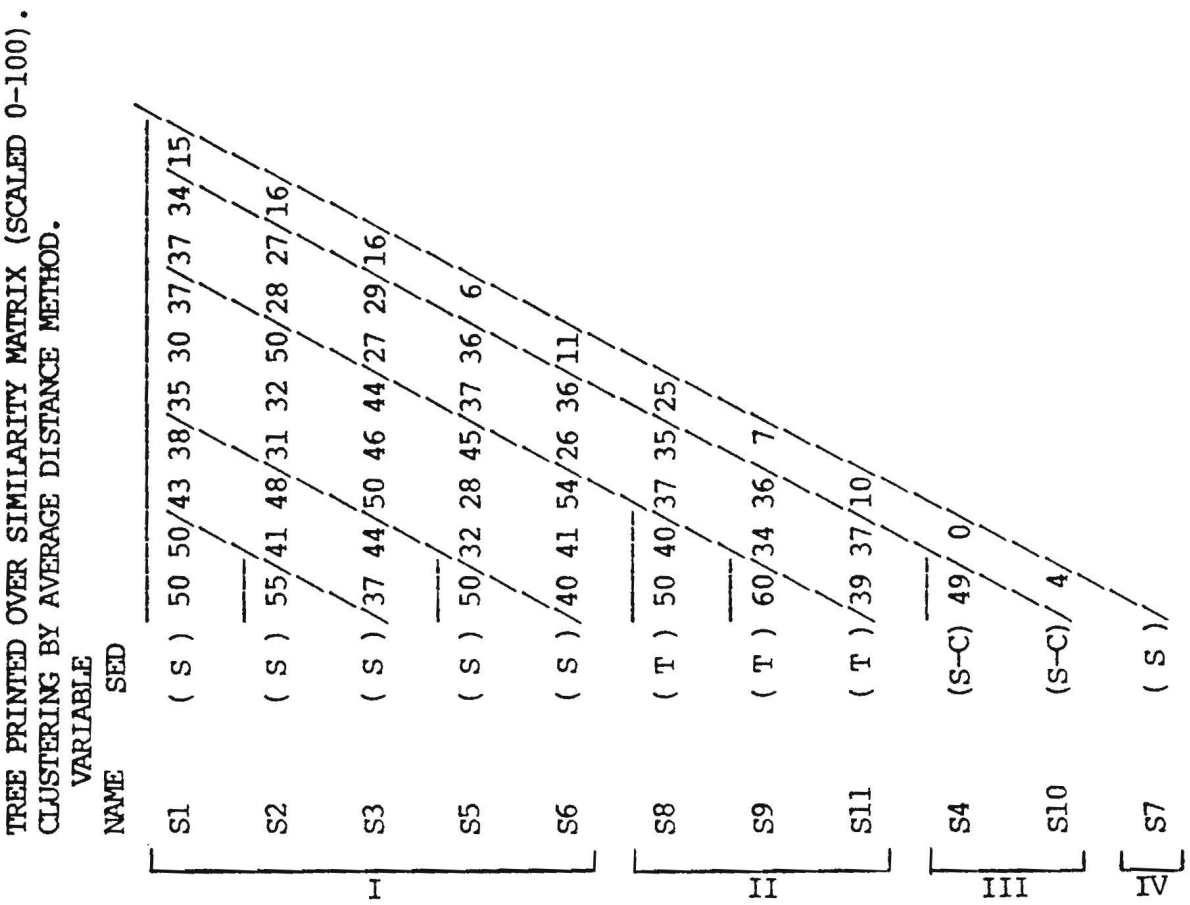
FIGURE 77



THE VALUES IN THIS TREE HAVE BEEN SCALED 0 TO 100
ACCORDING TO THE FOLLOWING TABLE

VALUE ABOVE	SIMILARITY	VALUE ABOVE	SIMILARITY
0	.134	50	.567
5	.177	55	.610
10	.221	60	.654
15	.264	65	.697
20	.307	70	.740
25	.350	75	.783
30	.394	80	.827
35	.437	85	.870
40	.480	90	.913
45	.524	95	.957

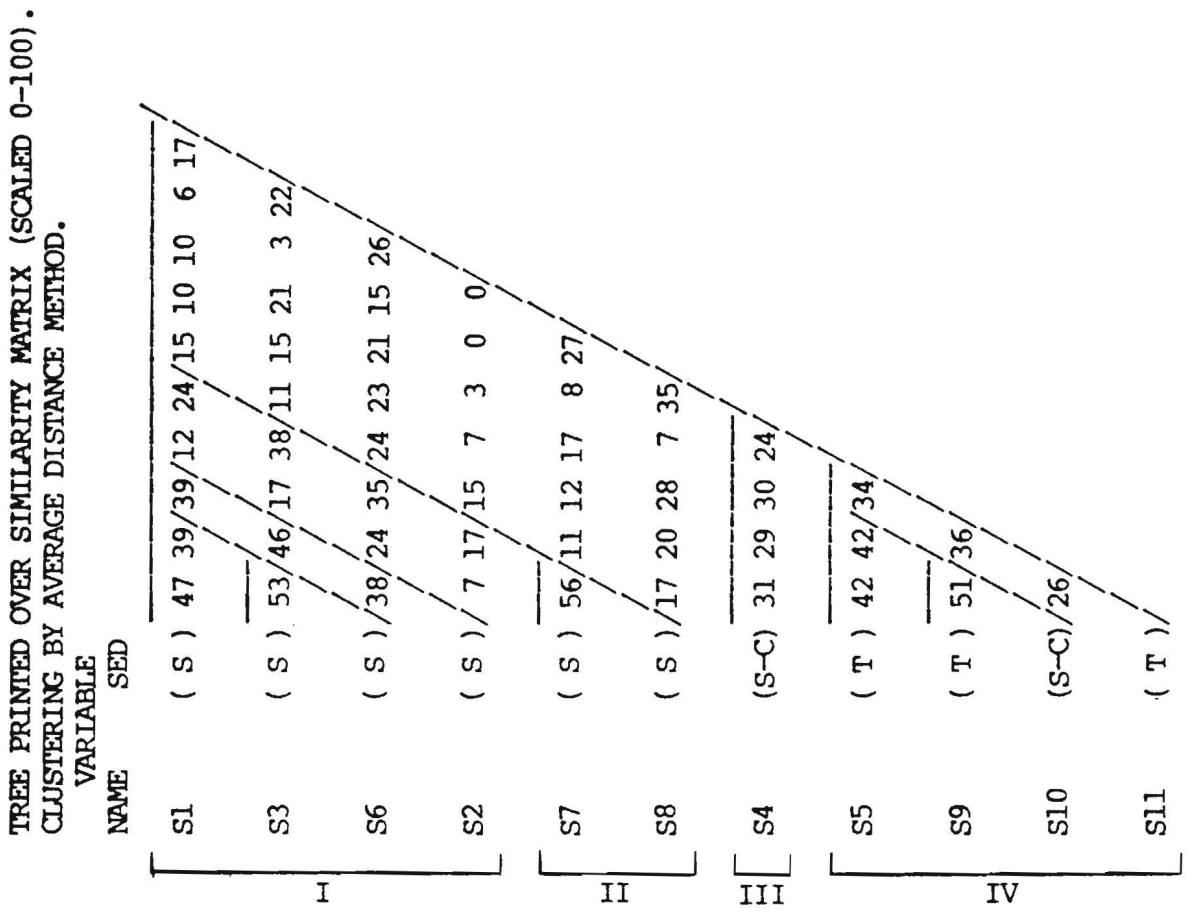
FIGURE 78



THE VALUES IN THIS TREE HAVE BEEN SCALED 0 TO 100
ACCORDING TO THE FOLLOWING TABLE

VALUE ABOVE	SIMILARITY	VALUE ABOVE	SIMILARITY
0	.050	50	.525
5	.097	55	.572
10	.145	60	.620
15	.192	65	.667
20	.240	70	.715
25	.287	75	.762
30	.335	80	.810
35	.382	85	.857
40	.430	90	.905
45	.477	95	.952

FIGURE 79



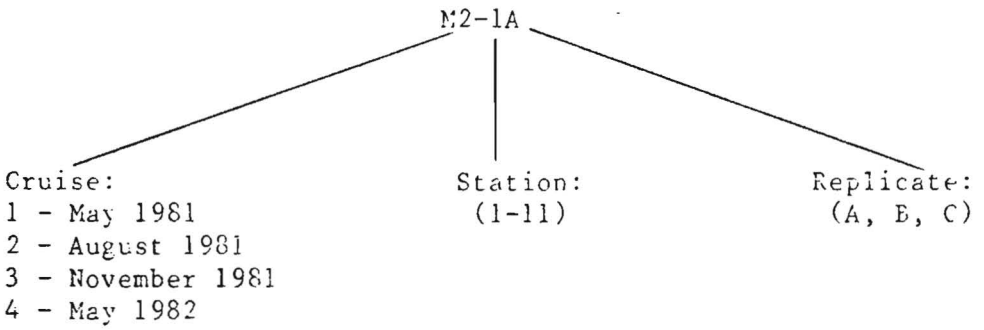
THE VALUES IN THIS TREE HAVE BEEN SCALED 0 TO 100
ACCORDING TO THE FOLLOWING TABLE

VALUE ABOVE	SIMILARITY	VALUE ABOVE	SIMILARITY
0	.191	50	.595
5	.231	55	.636
10	.272	60	.676
15	.312	65	.717
20	.353	70	.757
25	.393	75	.798
30	.434	80	.838
35	.474	85	.879
40	.515	90	.919
45	.555	95	.960

Appendix A

Data Tabulations by Sample

Column Heading Code Key



	M1-1A	M1-1B	M1-1C
Porifera			
Cnidaria			
Unidentified hydroid spp.	+	+	+
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.	2		3
Nematoda			
Unidentified nematode spp.	3	1	2
Ectoprocta			
Annelida			
Unidentified oligochaete spp.	2	1	
Heteromastus filiformis	10	5	4
Capitella capitata	6	19	17
Spiochaetopterus oculatus	1		
Tharyx acutus	3	3	2
Stauronereis rudolphi		2	
Clymanella torquata	1	1	1
Nereis arenaceodonta	20	28	50
Nereis succinea	1	1	2
Scoloplos acutus			1
Pectinaria gouldii	3	6	12
Sabella microphthalma	1		1
Polydora ligni	16	1	1
Prionospio heterobranchia	131	119	217
Scolecolepides viridis	5	6	6
Scolecolepis squamata		3	
Brania clavata		1	
Exogone dispar	19	8	4
Parapionosyllis longicirrata	2		
Polycirris spp.			2
Terebellidae spp.		1	
Gastropoda			
Bivalvia			
Laevicardium mortoni	1		
Lyonsia hyalina	1		
Mytilus edulis	2		15
Amphipoda			
Ampelisca abdita	38	55	32
Caprellidae spp.(damaged)		4	2
Corophium acherusicum	18	11	25
Cymadusa compta			2
Elasmopus laevis	8	1	16
Lysianopsis alba	41	51	124
Microdeutopus gryllotalpa			9
Paraphoxus spinosus	31	26	52
Isopoda			
Cyathura polita			1
Edotea montosa	1		
Erichsonella attenuata		1	1
Decapoda			
Neopanope texana	1		2
Misc. Arthropoda			
Leptochelia rapax	17	14	15
Ostracod spp.	2	1	3
Oxyurostylis smithi		1	
Echinodermata			
TOTAL NUMBER OF SPECIES	30	28	30
TOTAL NUMBER OF INDIVIDUALS	387	371	624

	M1-2A	M1-2B	M1-2C
Porifera			
Cnidaria			
Unidentified hydroid spp.			+
Platyhelminthes			
Nemertea			
Nematoda			
Unidentified nematode spp.		2	
Ectoprocta			
Annelida			
Unidentified oligochaete spp.	1	2	8
Capitella capitata	3	11	16
Tharyx acutus		1	
Podarke obscura	2	4	4
Clymanella torquata	2	8	7
Nereis arenaceodonta	6	12	15
Hoploscoloplos robustus		1	
Scoloplos acutus		1	
Pectinaria gouldii	2		
Phyllodoce arenae			1
Harmothoe extenuata			1
Sabella microphthalma		1	
Dispio uncinata			1
Polydora ligni	2	4	5
Prionospio heterobranchia	26	79	49
Scolecolepides viridis	8	33	15
Spionidae spp. imm.	1		
Brania clavata		4	
Exogone dispar	3	22	17
Gastropoda			
Crepidula plana	1		
Mitrella lunata		1	
Bivalvia			
Aligena elevata		1	
Gemma gemma	2	3	1
Mytilus edulis	128	114	218
Solemya velum	1	4	1
Amphipoda			
Ampelisca abdita	7	9	6
Caprellidae spp.(damaged)		3	2
Corophium acherusicum	3	1	1
Elasmopus laevis	1	1	1
Lysianopsis alba	69	18	22
Microdeutopus gryllotalpa		1	
Paraphoxus spinosus	9	11	7
Rhepoxynuis epistomus			2
Isopoda			
Edotea montosa	1		1
Erichsonella attenuata		1	1
Idotea balthica		3	2
Decapoda			
Neopanope texana	1	1	1
Misc. Arthropoda			
Leptochelia rapax	1	1	4
Ostracod spp.		1	
Echinodermata			
TOTAL NUMBER OF SPECIES	23	32	29
TOTAL NUMBER OF INDIVIDUALS	280	359	409

	M1-3A	M1-3B	M1-3C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.	1	3	2
Nematoda			
Ectoprocta			
Annelida			
Unidentified oligochaete spp.	8	1	2
Asabellides oculata	1	2	
Heteromastus filiformis	2	12	
Capitella capitata	10	4	4
Tharyx acutus	2	3	1
Glycera americana			1
Glycinde solitaria	2	3	
Podarke obscura	2		2
Lubrineris tenuis	21	15	16
Clymanella torquata	14	3	13
Nereis arenaceodonta	45	8	9
Nereis succinea		1	
Platynereis dumerilii			1
Hoploscoloplos robustus	6	4	6
Scoloplos acutus	7	15	4
Phyllodoce arenae	1		
Polydora ligni	5	3	1
Prionospio heterobranchia	26	24	11
Scolecolepides viridis	22	8	17
Spiophanes bombyx			1
Streblospio benedicti	1	1	
Spionidae spp. imm.	1		
Brania clavata	1		
Exogone dispar	22	23	37
Gastropoda			
Crepidula plana			1
Bivalvia			
Aligena elevata			2
Ensis directus			1
Gemma gemma			1
Lyonsia hyalina	2	1	1
Mytilus edulis	10	36	206
Solemya velum	3	5	1
Tellina agilis	3	2	
Amphipoda			
Ampelisca abdita	89	436	55
Caprellidae spp.(damaged)		1	1
Corophium acherusicum		1	10
Elasmopus laevis			1
Gammarus annulatus			2
Gammarus lawrencianus			4
Lysianopsis alba	11	11	44
Microdeutopus gryllotalpa			1
Microprotopus ranei		1	
Paraphoxus spinosus		1	9
Isopoda			
Cyathura polita			1
Edotea montosa		2	7
Erichsonella attenuata		4	1
Decapoda			
Neopanope texana			1
Misc. Arthropoda			
Leptochelia rapax			1
Ostracod spp.	1	1	1
Echinodermata			
TOTAL NUMBER OF SPECIES	28	31	39
TOTAL NUMBER OF INDIVIDUALS	319	635	480

	M1-4A	M1-4B	M1-4C
Porifera			
Unidentified sponge sp.	+		
Cnidaria			
Unidentified anemone sp.			5
Platyhelminthes			
Unidentified flatworm spp.	11	2	13
Nemertea			
Unidentified nemertean spp.			1
Nematoda			
Ectoprocta			
Unidentified bryozoan spp.	+		+
Annelida			
Heteromastus filiformis	1		6
Capitella capitata	31	42	5
Tharyx acutus		1	3
Podarke obscura	19	2	13
Eteone longa	4		
Polydora ligni	78	127	100
Scolecolepides viridis	1		2
Gastropoda			
Nassarius trivitattus		1	
Odostomia producta		1	
Bivalvia			
Mytilus edulis	4	1	8
Amphipoda			
Ampelisca abdita	20	66	41
Corophium acherusicum	299	142	
Corophium insidiosium	46	60	235
Cymadusa compta	1		
Elasmopus laevis	3		1
Gammarus lawrencianus	1		
Gammarus mucronatus	1		
Lysianopsis alba	24	5	13
Microdeutopus gryllotalpa	79	20	99
Isopoda			
Cyathura polita		1	
Edotea montosa		1	2
Idotea balthica		2	
Decapoda			
Misc. Arthropoda			
Echinodermata			
Leptosynapta spp.	1		
TOTAL NUMBER OF SPECIES	20	16	17
TOTAL NUMBER OF INDIVIDUALS	624	474	547

	M1-5A	M1-5B	M1-5C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.		1	
Nematoda			
Ectoprocta			
Annelida			
Unidentified oligochaete spp.			1
Heteromastus filiformis	9	6	7
Capitella capitata	4	2	5
Tharyx acutus	1		
Podarke obscura	1	1	
Lubrineris tenuis	1		1
Clymanella torquata		1	
Nereis arenaceodonta	1	1	
Nereis succinea			1
Hoploscoloplos fragilis	2		
Eteone longa		1	1
Polydora ligni	12	8	12
Prionospio heterobranchia	2		
Exogone dispar	3	11	2
Gastropoda			
Haminoea solitaria	3		1
Bivalvia			
Gemma gemma	1	1	
Amphipoda			
Ampelisca abdita	177	223	190
Corophium acherusicum	3	1	
Corophium insidiosium			1
Corophium lacustre			1
Lysianopsis alba	2	5	5
Paraphoxus spinosus		2	1
Rhepoxynuis epistomus	3		
Isopoda			
Cyathura polita	3	1	
Decapoda			
Misc. Arthropoda			
Echinodermata			
TOTAL NUMBER OF SPECIES	17	15	14
TOTAL NUMBER OF INDIVIDUALS	228	265	229

	M1-6A	M1-6B	M1-6C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Nematoda			
Unidentified nematode spp.	1		3
Ectoprocta			
Unidentified bryozoan spp.			+
Annelida			
Unidentified oligochaete spp.	2	1	
Heteromastus filiformis	27	17	
Capitella capitata	2	2	
Tharyx acutus	10	5	3
Glycinde solitaria	2	1	
Lubrineris tenuis	19	15	
Clymanella torquata	1	1	4
Nephtys picta	1	2	
Nereis arenaceodonta	15	10	17
Hoploscoloplos fragilis			1
Hoploscoloplos robustus	1		
Scoloplos acutus			1
Paraonis fulgens			10
Eteone longa	1		
Phyllodoce arenae	1	1	
Dispio uncinata	1		
Polydora ligni	1	1	1
Prionospio heterobranchia	5	8	21
Scolecolepides viridis	26	34	28
Scolecolepis squamata			15
Spiophanes bombyx	1		
Streblospio benedicti	2	2	4
Brania clavata			3
Exogone dispar			3
Gastropoda			
Bivalvia			
Gemma gemma	5	1	3
Mytilus edulis		1	2
Solemya velum		2	1
Tellina agilis	2	3	
Amphipoda			
Ampelisca abdita	6	2	
Paraphoxus spinosus			1
Isopoda			
Decapoda			
Ovalipes ocellatus			1
Pagarus longicarpus		1	
Misc. Arthropoda			
Echinodermata			
TOTAL NUMBER OF SPECIES	22	20	20
TOTAL NUMBER OF INDIVIDUALS	132	110	122

	M1-7A	M1-7B	M1-7C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Nematoda			
Unidentified nematode spp.	7	9	4
Ectoprocta			
Unidentified bryozoan spp.	+	+	+
Annelida			
Asabellides oculata	1		
Heteromastus filiformis			1
Tharyx acutus	10	3	7
Glycinde solitaria	1	1	1
Nereis arenaceodonta	6	3	1
Hoploscoloplos robustus			1
Scoloplos acutus	1	1	1
Paraonis fulgens	4	5	3
Harmothoe extenuata			1
Scolecolepides viridis	3		2
Spiophanes bombyx		1	2
Gastropoda			
Lunatia heros			1
Bivalvia			
Gemma gemma	1		
Mytilus edulis	7224	104	1956
Tellina agilis	15	5	13
Amphipoda			
Ampelisca abdita	1		2
Gammarus lawrencianus	19		
Paraphoxus spinosus		1	
Rhepoxynuis epistomus	8	2	
Isopoda			
Decapoda			
Misc. Arthropoda			
Echinodermata			
TOTAL NUMBER OF SPECIES	15	12	16
TOTAL NUMBER OF INDIVIDUALS	7301	135	1996

	M1-8A	M1-8B	M1-8C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.	1		
Nematoda			
Ectoprocta			
Unidentified bryozoan spp.	+	+	+
Annelida			
Unidentified oligochaete spp.			1
Asabellides oculata		2	1
Heteromastus filiformis		2	
Podarke obscura	1		
Nereis arenaceodonta			2
Harmothoe extenuata	1	2	2
Harmothoe imbricata	2		1
Potamilla neglecta	1		
Scolecolepides viridis			6
Gastropoda			
Bivalvia			
Ensis directus	1		
Mytilus edulis	4592	4624	5416
Tellina agilis		3	2
Amphipoda			
Elasmopus laevis	12	13	13
Gammarus annulatus			1
Gammarus lawrencianus	3	7	3
Lysianopsis alba			1
Microdeutopus gryllotalpa	16	16	16
Paraphoxus spinosus		1	
Isopoda			
Decapoda			
Misc. Arthropoda			
Balanus amphitrite	1		6
Echinodermata			
TOTAL NUMBER OF SPECIES	12	10	15
TOTAL NUMBER OF INDIVIDUALS	4631	4670	5471

	M1-9A	M1-9B	M1-9C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Annelida			
Unidentified oligochaete spp.	1	8	
Heteromastus filiformis	5	16	13
Capitella capitata	10	11	10
Tharyx acutus	3	30	9
Podarke obscura	1	1	1
Lubrineris tenuis	17	21	27
Clymanella torquata		2	5
Nereis arenaceodonta	7		4
Nereis succinea	1		2
Hoploscoloplos fragilis	2	1	5
Hoploscoloplos robustus		3	
Scoloplos acutus	9		8
Eteone longa	1	2	
Mystides borealis	1		
Phyllodoce arenae	1		
Harmothoe extenuata		1	
Harmothoe imbricata	3		
Polydora ligni	2		
Prionospio heterobranchia		1	
Streblospio benedicti		2	2
Parapionosyllis longicirrata	1		
Terebellidae spp.		1	
Gastropoda			
Bivalvia			
Mytilus edulis	37	1	21
Solemya velum	3	5	
Tellina agilis		1	1
Amphipoda			
Ampelisca abdita	2		
Corophium acutum			1
Corophium insidiosium	1		
Elasmopus laevis	4	1	
Lysianopsis alba	4		5
Microdeutopus gryllotalpa	26	3	7
Isopoda			
Idotea balthica	1		2
Decapoda			
Misc. Arthropoda			
Ostracod spp.	1		
Echinodermata			
TOTAL NUMBER OF SPECIES	25	19	17
TOTAL NUMBER OF INDIVIDUALS	144	111	123

	M1-10A	M1-10B	M1-10C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.	4		1
Nematoda			
Ectoprocta			
Annelida			
Heteromastus filiformis	26	4	25
Capitella capitata	30	12	38
Spiochaetopterus oculatus	1		
Glycinde solitaria	1		
Lubrineris tenuis	38	25	64
Nereis arenaceodonta			1
Hoploscoloplos fragilis			6
Hoploscoloplos robustus	11	15	3
Scoloplos acutus	3		1
Eteone longa	1		1
Polydora ligni	3	1	5
Scolecolepides viridis	2		1
Streblospio benedicti	22	4	19
Gastropoda			
Haminoea solitaria			1
Bivalvia			
Gemma gemma			1
Amphipoda			
Ampelisca abdita	195	56	298
Lysianopsis alba	7		4
Isopoda			
Cyathura polita	9	9	11
Decapoda			
Misc. Arthropoda			
Echinodermata			
TOTAL NUMBER OF SPECIES	15	8	17
TOTAL NUMBER OF INDIVIDUALS	353	126	480

	M1-11A	M1-11B	M1-11C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Annelida			
Unidentified oligochaete spp.		1	2
Heteromastus filiformis	20	33	7
Capitella capitata	3		3
Spiochaetopterus oculatus	1		
Tharyx acutus	40	29	32
Glycinde solitaria	2	2	3
Lubrineris tenuis		1	
Clymanella torquata	1	3	3
Nereis arenaceodonta	6	15	13
Nereis succinea	1		
Hoploscoloplos robustus	1		3
Eteone longa		2	2
Prionospio heterobranchia	17	37	32
Scolecolepides viridis	1		2
Brania clavata		3	
Exogone dispar	5	7	2
Terebellidae spp.	1	1	
Gastropoda			
Crepidula plana		1	
Haminoea solitaria		1	
Bivalvia			
Gemma gemma	1		
Mytilus edulis	5		
Solemya velum	4	1	
Tellina agilis	1		
Amphipoda			
Caprellidae spp.(damaged)		1	
Listriella barnardi		1	
Lysianopsis alba	1		
Paraphoxus spinosus		1	
Rhepoxynuis epistomus		1	
Isopoda			
Cyathura polita			1
Decapoda			
Misc. Arthropoda			
Echinodermata			
TOTAL NUMBER OF SPECIES	18	19	13
TOTAL NUMBER OF INDIVIDUALS	111	141	105

	M2-1A	M2-1B	M2-1C
Porifera			
Cnidaria			
Diadumene leucolena		2	
Haloclava producta		1	
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.		1	
Nematoda			
Ectoprocta			
Annelida			
Unidentified oligochaete spp.	1		
Heteromastus filiformis	33	13	6
Capitella capitata	3	6	5
Spiochaetopterus oculatus		4	1
Tharyx acutus	2		
Stauronereis rudolphi			2
Glycera americana	2		
Glycinde solitaria		4	
Podarke obscura	1	2	9
Lubrineris tenuis	1		4
Clymanella torquata	5	26	7
Nereis arenaceodonta	1	5	8
Nereis succinea			2
Platynereis dumerilii		5	
Hoploscoloplos robustus	1	3	1
Scoloplos acutus		2	
Pectinaria gouldii	1		2
Eumida sanguinea		2	1
Phyllodoce arenae		1	
Sabella microphthalma		2	3
Polydora ligni	4		6
Prionospio heterobranchia	59	13	19
Exogone dispar	7		
Amphitrite affinis	11	21	9
Gastropoda			
Retusa canaliculata	3		1
Crepidula plana		1	
Bivalvia			
Laevicardium mortoni	1	13	2
Lyonsia hyalina	2	2	1
Mercenaria mercenaria		1	
Solemya velum	7	12	29
Tellina agilis		2	
Amphipoda			
Ampelisca abdita	116	72	40
Caprellidae spp.(damaged)	1		
Corophium insidiosium	1		
Cymadusa compta	1	5	1
Elasmopus laevis		6	3
Listriella barnardi	1		
Lysianopsis alba	20	16	25
Microdeutopus gryllotalpa	5		5
Paraphoxus spinosus	2	3	
Isopoda			
Erichsonella attenuata		1	1
Decapoda			
Neopanope texana	7	4	2
Misc. Arthropoda			
Leptochelia rapax			2
Ostracod spp.			2
Echinodermata			
Chordata			
Mogula manhattensis		2	
TOTAL NUMBER OF SPECIES	28	32	29
TOTAL NUMBER OF INDIVIDUALS	299	253	199

	M2-2A	M2-2B	M2-2C
Porifera			
Cnidaria			
Unidentified hydroid spp.	+		+
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.		5	3
Nematoda			
Ectoprocta			
Unidentified bryozoan spp.			+
Annelida			
Drilonereis longa	1		
Heteromastus filiformis		1	
Capitella capitata	1	3	
Tharyx acutus	17	31	7
Glycinde solitaria	1		
Podarke obscura			2
Lubrineris tenuis		4	
Clymanella torquata		1	
Nereis arenaceodonta	8	16	14
Nereis succinea		3	
Sabella microphthalma			1
Polydora ligni		1	
Prionospio heterobranchia	2	7	1
Scolecolepides viridis		13	3
Scolecolepis squamata	16	10	1
Spiophanes bombyx		2	
Exogone dispar		1	1
Amphitrite affinis			2
Gastropoda			
Bivalvia			
Gemma gemma			1
Mytilus edulis	1		
Solemya velum	1	2	
Tellina agilis	1	2	4
Amphipoda			
Ampelisca abdita	2	263	7
Caprellidae spp.(damaged)	1		
Corophium lacustre	1	3	
Cymadusa compta	1		
Elasmopus laevis	2		5
Lembos smithi		1	1
Listriella barnardi	1	5	
Lysianopsis alba	3	21	4
Microdeutopus gryllotalpa	5	14	5
Paraphoxus spinosus	7	6	2
Rhepoxynuis epistomus	2	1	5
Unciola dissimilis			2
Isopoda			
Edotea montosa		3	
Erichsonella attenuata	1		
Decapoda			
Larval crab	1		
Neopanope texana	1	2	
Misc. Arthropoda			
Leptochelia rapax		2	1
Oxyurostylis smithi	3	2	3
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	25	28	24
TOTAL NUMBER OF INDIVIDUALS	80	425	75

	M2-3A	M2-3B	M2-3C
Porifera			
Cnidaria			
Unidentified hydroid spp.			+
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Annelida			
Unidentified oligochaete spp.			8
Heteromastus filiformis	9	18	10
Capitella capitata	3	5	1
Tharyx acutus			2
Glycinde solitaria	1	3	
Podarke obscura	1		1
Lubrineris tenuis	7	7	6
Clymanella torquata		3	15
Nephtys picta			1
Nereis arenaceodonta	18	17	2
Nereis succinea			1
Platynereis dumerilii			1
Hoploscoloplos fragilis			1
Hoploscoloplos robustus	2	1	1
Scoloplos acutus	4	9	2
Paraonis fulgens	1		
Eumida sanguinea			1
Potamilla neglecta			1
Sabella microphthalma			3
Polydora ligni			2
Prionospio heterobranchia	23	20	24
Pygospio elegans		1	2
Scolecolepides viridis	1	1	2
Scolecolepis squamata		4	2
Brania clavata	2		
Exogone dispar	3	1	3
Gastropoda			
Retusa canaliculata		3	
Bivalvia			
Gemma gemma	2	10	3
Solemya velum	3	1	
Tellina agilis	4	2	2
Amphipoda			
Ampelisca abdita	1		2
Caprellidae spp.(damaged)			3
Corophium insidiosium			1
Elasmopus laevis			2
Listriella barnardi	1	1	
Lysianopsis alba	4	1	12
Microdeutopus gryllotalpa	19		3
Paraphoxus spinosus	6		10
Rhepoxynuis epistomus	2	2	6
Isopoda			
Edotea montosa	1	1	1
Erichsonella attenuata	1		2
Decapoda			
Neopanope texana	2		2
Misc. Arthropoda			
Leptochelia rapax		1	1
Ostracod spp.	1		2
Oxyurostylis smithi	1		1
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	27	22	40
TOTAL NUMBER OF INDIVIDUALS	123	112	145

	M2-4A	M2-4B	M2-4C
Porifera			
Cnidaria			
Tealia felina (tent.)	4	5	
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Unidentified bryozoan spp.	+	+	
Annelida			
Unidentified oligochaete spp.		1	
Capitella capitata			1
Glycera americana	1		
Podarke obscura	4	1	
Sabella microphthalma		1	
Polydora ligni	6	13	
Spiophanes bombyx	1		
Gastropoda			
Retusa canaliculata	2		
Bivalvia			
Amphipoda			
Ampelisca abdita	1		
Corophium insidiosium	24	142	2
Cymadusa compta	1	5	
Elasmopus laevis		1	
Gammarus mucronatus		2	
Lysianopsis alba	2	8	1
Microdeutopus gryllotalpa	6	6	1
Isopoda			
Idotea balthica	1		
Decapoda			
Misc. Arthropoda			
Echinodermata			
Chordata			
Mogula manhattensis	2	91	
TOTAL NUMBER OF SPECIES	14	13	4
TOTAL NUMBER OF INDIVIDUALS	55	276	5

	M2-5A	M2-5B	M2-5C
Porifera			
Cnidaria			
Haloclava producta		1	
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.		3	2
Nematoda			
Ectoprocta			
Annelida			
Heteromastus filiformis	3	4	7
Capitella capitata	1		6
Glycinde solitaria		1	
Podarke obscura	1		
Lubrineris tenuis	4	1	3
Clymanella torquata			2
Nereis succinea			2
Platynereis dumerilii			2
Hoploscoloplos fragilis		1	
Eumida sanguinea			1
Polydora ligni		13	2
Prionospio heterobranchia		1	1
Exogone dispar	1	2	2
Gastropoda			
Retusa canaliculata	2	5	
Crepidula plana			2
Bivalvia			
Lyonsia hyalina		1	
Solemya velum	2		
Amphipoda			
Ampelisca abdita	117	245	42
Batea catharinensis	1	3	
Caprellidae spp.(damaged)			1
Corophium lacustre	2	8	
Cymadusa compta			1
Lysianopsis alba	8	17	12
Microdeutopus gryllotalpa		1	
Paraphoxus spinosus	1	1	1
Isopoda			
Cyathura polita	4	13	9
Decapoda			
Neopanope texana	2		2
Misc. Arthropoda			
Leptochelia rapax		6	
Ostracod spp.	2		
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	15	19	19
TOTAL NUMBER OF INDIVIDUALS	151	327	100

	M2-6A	M2-6B	M2-6C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Annelida			
Heteromastus filiformis		5	
Capitella capitata	1		
Tharyx acutus	14	6	2
Lubrineris tenuis	16	14	12
Clymanella torquata	1	8	12
Nereis arenaceodonta		2	1
Eumida sanguinea			2
Harmothoe extenuata			2
Polydora ligni	2	1	
Gastropoda			
Crepidula plana		1	
Bivalvia			
Mytilus edulis			13
Solemya velum	1	2	
Tellina agilis	1	7	1
Amphipoda			
Ampelisca abdita	3	1	
Elasmopus laevis			14
Lysianopsis alba			4
Unciola serrata	2		
Isopoda			
Decapoda			
Neopanope texana			8
Misc. Arthropoda			
Oxyurostylis smithi			1
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	9	10	12
TOTAL NUMBER OF INDIVIDUALS	41	47	72

	M2-7A	M2-7B	M2-7C
Porifera			
Cnidaria			
Unidentified hydroid spp.	+	+	+
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Unidentified bryozoan spp.	+		
Annelida			
Unidentified oligochaete spp.	2	9	6
Heteromastus filiformis	2	9	2
Capitella capitata		1	
Tharyx acutus	5	10	5
Podarke obscura	1		
Lubrineris tenuis	1	1	
Clymanella torquata		1	
Nereis arenaceodonta	4	24	20
Platynereis dumerilii	2		
Paraonis fulgens	1		
Eteone longa	1		
Brania clavata		1	
Gastropoda			
Bivalvia			
Mercenaria mercenaria	1		
Tellina agilis	3	5	4
Amphipoda			
Elasmopus laevis	4	1	3
Lysianopsis alba	1		2
Paraphoxus spinosus	5		4
Isopoda			
Decapoda			
Misc. Arthropoda			
Balanus amphitrite			81
Oxyurostylis smithi	2		1
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	17	11	11
TOTAL NUMBER OF INDIVIDUALS	35	62	128

	M2-8A	M2-8B	M2-8C
Porifera			
Cnidaria			
Unidentified hydroid spp.		+	+
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.			1
Nematoda			
Ectoprocta			
Unidentified bryozoan spp.	+	+	
Annelida			
Tharyx acutus	4	1	1
Lubrineris tenuis	1	1	
Nereis arenaceodonta	1	2	
Nereis succinea	1		
Platynereis dumerilii			1
Hoploscoloplos fragilis	1		
Phyllodoce arenae			1
Gastropoda			
Bivalvia			
Mercenaria mercenaria	1		
Mytilus edulis		1	
Petricola pholadiformis		7	21
Tellina agilis	17	3	1
Amphipoda			
Ampelisca abdita		1	3
Caprellidae spp.(damaged)		1	
Corophium lacustre	10	2	28
Elasmopus laevis	12	2	5
Lysianopsis alba	5	7	4
Microdeutopus gryllotalpa	10	8	13
Paraphoxus spinosus	6	3	3
Isopoda			
Edotea montosa			1
Idotea balthica			4
Decapoda			
Libinia dubia	1	1	
Misc. Arthropoda			
Balanus amphitrite	1	2	
Oxyurostylis smithi		1	
Echinodermata			
Asterias forbesii			1
Chordata			
Mogula manhattensis			4
TOTAL NUMBER OF SPECIES	15	18	17
TOTAL NUMBER OF INDIVIDUALS	71	43	92

	M2-9A	M2-9B	M2-9C
Porifera			
Cnidaria			
Platyhelminthes			
Unidentified flatworm spp.	1		
Nemertea			
Unidentified nemertean spp.	1		
Nematoda			
Ectoprocta			
Annelida			
Heteromastus filiformis	2	1	1
Capitella capitata	20	2	4
Tharyx acutus		1	
Podarke obscura		1	
Lubrineris tenuis	31	8	6
Clymanella torquata	2		
Nereis arenaceodonta	1	1	1
Hoploscoloplos fragilis	1	12	2
Hoploscoloplos robustus	14	1	3
Eteone longa		1	
Harmothoe imbricata	1		
Polydora ligni	2		
Prionospio heterobranchia	3		
Amphitrite affinis			1
Gastropoda			
Retusa canaliculata	1		
Eupleura caudata	1		
Bivalvia			
Aligena elevata			1
Mytilus edulis	23		7
Nucula annulatus	2	1	
Solemya velum	4	2	
Tellina agilis	4	5	
Amphipoda			
Ampelisca abdita	1		
Elasmopus laevis	7	1	
Lysianopsis alba	27	6	1
Microdeutopus gryllotalpa	15		
Isopoda			
Decapoda			
Misc. Arthropoda			
Ostracod spp.	1		
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	23	14	10
TOTAL NUMBER OF INDIVIDUALS	165	43	27

	M2-10A	M2-10B	M2-10C
Porifera			
Cnidaria			
Haloclava producta	2		
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.		1	
Nematoda			
Ectoprocta			
Annelida			
Heteromastus filiformis	1	7	10
Capitella capitata	4	30	13
Spiochaetopterus oculatus		2	
Tharyx acutus			2
Glycera americana	1		
Podarke obscura		1	
Lubrineris tenuis	48	86	63
Maldanid spp.		1	
Nereis arenaceodonta		1	
Hoploscoloplos fragilis	2		
Hoploscoloplos robustus	2	10	10
Scoloplos acutus		2	1
Eteone longa			1
Polydora ligni	4	3	3
Prionospio heterobranchia	1	2	
Streblospio benedicti	1	8	13
Gastropoda			
Retusa canaliculata		3	7
Haminoea solitaria			1
Bivalvia			
Gemma gemma	1	5	
Laevicardium mortoni	1		
Amphipoda			
Ampelisca abdita	474	658	543
Batea catharinensis	1	1	4
Corophium lacustre	1	6	
Cymadusa compta	2	6	8
Elasmopus laevis	2	1	17
Lysianopsis alba	10	4	3
Microdeutopus gryllotalpa	1	6	12
Isopoda			
Cyathura polita	15	14	8
Decapoda			
Neopanope texana			1
Misc. Arthropoda			
Anoplodactylus lentus	1	1	
Leucon americanus	1	1	3
Echinodermata			
Chordata			
Unidentified tunicate spp.	1		
TOTAL NUMBER OF SPECIES	23	25	20
TOTAL NUMBER OF INDIVIDUALS	577	860	723

	M2-11A	M2-11B	M2-11C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Annelida			
Heteromastus filiformis	5	3	4
Capitella capitata	17	5	8
Spiochaetopterus oculatus	2		
Tharyx acutus		2	2
Glycinde solitaria	1		1
Lubrineris tenuis	2	3	1
Clymanella torquata	1	1	
Nereis arenaceodonta	20	13	24
Hoploscoloplos robustus		1	1
Scoloplos acutus	2		2
Eteone longa	1	2	
Polydora ligni	1	1	
Prionospio heterobranchia	26	28	25
Scolecolepis squamata	7	10	13
Exogone dispar	1		
Polycirris eximius	1		
Gastropoda			
Crepidula convexa	1		
Bivalvia			
Gemma gemma	1	1	
Amphipoda			
Ampelisca abdita	1		
Listriella barnardi		1	
Lysianopsis alba	1		1
Microdeutopus gryllotalpa	2		
Rhepoxynuis epistomus	2	1	2
Unciola dissimilis	1		
Unciola serrata		2	
Isopoda			
Decapoda			
Larval crab	1		
Ovalipes ocellatus		1	
Misc. Arthropoda			
Oxyurostylis smithi	1		
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	23	16	12
TOTAL NUMBER OF INDIVIDUALS	98	75	84

	M3-1A	M3-1B	M3-1C
Porifera			
Cnidaria			
Unidentified hydroid spp.			+
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Annelida			
Heteromastus filiformis	4	15	11
Capitella capitata		1	1
Tharyx acutus	41	46	51
Glycera americana		1	
Glycinde solitaria		3	1
Lubrineris tenuis	4	2	4
Clymanella torquata	2	4	3
Nephtys picta	2	4	7
Nereis arenaceodonta		9	2
Scoloplos acutus		1	
Eteone longa		2	
Polydora ligni			1
Prionospio heterobranchia		10	16
Scolecolepis squamata	3	1	
Brania clavata			1
Exogone dispar		2	19
Gastropoda			
Retusa canaliculata	1	1	1
Bivalvia			
Gemma gemma	2		
Mercenaria mercenaria		1	
Tellina agilis	2	2	
Amphipoda			
Ampelisca abdita			3
Ampelisca verrilli	8	6	21
Batea catharinensis			3
Caprellidae spp.(damaged)			7
Corophium lacustre			2
Elasmopus laevis			1
Listriella barnardi			1
Lysianopsis alba		1	1
Paraphoxus spinosus			1
Unciola serrata		1	10
Isopoda			
Decapoda			
Neopanope texana		1	1
Ovalipes ocellatus			1
Misc. Arthropoda			
Leptochelia rapax			1
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	10	21	27
TOTAL NUMBER OF INDIVIDUALS	69	114	171

	M3-2A	M3-2B	M3-2C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.		3	1
Nematoda			
Unidentified nematode spp.		3	
Ectoprocta			
Annelida			
Unidentified oligochaete spp.		1	
Asabellides oculata			1
Heteromastus filiformis	1	7	9
Capitella capitata			2
Tharyx acutus	2		37
Glycinde solitaria		1	1
Lubrineris tenuis	1	1	
Clymanella torquata		7	1
Nereis arenaceodonta	1	5	12
Platynereis dumerilii		10	
Scoloplos acutus		10	10
Eteone longa			2
Eumida sanguinea		2	
Polydora ligni		2	
Prionospio heterobranchia	12	81	141
Scolecolepides viridis		2	
Scolecolepis squamata			2
Spiophanes bombyx		1	1
Brania clavata		3	
Exogone dispar	3	21	11
Amphitrite affinis			1
Gastropoda			
Retusa canaliculata		1	2
Crepidula convexa		1	
Lunatia heros			1
Mitrella lunata		1	
Bivalvia			
Gemma gemma		1	2
Lyonsia hyalina			1
Mercenaria mercenaria			1
Amphipoda			
Ampelisca abdita		3	
Caprellidae spp.(damaged)		13	3
Corophium acutum		1	
Elasmopus laevis		6	
Erichthonius brasiliensis			1
Gammarus lawrencianus		2	1
Lysianopsis alba	1	36	20
Microdeutopus gryllotalpa		1	
Paraphoxus spinosus	2	11	3
Rhepoxynuis epistomus		1	6
Unciola serrata	1	1	
Isopoda			
Edotea montosa		1	1
Erichsonella attenuata		2	3
Decapoda			
Neopanope texana		1	1
Misc. Arthropoda			
Anoplodactylus lentus	1		
Leptochelia rapax		7	
Oxyurostylis smithi		4	1
Echinodermata			
Leptosynapta spp.			1
Chordata			
TOTAL NUMBER OF SPECIES	10	36	31
TOTAL NUMBER OF INDIVIDUALS	25	254	280

	M3-3A	M3-3B	M3-3C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.	9		
Nematoda			
Unidentified nematode spp.	2		
Ectoprocta			
Annelida			
Unidentified oligochaete spp.	1		2
Heteromastus filiformis	91	63	45
Capitella capitata	1		1
Tharyx acutus	4	5	3
Glycinde solitaria	1	5	4
Lubrineris tenuis	22	11	5
Nephtys picta	18	3	13
Nereis arenaceodonta	8	2	8
Nereis succinea	13		
Platynereis dumerilii	1		
Hoploscoloplos robustus			1
Scoloplos acutus	12	4	4
Eumida sanguinea	1		
Phyllodoce arenae	1		1
Polydora ligni	2	3	1
Prionospio heterobranchia	25	27	25
Scolecolepis squamata		1	3
Spiophanes bombyx	3		
Streblospio benedicti		1	
Exogone dispar	76	13	2
Gastropoda			
Retusa canaliculata	4		1
Crepidula convexa	3		
Haminoea solitaria	1	2	1
Turbonilla spp. (juv.)	1		
Bivalvia			
Gemma gemma	8	12	2
Lyonsia hyalina	2	1	
Solemya velum	1	2	
Tellina agilis	2	1	4
Amphipoda			
Ampelisca abdita	2		
Caprellidae spp.(damaged)	13	2	3
Corophium lacustre	1		
Cymadusa compta	1		
Elasmopus laevis	1		
Listriella barnardi	2	1	1
Lysianopsis alba	7		1
Microdeutopus gryllotalpa	4		
Paraphoxus spinosus	4		
Unciola dissimilis	1		
Isopoda			
Edotea montosa	3		
Erichsonella attenuata	2		
Decapoda			
Misc. Arthropoda			
Leptochelia rapax	2	1	1
Ostracod spp.	1	11	1
Oxyurostylis smithi	1		
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	42	21	24
TOTAL NUMBER OF INDIVIDUALS	358	171	133

	M3-4A	M3-4B	M3-4C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.		1	
Nematoda			
Ectoprocta			
Annelida			
Heteromastus filiformis	3	9	8
Capitella capitata	4	5	1
Tharyx acutus	9	3	18
Glycinde solitaria	2		
Podarke obscura	1	3	2
Lubrineris tenuis		1	1
Eteone longa		2	1
Polydora ligni		1	
Streblospio benedicti	35	28	81
Exogone dispar	2	1	1
Gastropoda			
Acteon punctostriatus			2
Retusa canaliculata		1	3
Bivalvia			
Gemma gemma			3
Amphipoda			
Ampelisca abdita	129	148	200
Lysianopsis alba	5		1
Isopoda			
Cyathura polita	4	7	9
Decapoda			
Misc. Arthropoda			
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	10	13	14
TOTAL NUMBER OF INDIVIDUALS	194	210	331

	M3-5A	M3-5B	M3-5C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Unidentified bryozoan spp.	+		+
Annelida			
Unidentified oligochaete spp.	6	2	2
Heteromastus filiformis	1	1	
Capitella capitata	2	4	2
Tharyx acutus	9	22	5
Nephtys picta		1	
Nereis arenaceodonta		5	
Eumida sanguinea			1
Hydroides dianthus			23
Polydora ligni	1		
Prionospio heterobranchia	14	9	4
Scolecolepis squamata		1	
Streblospio benedicti		3	
Brania clavata			1
Exogone dispar	3		2
Amphitrite affinis	2		
Gastropoda			
Crepidula convexa	1		4
Bivalvia			
Gemma gemma			1
Mercenaria mercenaria		1	
Tellina agilis	1		
Amphipoda			
Ampelisca abdita	17	2	9
Corophium lacustre	1		2
Elasmopus laevis	1	1	6
Lysianopsis alba	11		
Microdeutopus gryllotalpa	1		2
Paraphoxus spinosus	35	1	1
Isopoda			
Cyathura polita	2		
Decapoda			
Neopanope texana		2	1
Misc. Arthropoda			
Ostracod spp.	3		
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	19	14	17
TOTAL NUMBER OF INDIVIDUALS	111	55	66

	M3-6A	M3-6B	M3-6C
Porifera			
Cnidaria			
Unidentified hydroid spp.		+	
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.	1		1
Nematoda			
Unidentified nematode spp.	1		
Ectoprocta			
Unidentified bryozoan spp.		+	+
Annelida			
Unidentified oligochaete spp.	4	16	6
Heteromastus filiformis	5	10	4
Capitella capitata	9	10	8
Tharyx acutus	6	10	11
Lubrineris tenuis	3	4	14
Nephtys picta		1	
Nereis arenaceodonta	2	1	2
Nereis pelagica	25	29	12
Hoploscoloplos robustus	1		
Scoloplos acutus	3		3
Paraonis fulgens	1		
Eumida sanguinea	8	1	1
Hydroides dianthus	1		
Polydora ligni	1		
Prionospio heterobranchia	4	4	2
Scolecolepides viridis			1
Spiophanes bombyx	1		
Streblospio benedicti	1	5	2
Brania clavata		1	
Exogone dispar	7	4	2
Amphitrite affinis			1
Gastropoda			
Crepidula convexa	7	1	2
Crepidula fornicata		1	
Bivalvia			
Anadara transversa	2	1	
Gemma gemma	10	2	3
Mercenaria mercenaria	1		
Mytilus edulis	6	2	2
Amphipoda			
Ampelisca abdita		1	
Ampelisca verrilli	1		
Batea catharinensis	12	1	
Caprellidae spp.(damaged)	1		2
Corophium lacustre	2	1	
Cymadusa compta	1		
Elasmopus laevis	14	15	15
Erichthonius brasiliensis	8		
Gammarus annulatus	1		
Gammarus lawrencianus		20	
Lysianopsis alba	56	40	10
Melita nitida	30	11	3
Microdeutopus gryllotalpa	12	6	7
Paraphoxus spinosus		16	6
Isopoda			
Erichsonella attenuata			2
Decapoda			
Neopanope texana	12	6	10
Misc. Arthropoda			
Heteromysis formosa	3	1	5
Ostracod spp.		1	
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	37	32	28
TOTAL NUMBER OF INDIVIDUALS	263	222	137

	M3-7A	M3-7B	M3-7C
Porifera			
Cnidaria			
Unidentified hydroid spp.	+	+	+
Platyhelminthes			
Nemertea			
Nematoda			
Unidentified nematode spp.	7	6	17
Ectoprocta			
Unidentified bryozoan spp.	+	+	+
Annelida			
Tharyx acutus		7	
Magelona riojai	1	7	11
Nephtys picta		8	4
Nereis arenaceodonta		4	5
Scoloplos acutus	1	1	1
Paraonis fulgens	9	5	4
Spiophanes bombyx		1	
Gastropoda			
Bivalvia			
Spisula solidissima		1	1
Tellina agilis	8	20	9
Amphipoda			
Acanthohaustorius millsi		1	1
Ampelisca abdita		1	
Gammarus lawrencianus	5	5	1
Rhepoxynuis epistomus		3	3
Isopoda			
Decapoda			
Misc. Arthropoda			
Balanus amphitrite	2	5	
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	9	17	13
TOTAL NUMBER OF INDIVIDUALS	33	75	57

	M3-8A	M3-8B	M3-8C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.	1		
Nematoda			
Unidentified nematode spp.	4	1	2
Ectoprocta			
Annelida			
Unidentified oligochaete spp.	9	11	5
Asabellides oculata	6	1	1
Heteromastus filiformis	98	8	80
Capitella capitata	2	15	9
Tharyx acutus	1	1	
Pherusa affinis			1
Glycinde solitaria	1		1
Lubrineris tenuis	20	2	30
Nephtys picta	10	13	2
Nereis arenaceodonta		2	3
Nereis pelagica	5	13	1
Hoploscoloplos fragilis			1
Hoploscoloplos robustus	1		2
Scoloplos acutus	4	2	
Harmothoe imbricata			1
Polydora ligni		6	1
Prionospio heterobranchia			1
Scolecolepis squamata	1		
Spiophanes bombyx	4	1	3
Streblospio benedicti	4	4	2
Brania clavata		3	
Exogone dispar	1	3	
Gastropoda			
Haminoea solitaria	3		
Nassarius trivitattus			1
Bivalvia			
Aligena elevata			3
Gemma gemma	21	9	3
Nucula annulatus			1
Solemya velum			3
Tellina agilis	26	10	9
Amphipoda			
Ampelisca abdita	209	274	30
Gammarus lawrencianus	1		
Parametopella cypris			1
Unciola serrata	1		
Isopoda			
Edotea montosa		1	
Decapoda			
Misc. Arthropoda			
Leucon americanus	1		
Ostracod spp.	9	2	
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	25	21	26
TOTAL NUMBER OF INDIVIDUALS	443	382	197

	M3-9A	M3-9B	M3-9D
Porifera			
Cnidaria			
Epizoanthus incrustatus	+		
Platyhelminthes			
Unidentified flatworm spp.		1	
Nemertea			
Unidentified nemertean spp.	4	6	3
Nematoda			
Unidentified nematode spp.	2		1
Ectoprocta			
Annelida			
Unidentified oligochaete spp.	1	6	2
Heteromastus filiformis	27	21	6
Capitella capitata	12	14	10
Tharyx acutus	1		
Glycinde solitaria	6		3
Podarke obscura		1	
Lubrineris tenuis	38	16	14
Clymanella torquata	5	2	2
Nereis arenaceodonta	12	19	22
Nereis pelagica	8	16	30
Nereis succinea		1	5
Hoploscoloplos fragilis	2		2
Hoploscoloplos robustus	6	9	
Scoloplos acutus	18	19	16
Eteone longa	3	3	3
Paranaitis speciosa			1
Phyllodoce arenae	1		
Polydora ligni	7	11	11
Prionospio heterobranchia		3	5
Streblospio benedicti	17	21	15
Exogone dispar	1		
Gastropoda			
Retusa canaliculata	1		
Haminoea solitaria		3	
Bivalvia			
Gemma gemma	1		
Mysella planulata		1	
Nucula annulatus			1
Solemya velum	2	3	2
Tellina agilis		2	2
Amphipoda			
Ampelisca abdita	1032	1521	1540
Corophium lacustre	2	10	5
Listriella barnardi	2	4	1
Lysianopsis alba	29	118	87
Microdeutopus gryllotalpa	5	41	14
Paraphoxus spinosus	1	3	
Isopoda			
Decapoda			
Crangon septemspinosa		1	
Misc. Arthropoda			
Leucon americanus	10	19	4
Ostracod spp.	17	7	3
Oxyurostylis smithi		3	
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	31	31	28
TOTAL NUMBER OF INDIVIDUALS	1273	1905	1810

	M3-10A	M3-10B	M3-10C
Porifera			
Cnidaria			
Gorgonian octocoral spp.	+	+	
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Annelida			
Heteromastus filiformis	1	2	2
Capitella capitata	14	35	42
Tharyx acutus	16	8	12
Lubrineris tenuis	7	17	5
Nereis pelagica	2		
Hoploscoloplos fragilis	5	1	
Hoploscoloplos robustus		2	
Scoloplos acutus			1
Eteone longa			1
Polydora ligni	8	6	9
Prionospio heterobranchia	3		
Streblospio benedicti	25	18	11
Gastropoda			
Bivalvia			
Amphipoda			
Ampelisca abdita	1	1	
Elasmopus laevis	1		
Gammarus lawrencianus	1		
Lysianopsis alba	3	6	1
Microdeutopus gryllotalpa			1
Isopoda			
Cyathura polita	1		1
Decapoda			
Neopanope texana	2		
Misc. Arthropoda			
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	16	11	11
TOTAL NUMBER OF INDIVIDUALS	90	96	86

	M3-11A	M3-11B	M3-11C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.	1	11	4
Nematoda			
Ectoprocta			
Annelida			
Heteromastus filiformis	1	3	4
Capitella capitata	21	6	6
Tharyx acutus	1	6	2
Glycinde solitaria	1		1
Lubrineris tenuis	2	11	4
Nereis arenaceodonta	5	9	7
Nereis pelagica	6	26	23
Nereis succinea			5
Scoloplos acutus	1	1	
Eteone longa	1		1
Polydora ligni	1		
Prionospio heterobranchia	6	9	7
Scolecolepides viridis		1	
Streblospio benedicti	2		
Exogone dispar	2	22	15
Gastropoda			
Bivalvia			
Amphipoda			
Ampelisca abdita	445	1000	754
Caprellidae spp.(damaged)		1	
Corophium lacustre	7	9	6
Elasmopus laevis	1	2	1
Gammarus lawrencianus	8	5	5
Lysianopsis alba	3	118	64
Microdeutopus gryllotalpa	11	3	3
Paraphoxus spinosus	1	3	4
Unciola dissimilis		1	
Isopoda			
Edotea montosa		7	4
Decapoda			
Callinectes sapidus			1
Neopanope texana	2	2	
Misc. Arthropoda			
Ostracod spp.	3	6	7
Oxyurostylis smithi		2	1
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	23	24	23
TOTAL NUMBER OF INDIVIDUALS	532	1264	929

	M4-1A	M4-1B	M4-1C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.	1		
Nematoda			
Ectoprocta			
Unidentified bryozoan spp.	+		
Sipuncula			
Annelida			
Unidentified oligochaete spp.			1
Heteromastus filiformis	1		
Capitella capitata		1	1
Tharyx acutus			6
Glycinde solitaria		1	
Podarke obscura	1		
Clymanella torquata	1		
Nephtys picta	5	2	3
Nereis arenaceodonta	4		
Hoploscoloplos robustus	1		
Scoloplos acutus	1		1
Eteone longa	1		
Pygospio elegans		1	
Scolecolepides viridis	1		10
Scolecolepis squamata		3	5
Spiophanes bombyx		1	
Gastropoda			
Retusa canaliculata		1	
Bivalvia			
Ensis directus			1
Gemma gemma	12	5	1
Tellina agilis	1		1
Amphipoda			
Ampelisca abdita	1		4
Ampelisca verrilli	2	1	2
Lysianopsis alba	1		
Paraphoxus spinosus	1		1
Unciola serrata	1		
Isopoda			
Decapoda			
Misc. Arthropoda			
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	18	9	13
TOTAL NUMBER OF INDIVIDUALS	36	16	37

	M4-2A	M4-2B	M4-2C
Porifera			
Cnidaria			
Epizoanthus incrustatus		+	
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Sipuncula			
Annelida			
Heteromastus filiformis			4
Capitella capitata			1
Tharyx acutus	1	3	4
Lubrineris tenuis		2	
Clymanella torquata		1	
Nephtys picta	1	2	6
Scoloplos acutus		5	5
Prionospio heterobranchia		16	6
Pygospio elegans	1		13
Scolecolepides viridis	3		2
Scolecolepis squamata		2	6
Spiophanes bombyx	1	4	
Gastropoda			
Retusa canaliculata		1	
Bivalvia			
Gemma gemma		9	
Mytilus edulis		3	4
Tellina agilis			1
Amphipoda			
Unciola dissimilis		1	
Isopoda			
Decapoda			
Pagarus longicarpus		2	
Misc. Arthropoda			
Oxyurostylis smithi		1	
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	5	15	11
TOTAL NUMBER OF INDIVIDUALS	7	52	52

	M4-3A	M4-3B	M4-3C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Sipuncula			
Annelida			
Heteromastus filiformis		4	
Capitella capitata		1	1
Lubrineris tenuis	3	1	
Clymanella torquata		1	
Nephtys picta	23	12	9
Nereis arenaceodonta	3	5	5
Hoploscoloplos robustus		1	
Scoloplos acutus	5	5	2
Prionospio heterobranchia		1	1
Pygospio elegans		2	
Scolecolepides viridis	2	1	
Scolecolepis squamata		1	1
Spiophanes bombyx		1	
Gastropoda			
Bivalvia			
Gemma gemma	3	4	1
Mytilus edulis		8	37
Solemya velum	1	1	
Tellina agilis	1	1	1
Amphipoda			
Ampelisca abdita			2
Listriella barnardi	1		
Lysianopsis alba	1		
Rhepoxynuis epistomus	10	2	
Unciola serrata			1
Isopoda			
Decapoda			
Misc. Arthropoda			
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	11	18	11
TOTAL NUMBER OF INDIVIDUALS	53	52	61

	M4-4A	M4-4B	M4-4C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Sipuncula			
Annelida			
Heteromastus filiformis		1	
Capitella capitata	12	1	4
Tharyx acutus	2	7	5
Glycera dibranchiata			1
Glycinde solitaria	1	1	
Podarke obscura	2		1
Nereis succinea		2	
Hoploscoloplos fragilis	1		
Scoloplos acutus	1	1	1
Polydora ligni		1	
Scolecolepis squamata		2	
Streblospio benedicti	6	24	16
Gastropoda			
Bivalvia			
Gemma gemma	1	1	
Mytilus edulis	1	1	1
Amphipoda			
Ampelisca abdita	13	18	11
Corophium insidiosium	8	6	
Lysianopsis alba	3		7
Microdeutopus gryllotalpa	3	59	15
Isopoda			
Decapoda			
Misc. Arthropoda			
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	13	14	10
TOTAL NUMBER OF INDIVIDUALS	54	125	62

	M4-5A	M4-5B	M4-5C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.	2		
Nematoda			
Ectoprocta			
Unidentified bryozoan spp.	+		
Sipuncula			
Phascolopsis gouldii		1	
Annelida			
Heteromastus filiformis	3		
Capitella capitata	7		2
Tharyx acutus	1		
Podarke obscura			1
Lubrineris tenuis		1	1
Clymanella torquata	2		2
Nereis succinea	4	5	1
Hoploscoloplos robustus			1
Eumida sanguinea	1		
Harmothoe imbricata		1	
Prionospio heterobranchia	4	1	
Exogone dispar	4		1
Gastropoda			
Bivalvia			
Aligena elevata			2
Gemma gemma	1		
Mytilus edulis	44	23	
Amphipoda			
Ampelisca abdita	218	98	10
Caprellidae spp.(damaged)		1	
Corophium lacustre	13		
Lysianopsis alba	5	7	1
Microdeutopus gryllotalpa	21	9	
Paraphoxus spinosus	4		
Isopoda			
Cyathura polita	1		
Decapoda			
Misc. Arthropoda			
Echinodermata			
Chordata			
Syngnathus fuscus (pipefish)	1		
TOTAL NUMBER OF SPECIES	19	10	10
TOTAL NUMBER OF INDIVIDUALS	336	147	22

	M4-6A	M4-6B	M4-6C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Sipuncula			
Annelida			
Asabellides oculata		1	1
Heteromastus filiformis		4	
Capitella capitata	1	1	1
Lubrineris tenuis			1
Clymanella torquata		1	1
Nephtys picta	9	3	11
Nereis arenaceodonta	1		3
Hoploscoloplos robustus			1
Scoloplos acutus	2	3	
Paraonis fulgens		1	
Polydora ligni			1
Prionospio heterobranchia	2	6	1
Scolecolepides viridis	11	9	12
Scolecolepis squamata	8	2	8
Streblospio benedicti	2	2	1
Brania clavata		1	
Gastropoda			
Bivalvia			
Gemma gemma	5	9	1
Mysella planulata			1
Mytilus edulis	10	88	1
Solemya velum		1	
Tellina agilis	3		1
Amphipoda			
Ampelisca abdita	4	1	4
Corophium lacustre		1	
Microdeutopus gryllotalpa		1	
Isopoda			
Decapoda			
Misc. Arthropoda			
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	12	18	17
TOTAL NUMBER OF INDIVIDUALS	58	135	50

	M4-7A	M4-7B	M4-7C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.	1		
Nematoda			
Unidentified nematode spp.	3	1	11
Ectoprocta			
Unidentified bryozoan spp.			+
Sipuncula			
Annelida			
Asabellides oculata	1		6
Tharyx acutus	9	2	3
Glycera dibranchiata			1
Magelona riojai			2
Nephtys picta	39	27	36
Nereis arenaceodonta	2	8	8
Nereis succinea			1
Paraonis fulgens		1	1
Harmothoe extenuata			2
Scolecolepides viridis	5	3	9
Spiophanes bombyx	2	1	
Brania clavata	1		
Parapionosyllis longicirrata			1
Gastropoda			
Bivalvia			
Mytilus edulis	244	6952	1512
Tellina agilis	16	37	25
Amphipoda			
Ampelisca abdita	3	17	6
Gammarus lawrencianus		3	
Lysianopsis alba	8	15	23
Microdeutopus gryllotalpa		2	2
Paraphoxus spinosus	3	10	16
Phoxocephalus holbolli		1	
Isopoda			
Decapoda			
Misc. Arthropoda			
Balanus amphitrite			2
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	14	15	20
TOTAL NUMBER OF INDIVIDUALS	337	7080	1667

	M4-8A	M4-8B	M4-8C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Sipuncula			
Annelida			
Tharyx acutus		1	
Lubrineris tenuis	5	13	4
Nephtys picta	18	28	14
Nereis arenaceodonta	2	4	2
Nereis succinea	3		
Hoploscoloplos robustus	2		1
Scoloplos acutus	2	1	3
Paraonis fulgens	2	1	
Phyllodoce arenae	1		
Scolecolepides viridis	1		
Scolecolepis squamata	2	7	2
Spiophanes bombyx		2	
Gastropoda			
Bivalvia			
Gemma gemma		1	
Mytilus edulis	4032	1560	2044
Tellina agilis	15	19	6
Amphipoda			
Ampelisca abdita	18	3	9
Lysianopsis alba	1		
Microdeutopus gryllotalpa	5	1	5
Paraphoxus spinosus	1	2	
Isopoda			
Decapoda			
Misc. Arthropoda			
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	16	14	10
TOTAL NUMBER OF INDIVIDUALS	4110	1643	2090

	M4-9A	M4-9B	M4-9C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.			1
Nematoda			
Ectoprocta			
Sipuncula			
Annelida			
Heteromastus filiformis			3
Capitella capitata	6	11	3
Tharyx acutus	1		1
Lubrineris tenuis	5	5	2
Nereis arenaceodonta	4	2	2
Nereis succinea	22	1	13
Hoploscoloplos robustus	2	4	5
Scoloplos acutus	8	1	2
Eteone longa	4		1
Streblospio benedicti			1
Gastropoda			
Bivalvia			
Ensis directus		1	
Mercenaria mercenaria			1
Mytilus edulis	11	16	4
Solemya velum			1
Tellina agilis			1
Amphipoda			
Ampelisca abdita	1440	645	622
Gammarus lawrencianus	4		
Lysianopsis alba	8	2	2
Microdeutopus gryllotalpa		2	4
Isopoda			
Cyathura polita	4		1
Decapoda			
Neopanope texana			1
Misc. Arthropoda			
Ostracod spp.	20	1	
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	14	12	20
TOTAL NUMBER OF INDIVIDUALS	1539	691	671

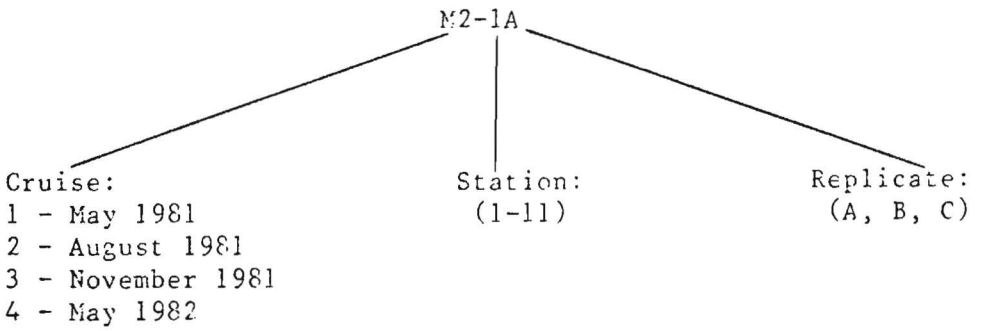
	M4-10B	M4-10C	M4-10E
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Unidentified nemertean spp.		1	
Nematoda			
Ectoprocta			
Sipuncula			
Annelida			
Asabellides oculata		1	
Heteromastus filiformis	2	40	
Capitella capitata		1	2
Tharyx acutus		1	
Glycinde solitaria		1	
Lubrineris tenuis	3		
Nereis succinea	1	2	
Hoploscoloplos fragilis	13	3	
Hoploscoloplos robustus	7	6	3
Eteone longa	3	8	
Eumida sanguinea		1	
Harmothoe extenuata	1		
Harmothoe imbricata		1	
Prionospio heterobranchia		1	
Streblospio benedicti	1	32	
Gastropoda			
Retusa canaliculata		6	
Mitrella lunata		2	
Bivalvia			
Mytilus edulis	2	8	
Amphipoda			
Ampelisca abdita	249	664	3
Gammarus lawrencianus			8
Lysianopsis alba	1	8	
Microdeutopus gryllotalpa		8	
Isopoda			
Cyathura polita	1	1	
Decapoda			
Neopanope texana			1
Misc. Arthropoda			
Ostracod spp.		2	
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	12	22	5
TOTAL NUMBER OF INDIVIDUALS	284	798	17

	M4-11A	M4-11B	M4-11C
Porifera			
Cnidaria			
Platyhelminthes			
Nemertea			
Nematoda			
Ectoprocta			
Sipuncula			
Annelida			
Capitella capitata	12	4	13
Nereis arenaceodonta	3	4	2
Nereis succinea	3	2	
Hoploscoloplos fragilis			1
Hoploscoloplos robustus	1		
Scoloplos acutus	1		
Eteone longa			1
Harmothoe imbricata			3
Scolecolepides viridis	1	3	1
Exogone dispar			1
Gastropoda			
Bivalvia			
Gemma gemma			2
Mytilus edulis	40	20	2792
Amphipoda			
Ampelisca abdita	10	71	41
Elasmopus laevis			1
Lysianopsis alba			3
Microdeutopus gryllotalpa			1
Paraphoxus spinosus			1
Unciola serrata	2		1
Isopoda			
Decapoda			
Neopanope texana			4
Misc. Arthropoda			
Echinodermata			
Chordata			
TOTAL NUMBER OF SPECIES	9	6	16
TOTAL NUMBER OF INDIVIDUALS	73	104	2868

Appendix B

Biological Parameters for Each Sample

Column Heading Code Key



SAMPLE	ABUNDANCE (per sq m)	NUMBER OF SPECIES	DIVERSITY	EQUITABILITY
M1-1A	9675	29	3.484	0.717
M1-1B	9275	27	3.299	0.694
M1-1C	15600	30	3.230	0.658
M1-2A	7000	23	2.588	0.572
M1-2B	8975	32	3.367	0.673
M1-2C	10225	27	2.735	0.575
M1-3A	7975	28	3.671	0.764
M1-3B	15875	31	2.169	0.438
M1-3C	12000	39	3.254	0.616
M1-4A	15600	18	2.569	0.616
M1-4B	11850	16	2.588	0.647
M1-4C	13675	16	2.501	0.625
M1-5A	5700	17	1.556	0.381
M1-5B	6625	15	1.134	0.290
M1-5C	5725	14	1.175	0.309
M1-6A	3300	22	3.470	0.778
M1-6B	2750	20	3.285	0.760
M1-6C	3050	19	3.407	0.802
M1-7A	182525	14	0.117	0.031
M1-7B	3375	11	1.446	0.418
M1-7C	49900	15	0.205	0.052
M1-8A	115775	11	0.090	0.026
M1-8B	116750	9	0.104	0.033
M1-8C	136775	14	0.111	0.029
M1-9A	3600	25	3.602	0.776
M1-9B	2775	19	3.257	0.767
M1-9C	3075	17	3.504	0.857
M1-10A	8825	15	2.356	0.603
M1-10B	3150	8	2.315	0.772
M1-10C	12000	17	2.016	0.493
M1-11A	2775	18	2.990	0.717
M1-11B	3525	19	2.942	0.693
M1-11C	2625	13	2.764	0.747
M2-1A	7475	28	3.069	0.638
M2-1B	6325	32	3.930	0.786
M2-1C	4975	29	3.933	0.810
M2-2A	2000	24	3.744	0.817
M2-2B	10625	28	2.482	0.516
M2-2C	1875	22	4.019	0.901
M2-3A	3075	27	3.920	0.824
M2-3B	2800	22	3.680	0.825
M2-3C	3625	39	4.539	0.859
M2-4A	1375	13	2.817	0.761
M2-4B	6900	12	1.876	0.523
M2-4C	125	4	1.922	0.961
M2-5A	3775	15	1.552	0.397
M2-5B	8175	19	1.684	0.396
M2-5C	2500	19	3.104	0.731
M2-6A	1025	9	2.283	0.720
M2-6B	1175	10	2.830	0.852

SAMPLE	ABUNDANCE (per sq m)	NUMBER OF SPECIES	DIVERSITY	EQUITABILITY
M2-6C	1800	12	3.039	0.848
M2-7A	875	15	3.644	0.933
M2-7B	1550	10	2.536	0.763
M2-7C	3200	10	1.907	0.574
M2-8A	1775	14	3.135	0.823
M2-8B	1075	16	3.547	0.887
M2-8C	2300	16	3.045	0.761
M2-9A	4125	23	3.531	0.781
M2-9B	1075	14	3.144	0.826
M2-9C	675	10	2.906	0.875
M2-10A	14425	23	1.202	0.266
M2-10B	21500	25	1.525	0.328
M2-10C	18075	20	1.646	0.381
M2-11A	2450	23	3.356	0.742
M2-11B	1875	16	2.988	0.747
M2-11C	2100	12	2.675	0.746
M3-1A	1725	10	2.160	0.650
M3-1B	2850	21	3.160	0.719
M3-1C	4275	26	3.540	0.753
M3-2A	625	10	2.573	0.775
M3-2B	6350	36	3.786	0.732
M3-2C	7000	31	2.885	0.582
M3-3A	8950	42	3.864	0.717
M3-3B	4275	21	3.202	0.729
M3-3C	3325	24	3.362	0.733
M3-4A	4850	10	1.678	0.505
M3-4B	5250	13	1.653	0.447
M3-4C	8275	14	1.774	0.466
M3-5A	2775	18	3.192	0.765
M3-5B	1375	14	2.927	0.769
M3-5C	1650	16	3.231	0.808
M3-6A	6575	37	4.241	0.814
M3-6B	5550	30	4.033	0.822
M3-6C	3425	27	4.295	0.903
M3-7A	825	7	2.445	0.871
M3-7B	1875	15	3.391	0.868
M3-7C	1425	11	2.878	0.832
M3-8A	11075	25	2.660	0.573
M3-8B	9550	21	1.932	0.440
M3-8C	4925	26	3.050	0.649
M3-9A	31825	30	1.473	0.300
M3-9B	47625	31	1.495	0.302
M3-9C	45250	28	1.153	0.240
M3-10A	2250	15	3.134	0.802
M3-10B	2400	10	2.594	0.781
M3-10C	2150	11	2.360	0.682
M3-11A	13300	23	1.256	0.278
M3-11B	31600	24	1.397	0.305
M3-11C	23225	23	1.341	0.296
M4-1A	900	17	3.375	0.826

SAMPLE	ABUNDANCE (per sq m)	NUMBER OF SPECIES	DIVERSITY	EQUITABILITY
M4-1B	400	9	2.852	0.900
M4-1C	925	13	3.180	0.859
M4-2A	175	5	2.128	0.917
M4-2B	1300	14	3.207	0.842
M4-2C	1300	11	3.157	0.913
M4-3A	1325	11	2.612	0.755
M4-3B	1300	18	3.580	0.859
M4-3C	1525	11	2.047	0.592
M4-4A	1350	13	3.086	0.834
M4-4B	3125	14	2.395	0.629
M4-4C	1550	10	2.730	0.822
M4-5A	8400	18	2.005	0.481
M4-5B	3675	10	1.675	0.504
M4-5C	550	10	2.677	0.806
M4-6A	1450	12	3.200	0.893
M4-6B	3375	18	2.169	0.520
M4-6C	1250	17	3.287	0.804
M4-7A	8425	14	1.608	0.422
M4-7B	177000	15	0.184	0.047
M4-7C	41675	19	0.760	0.179
M4-8A	102750	16	0.195	0.049
M4-8B	41075	14	0.428	0.112
M4-8C	52250	10	0.214	0.064
M4-9A	38475	14	0.555	0.146
M4-9B	17275	12	0.536	0.149
M4-9C	16775	20	0.648	0.150
M4-10A	7100	12	0.885	0.247
M4-10B	19950	22	1.200	0.269
M4-10C	425	5	1.999	0.861
M4-11A	1825	9	2.072	0.654
M4-11B	2600	6	1.452	0.562
M4-11C	71700	16	0.241	0.060