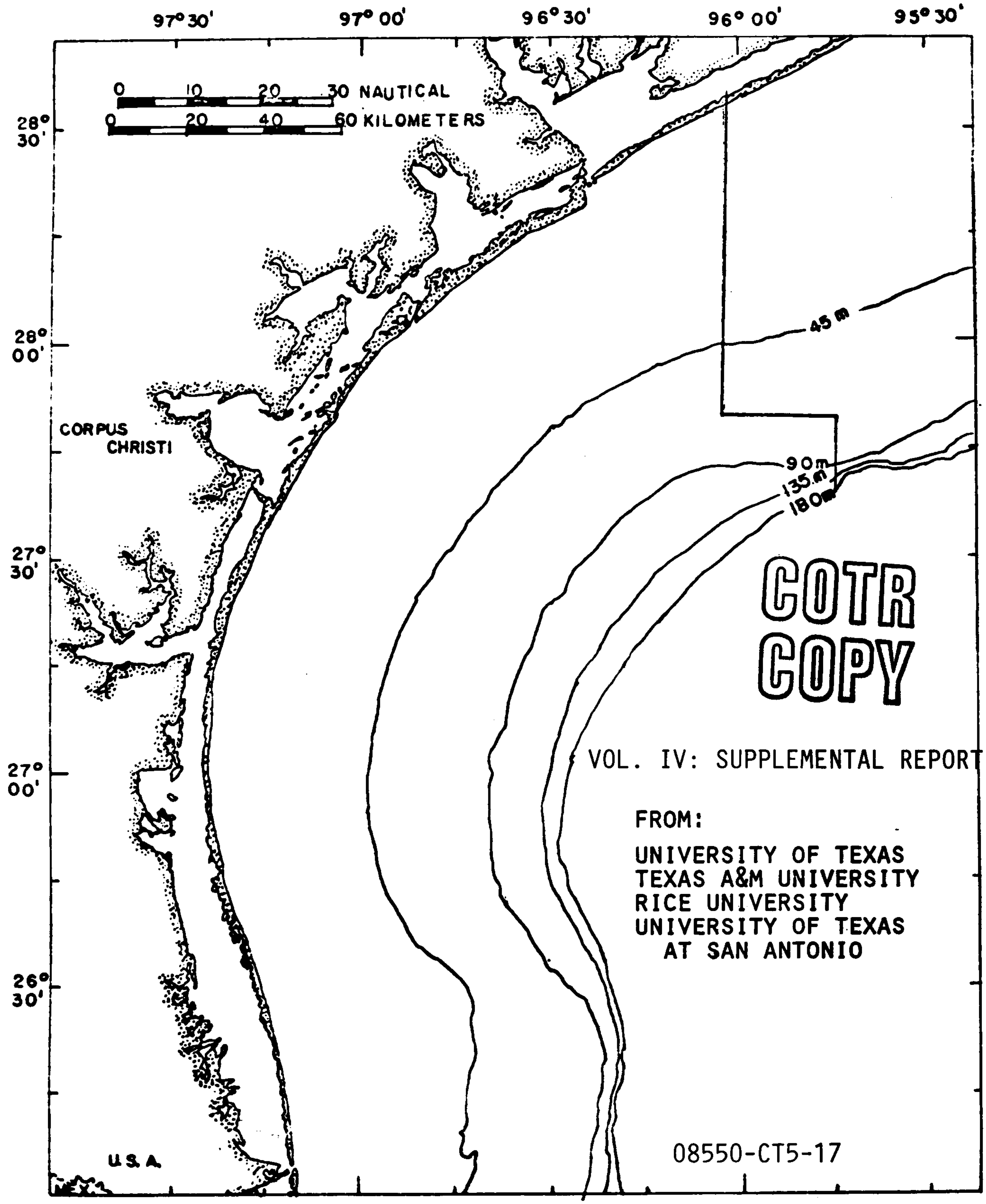
ENVIRONMENTAL STUDIES,
SOUTH TEXAS OUTER CONTINENTAL SHELF, 1975
BIOLOGY AND CHEMISTRY



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ENVIRONMENTAL STUDIES,
OF THE SOUTH TEXAS OUTER CONTINENTAL SHELF,
BIOLOGY AND CHEMISTRY

Submitted to:

The Bureau of Land Management
Washington, D. C.

by

The University of Texas Marine Science Institute
Port Aransas Marine Laboratory
Port Aransas, Texas 78373

Acting For and on Behalf of
A Consortium Program
Conducted by:

Rice University
Texas A&M University
The University of Texas

SUPPLEMENTAL REPORT
TO THE FINAL REPORT
In Fulfillment of
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SHELLED MICROZOOPLANKTON, GENERAL MICROPLANKTON AND SHELLED MICROZOOBENTHON

Supplemental Report

to

The Bureau of Land Management
Washington, D. C.

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ABSTRACT

Nansen net and Niskin bottle samples, and sub-cores from bottom grab samples were collected in the BLM-STOCS study area during the winter (1974), spring and summer (1975). Shelled microzooplankton and general microplankton were studied from Nansen net and Niskin bottle samples; living benthonic foraminiferans were studied from grab samples; and dead benthonic and planktonic foraminiferans were studied from down-core samples.

The shelled microzooplankton and general microplankton data from the net and bottle samples were compared to the physical oceanography of the study area by use of density, diversity and other plots of biological data as compared to temperature and salinity diagrams, isohaline, isothermal contouring, and other plots of the physical oceanographic data. These comparisons revealed: biological indicators of water masses and other physical oceanographic phenomena; a picture of the general microplankton seasonally; indications of upwelling; and, a generalized seasonal picture of the circulation and water mass patterns. With the aid of cluster analyses, certain of the shelled microzooplankton were designated as biological indicators of eutrophic and oligotrophic conditions, nearshore and offshore faunas, specific water masses, upwelling and seasonality.

Studies of living benthonic foraminiferans revealed: species indicative of nearshore, mid-shelf, and outer-shelf; eutrophic and oligotrophic conditions; and, to some extent, seasonality.

The down-core studies illustrated that some cores had penetrated sediments older than 100,000 years, with two cores penetrating through sediments of the last glacial period. Rates of sedimentation in these cores ranged from a low of 0.6 cm/1000 years to a maximum of at least 15 cm/1000 years. The thickness of the Holocene sediments were determined in a few cores (about 30 and 50 cm in two cases on the outer shelf).

Other aspects of the South Texas Outer Continental Shelf included in this study were the definition of a relict population of radiolarians and the occurrence of previously thought to be strictly benthonic forms of foraminifera in the water column.

INTRODUCTION

Purpose

This component of BLM-STOCS was charged with a baseline inventory of: the shelled microzooplankton; general microplankton; shelled microzoobenthon; down-core studies using microfossil evidence; correlation of these data with other biological, chemical and physical oceanographic data; and, the detection and use of certain species as biological indicators of oceanographic processes. Toward these ends, this study involved the taxonomic identification and counts of shelled microzooplankton, general microplankton and shelled microzoobenthon. Studies were based on shelled microzooplankton from Nansen tows (integrated samples), the general microplankton from Niskin bottle filtrates (discrete samples), and the shelled microzoobenthon from known surface area subsamples of grab samples and a few down-core samples from gravity cores collected by the U.S. Geological Survey, Corpus Christi, Texas. These data (except for the down core studies) were placed on computer cards, and R and Q mode cluster analyses were performed to construct dendrograms of species and samples. These dendrograms, selected species, group densities, diversities and dominances were correlated to the literature and other oceanographic components (biological, physical, chemical and geological) of the STOCS area.

Literature Survey and Previous Work

Shelled Microzooplankton

There have been few studies on living radiolaria. Haeckel (1887) examined plankton tows from the CHALLENGER expedition; Popofsky (1907, 1908, 1912 and 1913) examined radiolaria from the Deutsche Subpolar Expedition and observed bipolarity as well as water-mass preferences; Reshetnyak (1955) studied the vertical distribution in the Kuril-Kamchatka Deep;

Casey (1966, 1971a and 1971b, and In Press a) studied seasonal variations of radiolaria in the southern California borderland and established the preference of individual species for specific water masses and the radiolaria that are indicative of seasonality of the area; Petrushevskaya (1971) studied living radiolaria from the southwestern Pacific; and, Renz (1973) studied assemblages of the central Pacific. The only studies of radiolarians from the Gulf are those that have been and are currently being done by the Principal Investigator (R. E. Casey) and a former graduate student (K. J. McMillen). These studies have been and are currently on the South Texas Outer Continental Shelf (STOCS) and the open Gulf of Mexico and Caribbean (supported by NSF).

McMillen (1976), Casey and McMillen (1977) and McMillen and Casey (In Press a) have delineated the radiolarians "endemic" to the major water masses of the Gulf of Mexico. Casey and McMillen (1977) have delineated the radiolarians indicative of the seasonal trends (1975) of the STOCS and the densities and diversities of these forms. Casey, McMillen and Bauer (1975) noted a fauna of relict radiolarians in the Gulf of Mexico and STOCS area.

Living planktonic foraminifera have been studied to a much greater extent than radiolarians. A brief and incomplete review follows: Schott (1935) made some preliminary investigations in the North Atlantic; Bé (1960) worked on seasonal distribution in the North Atlantic; and, Cifelli (1965, 1974) examined the distribution of planktonic foraminifera in the vicinity of the North Atlantic Current, the Mediterranean and adjacent Atlantic waters. Few studies have been done on the planktonic foraminifera of the Gulf of Mexico. Phleger (1951) examined species and abundances for 27 plankton tows in the northwestern Gulf (close to the STOCS area). Jones (1968) inferred the source regions for planktonic foraminifera in the southern Gulf of Mexico and the straits of Florida to be of Caribbean origin. Bauer (1976) and Casey and Bauer (1976) studied the seasonal distribution of planktonic foraminiferans, in the STOCS study area in 1975, and found a seasonality that could be related to the physical oceanography of the area. The authors also noted that a benthonic foraminiferan (*Bolivina* or *Brizalina lowmani*) occurred commonly in their innermost stations and may be meroplanktonic.

McGowan (1960 and 1967), Fager and McGowan (1963), Chen and Hillman (1970) and Hida (1957) have shown that pteropods are good biological indicators of water masses and currents; and Herman and Rosenberg (1969) have shown that pteropods can be used as bathymetric indicators. As early as 1933, Burkenroad (1933) studied the pteropods off Louisiana. The other major works on pteropods, in the Gulf of Mexico, have been unpublished theses by Hughes (1968) and Snider (1975), which related specific pteropods to the water masses of the Gulf. Casey (*In* Parker, 1976) listed the pteropods taken off the STOCS for 1975.

General Microplankton

There have been many studies in the Gulf of Mexico that have included some microplankton work. Our (STOCS) investigation of the general microplankton was, and is, patterned after and compatible with, the investigations of Beers and Stewart (1967), Beers (1969a and b, 1970 and 1971) and Beers, Reid and Stewart (1975). Their work has been mainly in the waters off southern California, in the central and equatorial Pacific, and Gulf of Mexico. The only comparable investigations are the ones on which we are currently working.

The review of previous work is abstracted from Williams (1977). Hulburt and Corwin (1972) reported a change from a coccolithophorid dominated flora offshore to a diatom dominated flora nearshore. They noted this general trend in the eastern and central Gulf and suggested it may be a wide geographic phenomena. Ryther (1969) recognized three regions of productivity; open ocean, coastal water over continental shelves, and major upwelling areas. He reports photosynthetic rates on continental shelves to be about twice that of the open ocean, with upwelling areas nearly ten times of the open ocean. The STOCS area would mainly fall into his coastal zone region.

Numerous investigators have conducted studies to determine the relative importance of net (plankton net captured) and nannoplankton in terms of productivity. Watt (1971), using measurements of photosynthesis of individual phytoplankters by C^{14} autoradiography, concluded that large diatoms and dinoflagellates showed little photosynthetic activity in comparison to nannoplankton photosynthetic activity. Watt (1971), Malone (1971) and others have estimated that net phytoplankton productivity is only about 10% of the amount of nannoplankton productivity. (The Niskin plankters are most similar in size range to net plankton and therefore the Niskin collected plankton should be compared to net plankton, not nannoplankton.)

Pomeroy and Johannes (1968), Hobbie *et al.* (1972), Turner (1974), and others have studied the relative amounts of respiration of net plankton and marine microorganisms. In virtually all cases respiration of microorganisms exceeded that of net plankton, usually 10 times as great. It should be noted that this microplankton study does not include nannoplankton abundances which may contain the largest fraction of primary producers.

However, Beers and Stewart (1967, 1969a) concluded that significant portions of the energy budget of a planktonic ecosystem are consumed by microzooplankton. Hulburt (Hulburt and Corwin, 1972) suggested that diatoms were dominant in nearshore regions and Beers and Stewart's studies seems to indicate that microplankton make up a significant fraction of the primary producers and consumers in nearshore regions such as the STOCS. This indication, as concurred by Pomeroy (1974), makes such an investigation worthwhile.

Shelled Microzoobenthon (Benthonic Foraminifera)

Most of the many studies of the foraminifera of the Gulf of Mexico and its continental shelf have been concerned with the distribution of dead and total assemblages. There have been relatively few studies of living populations of the northwestern Gulf of Mexico. Of these the most useful are the studies of Phleger (1951, 1956). There have been no comprehensive seasonal studies except for our current study and Parker, Phleger and Pierson's (1953) studies of the Texas bays. Tresslar (1974) studied the living benthonic foraminiferal fauna of the West Flower Garden Bank; and, a thesis by Anepohl (1976) concerns itself with the benthonic foraminifera collected in the STOCS area during 1975.

METHODS AND MATERIALS

Collecting Procedures

Nansen Tows (Integrated Samples)

Nansen tows were taken at Stations 1, 2 and 3, on all transects, during the seasonal sampling (36 samples). At all Nansen stations a Nansen net with a mouth opening of 30 cm and mesh size of 76 μm, was placed on the wire, lowered to just off the bottom and slowly towed to the surface at approximately 20 m per minute. The net was then washed down with seawater from the outside of the mesh and the material in the cod end was preserved in a 500 ml Nalgene bottle, with a 5% solution of formalin, sodium borate, strontium chloride and rose Bengal. This solution was prepared in the following manner: 1 gallon of 37% (stock) formaldehyde + 80 gm $Na_2B_4O_7 \cdot 10H_2O$ (sodium borate) + 18.2 gm $SrCL_x \cdot 6H_2O$ (strontium chloride) + 2 gm rose Bengal. The bottle was then labeled, a shipboard data sheet filled out, and the samples and data sheets transmitted to the Principal Investigator.

Niskin Bottle Samples (Discrete Samples)

Niskin samples (30-ℓ) were taken at depths of 10 m and one-half the depth of the photic zone (as determined with a Secchi disk or photometer) at Stations 1 and 2; and at depths of 10 m, one-half the depth of the photic zone, the photic zone and one-half the distance between the bottom of the photic zone and bottom, or just off the sea floor, at Station 3 during the seasonal sampling (32 samples). At every Niskin cast, one liter was tapped off as an extra archive sample for possible future use. The remaining 29 ℓ were filtered through a 38 μm mesh net. The microplankton were washed into a 500 ml Nalgene bottle and preserved in a two to three percent solution as described for the Nansen tows, except that rose Bengal was not used. The bottle was then labeled, a shipboard data sheet filled out, and the samples and data sheets transmitted to the Principal Investigator.

Bottom Sediment Samples for Shelled Microzoobenthon (Foraminifera)

Bottom samples were obtained by subsampling the Smith-McIntyre grabs at Stations 1, 2 and 3 during the winter and spring sampling period. There were 24 samples studied although only 12 samples (one season) were required by the contract. The subsampling was accomplished by inserting a 6-1/2 cm coring tube at least five cm into the sediment from the sediment surface. The sample was then placed into a container and 25 cc of formalin solution (the same solution as described under the Nansen collecting technique) was added to the sample (with sea water if needed) and the bottle was sealed and shaken to mix sediment and solution. The bottle was then labeled, a shipboard data sheet filled out and the samples and data sheets transmitted to the Principal Investigator.

Post-Collecting Procedures

Nansen Samples

1. The samples were split into 1/2 working and 1/2 archive sub-samples using a plankton splitter.

2. The samples were then picked and placed on micropaleontological slides using a breaking pipette and a plankton microscope.

3. The radiolarians, plankton and "benthonic" foraminiferans and pteropods were identified and these data placed on data sheets.

4. These data were placed on computer cards and cluster analysis performed, resulting in Q and R mode dendrograms.

5. These dendrograms, Q mode seasonal maps of planktonic foraminifera and radiolaria, and radiolaria seasonal density and diversity plots were then compared to other oceanographic phenomena and reported on.

Niskin Samples

1. The entire sample was allowed to settle in its original collection bottle.

2. The supernatant was decanted and saved for archiving of that sample. The residue was placed in a plankton counting chamber.

3. The plankton counting chamber was placed on a modified stage (which holds it in place) of a plankton microscope. The first 100 organisms (or fecal pellets) were identified and counted starting at the top of the chamber, and the amount of area of the chamber traversed on the count was recorded.

4. In some samples, the total number of planktonic individuals was so

great that overlapping occurred in the settling chamber. This would tend to distort the results of the relative abundances, density estimates, and possibly obscure the presence of some shelled microplankton. A specific procedure was devised for these samples in order to avoid these problems. An aliquot of the original sample was taken with a Hensen-Stemple pipette. The size of the aliquot was usually a 1/100 of the sample (5 ml/500 ml), but in the case of a few extremely dense samples a 1/500 aliquot (1 ml/500 ml) was taken. After the aliquot was obtained and transferred to the settling chamber, the general counting procedures outlined above were performed. After most of the 1975 and 1976 Niskin samples had been completed, differences in the density estimates for one-half the depth of the photic zone samples for the two years were detected. The density estimates were recalculated, using the aliquot method described above, for some of these samples, and a conversion factor of 45 times the density of the 1975 samples was used to convert the 1975 one-half the depth of the photic zone densities to be compatible with 1976 densities, as used in the 1976 Draft Final Report.

5. The residue and supernatant were combined and stored as the archive.

6. The data were placed on computer cards and cluster analyses were performed for Q and R mode dendrograms.

7. The dendrograms, seasonal density data, general microplankton, seasonal plots, etc., were then compared to other oceanographic phenomena and reported.

Microzoobenthon Samples

1. The samples were mixed and split in a large modified plankton splitter.

2. One-half the sample was archived and one-half was washed through a 63 μm screen. The sands accumulated on the screen were dried in a 70°C oven.

3. The live foraminiferans were picked from the samples under a dissecting microscope and placed on cardboard foraminiferan slides.

4. The organisms were then identified to species, if possible, and counted.

5. These data were placed on computer cards and cluster analyses were performed resulting in Q and R mode dendrograms.

6. These dendrograms, Q mode seasonal maps, and seasonal faunal maps were then compared to other oceanographic phenomena and reported.

Statistical Methods

Most of the statistical methods employed in this study were done on the Rice University IBM 371-55 Series Computer. Once a corrected data set was obtained, statistical tables summarizing abundances were assembled (Appendix B). Variables occurring in approximately 10% or fewer of the samples were deleted because retention of such low percentages, rare individuals can distort the results of cluster analysis (Gevirtz *et al.*, 1971). However, some shelled microplankton groups which were not present in more than 10% of the samples were retained because of their interest to the investigators and BLM.

Cluster Analysis

Cluster analysis is a multivariate technique which can be of aid in pattern recognition and objective classification of multivariate data (Gevirtz, 1971; Sokal and Sneath, 1963; Sneath and Sokal, 1973; Davis, 1973). Much of its application to this kind of work came from attempts to develop objective classification systems for numerical taxonomy. Basically, cluster analysis groups samples or variables into a hierarchical classification based on an index of similarity computed from abundance data. This hierarchy may be represented as a dendrogram (a one-dimensional graph). Numerous cluster analysis methods and similarity coefficients are available; the one used was the Unweighted Pair-Group Average Linkage Method (Sokal and Sneath, 1963; Sneath and Sokal, 1973).

The similarity coefficient used to compare samples and biotic classes is a coefficient proposed by Sorensen. Sorensen's coefficient is defined as 2W/(A+B), where W is equal to the sum of the minimum values for all the paired variables in the two samples being considered, A is equal to the sum of all characters in the first sample, and B is equal to the sum of all characters in the second sample (Park, 1968). Two basic clustering configurations are employed: R-mode which clusters variables according to their occurrence in samples; and Q-mode which clusters samples according to the variables they contain.

The first step in clustering is the computation of a similarity array for all the characters present (samples or variables). The two samples (for Q-mode) most similar to one another are found and their variable distributions are averaged to create a new sample. This process continues until all the matrix is reduced to triviality. The results of this procedure are displayed in a one-dimensional dendrogram.

<u>Other Statistical Methods</u>

Analysis of variance was used to examine precision for the general laboratory counting procedures outlined. A full discussion of its application is presented in the following section on error analysis. Finally, trend surface analysis for a few of the major microplanktonic groups was done. The results obtained are not presented in this report because their significance was low due to the small number of data points.

<u>Error Analysis</u>

Determination of analytical error in microplankton data arising from laboratory technique was done in the following manner: a sample containing a large number of microplankton was selected and a 5 ml aliquot was drawn after the sample was agitated to completely mix the contents. The aliquot was then poured into a plankton settling chamber and allowed to settle out. After the microplankton had settled, five replicate counts of 100 organisms each were made following the general procedures outlined. Thus 500 total organisms were counted and approximately five times the area covered in counting 100 organisms was examined. The results of these replicate counts are given in Appendix C. The total number of groups represented in the various counting stages was listed to determine if rare microplankton groups were under-represented.

A graph of the number of groups as a function of the total number of organisms counted was made (Appendix C). The results indicate that no increase in counting precision in terms of representing rare groups was gained in counting more than 100 organisms. This would seem to justify the selection of counts of 100 organisms. Indeed, Beers has relied on counts of 40 individuals in his microplankton studies (Beers and Stewart, 1969).

From values obtained by replication, a new table was constructed in order to test whether the differences in values obtained in counting 100 organisms, 200 organisms, etc., were significant. Using the mean values obtained by the different count totals and considering them as subsamples, a one-way analysis of variance problems was set up to see if the differences were significant (Appendix C). The calculated F-value of 0.00762 is far smaller than the F-value for rejection [F^{4}_{25} (99.9% confidence level) = 6.49). Therefore, the null hypothesis cannot be rejected. This result would seem to indicate that no significant increase in counting precision can be obtained by counting greater than 100 organisms.

In order to obtain a total error of estimate due to analytical (*i.e.* counting) procedure, means, standard deviations, and coefficients of variation were computed for those categories with sufficient measurements present (*Ceratium*, *Noctiluca* and Naupliar larvae were excluded) using replicate table information (Appendix C).

The results of these computations are given in Appendix C. The total variation due to counting procedures was 12.15%. This value for counting error of estimate agrees well with the expected value of 10% for counts of 100 predicted by the standard counting error curve (Dryden, 1931). Individual components of variation agree well with expected results. Centric solitary diatoms, the most abundant category, has the lowest coefficient of variation (5%). Both colonial diatom groups have higher coefficients of variation (15%) as would be expected. Finally, the low percentage, rare groups had significantly higher coefficients of variation (35-40%). These findings suggest that the abundant groups are well represented quantitatively in the data, while the rare groups are represented in a more qualitative fashion (*i.e.* presence or absence) with relatively less significance in the numbers themselves.

RESULTS AND DISCUSSION

General Distribution

Shelled Microzooplankton (Nansen)

Fifteen live planktonic foraminifera (approximately 100 live radiolarian species and a dozen pteropod species) were collected and studied. In general, the planktonic foraminifera and radiolaria were sparse or absent in the innermost stations and increased in density and diversity offshore. These trends for radiolarians are illustrated in Figure 1. Figure 1 also illustrates some of the general seasonal trends seen in the radiolarians, many of which were shared with the planktonic foraminifera. The nearshore stations were dominated by spumellarian radiolarians with the number of nassellarian radiolarians increasing offshore (Figure 1). The ratio for the total collecting area was broken down seasonally (Figure 2) as a ratio of total live nassellarians (TLN) to total live spumellarians (TLS) for the entire study area. These ratios are 1:3 for winter, 1:1 for spring and 1:8 for summer. Here again, the spumellarians dominated in all

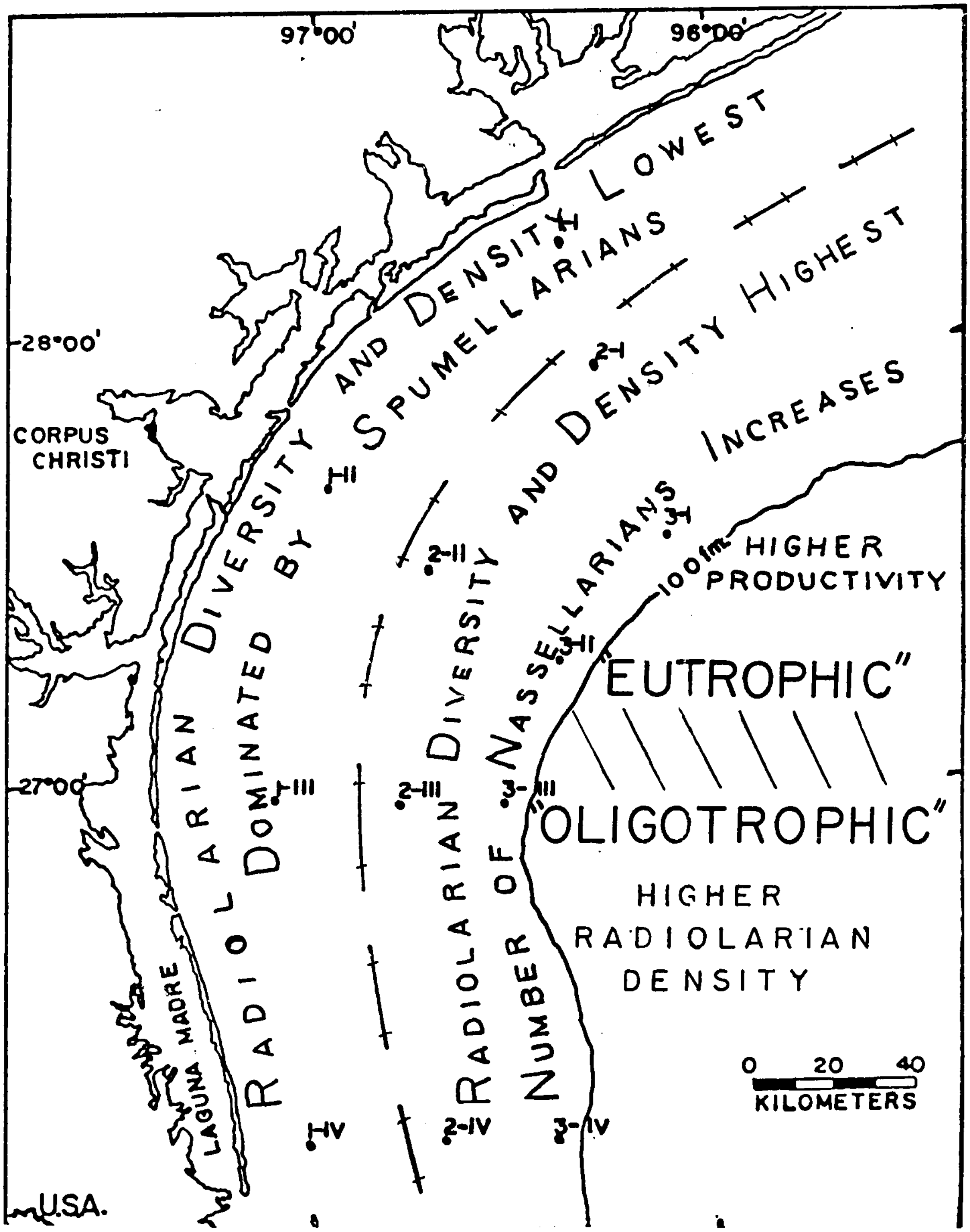
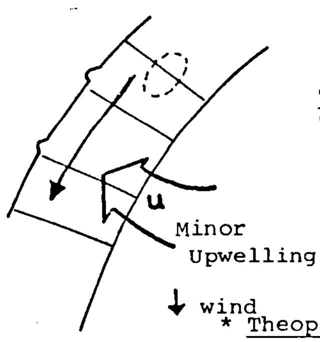


Figure 1. Radiolarian Ecologic Trends Along the South Texas Continental Shelf.

WINTER 1974-1975



$\frac{TLN}{TLS} = \frac{1}{3}$

I. Almost as high a standing crop as in summer.

II. Highest Diversity.

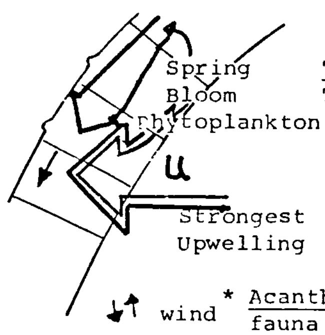
III. Dead population same as in spring

Pond of offshore wat.

Gen. shelf circulat.

* Theopilium tricostatum- Spirocyrtis scalaris fauna

SPRING 1975



$\frac{TLN}{TLS} = \frac{1}{1}$

I. Lowest standing crop ½ of winter or summer.

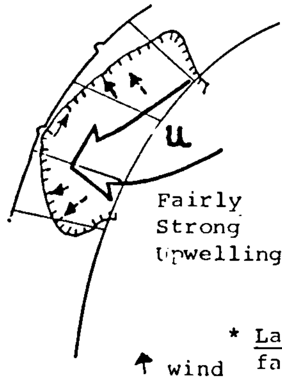
II. Diversity almost as high as winter.

III. Deads same as winter

Gen. shelf circul.

* Acantharian-?Anthocyrtidium ophiurensis fauna (no real dominants)

SUMMER 1975



$\frac{TLN}{TLS} = \frac{1}{8}$

I. Greatest standing crop.

II. Lowest diversity.

III. Lowest % of deads, 1/5 that of winter or spring.

offshore water

surface bottom circ.

* Lamprocyclas maritalis-Euchitonia elegans fauna

Figure 2. Seasonal Trends Derived from Radiolarian Data.

except the spring samples. The reason for the 1:1 ratio in the spring may have been due to the almost total exclusion of radiolarians from the inner- and mid-shelf stations, due to the intrusion of "Mississippi water" and the resultant bloom of large centric diatoms, which excluded the radiolarians (see section on radiolarian niche herein). The greatest standing crop of radiolarians (and planktonic foraminifera) occurred in the summer. A standing crop of radiolarians (and planktonic foraminifera) almost as high, occurred in the winter, and a standing crop of about one-half that of winter or summer occurred in the spring. The lowest diversity of radiolarians (and planktonic foraminifera) occurred in the summer, with higher and almost equal diversities occurring in winter and spring, respectively (diversity here refers to number of species represented per season). There appeared to be a distinct winter and summer assemblage of radiolarians and a mixed or transitional assemblage in the spring. (This is also true for the planktonic foraminifera, but to a limited extent due to fewer species.) The winter radiolarian assemblage was dominated by a *Theopilium tricostatum-Spirocyrtis scalaris* fauna and the summer by a *Lamprocyclas maritalis-Euchitonia elegans* fauna. Dominant radiolarians were species that were relatively abundant and more or less "endemic" to that season. (This is a subjective dominance.) The spring radiolarian assemblage appears to contain no real dominance; however, *Acantharian-?Anthocyrtidium ophiurensis* fauna might be considered as such. Figures 3 through 12 were generated using multivariant analysis. The R-mode planktonic foraminiferan dendrogram (Figure 3) contains two significant groups: the *Globigernoides ruber-Globigerina bulloides* cluster; and, the *Globigerina falconensis-Globigerina quinqueloba* cluster. Deficiency in cluster tightness, evident in low similarities for the remaining clusters, is indicative of the low densities encountered for many of the species.

Using the clusters from the R-mode dendrogram as a guide (Figure 3),

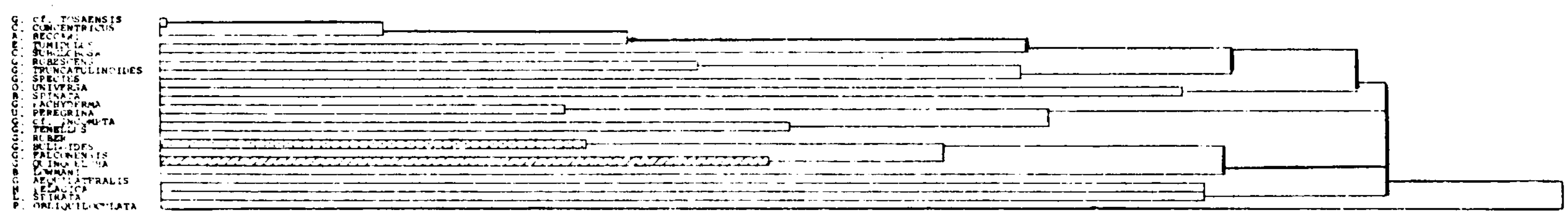


Figure 3. R-Mode Cluster Analysis of Planktonic Foraminiferans. Key to Species Names in Left-Hand Column Given on Following Page.

Figure 3 Continued. Key to Species.

G. cf. TOSAENSIS
C. CONCENTRICUS
A. BECCARI
E. TUMINDULUS
C. SUBGLOBOSA
G. RUBESCENS
G. TRUNCATULINOIDES
G. SPECIES
O. UNIVERSA
B. SPINATA
G. PACHYDERMA
U. PERIGRINA
G. cf. INCOMPTA
G. TENELLUS
G. RUBER
G. BULLOIDES
G. FALCONENSIS
G. QUINQUELOBA
B. LOWMANI
G. AEQUILATERALIS
H. PELAGICA
L. SPIRATA
P. OBLIQUILOCULATA

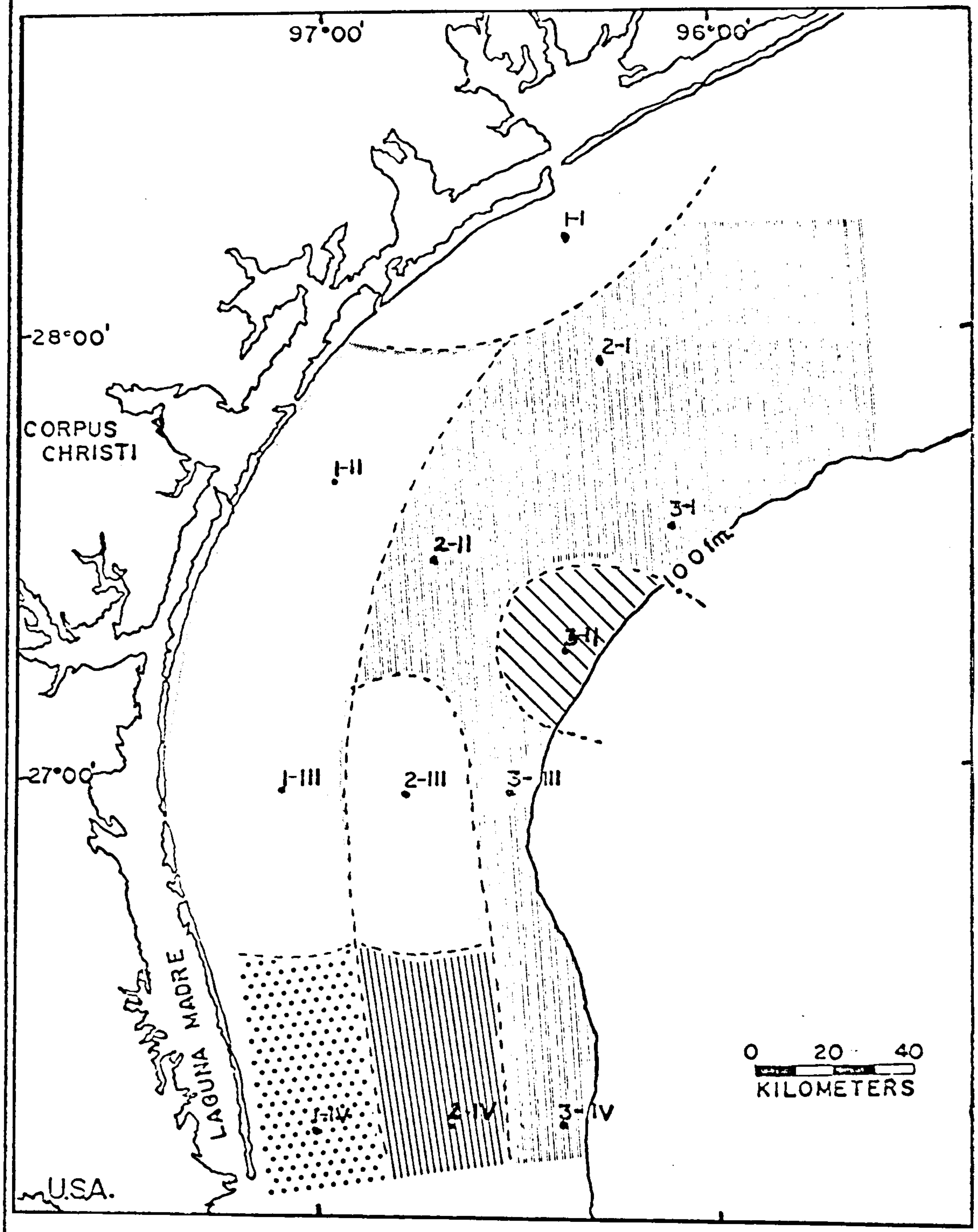


Figure 4. Winter Q-Mode Cluster of Planktonic Foraminifera.

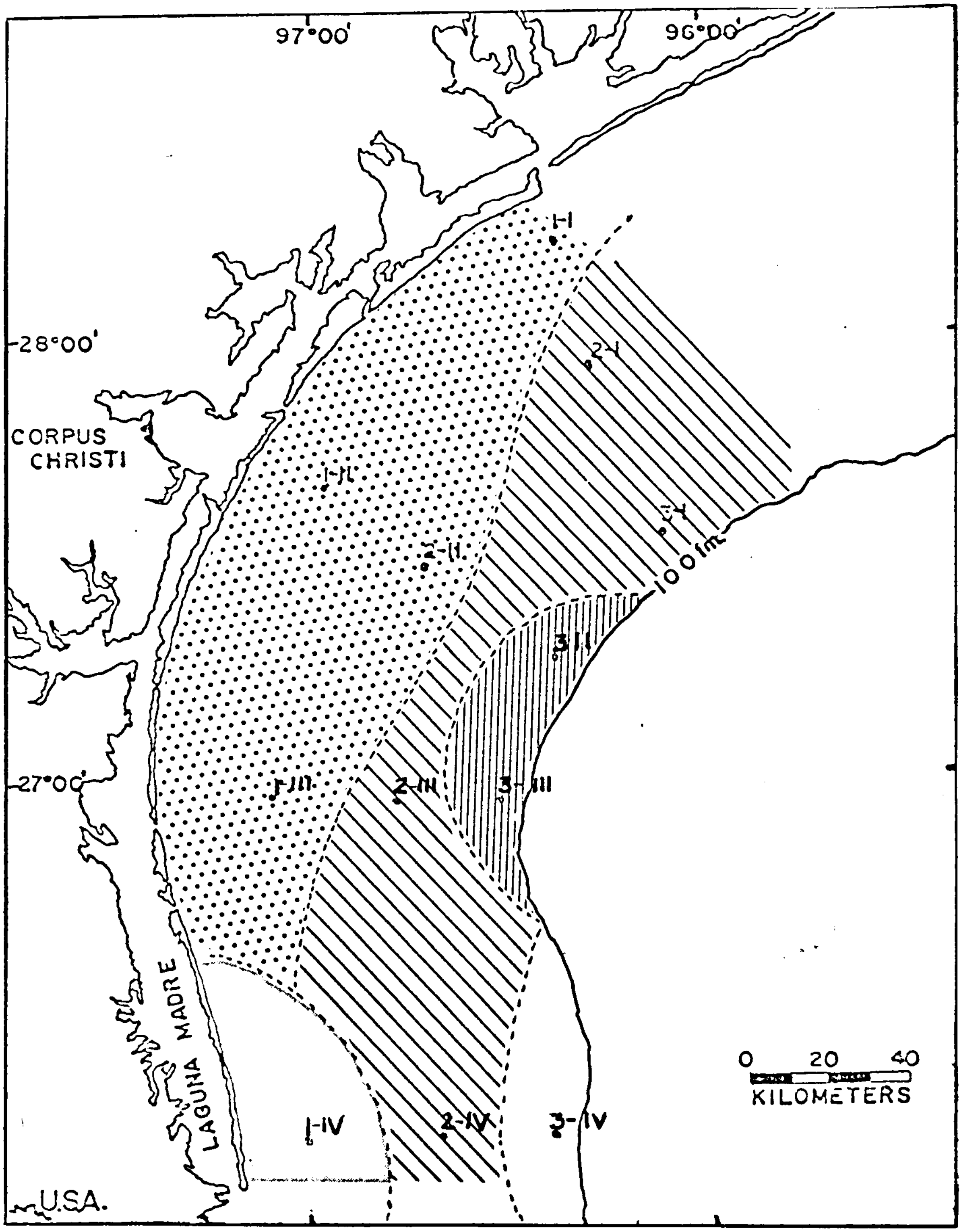


Figure 5. Spring Q-Mode Cluster of Planktonic Foraminifera.

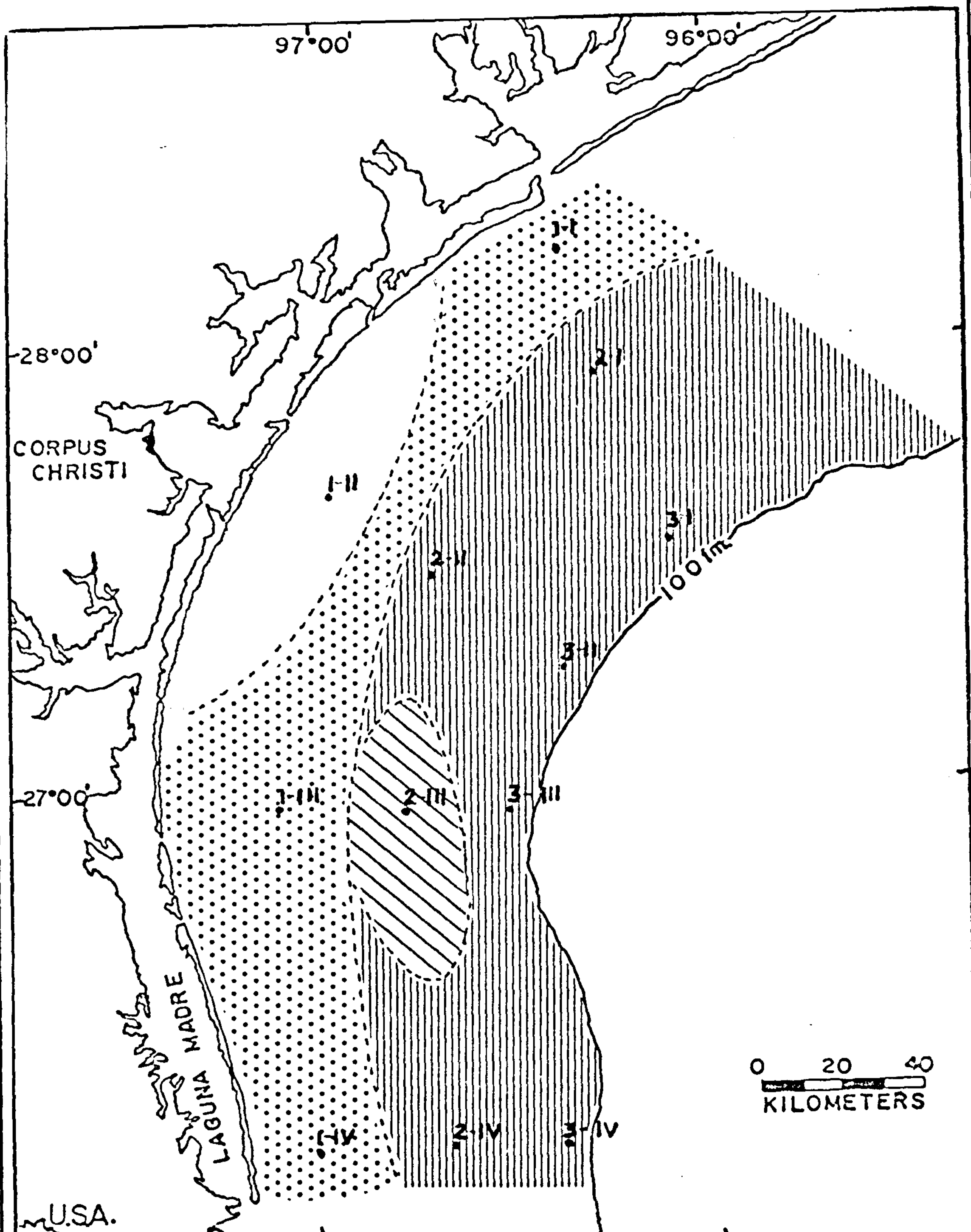


Figure 6. Summer Q-Mode Cluster of Planktonic Foraminifera.

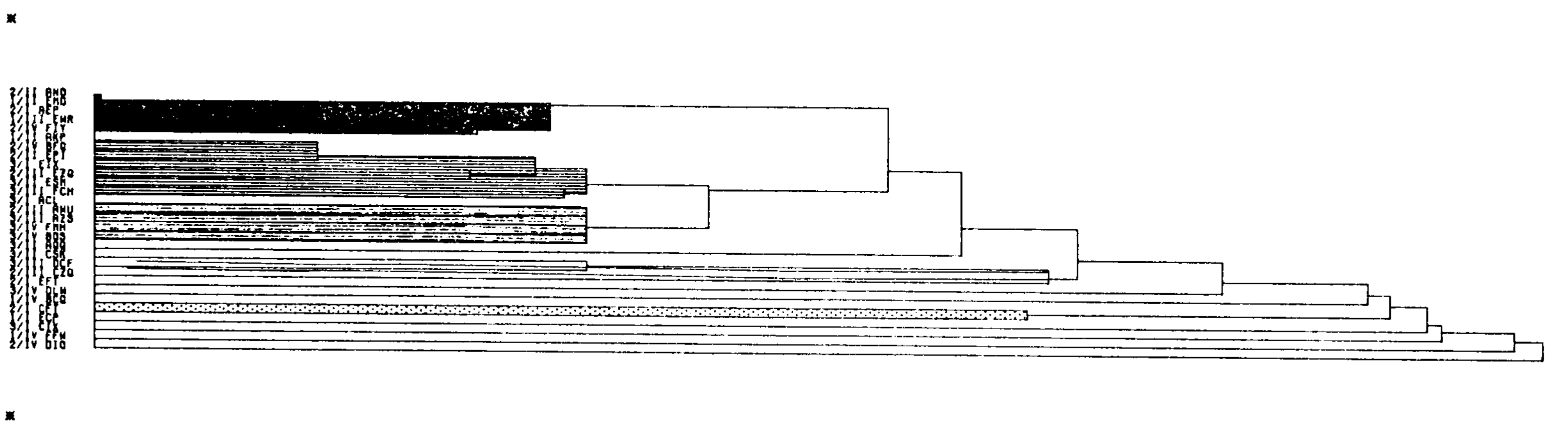


Figure 7. Q-Mode Cluster of Live Radiolarians, Winter-Spring-Summer. Key to Left-Hand Column on Following Page.

Figure 7 Continued. Key to Left-Hand Column

2/II ANO
1/II EMD
2/I AEP
1/III EWR
2/IV FIY
1/II AKP
2/IV BFQ
2/II EPI
3/I EIX
2/III EZQ
3/II ESM
3/III FCM
3/I ACL
2/III AWU
3/III AZS
3/IV FMM
3/IV BOS
3/II AQQ
3/II CSK
3/III DCF
2/III CZQ
2/I EFT
3/IV DLW
1/IV BCQ
2/I CFT
1?I ECP
3/I CIX
1/IV FFW
2/IV DIO

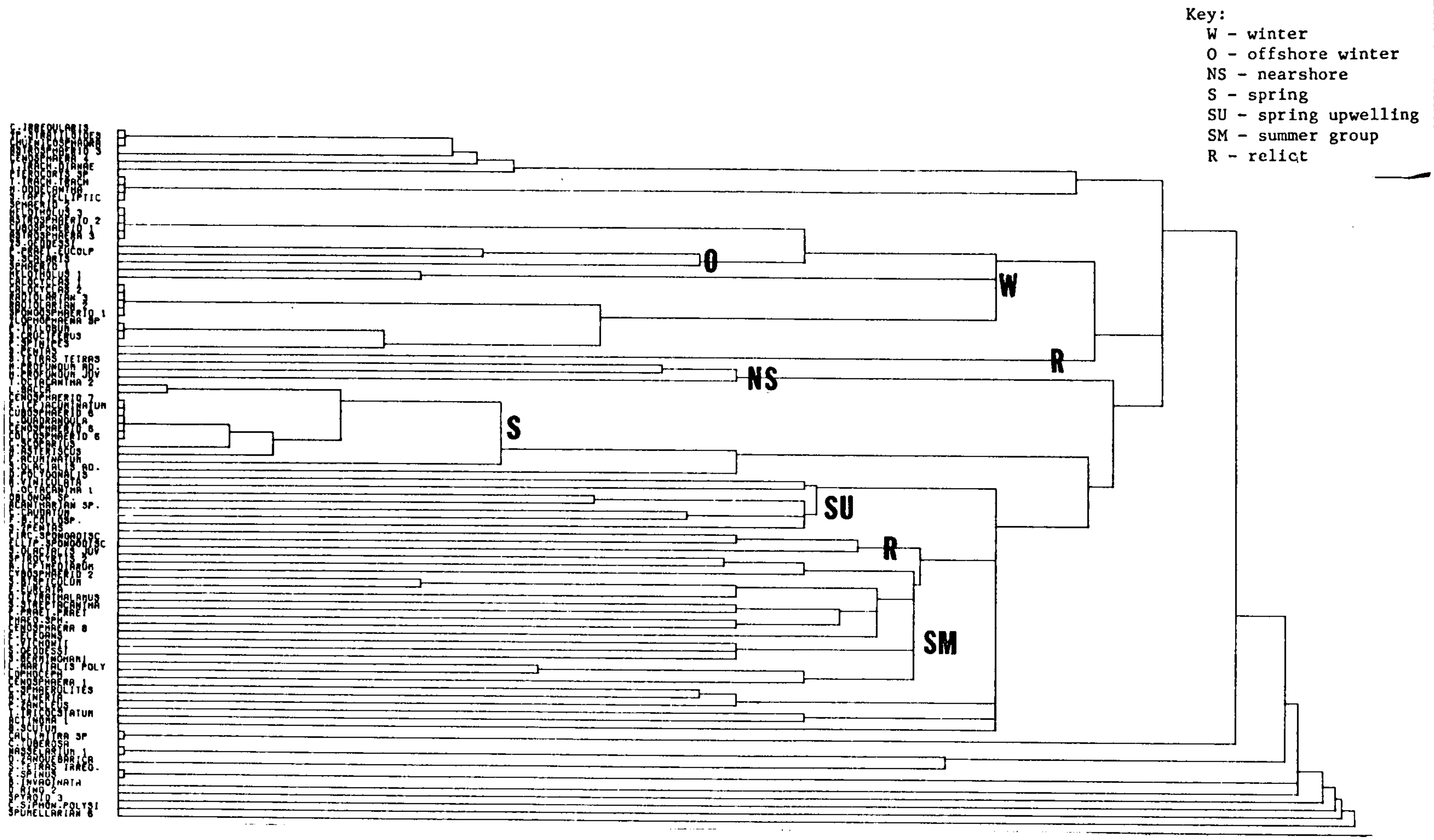


Figure 8. R-Mode Cluster of Live Radiolarians, Winter-Spring-Summer. Key to Left-Hand Column Given on Following Page.

Figure 8 Continued. Key to Left-Hand Column.

C. IRREGULARIS
?P. STRATILOIDES
CHUENICOSPHAGRA
ASTROSPHAERID 3
CENOSPHAERA 4
T. TRACH. DIANAE
PTEROCORYS SP.
T. TRACH. TRACH
H. DODECANTHA
S. (AFF)ELLIPTIC
SPHAERID 2
HELOTHOLUS 3
ASTROSPHAERID 2
CUBOSPHAERID 1
ASTROSPHAERA 3
?S. GEDDESSI
P. PRAET. EUCOLP
S. SCALARIS
SPHAERID 1
HELOTHOLUS 1
CALOCYCLAS 1
CALOCYCLAS 2
RADIOLARIAN 3
RADIOLARIAN 2
SPONGOSPHAERID 1
?LOPHOPHAENA SP.
P. TRILOBUM
S. CRUCIFERUS
P. SPINIPES
S. PENTAS
S. TETRAS TETRAS
H. PROFUNDUM AD.
H. PROFUNDUM JUV.
T. OCTACANTHA 2
L. BACCA
CENOSPHAERID 7
E. (CF) ACUMINATUM
CUBOSPHAERID 6
L. QUADRANGULA
CENOSPHAERID 6
COLLOSPHERID 6
C. SCOPARIUS
H. ASTERIASCUS
E. ACUMINATUM
S. GLACIALIS AD.
D. POLYGONALIS
A. VINICULATA
T. OCTACANTHA 1
L. BACCA
CENOSPHAERID 7
E. (CF) ACUMINATUM
CUBOSPHAERID 6
L. QUADRANGULA
CENOSPHAERID 6
COLLOSPHAERID 6
C. SCOPARIUS
H. ASTERISCUS
E. ACUMINATUM
S. GLACIALIS AD.
D. POLYGONALIS
A. VINICULATA
T. OCTACANTHA 1
OBLONGA SP.
ACANTHARIAN SP.
C. CAUDATUM
F. B. COLLOPS.
S. ?PENTAS
CIRC. SPONGADISC
ELLIP. SCPONGODISC
S. GLACIALIS JUV.
SPIROCYRTIS 2
A. (CF) MEDIARUM
CYBOSPHAERID 2
S. BISPICULUM
E. EURCATA
Q. TETRATHALAMUS
S. STREPTACANTHA
P. PRAET. PRAET
PHAEO. SPH.
CENOSPHAERA 8
E. ELEGANS
L. VICHOWII
S. GEDDESSI
S. BERMINGHAMI
L. MARITALIS POLY
LOPHOCEPH
CENOSPHAERA 1
C. SPHAERULITES
A. CINERIA
P. ZANCLEUS
T. TRICOSTATUM
ACTINOMA 1
B. SCUTUM
CALLIMITRA SP.
C. TUBEROSA
NASSELARIUM 1
D. ZANGUEBARICA
S. TETRAS IRREG.
E. SPINUS
B. INVAGINATA
D. RING 2
SPYROID 3
C. SIPHON. POLYSI
SPUMELLARIAN 6

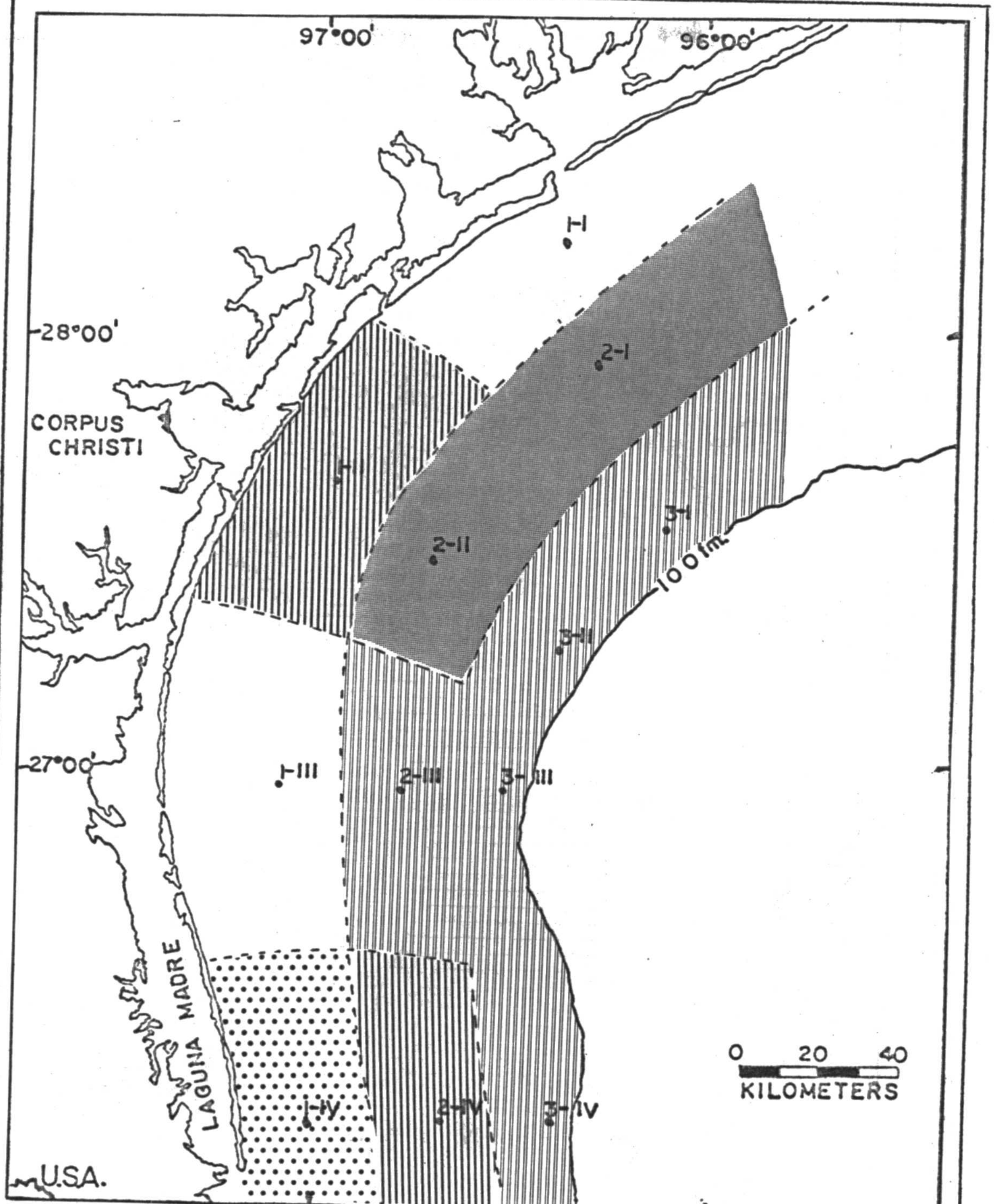


Figure 9. Winter Q-Mode Cluster of Radiolarians.

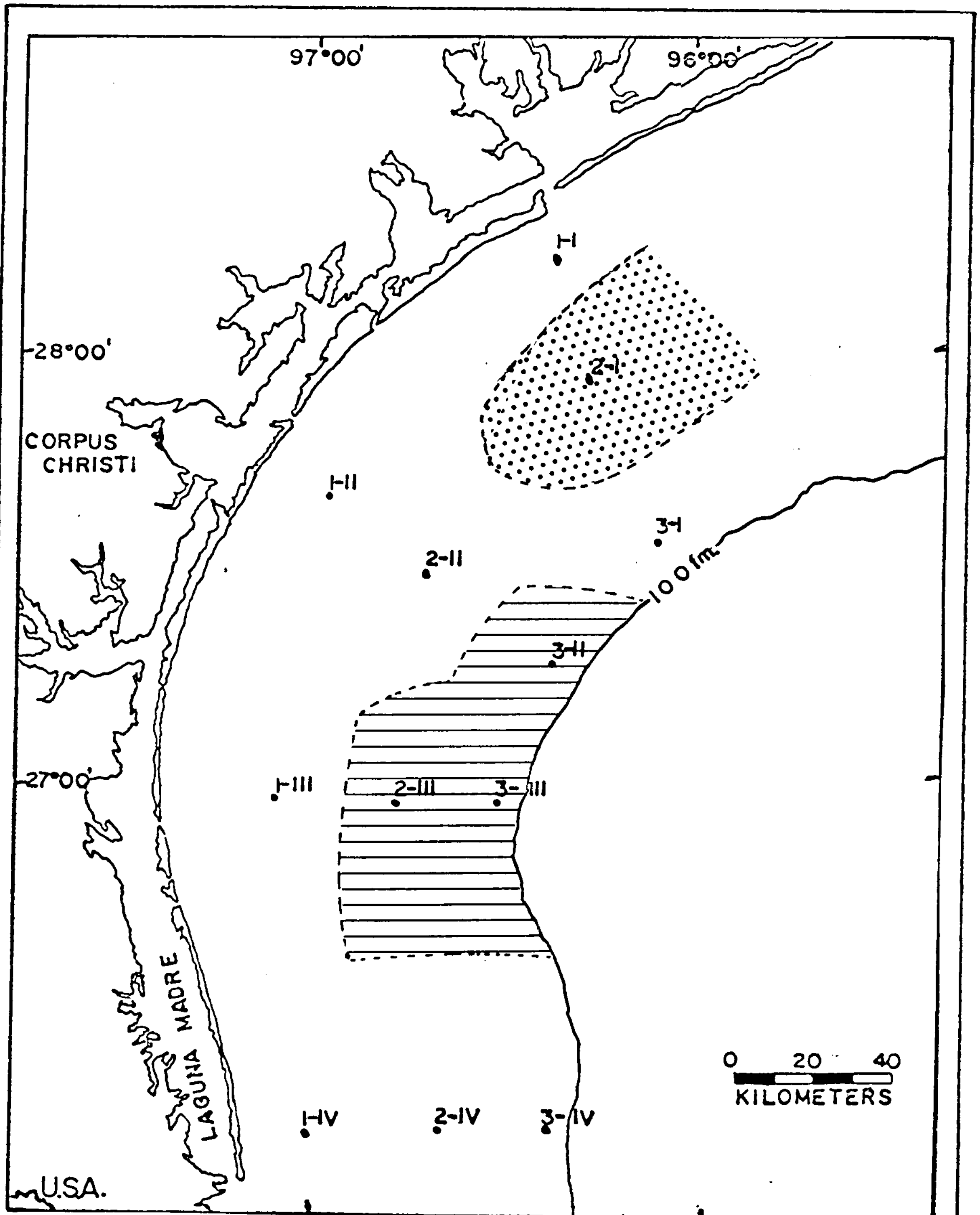


Figure 10. Spring Q-Mode Cluster of Radiolarians.

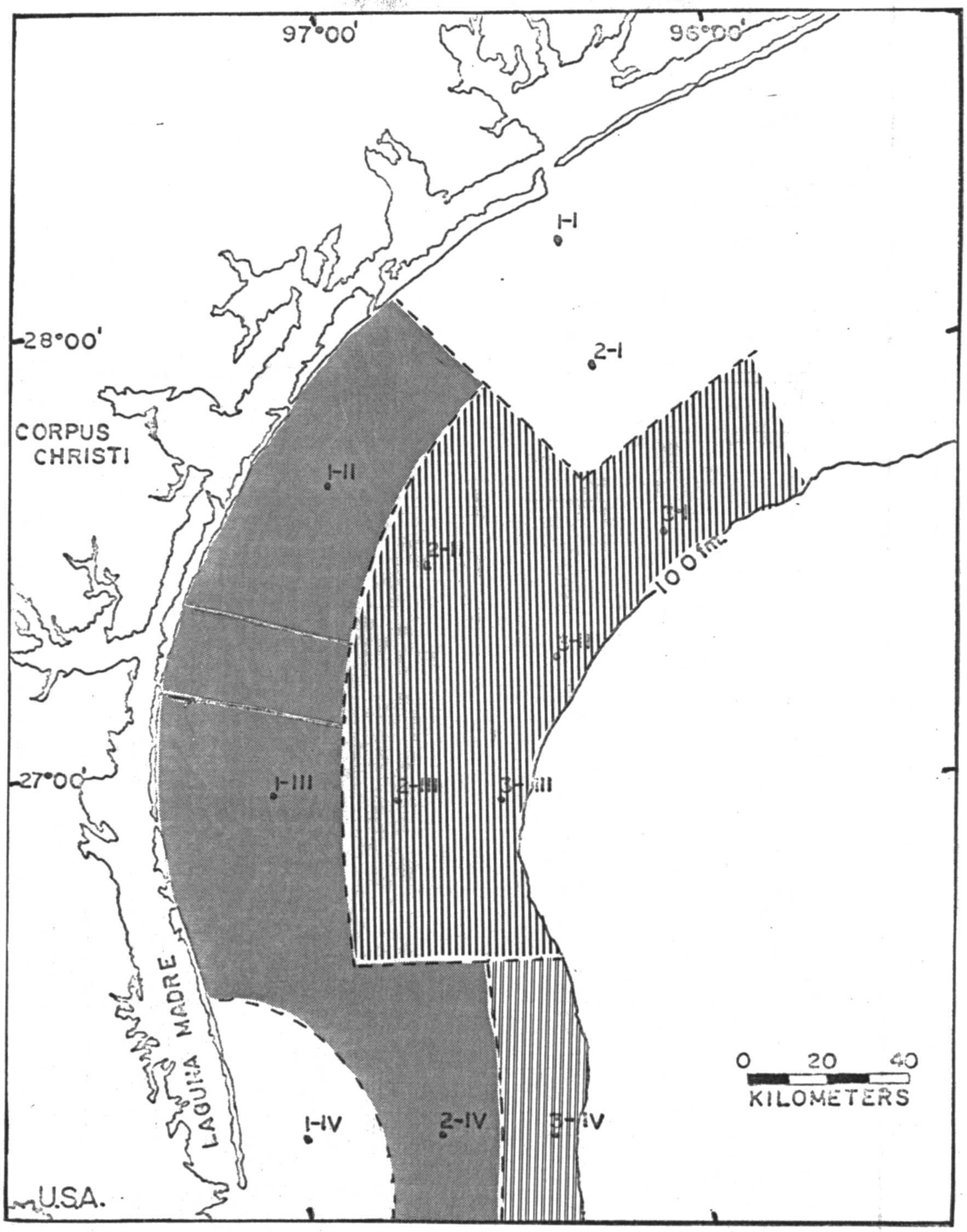


Figure 11. Summer Q-Mode Cluster of Radiolarians.

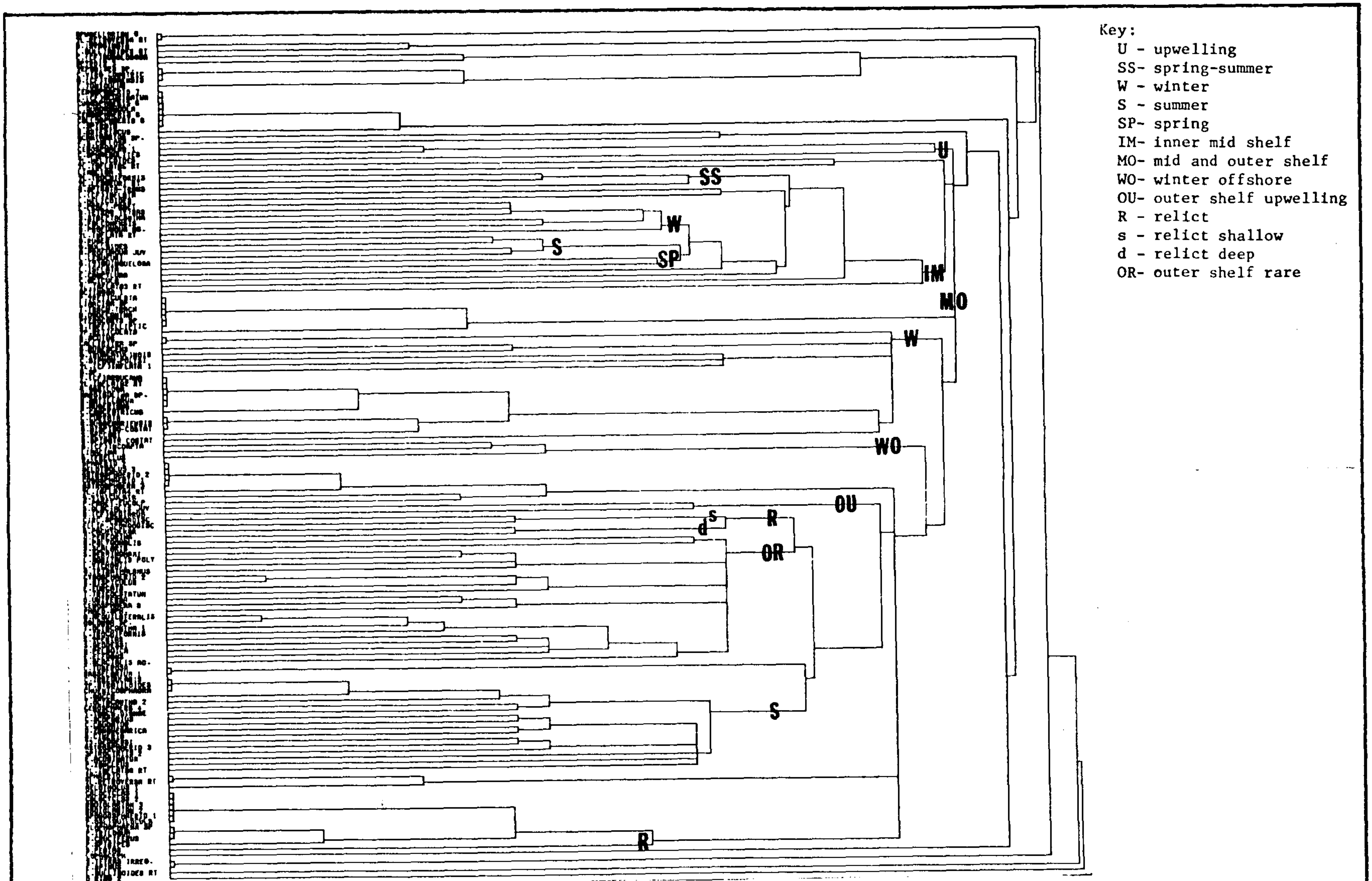


Figure 12. R-Mode Cluster of Radiolarians, Foraminifera and Pteropods. See Key on Following Page.

Figure 12 Continued. Key to Left-Hand Column.

SPUMELLARIAN G.
?L. RETROVERSA RT
B. INVAGINATA
L. BULLINOIDES RT
C. (CF) SUBGLOBOSA
SPYROID 3
?EPONIDES SP.
C. VIRG CONSTRIC
G. (CF) TOSAENSIS
E. TUMIDULUS
CENOSPHAERID 7
E. (CF) ACUMINATUM
CUBOSPHAERID 6
L. QUADRANGULA
CENOSPHAERID 6
COLLOSPHAERID 6
L. SPIRATA
H. ASTERISCUS
ACANTHARIAN SP.
E. B. COLLOSP.
CENOSPHAERA 1
C. SPHAERULITES
?L. HELICOIDES
?L. INFLATAS RT
LIMACINA 3
?L. TROCHIFORMIS
?L. LESUEURI RT
A. SPINATA-TRANS
L. (CF) INFLATA
L. HELICOIDES
P. PRAET. PRAET.
S. TETRAS TETRAS
S. STREPTACANTHA
G. FALCONESIS
H. PROFUNDUM AD.
?L. INFLATA RT
G. RUBER
G. BULLOIDES
H. PROFUNDUM JUV
L. LESUEURI
G (?) QUINQUELOBA
L. INFLATA
E. CAMPYLURA
C. ACICULA
?L. INFLATA3 RT
ACTINDUA 1
P. ? RETICULATA
LIMACINA SP
T. TRACH. TRACH
H. DODECANTHA

PTEROCORYS SP
S. (AFF) ELLIPTIC
?P. RETICULATA
A. SCUTUM
CALLIMITRA SP
G. ROBESCENS
G. TRUNCATULINOID
C. SIPHON. POLYSI
?L. (CF) INFLATA 1
G. SP.
V. (CF) ARAUCANA
?L. INFLATA 2 RT
?L. INFLATA 2 RT
N. BASALOBA
MARGINULINA SP.
N. ANTILLARUM
U. AUBERIANA
C. CONCENTRICUS
C. CURVATA
B. SUBRENARIENSIS
U. HISPIDO-COSTAT
S. BRECCARI
A. SPINATA COSTAT
G. (CF) INCOMPTA
LIMACINA 1
G. TENELLUS
SPHAERID 2
HELOTHOLUS 3
ASTROSPHAERID 2
CUROSPHAERID 1
ASTROSPHAERA 3
?L. INFLATA $ RT
A. VINICULATA
P. PRAET. EUCOLP
S. GLACIALIS JUV
A. (CF) MEDIARUM
CIRC. SPONGADISC
ELLIP. SPONGODISC
G. PACHYDERMA
U. PERIGRINA
U. POLYGONALIS
S. SCALARIS
S. BERMINGHAMI
L. MARITALIS POLY
L. VICHOWII
O. TETRATHALMUS
CYBOSPHAERID 2
S. BISPICULUM
E. EURCATA
T. TRICOCSTATUM
O. UNIVERSA
CENOSPHAERA 8

PHAEO. SPH.
G. AEQUILATERALIS
OBLONGA SP.
T. OCTACANTHA 1
L. TROCHIFORMIS
S.? PENTHAS
S. GEODESSI
H. PELAGICA
E. ELEGANS
S. GLACIALIS AD.
C. TUBEROSA
NASSELARIUM 1
C. IRREGULARIS
?P. STRATILOIDES
CHUENICOSPHAGRA
L. BACCA
T. OCTACANTHA 2
CENOSPHAERA 4
T. TRACH. DIANAE
C. SCOPARIUS
C. CAUDATUM
D. ZANGUEBARICA
A. CINERIA
?S. GEODESSI
ASTROSPHAERID 3
SPIROCYRTIS 2
E. ACUMINATUM
P, ZANCLEUS
?L. INFLATA 6 RT
SPHAERID 1
?L. RETROVERSA RT
HELOTHOLUS 1
CALOCYCLAS 1
CALOCYCLAS 2
RADIOLARIAN 3
RADIOLARIAN 2
SPONGOSPHAERID 1
P. OBLIQUILOCULA
?LOPHOPHAENA SP
P. TRILOBUM
S. CRUCIFERUS
P. SPINIPES
S. BENTOS
LOPHOCEPH
S. TETRAS. IRREG.
E. SPINUS
L. BULLIMOIDES RT
D RING 2

distinct winter and summer foraminiferal assemblages were constructed. The winter assemblage was characterized by very dominant *Globigerina falconensis* and *Globigerina quinqueloba*. Less abundant, but also winter characterizing species, were *Globigerina rubescens, Globorotalia truncatulinoides, Globigerina pachyderma, Globigerina* cf. *incompta, Globigerinoides tenellus* and *Globorotalia* cf. *tosaensis*.

A summer assemblage contained dominant *Globigerina bulloides* and *Globigerinoides ruber* with subordinate numbers of *Globigerina falconensis* and *Globigerina quinqueloba*. *Orbulina universa* was more abundant and *Bolivina lowmani* assumed the position of a dominant faunal component. *Hastigerina pelagica* first appeared in a spring sample but became moderately abundant in the summer.

The spring sampling period seemed to be transitional between the two more distinct winter and summer seasons. *Globigerina quinqueloba* was the most abundant spring species; however, there does not appear to be any other distinctly dominant species. Although diversity only slightly decreased for the spring period, density exhibited a significant decrease.

General Microplankton (Niskin)

From the Q-mode cluster of the 1975 Niskin data (Figure 13), two very important trends are apparent: location on the shelf was the first tier of the clustering hierarchy, and seasonality was the next most important parameter (representing the second hierarchical tier). Offshore clusters were generally related at a higher similarity level to one another, reflecting a greater stability present in biological composition of more normally oceanic microplankton populations, than nearshore clusters (where localized environmental changes are more dramatic).

Depth has generally been considered an important factor in determining the distribution of plankton populations. While this is undoubtedly the

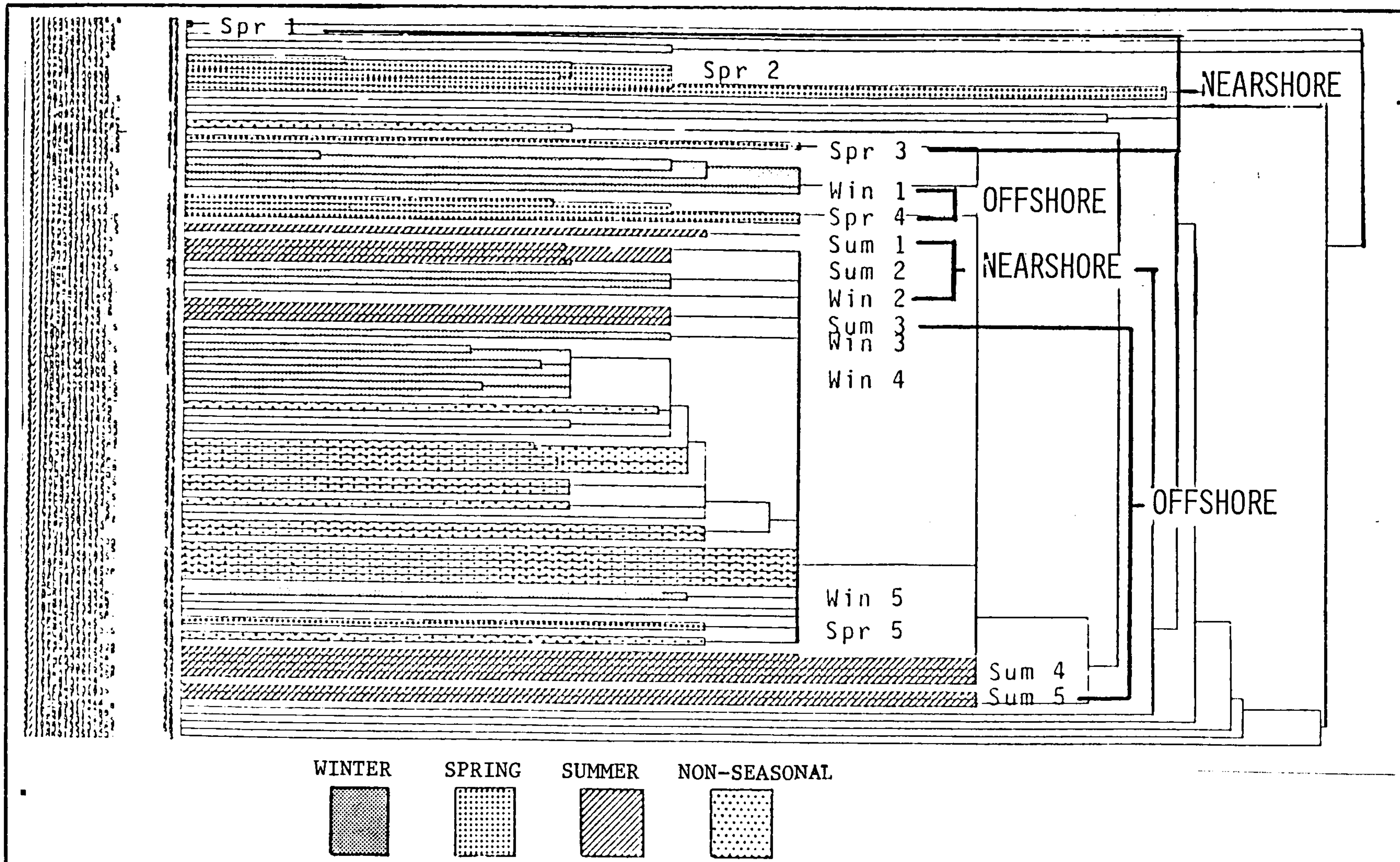


Figure 13. Q-Mode Dendrogram for 1975 Data Depicting Seasonal Clusters from Niskin Data of Microplankton. See Appendix A for Characteristics of this Q-Mode Cluster.

Figure 13 Continued. Key to Left-Hand Column.

The Station/Transect is followed by a three letter sample code, month and day, time of day, and depth[1].

1/IICMC4051025.5	62
1/ICCO4021730.5	67
1/IIICWO5101700	95
3/IVFMG9921150B	19
2/ICFS4201345.5	66
2/IICPE4101010	84
1/ICCM4101730	87
1/IICMA4101025	81
1/IVFFT9100930	97
2/IVDIL5101025	85
1/IVDFL5101535	82
3/IABZ12251500.5	16
1/IIIATU1241700.	5
3/IEJH8521708PZ	40
3/IIIDCC5691200P	46
3/IIBKB1991045PZ	73
2/IVDIN5111025.5	68
1/IVDFN5141535.5	78
2/IIIAWR12100945	11
3/IABY12101500	17
3/IIAZP12101115	10
3/IIIAZR12251115	7
3/IIAQN12101245	9
2/IIIAWT12250945	4
3/IIIDBY5101200	49
3/IICSD5101715	53
2/IICZN5101650	98
3/IIIDMR5381200P	47
1/IVFFV9130930.5	23
1/IIEMC9111344.5	38
1/IIIEWO9101545	90
1/IIEMA9101344	94
1/IIAKM12101310	2
2/IVFIV9101723	96
2/IIANN1181745.5	76
2/IIANL1101745	77
1/IVBCN12101115	1
1/IIICWQ5081700.	54
3/IIIFCA9291652.	35
2/IEFS8201820.5	43
3/IEIW8261708.5	41
2/IEFQ8101820	91
1/IVBCP1071000.5	71
3/IVBDP1101120	80
1/IIIEWQ9091545.	24
2/IVBFP1361310.5	70
1/IAHA12100900	12
3/IVBGR1361120.5	69
1/IAGZ12030900.5	13
3/IIAQP12251200.	8
2/IAEO12051045.5	15
3/IICSF5121715.5	52
3/IIESJ9811040P-	30
3/IVDLV4911015B	56

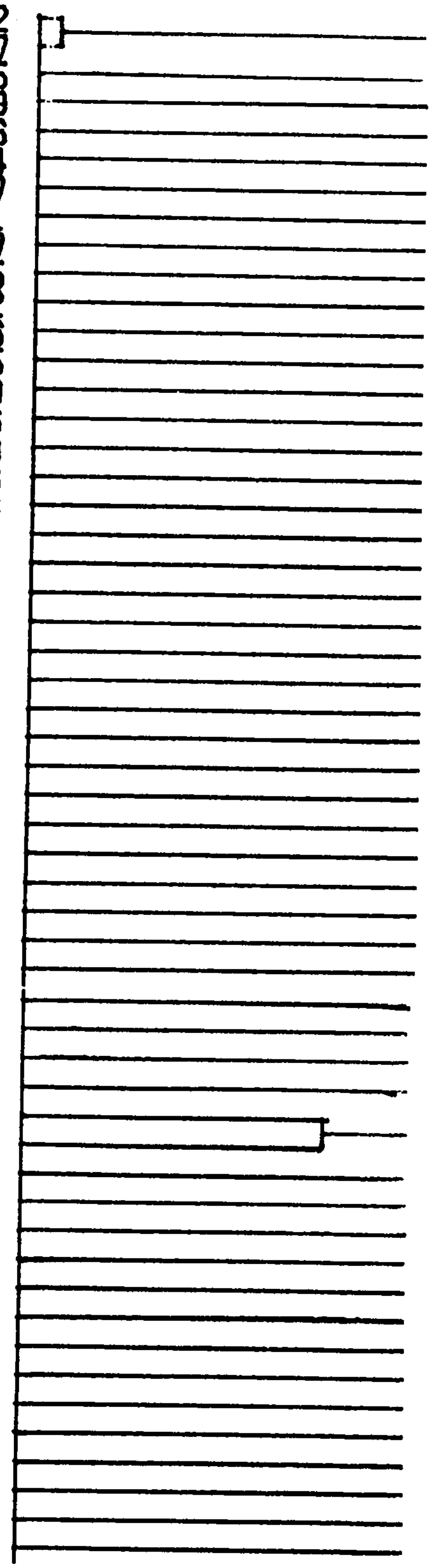
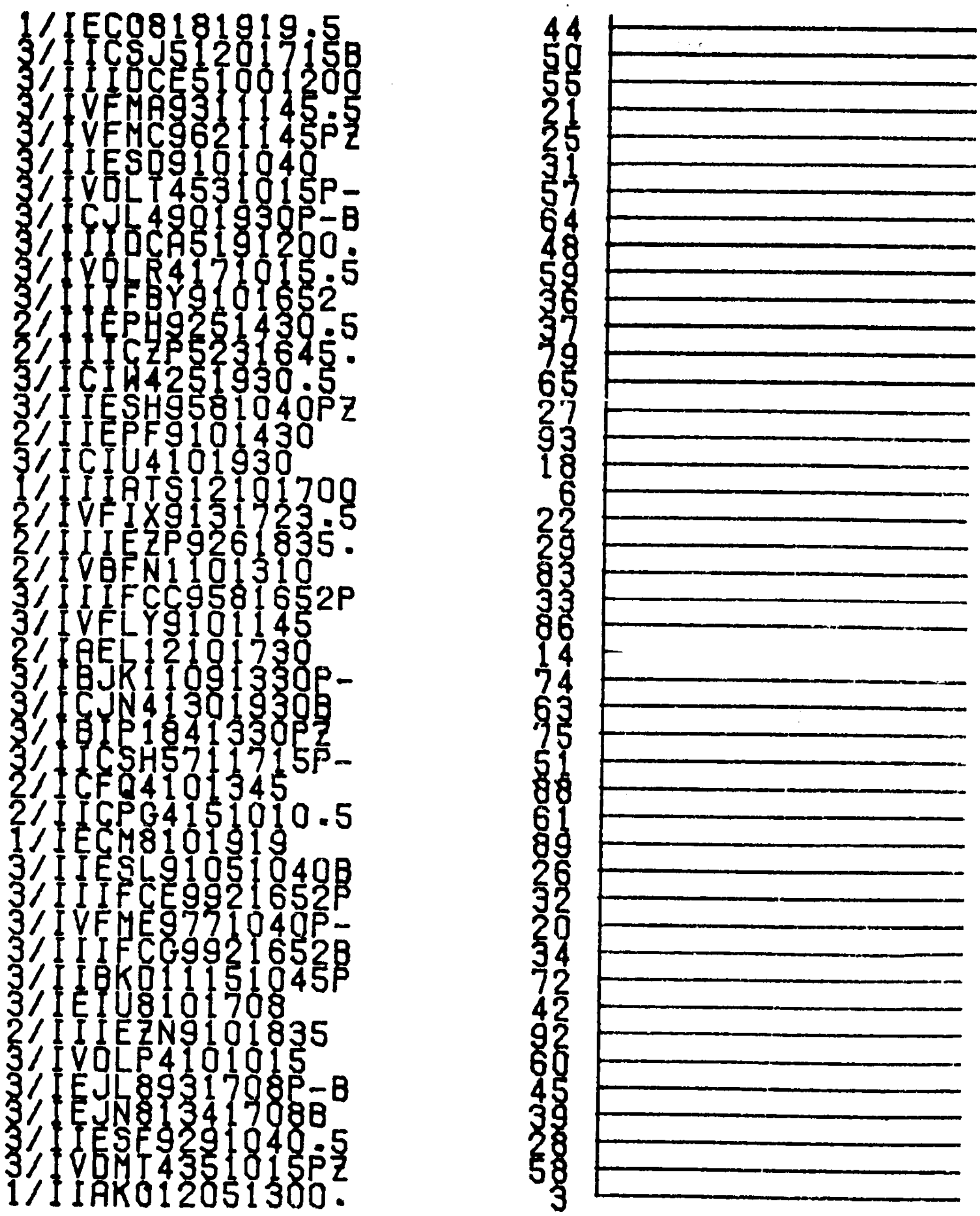


Figure 13 Continued.



[1]Depth: .5 = 5 m; pz = photic zone.

case, only some of the deep offshore samples clustered together. These results may be accounted for, to some extent, by settling of individuals out of the photic zone; thus, giving lower portions of the water column the same general appearance in terms of microplankton composition (especially in phytoplankters) as waters in the photic zone or less dominance in the more open ocean waters. In the 1975 R-mode dendrogram (Figure 14) centric solitary diatoms, naupliar larvae, calanoid copepods, *Ceratium* (the most common dinoflagellate genus), tintinnids, pennate solitary diatoms, and fecal pellets all showed a very intimate association. Tintinnids, calanoid copepods, and naupliar larvae were mainly herbivores and the diatoms and dinoflagellates above were probably basic constituents of their diet, although the tintinnids may graze primarily on the nannophytoplankton.

In general, the dendrogram seems to represent a descending hierarchy of relatively abundant organisms clustering together first, with relatively rare and extremely rare organisms being added to the cluster at lower similarity levels. This result is to be expected when consistently abundant variables are clustered together with very rare ones.

Absolute densities for the seven shelled microplankton groups were tabulated and plotted in histogram fashion as a function of year, season and station location (Figures 15 through 21).

Diagrams depicting the relative abundance of the major microplanktonic groups (diatoms, dinoflagellates, copepods, and naupliar larvae) along with absolute density estimates of one-half photic zone samples for each station and season for 1975 are shown on Figures 22 through 24. Average densities for Stations 1, 2 and 3 for one-half the depth of the photic zone samples are summarized in Table 1.

Several significant trends were present in these microplankton density data. Winter was the most stable and least "productive" season with densities

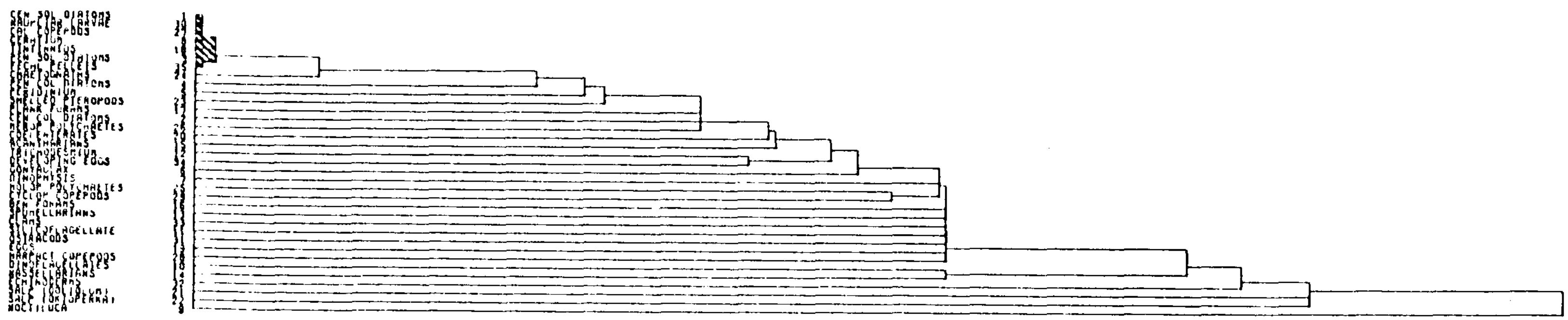
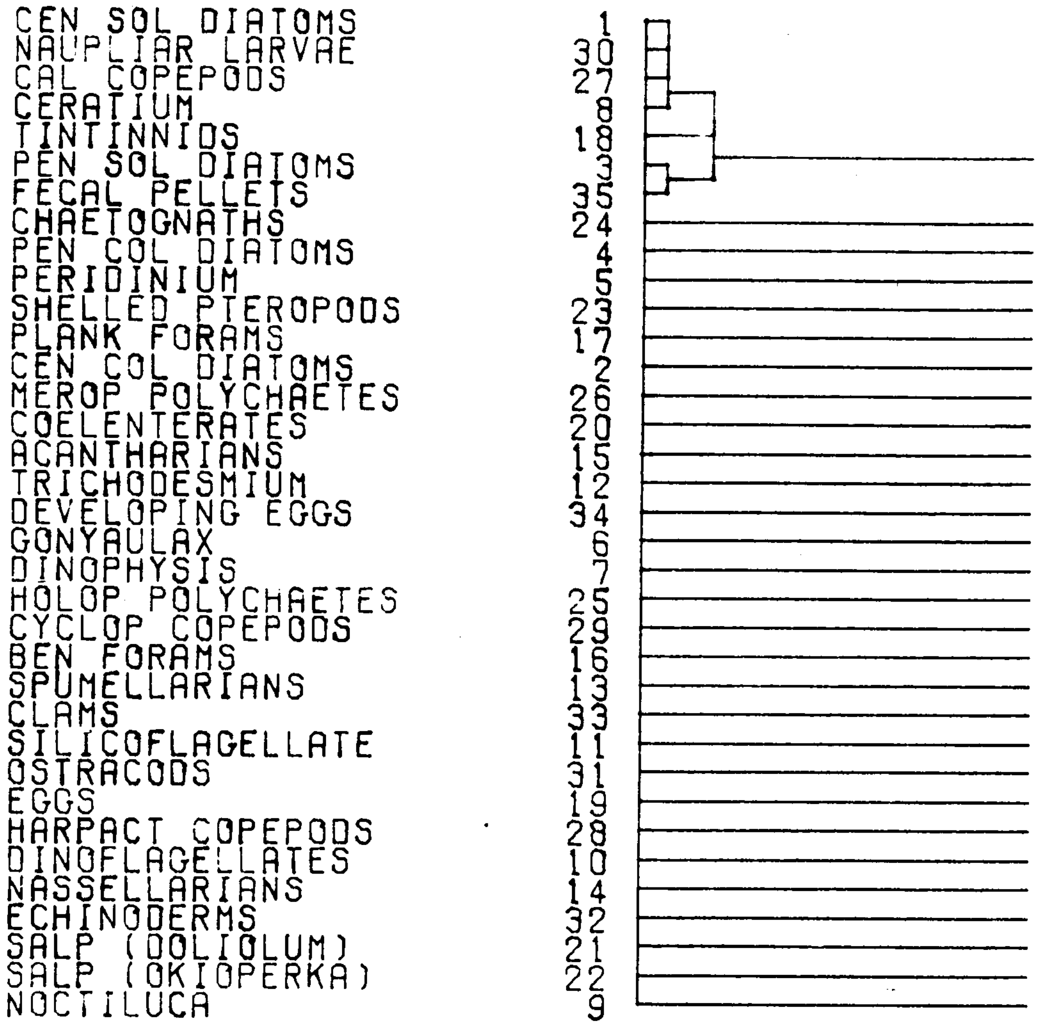


Figure 14. R-Mode Cluster Analysis of 1975 BLM-STOCS Niskin Data. Key to Figure on Following Page.

Figure 14 Continued. Key to Left-Hand Column.



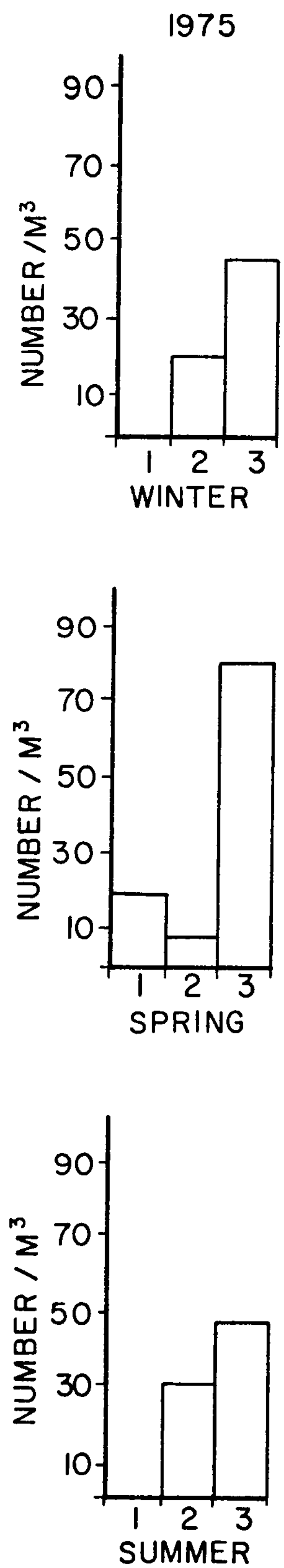


Figure 15. Density of Planktonic Foraminiferans.

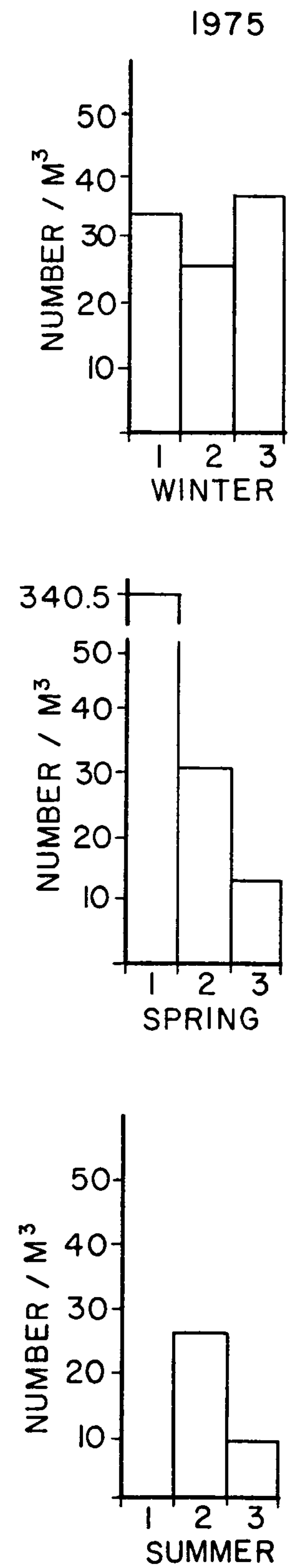


Figure 16. Density of Benthonic Foraminiferans.

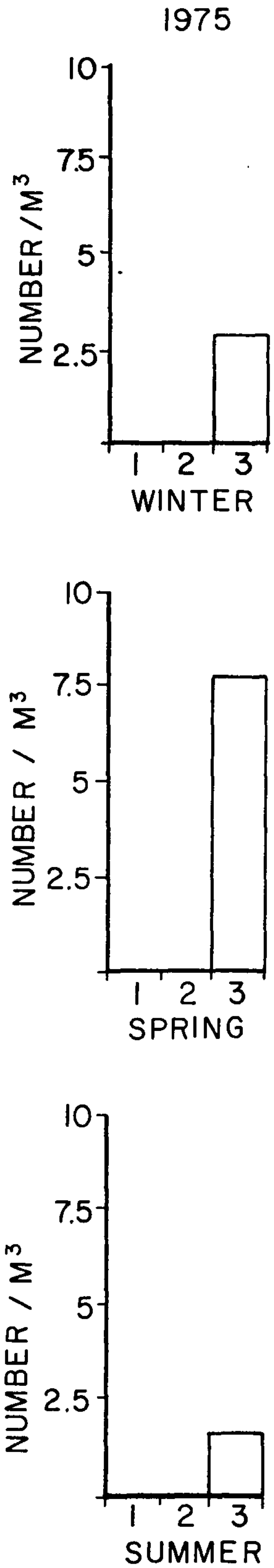


Figure 17. Density of Nassellarians.

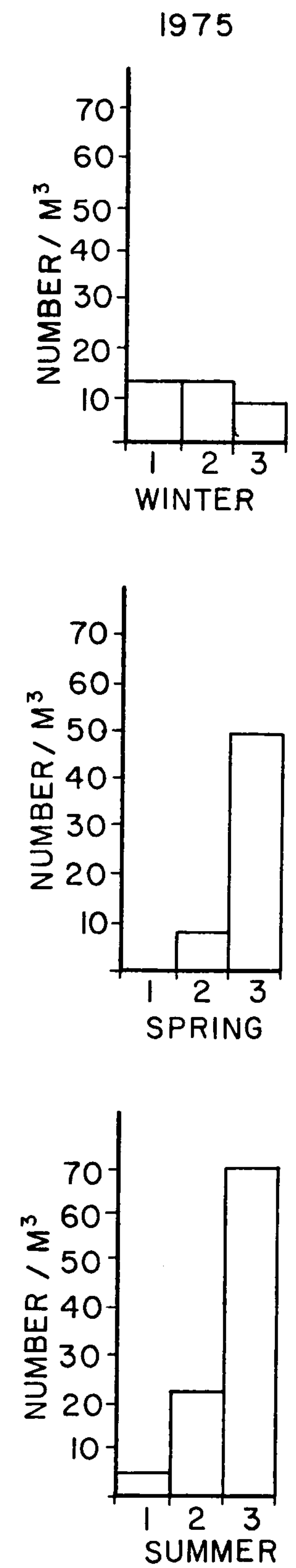


Figure 18. Density of Spumellarians.

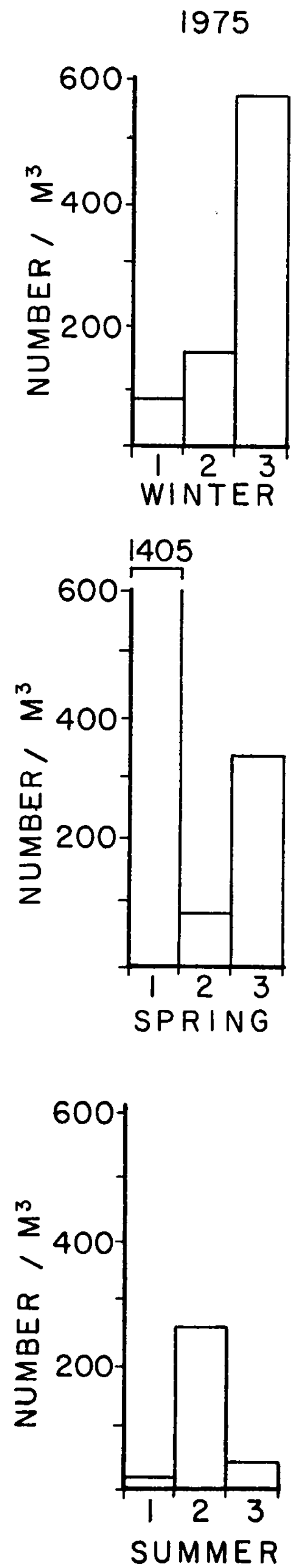


Figure 19. Density of Acantharians.

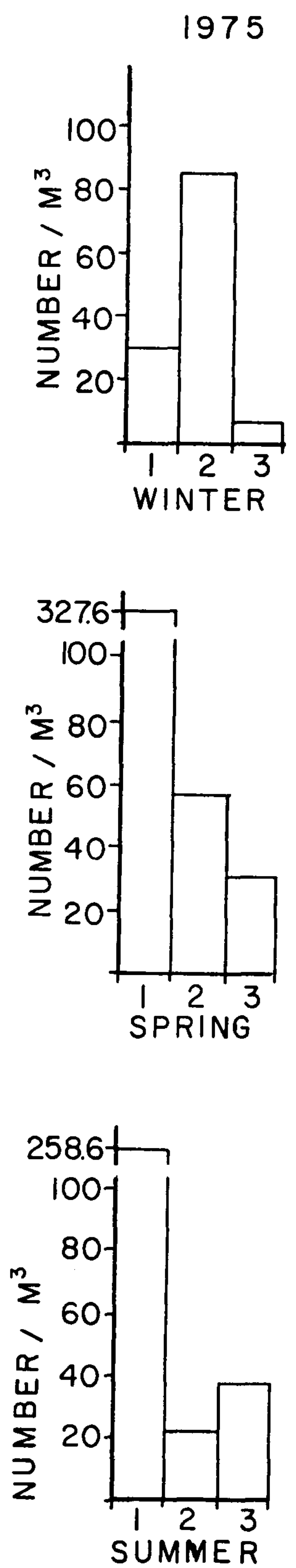


Figure 20. Density of Pteropods.

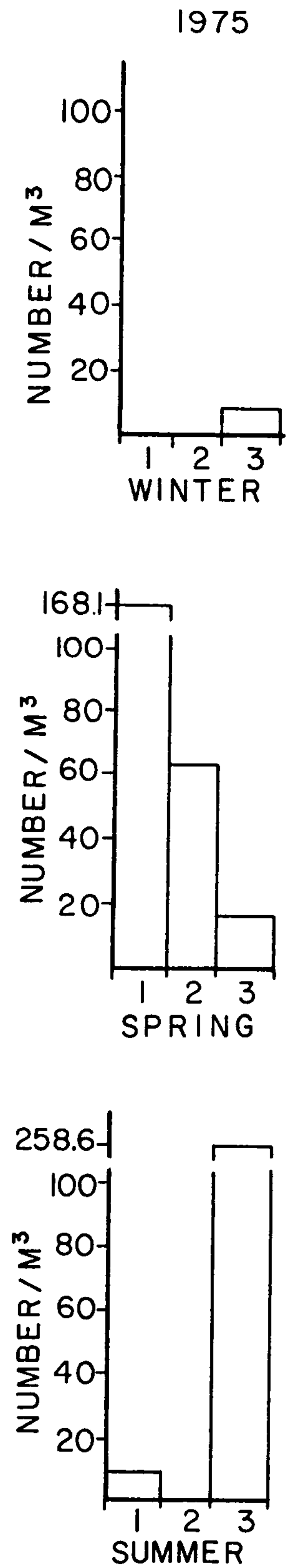


Figure 21. Density of Ostracods.

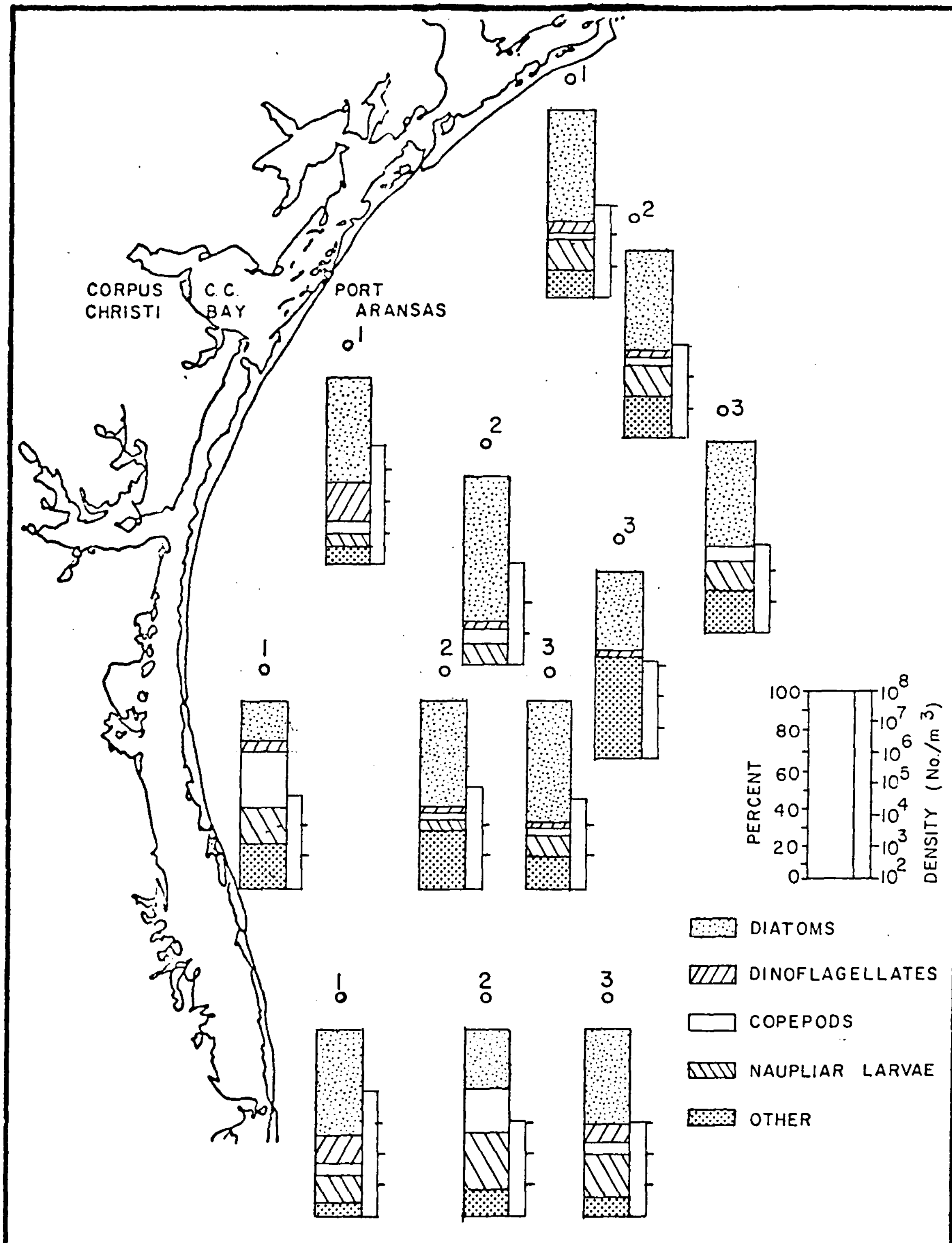


Figure 22. Relative Abundance (percent of total) of Major Groups and Total Density in Niskin Samples, Winter 1975.

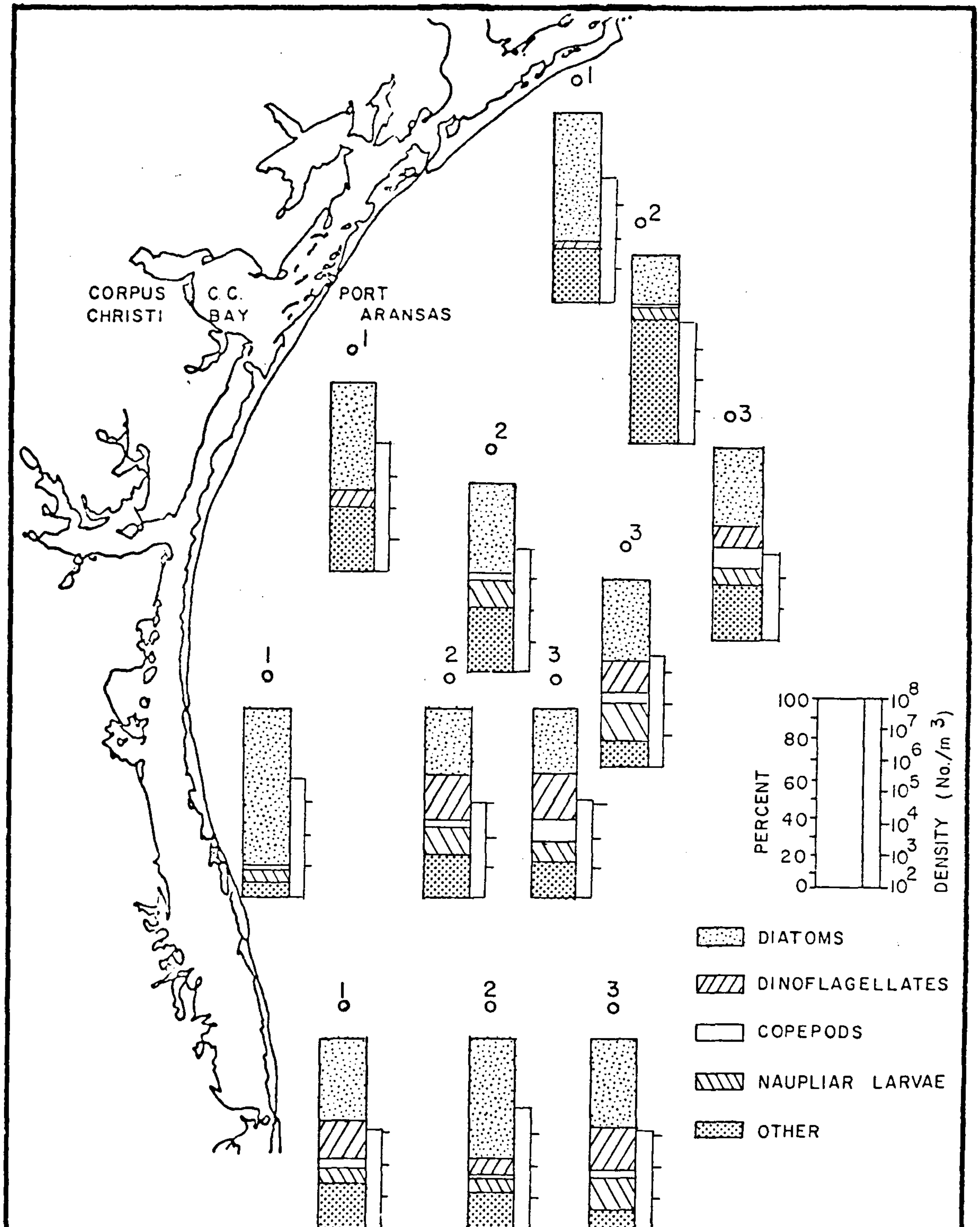


Figure 23. Relative Abundance (percent of total) of Major Groups and Total Density in Niskin Samples, Spring 1975.

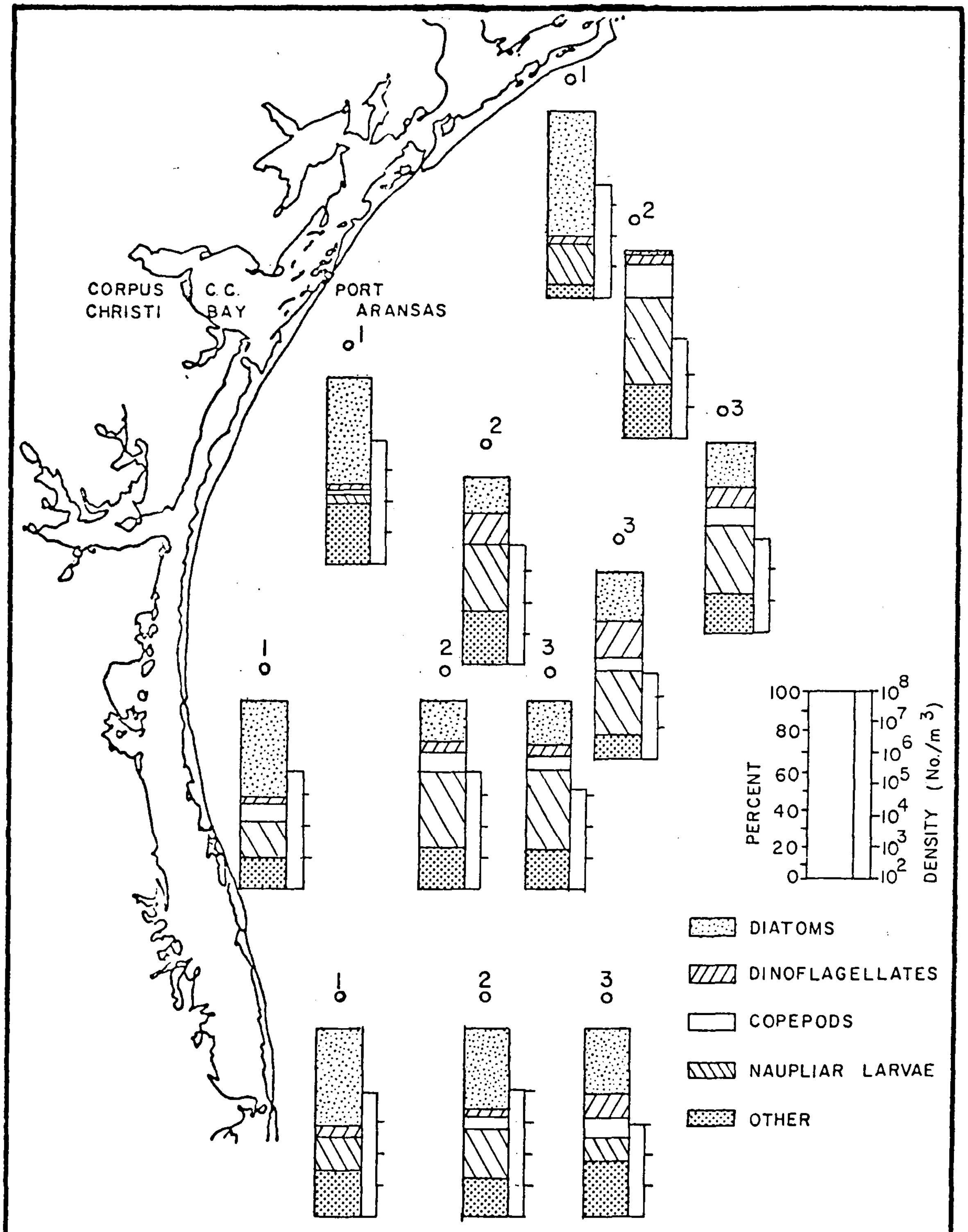


Figure 24. Relative Abundance (percent of total) of Major Groups and Total Density in Niskin Samples, Summer 1975.

TABLE 1

AVERAGE MICROPLANKTON DENSITIES (#/m^3) FOR
STATIONS 1, 2 AND 3 DURING WINTER, SPRING AND SUMMER
COMPUTED FROM ONE-HALF THE DEPTH OF THE PHOTIC ZONE SAMPLES

Stations	1	2	3
Winter	4.3×10^5	2.5×10^5	1.9×10^5
Spring	7.2×10^5	5.9×10^5	2.5×10^5
Summer	8.0×10^5	3.1×10^5	1.4×10^5

exhibiting less spatial variation than the other two seasons. This observation correlated well with the physical oceanography over the STOCS area for this time period. Winter was characterized by very nearly isothermal, isohaline conditions throughout the water column for the entire shelf. A well-developed Spring Diatom Increase (SDI) was evident in the spring. Probably the single most important oceanographic factor during the spring on the STOCS was the presence of a low-salinity Mississippi water mass extending along the coast. Densities were generally higher along the northern portions of the STOCS.

Nutrient levels are the most important determinants of high microplankton standing stocks (Ryther, 1969). Although upwelling of slope waters onto the shelf may supply important amounts of nutrients, surface run-off was probably the major nutrient source of this portion of the Gulf of Mexico (Parker, 1976). A resultant seaward decrease in nutrient levels and microplankton densities was generally observed for all transects. Thus, the STOCS area could have been characterized by a general trend of eutrophic conditions nearshore changing to more oligotrophic conditions moving offshore and in a southeasterly direction.

The relative abundances of the major microplankton groups reflected this eutrophic to oligotrophic condition of the STOCS (Figures 22 through 24). Diatoms and dinoflagellates generally showed a seaward decrease in total percentage of microplankton, and copepods and naupliar larvae showed a corresponding seaward increase in total percentage of microplankton in relative abundance.

The average density of microplanktonic organisms represented in the seasonal data for samples taken at one-half the depth of the photic zone for the stations was $2.9 \times 10^5/m^3$ for spring; and $4.5 \times 10^5/m^3$ for summer.

The general microplankton density diagrams (Figures 22 through 24) indicate a decrease in microplankton abundance offshore, and in a southerly direction in the STOCS area. These results correlate well with data collected by the phytoplankton project of the BLM-STOCS study. Their findings indicated that productivity is highest nearshore, and higher at Stations 1/I and 1/II than Stations 1/III and 1/IV (Van Baalen, 1976). Likewise, their investigations into physical or chemical parameters that correlate well with phytoplankton productivity showed an inverse relationship between salinity and chlorophyll a concentration. As stated earlier, surface runoff was the apparent major nutrient supply. Correlations with silicate, nitrate and other nutrient concentrations were not consistent, indicating that the concentration of nutrients in the water column at a specific point in time may not be the best measure of eutrophism or oligotrophism. Results of a mathematical model of plankton patch dynamics as well as a number of other findings, cited by Wroblewski and O'Brien (1976), indicated that exmetabolite excretion of nutrients by zooplankters may be a significant source of nutrients in a phytoplankton patch. Nutrient depletion and cycling within a plankton patch could explain why high nutrient concentrations were not always found in conjunction with areas of high productivity.

The major planktonic foraminiferan genus represented in the Niskin casts was *Globigerina*. Planktonic foraminiferans exhibited a seaward increase in density (Figure 15), reflecting their typically normal marine habitat (Bauer, 1976). Data from 1975 indicated the dominant increase in density (in the Niskin collections) occurred during the spring (Figure 15). This was also the period of lowest planktonic foraminiferan densities as represented by the Nansen data. This may mean that juvenile forms were more prevalent in the spring.

Relatively high benthonic foraminiferan densities in Niskin samples apparently reflected the suspension of a meroplanktonic stage of these "benthonic" organisms. The dominant benthonic species in Niskin casts was *Brizalina lowmani*, which apparently has a meroplanktonic juvenile stage (Bauer, 1976). Densities of benthonic foraminiferans were usually highest at Station 1, all transects (Figure 16). *B. lowmani* also may have been displaced from the estuaries by spring "freshwater" outflow, resulting in the spring high at Station 1, all transects, shown in Figure 16.

Nassellarian radiolarian densities (Figure 17) were quite low when compared to spumellarian densities and are restricted to Station 3, all transects.

Spumellarian radiolarian densities (Figure 18) were generally higher than nassellarian densities, and spumellarians were found at Station 1, all transects. The appearance of one deep living species, *Spongotrochus glacialis*, in shallow Niskin casts was a good environmental indicator of upwelled or displaced deeper waters. The increase in spumellarian densities in the spring of 1975 may be considered indicative of upwelling during this time at the offshore stations or perhaps the displacement of an envelope of high productivity water moving out during spring.

Acantharians are non-polycystin radiolarians which can be distinguished from the other major radiolarian groups by their organic-walled test. In the STOCS area acantharians (Figure 19) exhibited a nearshore, low-salinity habitat preference. Spring, 1975, densities showed a substantial increase that is probably tied to surface runoff (perhaps Mississippi River water).

Densities of pteropods (Figure 20) are lowest in the winter and increase in the spring, with a slight tapering off in the summer. Pteropods behaved like most general microplankton groups in showing a decrease in numbers in an offshore direction.

Ostracods were well represented in the larger zooplankton size classes (Park, 1976), but they were almost non-existent in 1976 Niskin data (Figure 21). No general trends other than a spring increase were evident.

Shelled Microzoobenthon

Benthonic Foraminifera

Originally, one season's sampling was to be done to determine the distributional patterns of the benthonic foraminifera in the study area. Studies of this first season suggested that the populations may well show some seasonal trends that would make the projected down-core studies (of an undetermined number of down-core samples obtained from the USGS) less than desirable. The collecting and examination of the spring sampling confirmed these suspicions, and therefore, it was decided to work up two seasons of benthonic samples even though the contract called for only one season. The winter and spring seasons have been worked up and are reported herein. Ms. Anepohl's thesis (1976) gives good coverage on this material.

The average standing crop of benthonic foraminiferans for all stations in winter and spring was 75 individuals/10 cm^2. Average values for shelf and marginal marine environments are 50 to 200/10 cm^2 (Murray, 1973). However, Phleger (1956), studying approximately the same area as the STOCS study area, reported an average from 21/10 cm^2 for his southern transect (a transect that extended from between Stations 1/II and 1/III to 3/III), to 61/10 cm^2 for a more northerly transect which ran from approximately midway between STOCS Stations 1/I and 1/II, terminating offshore at about Station 3/II. When Stations 1/II and 1/III were combined as a composite station, and that composite considered with Stations 2/III and 3/III, a station distribution close to Phleger's southern transect was obtained. (An average density of 89/10 cm^2 during winter and spring 1975.) Seasonal averages for these stations were 86 for the winter and 91 for the spring.

Phleger's samples were collected in late June, which was closest seasonally to the STOCS spring collecting period. When Stations 1/I and 1/II were combined as a composite nearshore station and averaged with Stations 2/II and 3/II, an average density of 28 was obtained. The averages for these stations seasonally were 20 for the winter and 36 for the spring. These densities are about half as high as those reported by Phleger (1956) for the northern transect, and four times as high as Phleger's values for the southern transect. This may be accounted for by his sampling only one season or use of a different sampling method (a corer). However, considering the small sample size taken in both studies, and the variability and patchiness in distribution of benthonic foraminiferans, the data are considered reasonably compatible.

The average standing crop for all stations during the winter of 1975 was $72/10\ cm^2$ and $77/10\ cm^2$ for spring. Combining Transects I and II as a northern section, and Transects III and IV as a southern section, the southern section had greater standing crops in both winter and spring ($112/10\ cm^2$ to $31/10\ cm^2$ in winter and $109/10\ cm^2$ to $101/10\ cm^2$ in spring). The higher standing crops of benthonic foraminiferans, along the southern transects, may have been representative of their importance as meiofauna in sediments underlying more oligotrophic waters. There probably was a lag time between plankton productivity (both primary and secondary) and benthonic productivity (represented by standing crop). These data suggest that, in general, the high spring plankton productivity was not reflected in the meiofauna until the following winter when the benthonic foraminiferan standing crop dropped, with a probable increase in more opportunistic meiofauna, such as nematodes.

Figures 25 and 26 illustrate standing crop (in numbers of individuals/ $10\ cm^2$) and dominant species (in percent) for each of the stations for winter

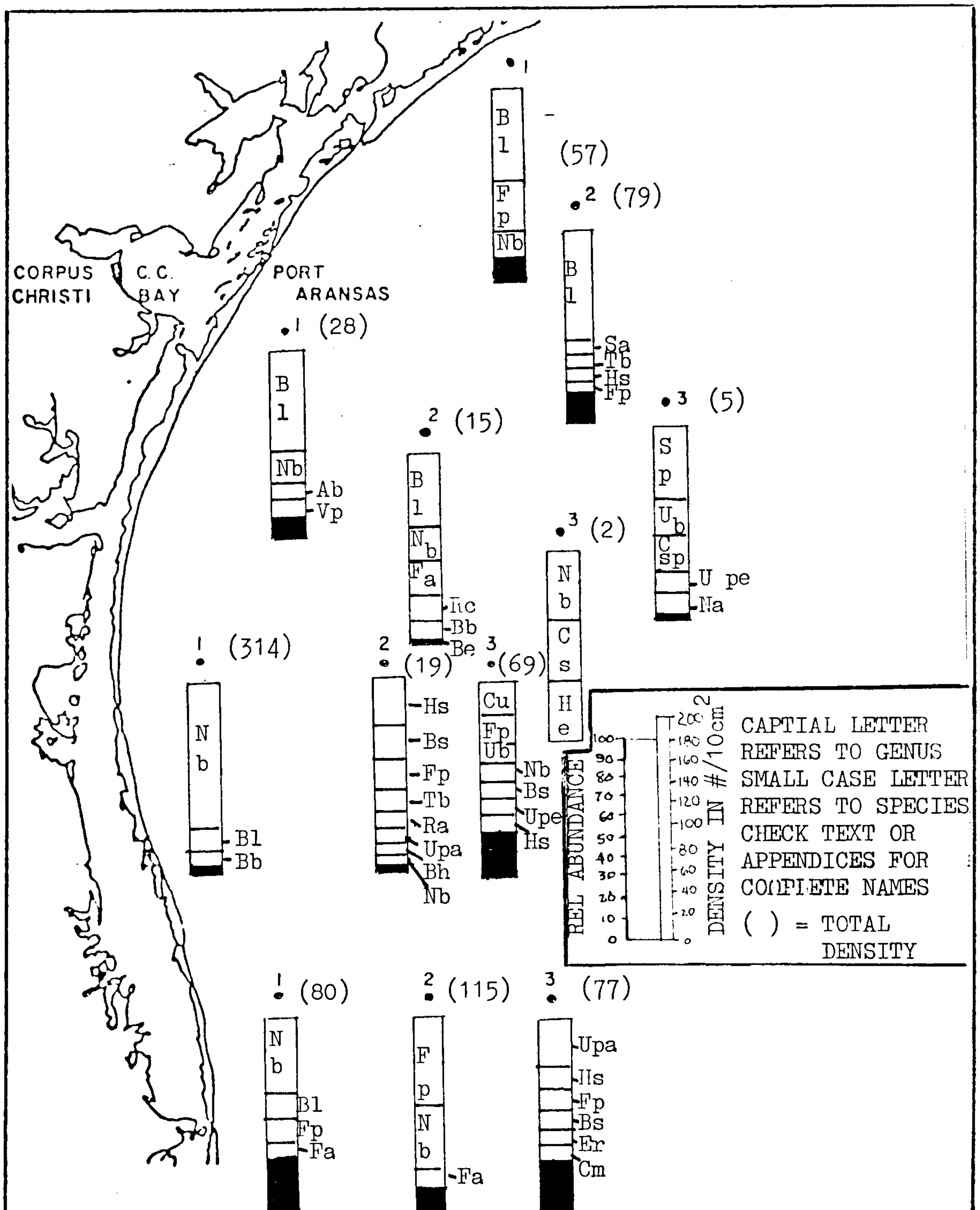


Figure 25. Winter Percentages of Dominants and Total Standing Crops of Benthonic Foraminiferans.

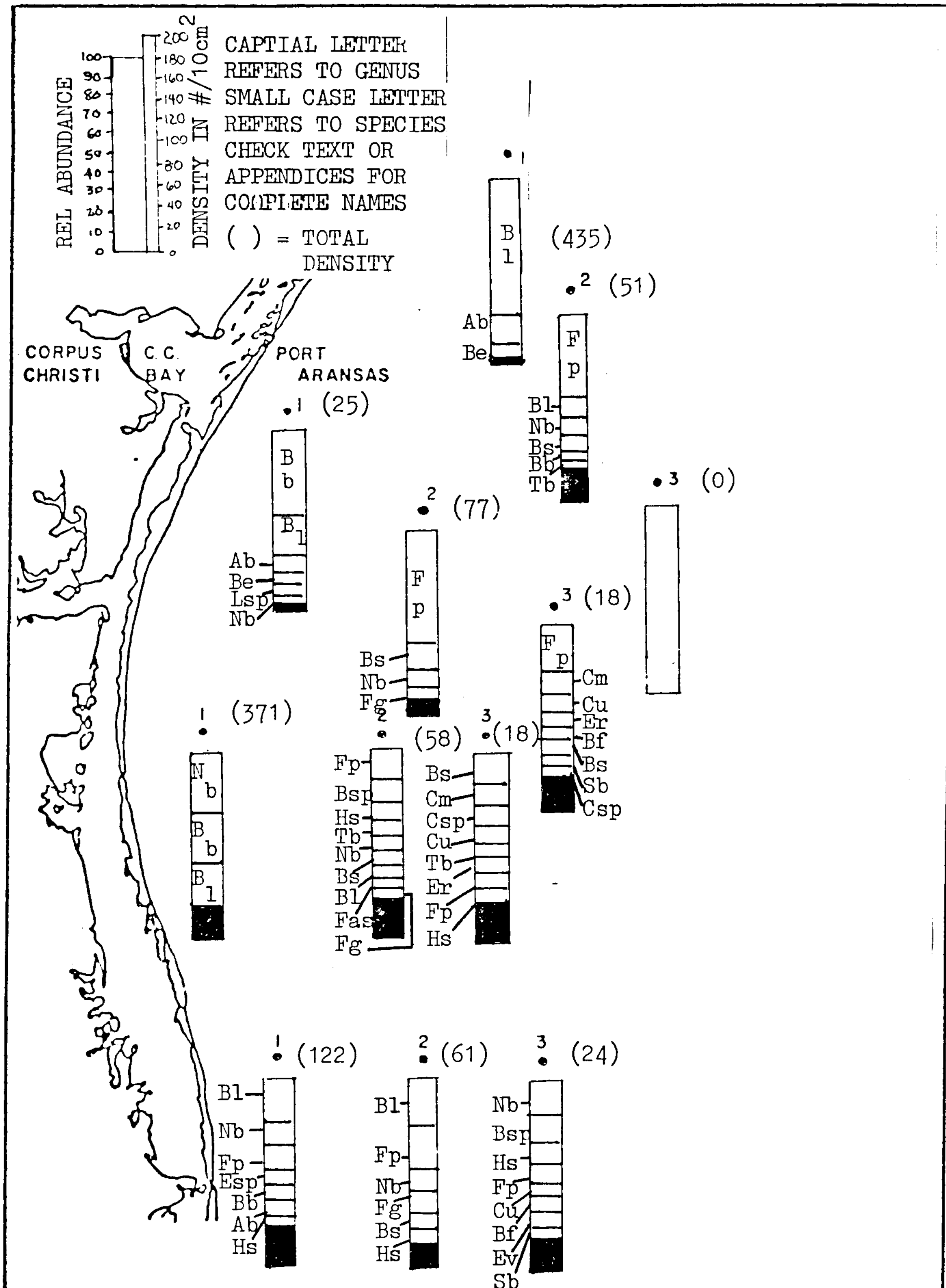


Figure 26. Spring Percentages of Dominants and Total Standing Crops of Benthonic Foraminiferans.

and spring. During both seasons there was a general decrease in standing crop shelfward, with a winter and spring average for Station 1, all transects, being 137/10 cm^2, 60/10 cm^2 for Station 2, all transects, and 27/10 cm^2 for Station 3, all transects (approximately a 50% reduction from Station 1 to Station 2 and from Station 2 to Station 3). Seasonal averages for Stations 1, 2 and 3, respectively, were 119, 57 and 38 for winter, and 154, 62 and 15 for spring.

The nature of the communities at the species level also changed seasonally. The dominant species (in abundance) on the shelf was *Brizalina lowmani*, which exhibited an interesting seasonal pattern (Figures 25 and 26). This species was dominant at Stations 1 and 2, Transects I and II, during the winter. During the spring this species was dominant only at northern and southern transects "nearshore" (Stations 1/I and 1/IV and 2/IV), but essentially played a sub-dominant role in the northern section except for Station 1/I. *B. lowmani* may be a good immediate indicator of eutrophism in the benthic environment as the above-mentioned trends suggest (it's dominance=eutrophism).

An apparent supra-species seasonal trend was that the northern section appeared to be dominated by fewer species than the southern section. This trend reinforces the previously-stated idea that high plankton productivity is reflected in lower benthonic foraminiferan densities and dominance (especially of *B. lowmani*). It also reinforces the suggestion that *B. lowmani* might be a good indicator of "benthic productivity" and that its dominance in the winter (northern sector) demonstrates eutrophism of the northern sector. *B. lowmani* may well be an opportunistic species which takes advantage of this eutrophism, perhaps at the expense of others (as the nematodes may do). At the same level, the benthic foraminiferans of the southernmost transect (IV) apparently illustrate the more oligotrophic conditions of this transect. Shared dominance is the rule in the southern portion of the study area.

Perhaps the most obvious correlations of species and standing crop distributions were with depth. *Ammonia beccarri, Brizalina lowmani* and *Nonionella basiloba* were dominant at inner and mid-shelf Stations 1 and 2. *Fursenkoina pontoni* may be indicative of the mid-shelf (Station 2), but the major bathymetric break in the benthonic foraminiferan populations appeared to be mainly between Stations 2 and 3, or at 60 to 70 m as was first noted for the study area by Phleger (1956). Outer shelf depths were indicated by the occurrence of *Uvigerina peregrina, Bolivina subspinescens* and *Brizalina spinata* at the species level, and more generally by increases in *Cibicides, Siphonina* and other species of *Brizalina* and *Bolivina.*

The Q-mode cluster analysis dendrogram for benthonic foraminiferan is given in Figure 27. Clustering was predominantly influenced by depth and secondarily by seasonality. Depth appeared to be the dominant factor controlling the distribution of benthonic foraminiferans in the STOCS study area. Nearshore forms showed a greater seasonality than mid- or outer-shelf forms. (Mid- and outer-shelf forms occasionally occurred in inner-shelf samples but were designated as mid- or outer-shelf forms, primarily because their standing crops were maintained in deeper waters, whereas forms that were designated as more nearshore types decreased in standing crop offshore.)

Seasonal variation in distribution of living benthonic foraminifera was apparent from specimens collected during winter and spring samplings. *Nonionella basiloba* and *Brizalina lowmani* dominated winter samples. During the spring, other forms, notably *Brizalina spinata* and species of *Buliminella, Cibicides* and *Fursenkoina*, were dominant. Lowest species diversity and greatest test density occurred during the spring which corresponded to

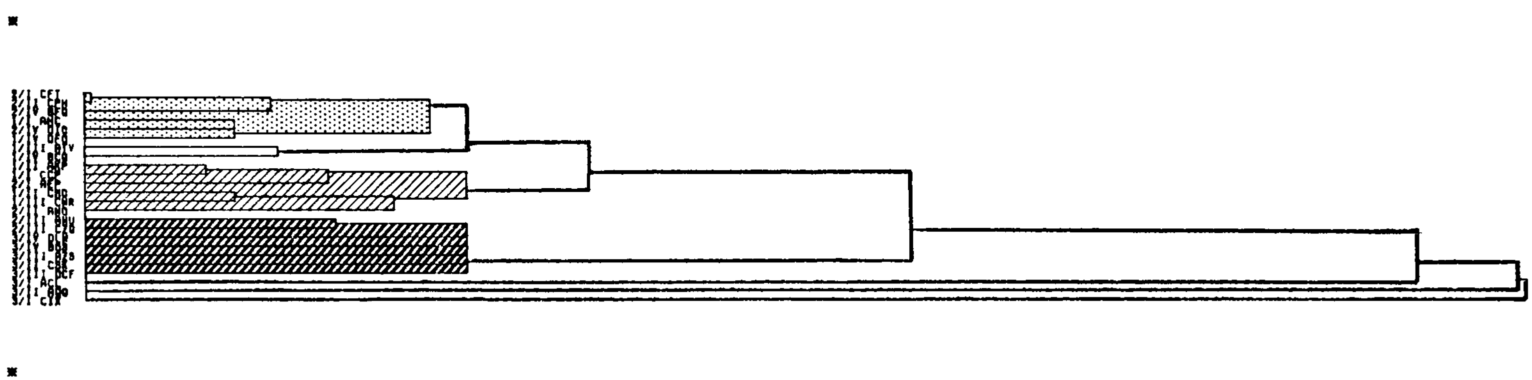


Figure 27. Q-Mode Cluster Analyses of Live Benthonic Forams, Winter and Spring. Key to Left-Hand Column on Following Page.

Figure 27 Continued. Key to Left-Hand Column.

2/I CFT
2/II CPM
2/IV BFQ
1/I AMC
2/IV DIO
1/IV DFO
1/III ATV
1/IV BCQ
1/II AKP
1/I CCP
2/I AEP
1/II CMO
1/III CWR
2/II ANO
2/III AWU
2/III CZQ
3/IV DLW
3/IV BOS
3/III AZS
3/II CSR
3/III DCF
3/I ACL
3/II AQQ
3/I CIX

increased standing crops of *Nonionella basiloba, Brizalina lowmani, Ammonia beccarii* and *Buliminella* cf. *bassendorfensis* during that season.

Variations in the living faunal composition occurred from north to south in the study area, with the shallow stations (18-26 m) to the north dominated by *Ammonia beccarii* and *Brizalina lowmani* while those to the south were dominated by *Nonionella basiloba* and species of *Buliminella*. Faunal changes with depth generally agreed with earlier studies (Phleger, 1951).

Multivariant analyses were performed on these data and the results displayed in Figures 28 through 30. The Q-mode cluster of live benthonic foraminifera (winter and spring) (Figure 27) generated three groups which are displayed in Figures 28 (winter) and 29 (spring). These depicted fairly stable inner and outer groups with a "stable" or constant southern transect (IV) group. The R-mode cluster (Figure 30) generated a dendrogram and clustered the following groups: outer-shelf winter (OSW), and outer-shelf winter and summer (OSWS), inner-shelf winter and summer (ISWS), mid- and outer-shelf winter and summer (MOSWS), and inner and mid-shelf winter (IMSW) assemblages. These data substantiated the investigations, illustrating that there appears to be distinct inner and outer assemblages with a mixed mid-shelf fauna. (Figure 28 also suggests a seasonality superimposed on the dominant "depth" zonation.)

This distinct "depth" zonation fits well with published reports from the study area and other areas (Anepohl, 1976). Various explanations have been suggested for this depth zonation, such as temperature and/or salinity changes, etc. Winter and spring bottom temperature and salinity contour have been constructed (Figures 31 through 34). It is tempting to infer that these data suggest the inner fauna may be a euryhaline and eurythermal fauna while the other fauna may be more stenohaline and stenothermal; however, it

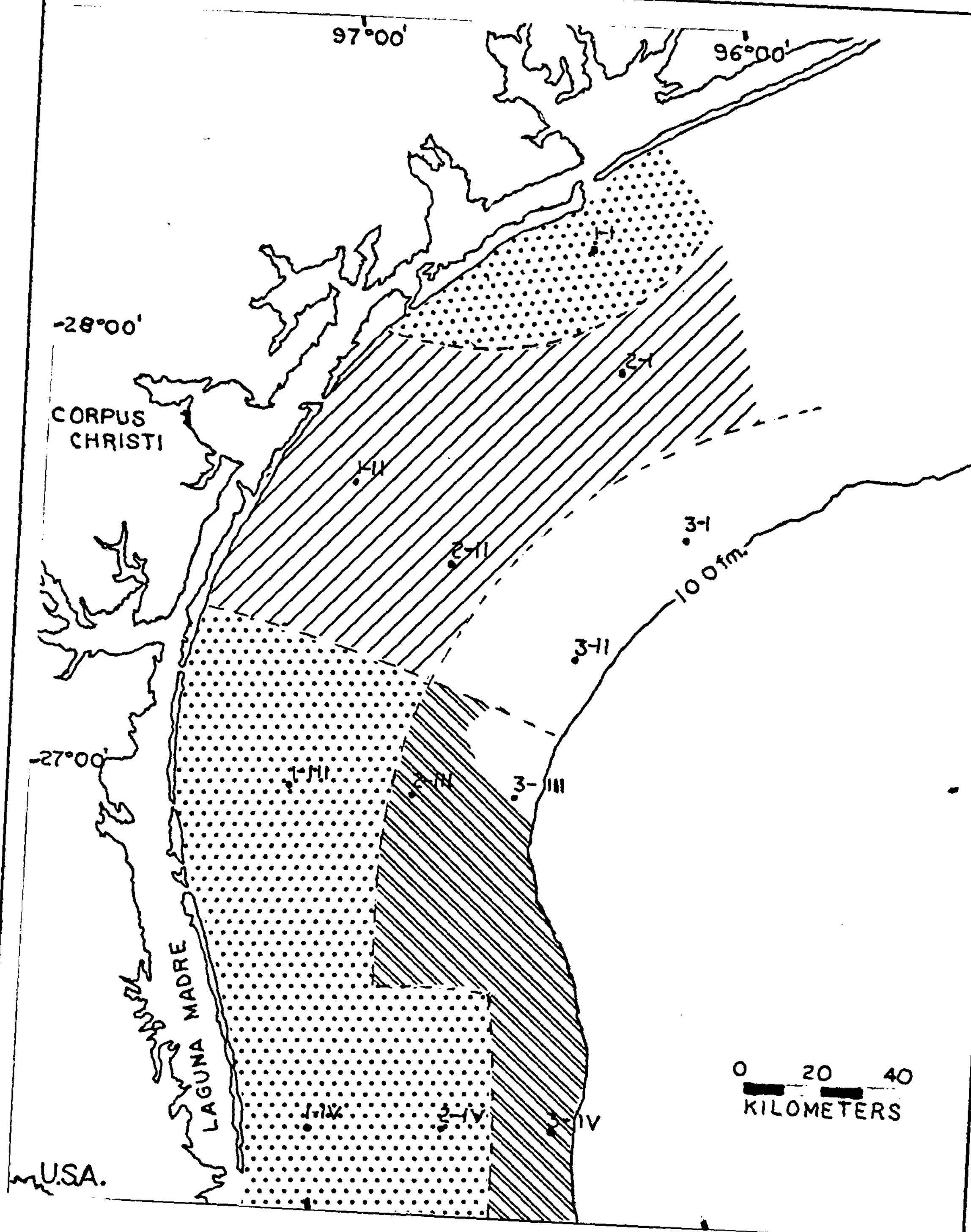


Figure 28. Winter Q-Mode Cluster of Benthonic Forams.

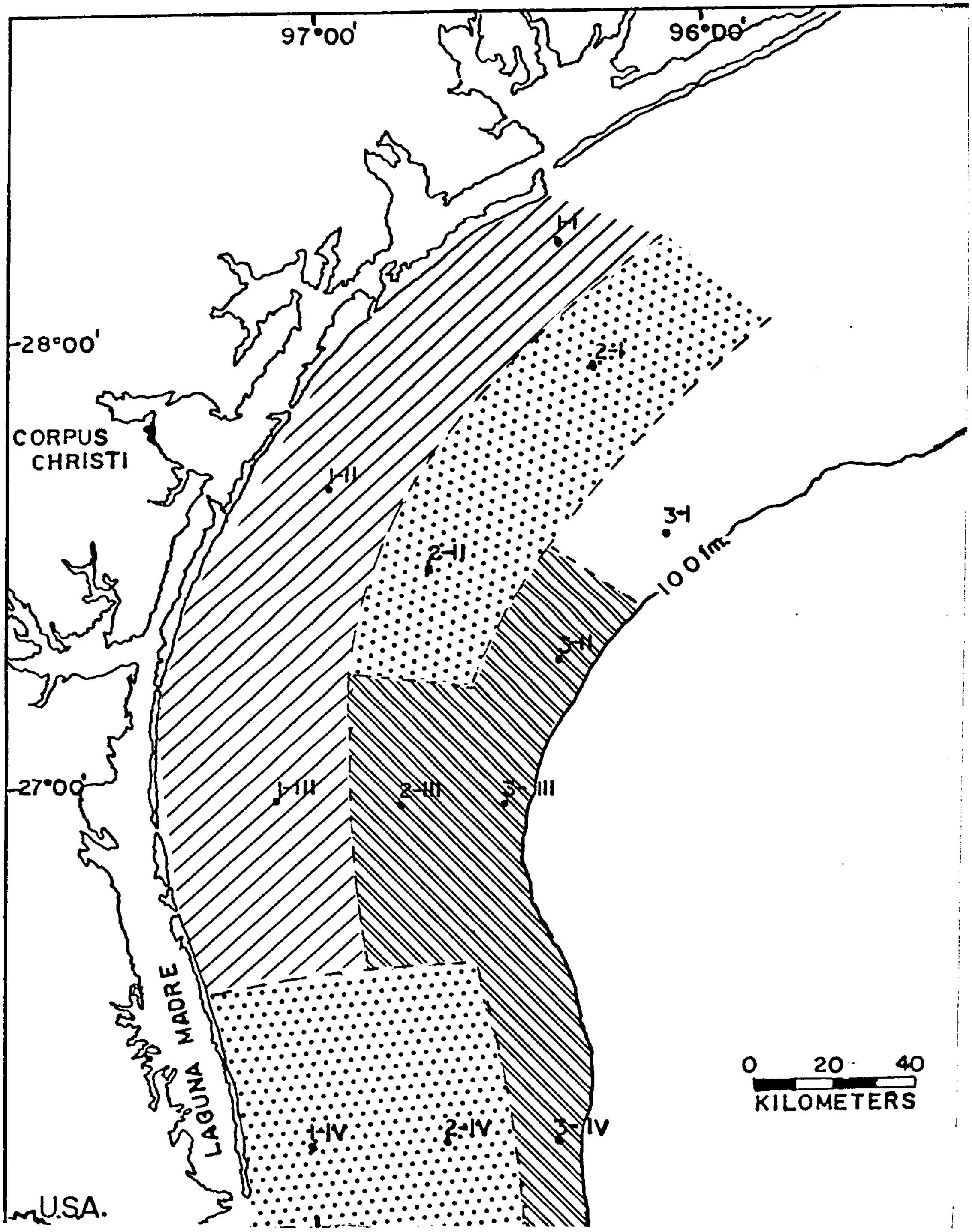


Figure 29. Spring Q-Mode Cluster of Benthonic Forams.

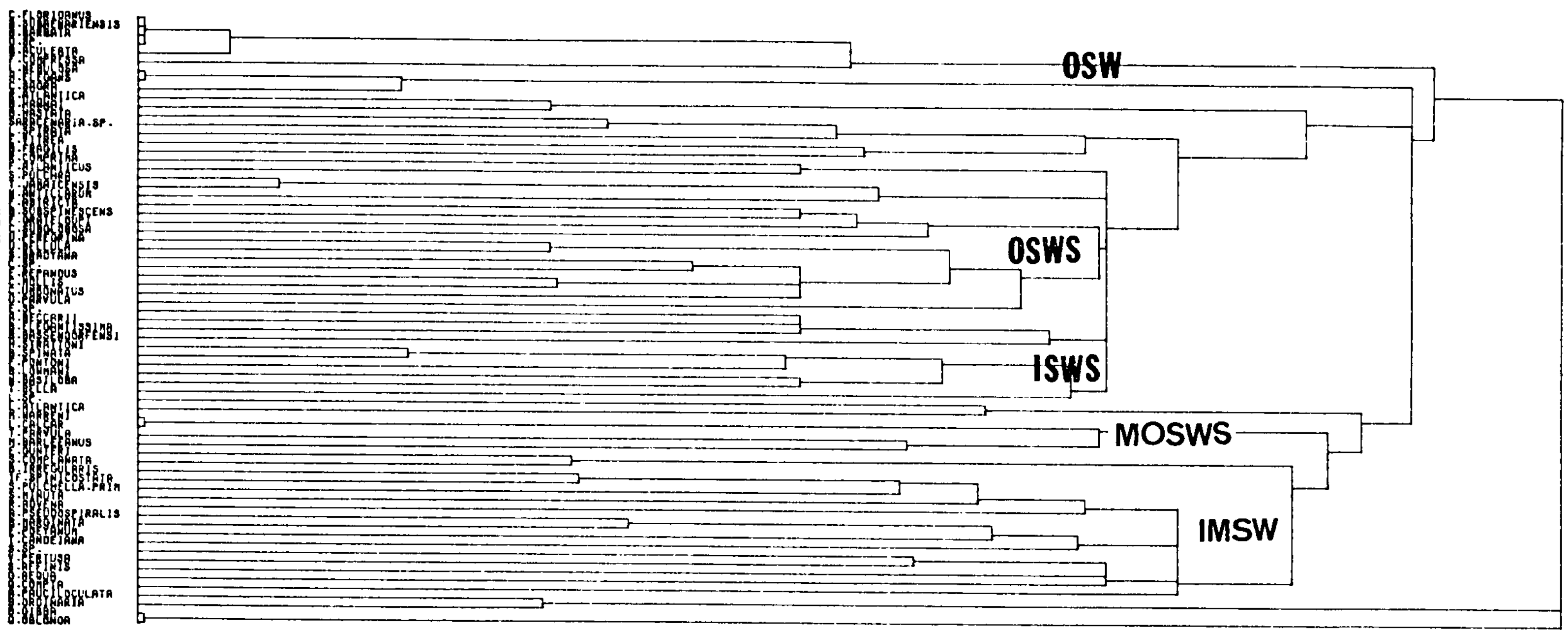


Figure 30. R-Mode Cluster Analyses of Live Benthonic Forams, Winter and Spring. See Key Next Page.

Figure 30 Continued. Key to Left-Hand Column.

C. FLORIDAMUS
B. SUBAENARIENSIS
B. BARBATA
D. SP.
B. ACULEATA
F. COMPRESSA
L. NEBULOSA
H. ELEGANS
C. SAGRA
R. ATLANTICA
B. HAWNAI
B. HASTATA
SARACENARIA SP.
L. SPIRATA
E. VITREA
B. FRAGILUS
R. COMPRIMA
F. ATLANTICUS
S. PULCHRA
T. JAMAICENSIS
M. ANTILLARUM
F. ASTRICTA
B. SUBSPINICENS
F. GRATELOUPI
C. SUBGLOBOSA
U. PERIGRINA
U. BELLULA
S. BRADYANA
C. SP.
E. REPANDUS
C. HOLLIS
C. UMBONATUS
U. PARVULA
E. SP.
A. BRECCARII
B. ELEGANTISSIMA
B. BASSENDORFENSI
H. STRATIONI
B. SPINATA
F. PONTONI
B. LOWMANI
N. BASILOBA
T. BELLA
L. SP.
L. ATLANTICA
M. WARRENI
L. CALCAR
T. PARVULA
M. BARLEEANUS
E. GUNTERI
S. COMPLANATA
B. IRREGULARIS
1F. SPINICOSTATA
S. PULCHELLA.PRIM
S. MINUTA
R. ADVENA
A. PSEUDOSPIRALIS
B. MARGINATA
E. POEYANUM
T. CANDEIANA
S. SP.
V. PERTUSA
S. AFFINIS
G. AEQUR
Q. COMPTA
A. PAUCILOCULATA
B. ORDINARIA
B. GIBBA
Q. OBLONGA

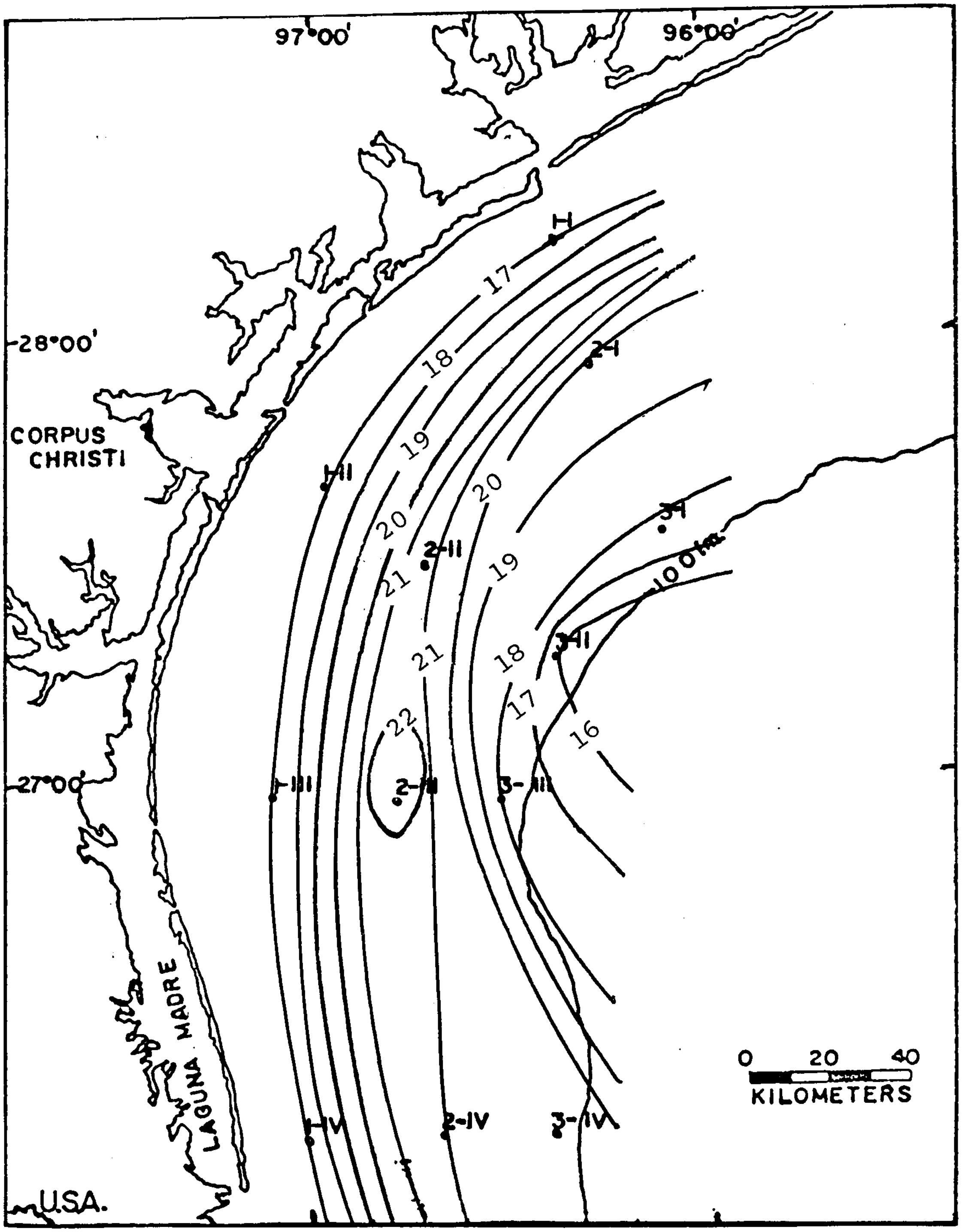


Figure 31. Winter Bottom Temperatures (°C).

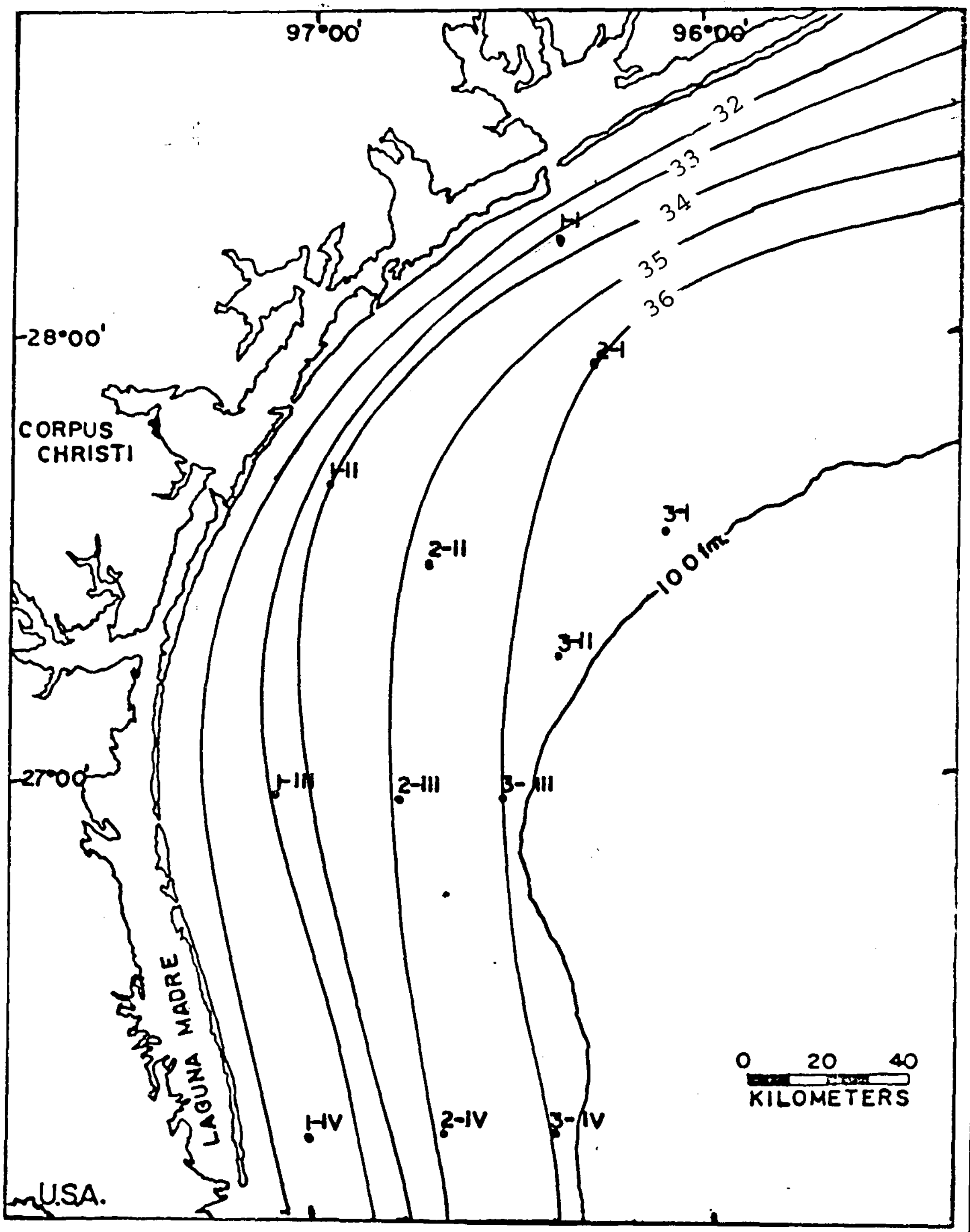


Figure 32. Winter Bottom Salinities (ppt).

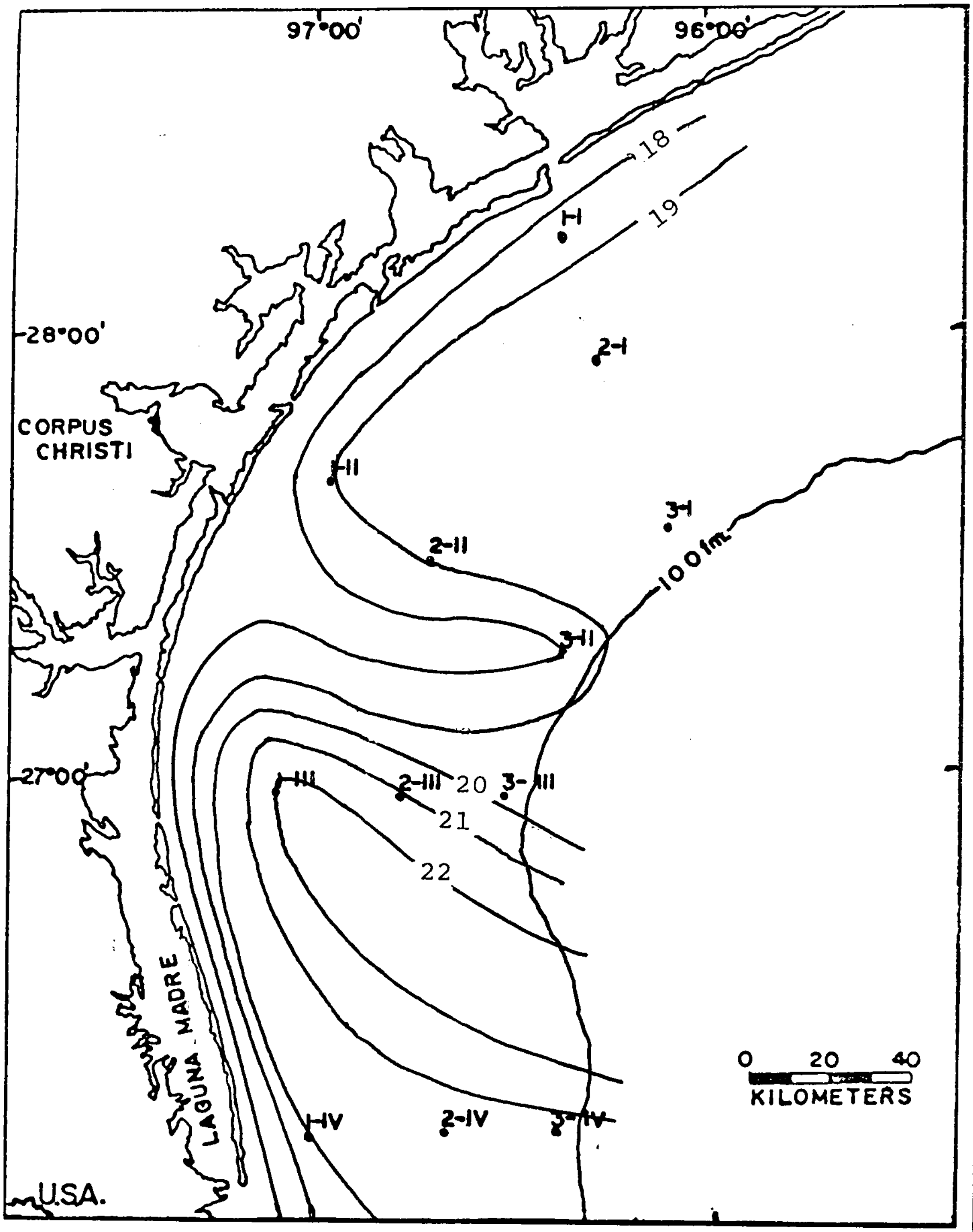


Figure 33. Spring Bottom Temperatures (°C).

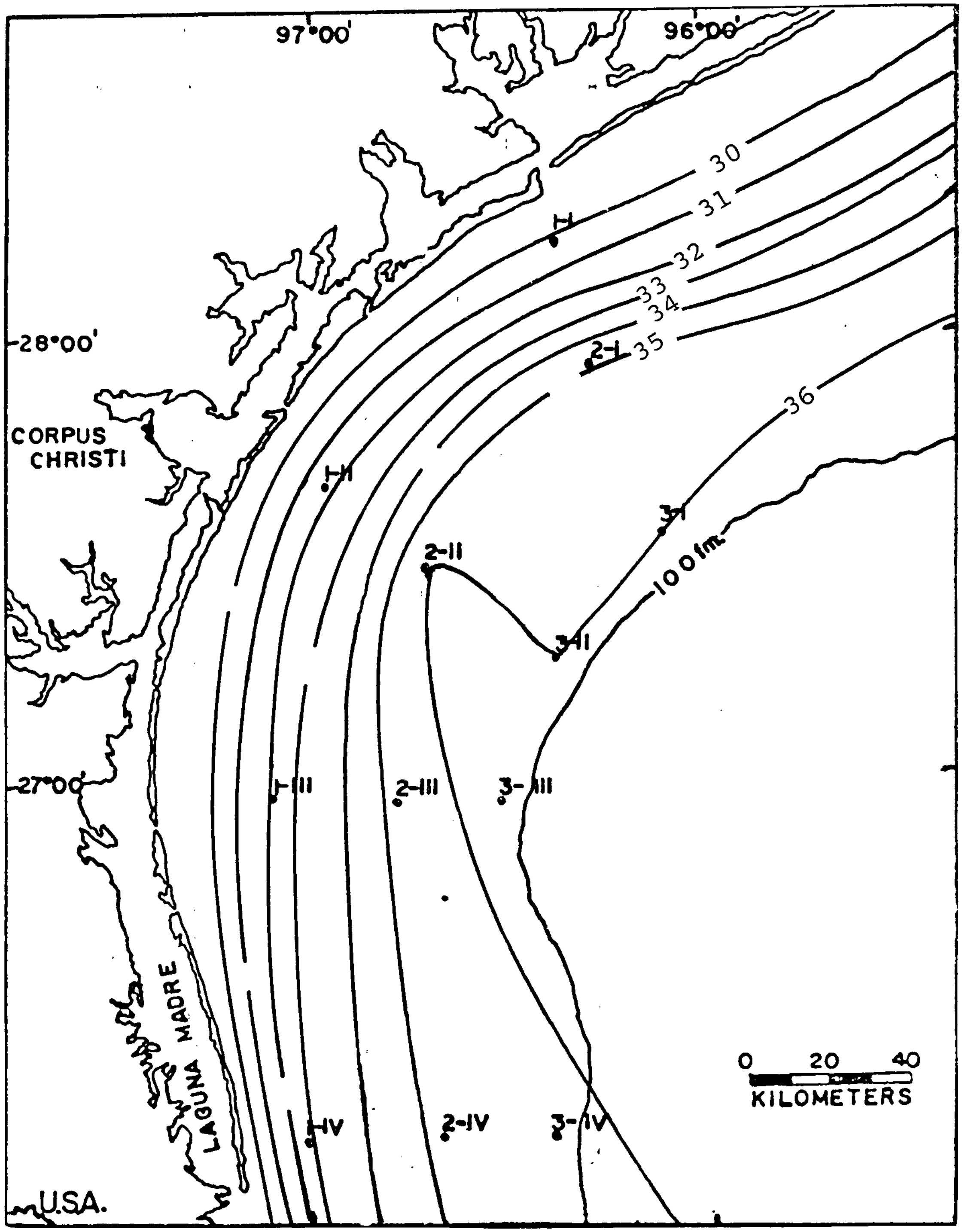


Figure 34. Spring Bottom Salinities (ppt).

is too early for such suggestions. It is also intriguing to imagine that the nepheloid layer, described by the USGS and other investigators in the study area, may have some significance in this "depth" zonation. Perhaps the inner fauna constituted a nephelophobic fauna and the outer fauna a nephelophilic fauna; however, more research is necessary before this question can be answered.

In relating the benthonic foraminiferan studies to geological studies of Berryhill *et al.* (1976), a good relationship between sediment type and benthonic foraminiferan distribution was not evident. However, at the BLM-STOCS Quarterly Conference (April 1977), Berryhill suggested that: 1) the major sediment depocenter was in the northern sector mid-shelf; 2) little current sedimentation was occurring south of 26° North on the shelf; 3) perhaps a convergence existed which divided the shelf into north and south components; and 4) perhaps internal waves were important in this division of the STOCS into geological (and biological and physical) northern and southern components. We suggest that the major break in the foraminiferal faunas at 60 to 70 m depth is related either to the shallowest common incursion of offshore waters (Phleger, 1956 stated a similar conclusion); or to the distribution of the nepheloid layer (which might be related to internal waves that stir the bottom). The north-south differences in communities (and standing crops) might well be related to internal waves stirring the bottom and a South Texas Shelf Convergence along Transect II. This convergence may be related to sedimentation and eutrophic-oligotrophic patterns that may be related to benthonic foraminiferal distributions, densities and dominances.

Indicators of Water Mass Distribution and Movements

All the temperature and salinity curves for the study year were plotted and "water mass" envelopes were drawn around the seasons of collection

(Figure 35). For 1975 we suggested four "water masses" on this diagram. The "core" of about 36 ppt water we believe to be Western Gulf Surface Water (WGSW) (Armstrong and Grady, 1967), which is always present in the study area. It is always present at depth on the outer shelf and appears to encroach on the inner shelf in the winter and especially in the summer. Shoreward of this water we suggest there are three shelf water masses (SW). These are: South Texas Summer Shelf Water (STSmSW), South Texas Spring Shelf Water (STSpSW) and South Texas Winter Shelf Water (STWSW). Radiolarians were considered to be more or less endemic to specific water masses (Casey, in press a). With this in mind, a temperature-salinity-radiolarian diagram was constructed (Figure 36). The subpackets denoted by the five symbols represent radiolarian groups (faunas or populations) generated by multivariant analysis and are coded (symbol coded) on the Q-mode cluster dendrogram of live radiolarians (Figure 7). The temperature-salinity-radiolarian diagram (Figure 36) suggests the following: specific radiolarians and specific radiolarian populations (Q-mode groups) were indeed "endemic" to "specific water masses", radiolarians were in general "open ocean" forms; radiolarian faunas may be used as indices of water mass incursion onto a shelf environment; radiolarians were indicative of seasonality on the shelf; and in spring the study area was a "mixed" period of both water masses and endemic radiolarian faunas.

The above statement that radiolarians were endemic to specific water masses is made due to the fact that most Q-mode faunas were restricted to one of the water masses defined herein. In fact, there is a fauna that depicted the South Texas Winter Shelf Mass and one that perhaps depicted the South Texas Summer Shelf Water Mass (Figures 35 and 36). The statement that the radiolarians are in general "open ocean" forms, seems apparent from our studies showing their density and diversities increasing offshore

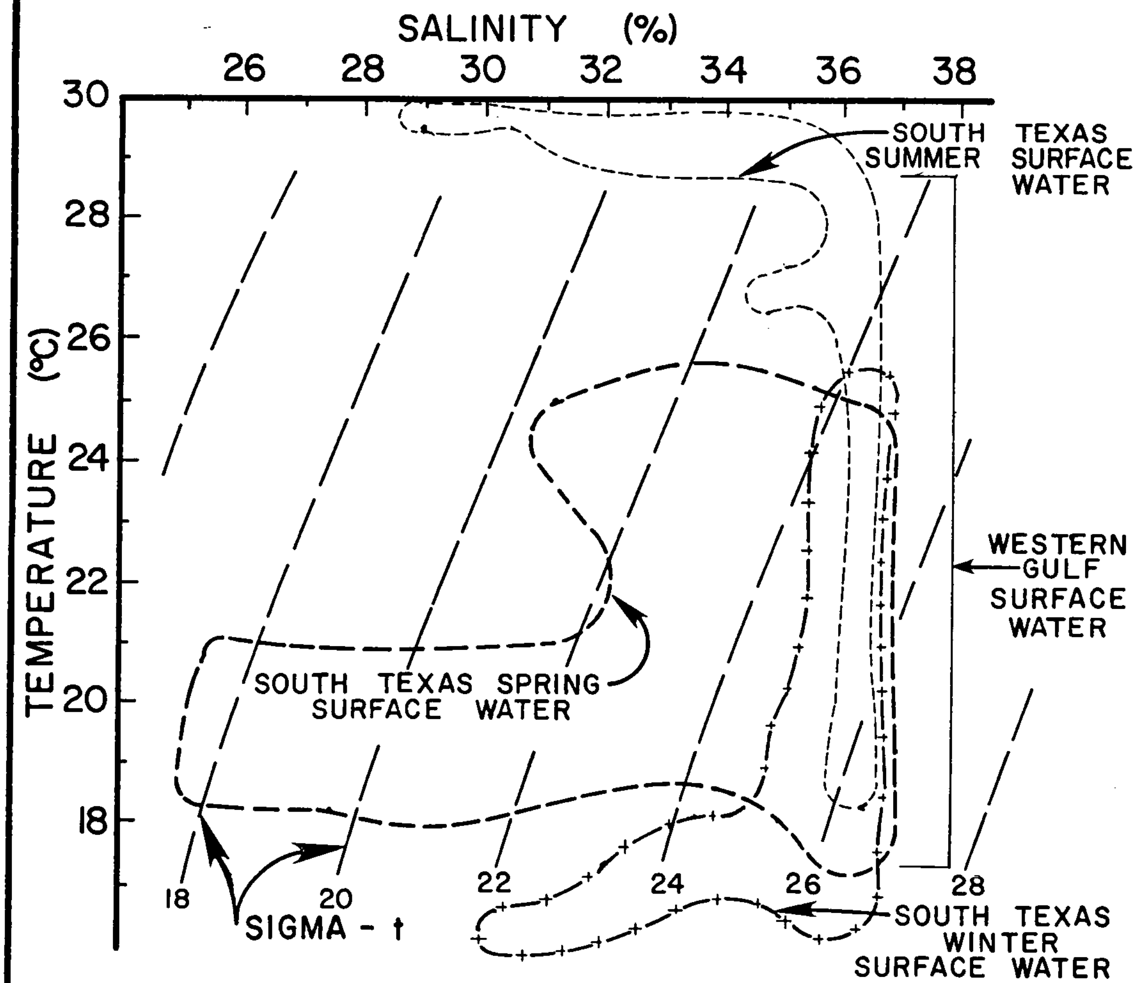


Figure 35. Temperature-Salinity Diagram for the South Texas Outer Continental Shelf. Dashed Lines Enclose Water Masses.

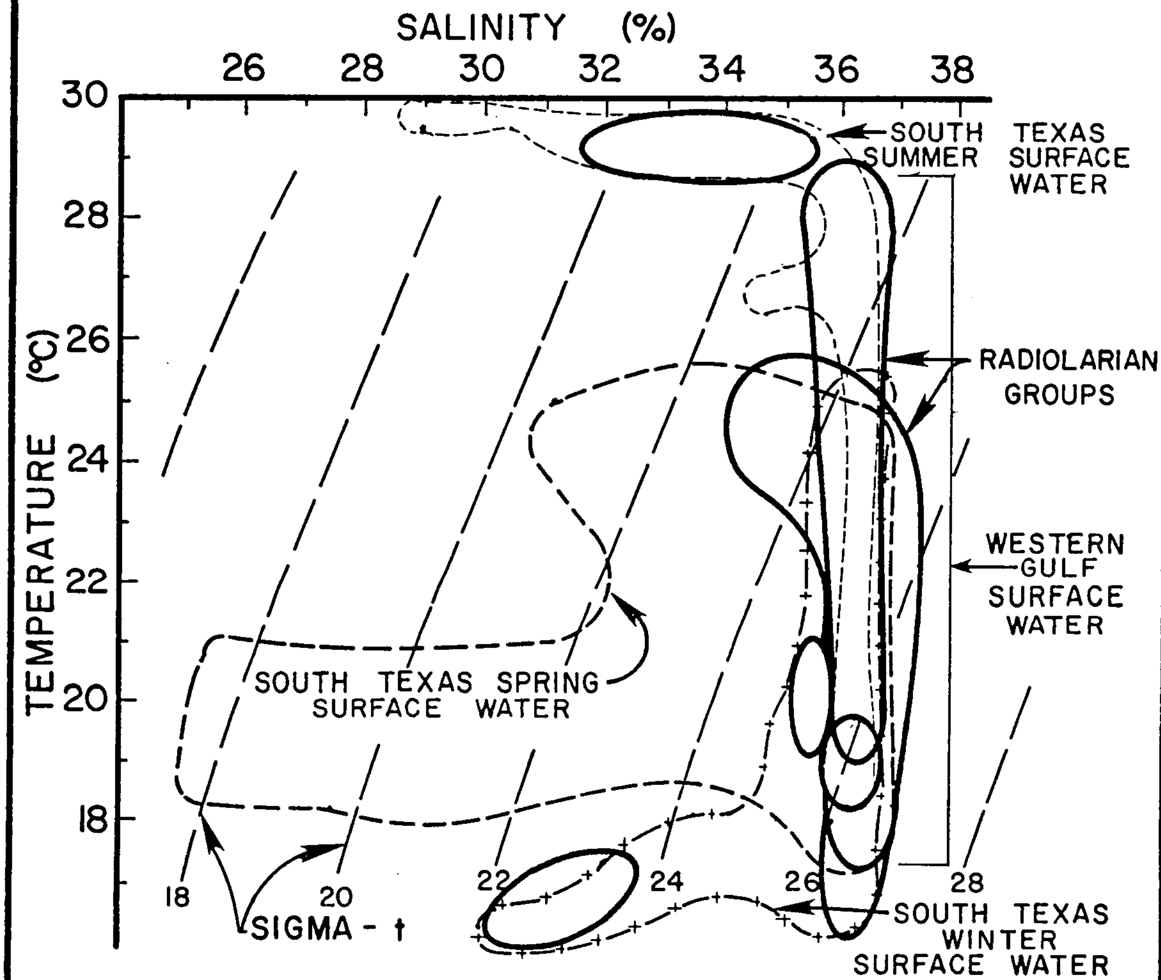


Figure 36. Temperature-Salinity-Radiolarian Diagram for the South Texas Outer Continental Shelf. Dashed Lines Enclose Water Masses, Bold Solid Lines Enclose Radiolarian Groups Derived from Q-Mode Cluster Analysis.

(Figure 1); but, this trend also appears on the temperature-salinity-radiolarian diagram which illustrates that three of the five Q-mode groups were "endemic" to the Western Gulf Surface Water. These three groups, "endemic" to the Western Gulf Surface Water Mass, occupied different but overlapping subpackets within this water mass envelope, which may suggest that they occupied different depths within this water mass, a "patchiness" within the water mass, or something else that may be elucidated with further studies (stratified tows are being taken in the BLM STOCS effort). Radiolarians obviously are indicative of a seasonality on the shelf as was illustrated by the representation of winter and summer shallow shelf faunas.

"Water masses" were also represented in a loose context by the information displayed on the R-mode cluster of live radiolarians (Figure 8). Here we have a winter group (W), a winter offshore group (O), a nearshore group (NS), a weak spring assemblage (S) (it clusters well only because there are individual occurrences of some species), a spring upwelling group (SU) and a summer group (SM). These are not as neatly associated with water masses as those generated by the Q-mode, but they do represent nearshore, winter-offshore, spring-upwelling etc. indices.

Water mass movements may be derived from comparing the temperature-salinity-radiolarian diagram (Figure 36) with the maps of the Q-mode radiolarian clusters (Figures 9 through 11). The winter Q-mode cluster is very complicated as is the planktonic foraminiferan cluster for the same period (Bauer, 1976). There does appear to be an incursion of offshore water (Western Gulf Surface Water Fauna) into the study area along Transect III in the winter (Figure 9) as has been depicted in Figure 2. This incursion shows up dramatically as a finger of high radiolarian density on the winter radiolarian density map (Figure 37), and as a finger of high radiolarian diversity in the winter radiolarian diversity map (Figure 38). This is substantiated to some extent by the inflection of the 22° isotherm shoreward along Transect III on the winter 10-m temperature map (Figure 39), although it is not apparent on the 10-m salinity contours (Figure 40).

The spring Q-mode cluster map (Figure 10) shows only two clusters. This was due to the fact that the spring diatom bloom and the "Mississippi River Water Mass" which are related, had apparently "eliminated" the polycystine radiolarian niche. This will be discussed later within this report. The foraminiferan Q-mode cluster map (Figure 5) illustrates the spring water movements much better than the radiolarian cluster because the cluster (Figure 5) includes benthonic foraminifera that are in the water column (planktonic-benthonic). However, both maps (Figures 5 and 10) show there was an incursion of offshore water faunas (Western Gulf Surface Water Mass Faunas) impinging on the shelf edge at Stations 3/II and 3/III, and the radiolarian evidence suggests there was an extension of this water into Station 2/III, therefore, the current arrow indicates this in Figure 2. This is substantiated by both spring radiolarian density (Figure 41) and diversity (Figure 42) maps, with fingers of high density and diversity coming in along these two outer stations. The spring 10-m temperature map (Figure 43) showed this very well with the 25° isotherm extending all the way to Station 1/III. The spring 10-m salinity (Figure 44) appeared to confirm the "bowing up" of water that might be related to this incursion. The Q-mode of the foraminifera for the spring illustrates very well the incursion of the low salinity water from the north ("Mississippi Water"). This incursion was also well illustrated by the physical oceanography, as can be seen by the bulging 30 ppt salinity contour on Figure 44, which

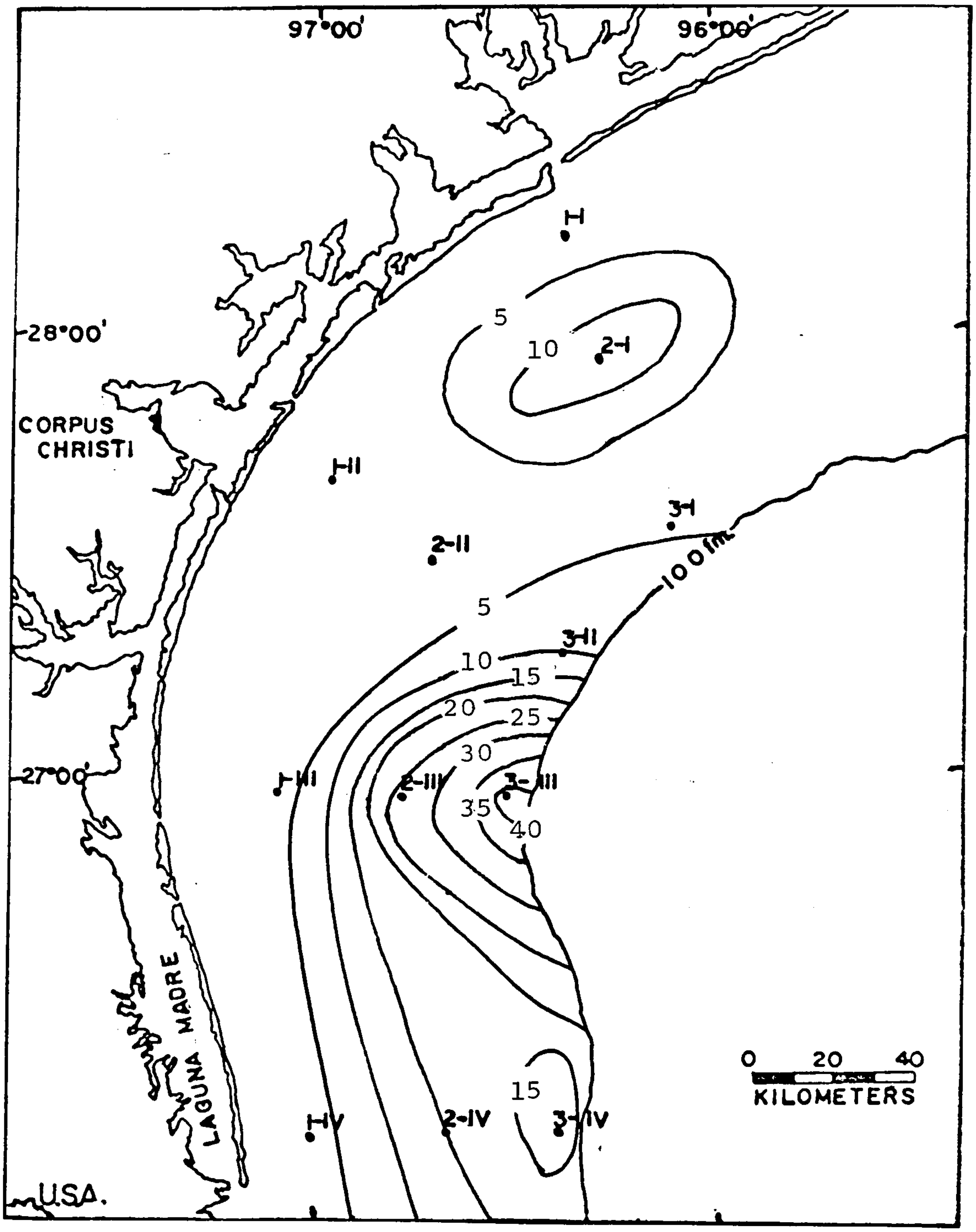


Figure 37. Winter Radiolarian Densities (#/m^3).

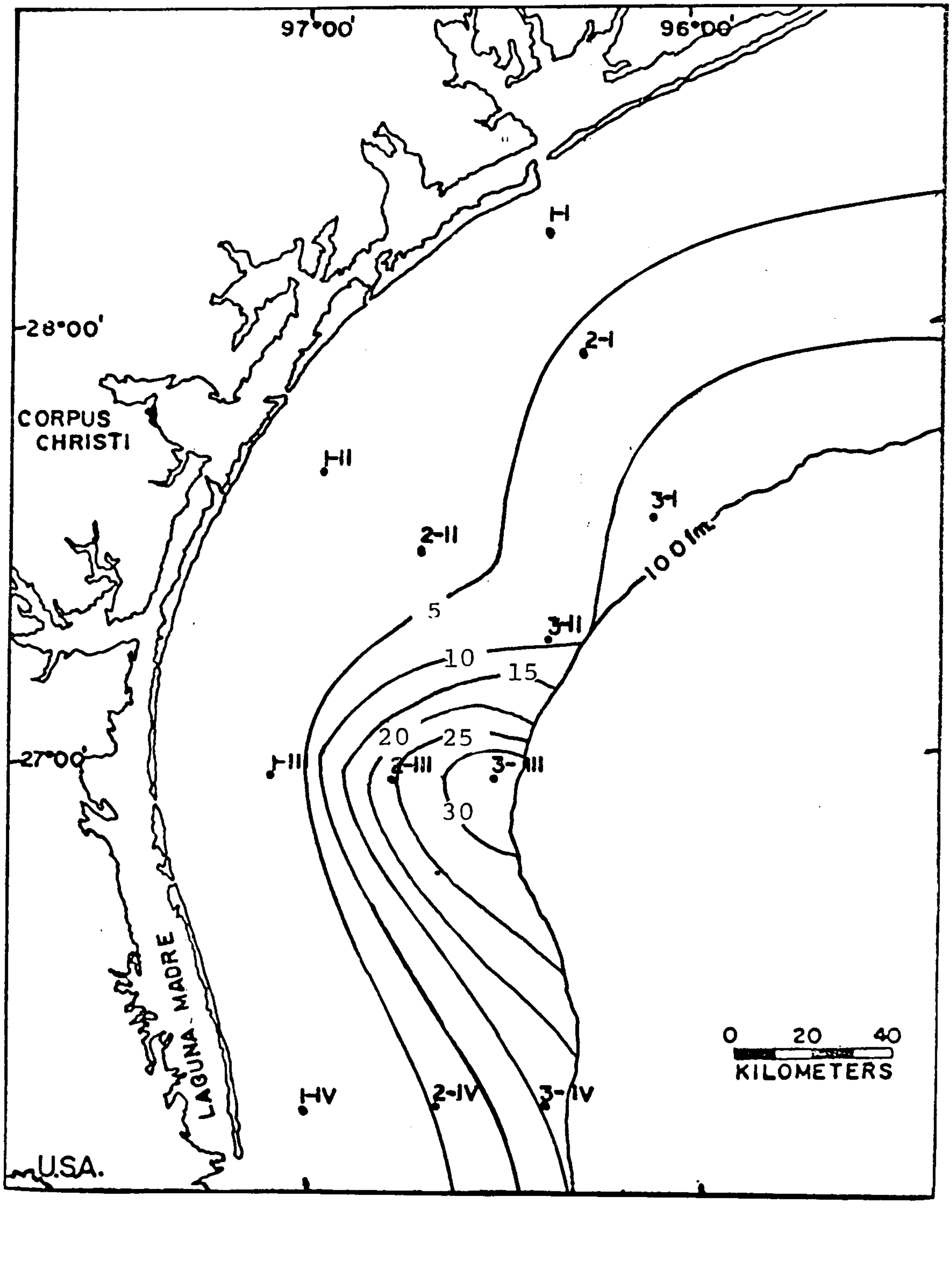


Figure 38. Winter Radiolarian Diversity (# of species/tow).

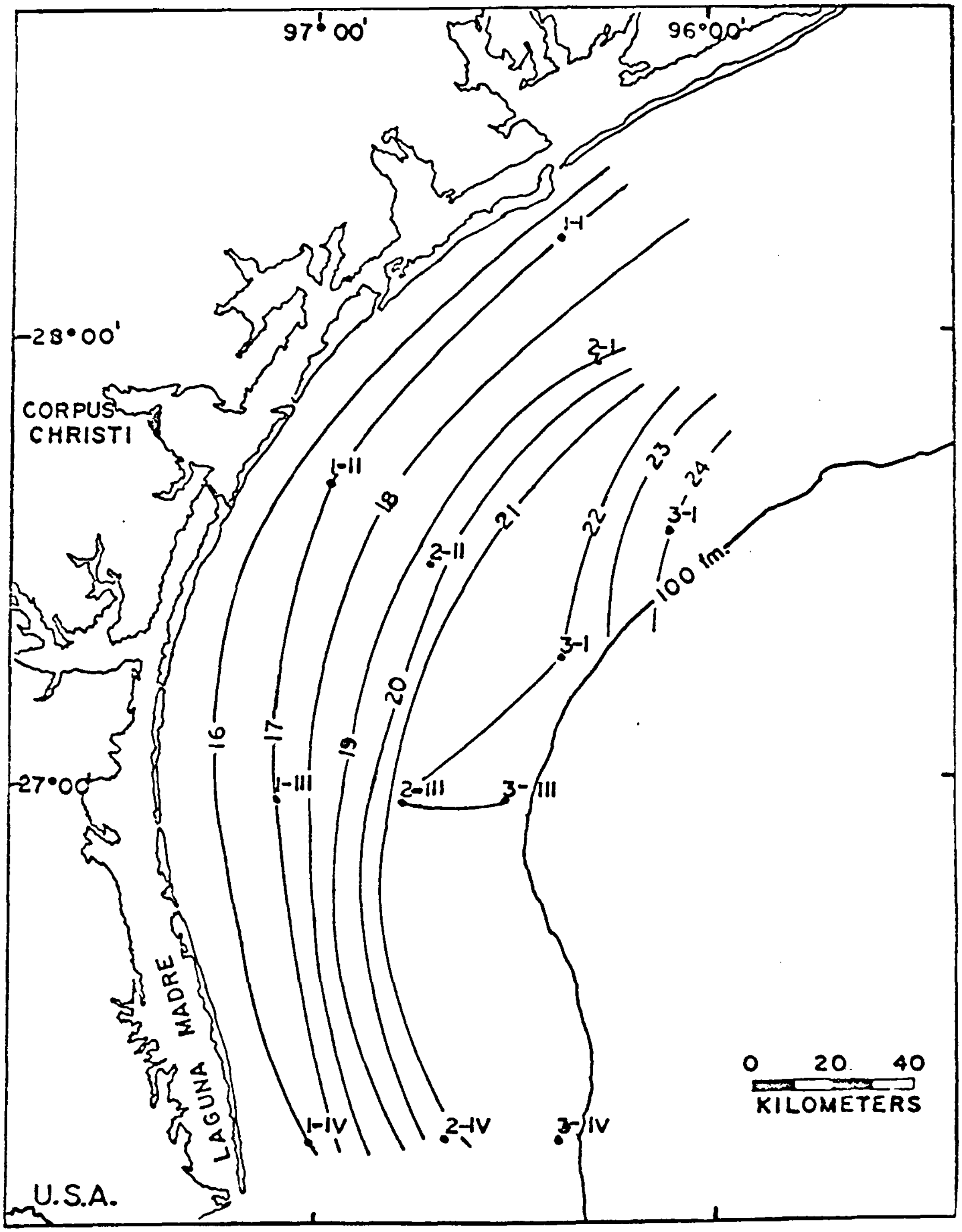


Figure 39. Winter Temperatures at 10 m (°C).

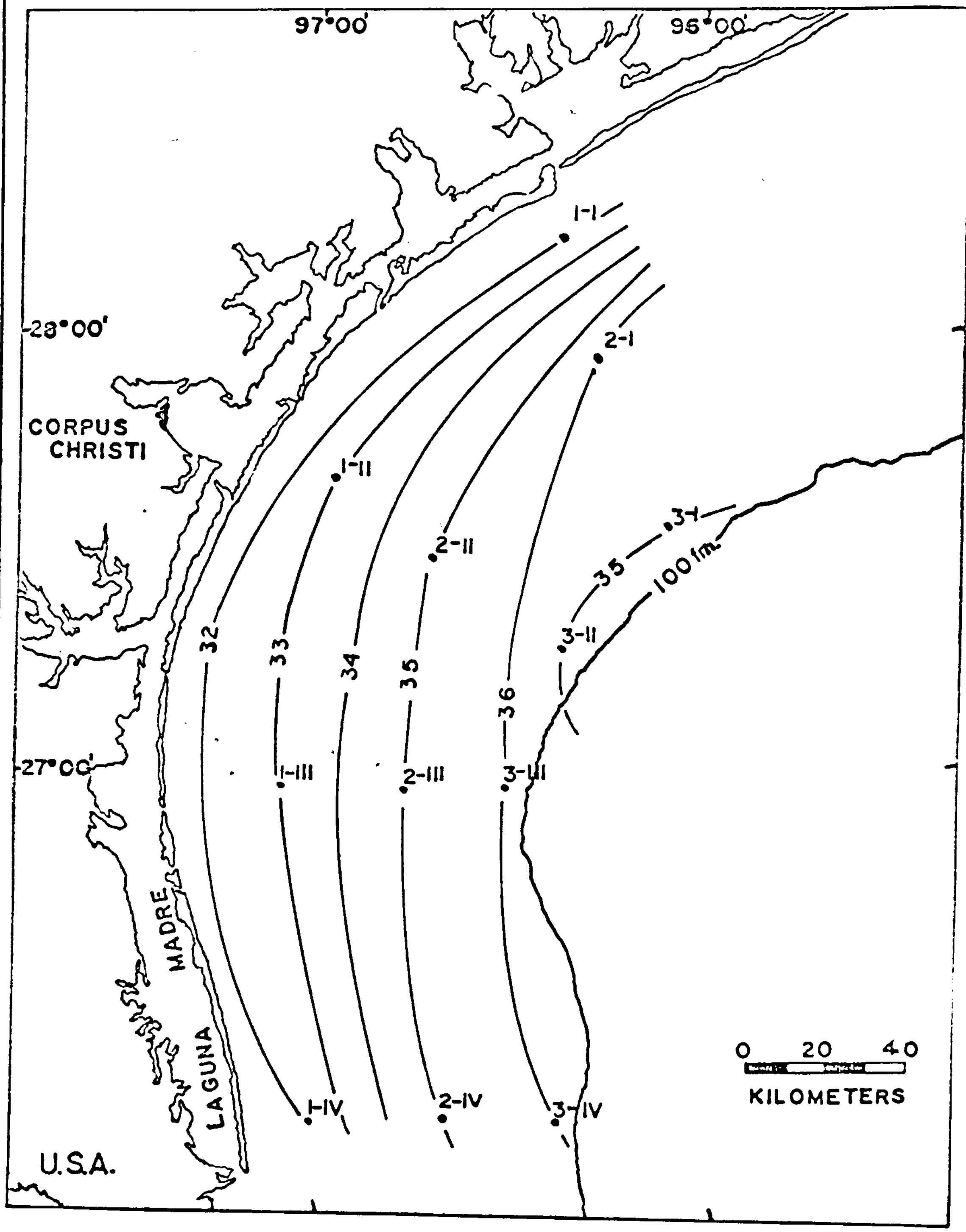


Figure 40. Winter Salinity (ppt) at 10 m.

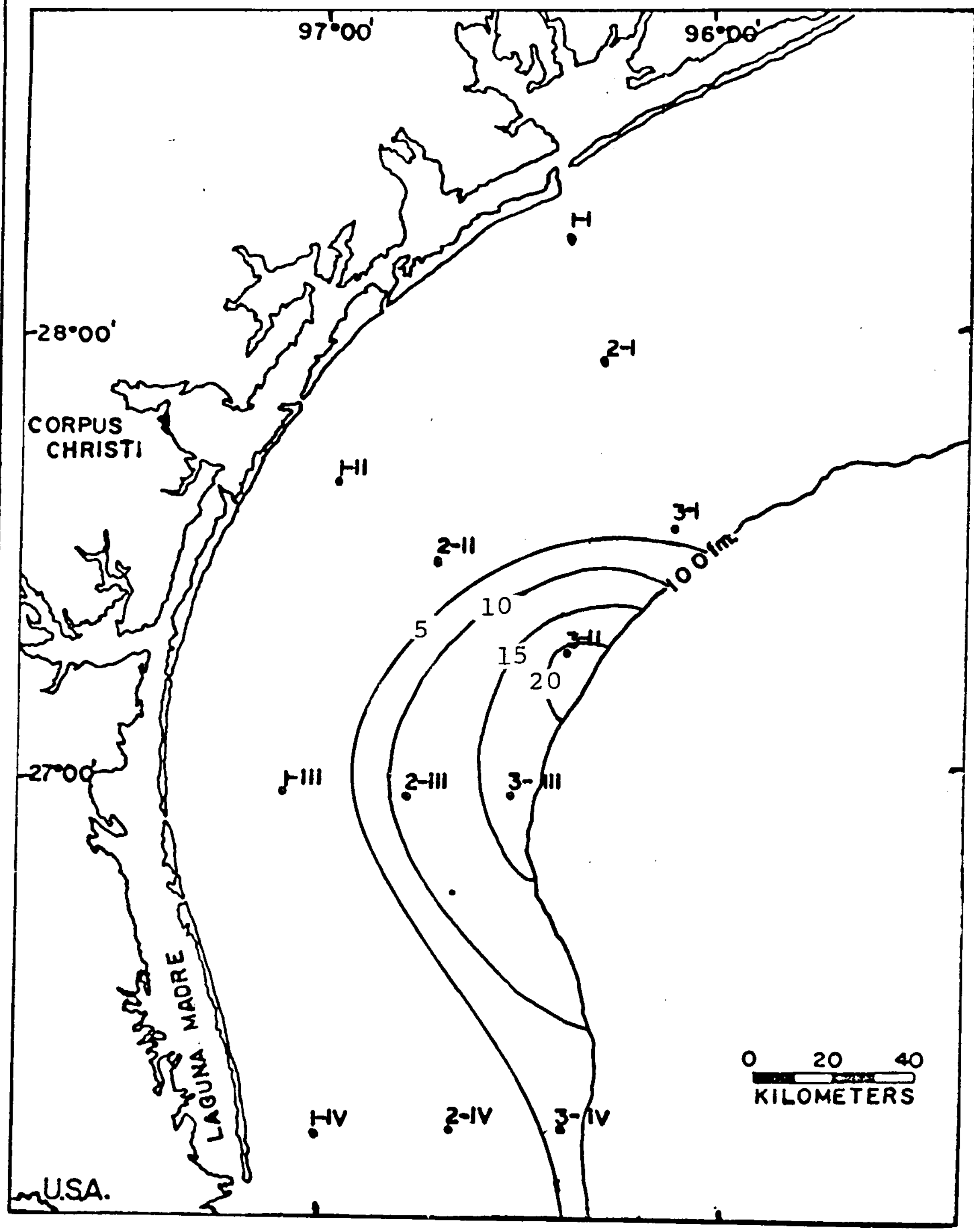


Figure 41. Spring Radiolarian Densities (#/m^3).

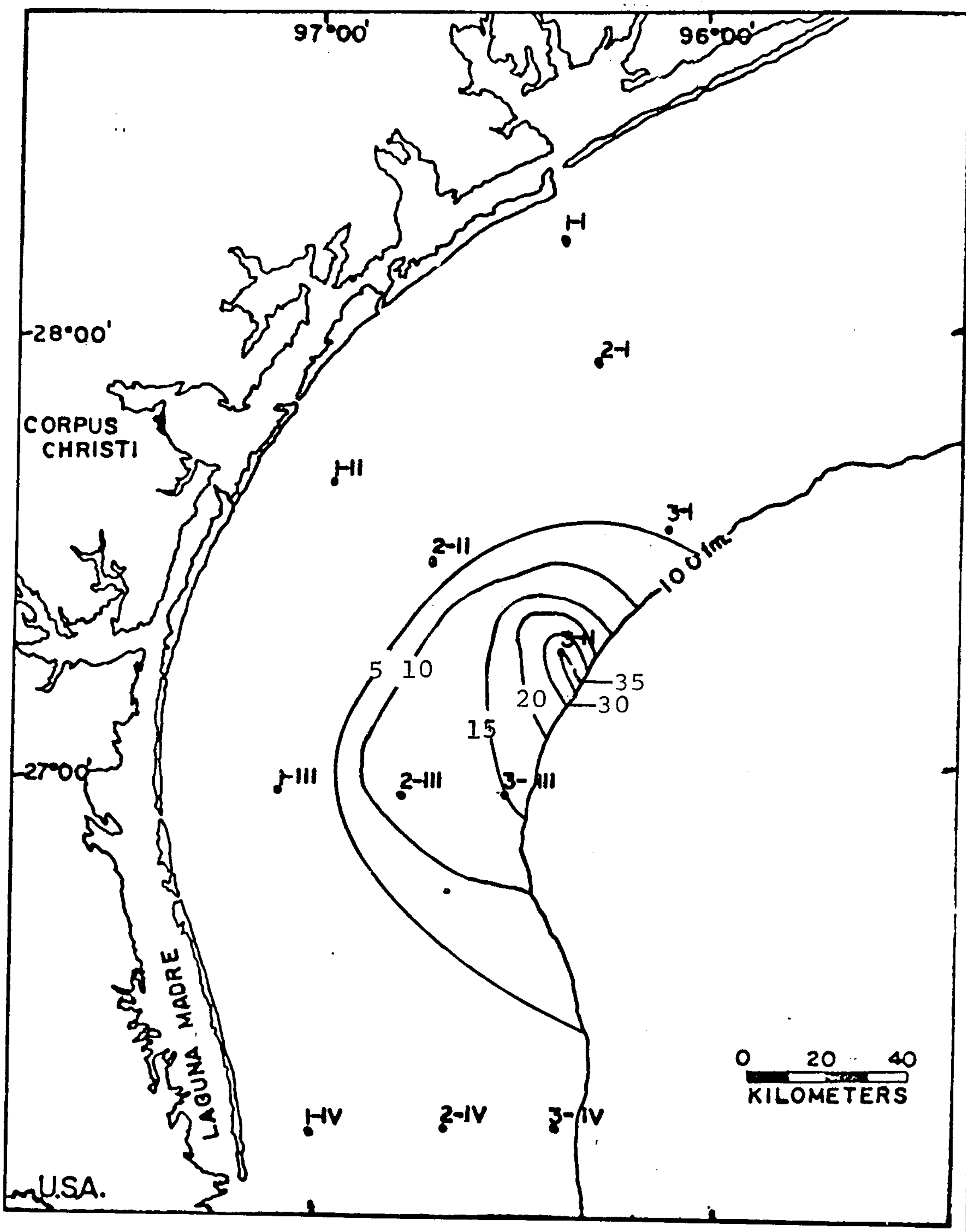


Figure 42. Spring Radiolarian Diversity (# of species/tow).

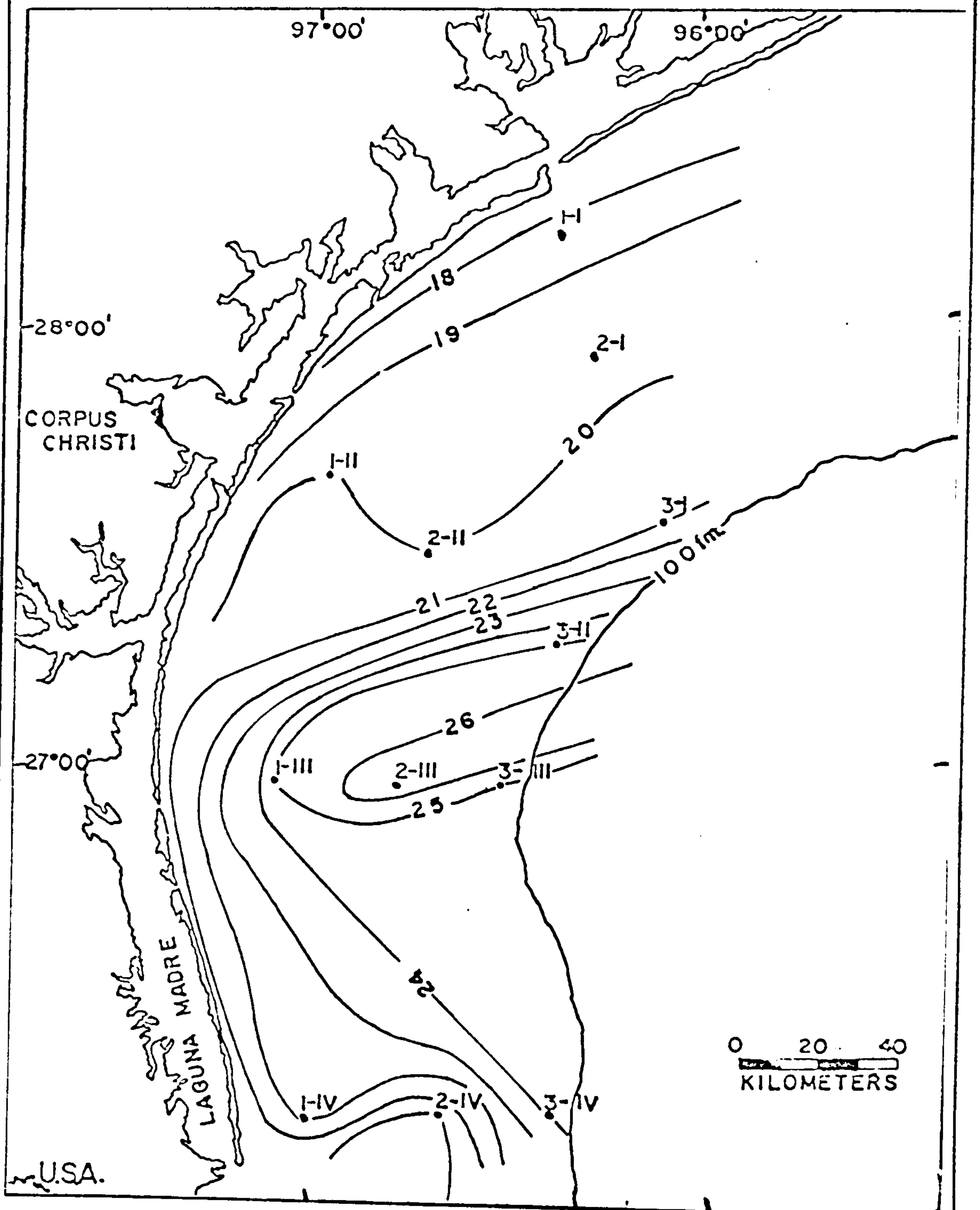


Figure 43. Spring Temperatures (°C) at 10 m.

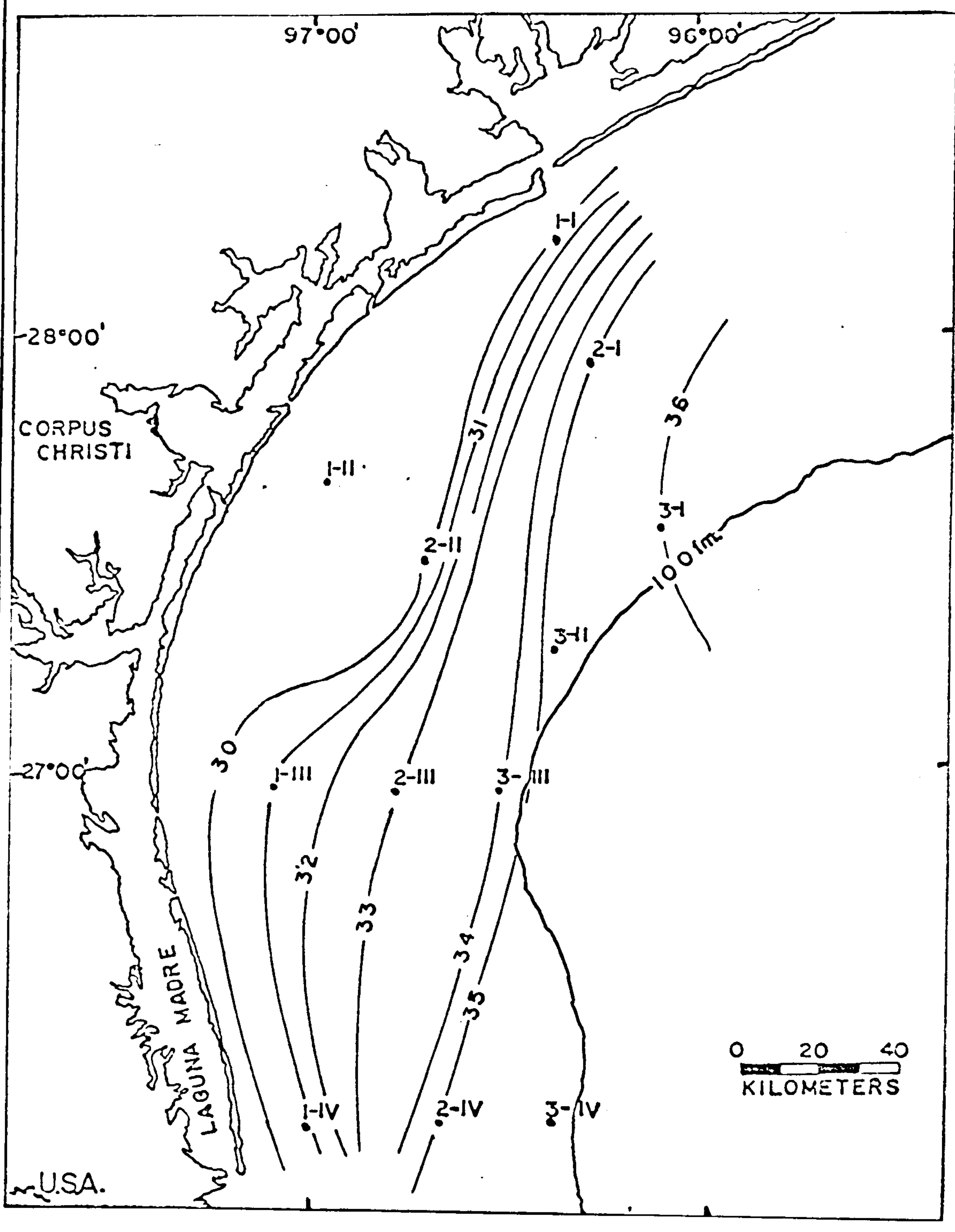


Figure 44. Spring Salinities (ppt) at 10 m.

matches very well with the inshore bulge of Figure 4, characterized by the foraminiferan indicator species *Bolivina lowmani* (see Table 2).

The summer Q-mode maps for radiolarians (Figure 11) and foraminifera (Figure 6) both show there was an extensive "pushing" of offshore faunas (and offshore waters) shoreward. The summer radiolarian density (Figure 45) and diversity (Figure 46) maps also illustrate this phenomenon. The summer 10-m temperature (Figure 47) illustrated this for the southern portion of the study area, at least, while the summer 10-m salinity (Figure 48) showed the 35 ppt contour "pushing" into Stations 1, on both Transects II and III. Figure 2, therefore, shows the current arrow pushing in along Transects II and III.

Areas of Possible Upwelling, Volumes and Routes of Currents and Possible Upwelling

Radiolarians exhibit a vertical zonation in the water column, therefore, upwelled waters may carry expatriate radiolarians from their normal living depths into shallower waters, as has been found in the waters off southern California (Casey, In Press a). In this current study, deeper living radiolarians were found at some shelf stations (outer stations) during different seasons in differing densities. The best indices of upwelled (or bulging up and encroachment of probably deeper than 200 m Gulf waters) were the radiolarians of the Superorder Phaeodarina. The species *Conchasm sphaerulites* and *Conchoceras caudatum* were large and easily recognized species, and therefore, probably the best indicators. Other radiolarians, that were also indices of upwelling, are the polycystins *Spongotrochus glacialis* (both juvenile and adult forms), and *Tetrapyle octacantha*. The relative magnitude noted on Figure 2 described the upwelling as minor off Transect III (with components off Transects I and II)

TABLE 2

OCCURRENCES OF LIVING BENTHONIC FORAMINIFERA IN THE PLANKTON TOWS

Winter

Station/Transect	3/I	2/IV	3/IV
Depth (in meters)	117	47	91
Sample Code	ACL	BFQ	BOS
Ammonia beccarii	0.9		0.8
Bolivina lowmani	1.5	1.4	0.8
Bolivina spinata	0.3		
Bolivina subaenariensis var. *mexicana*	0.6	0.8	
Cassidulina cf. *subglobosa*			0.8
Cassidulina curvata	0.6		
Cibicides concentricus	0.3	0.8	
?*Eponides* sp.			0.8
Eponides tumidulus			1.5
Marginulina sp.	0.3		
Neoeponides antillarum	0.3		
Nonionella basiloba	0.3		
Uvigerina auberiana var. *laevis*	0.3		
Uvigerina hispido-costata	0.6		
Uvigerina peregrina	0.8		
Valvulineria cf. *araucana*	0.3		

Spring

Station/Transect	1/I	2/I	1/II	2/II	1/III	3/III	2/IV	3/IV
Depth (in meters)	20	43	22	48	26	106	47	91
Sample Code	CCP	CFT	CMD	CPH	CWR	DCF	DIO	DLW
Bolivina lowmani	24.8	2.5	1.6	3.7	2.7			
Cassidulina cf. *subglobosa*		2.5						
Lagena spirata								0.4
Uvigerina peregrina						0.3	0.8	

Summer

Station/Transect	1/I	3/I	2/II	1/III	1/IV	2/IV	3/IV
Depth (in meters)	18	42	49	25	27	47	91
Sample Code	ECP	ELX	EPI	EWR	FFW	FIY	FMH
Bolivina lowmani	39.3	0.3	9.4	2.8	1.3	4.5	0.8

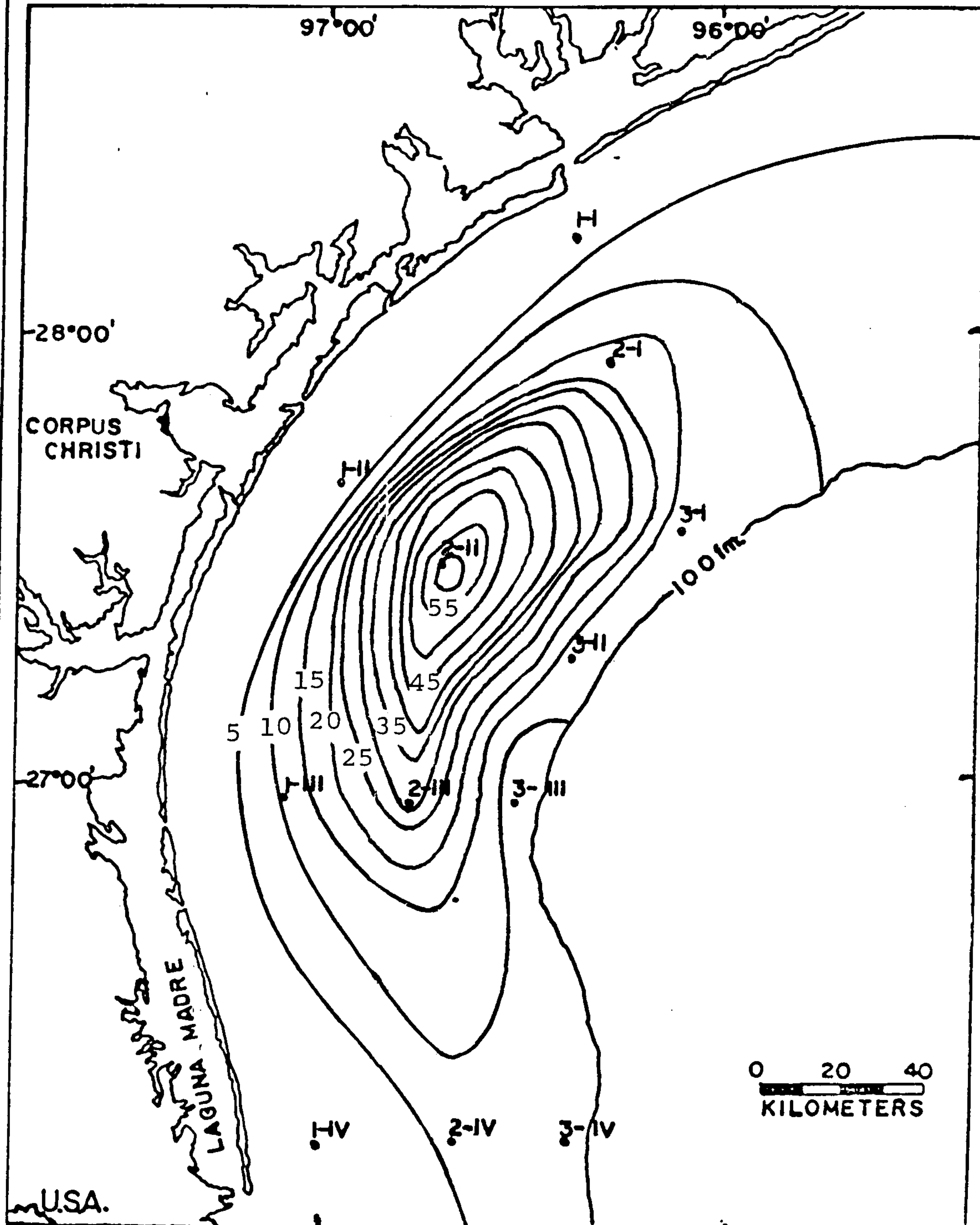


Figure 45. Summer Radiolarian Densities (#/m^3).

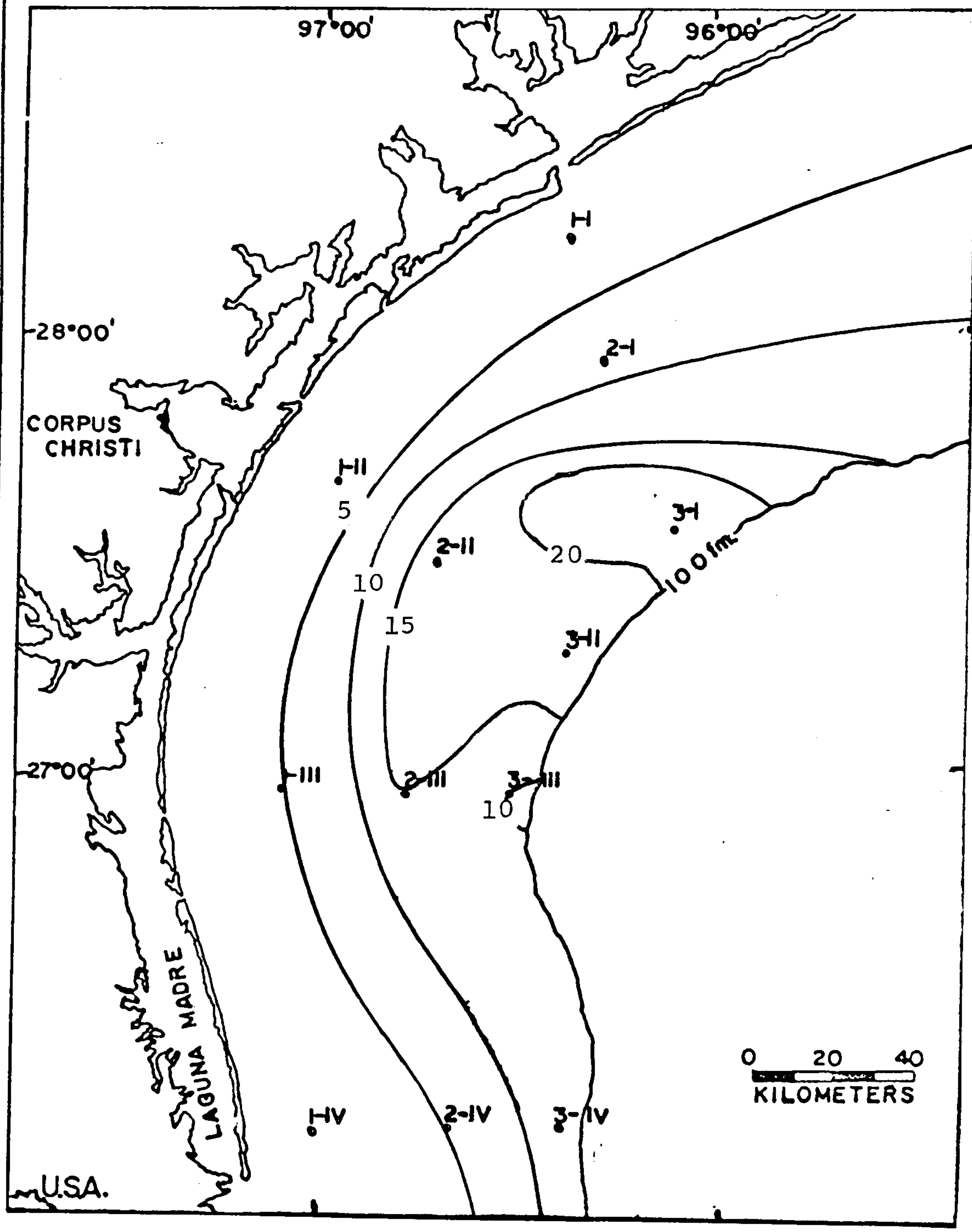


Figure 46. Summer Radiolarian Diversity (# of species/tow).

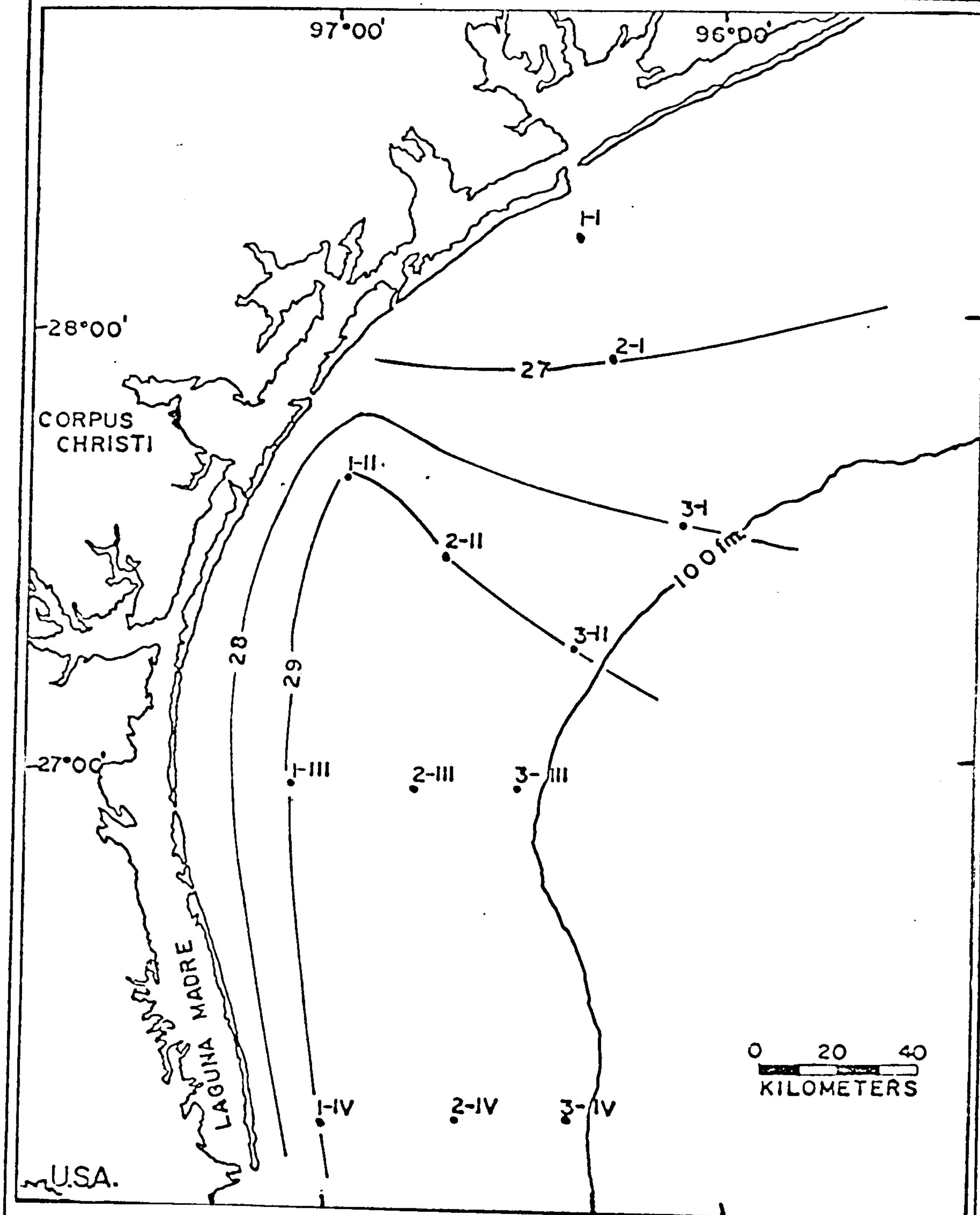


Figure 47. Summer Temperatures (°C) at 10 m.

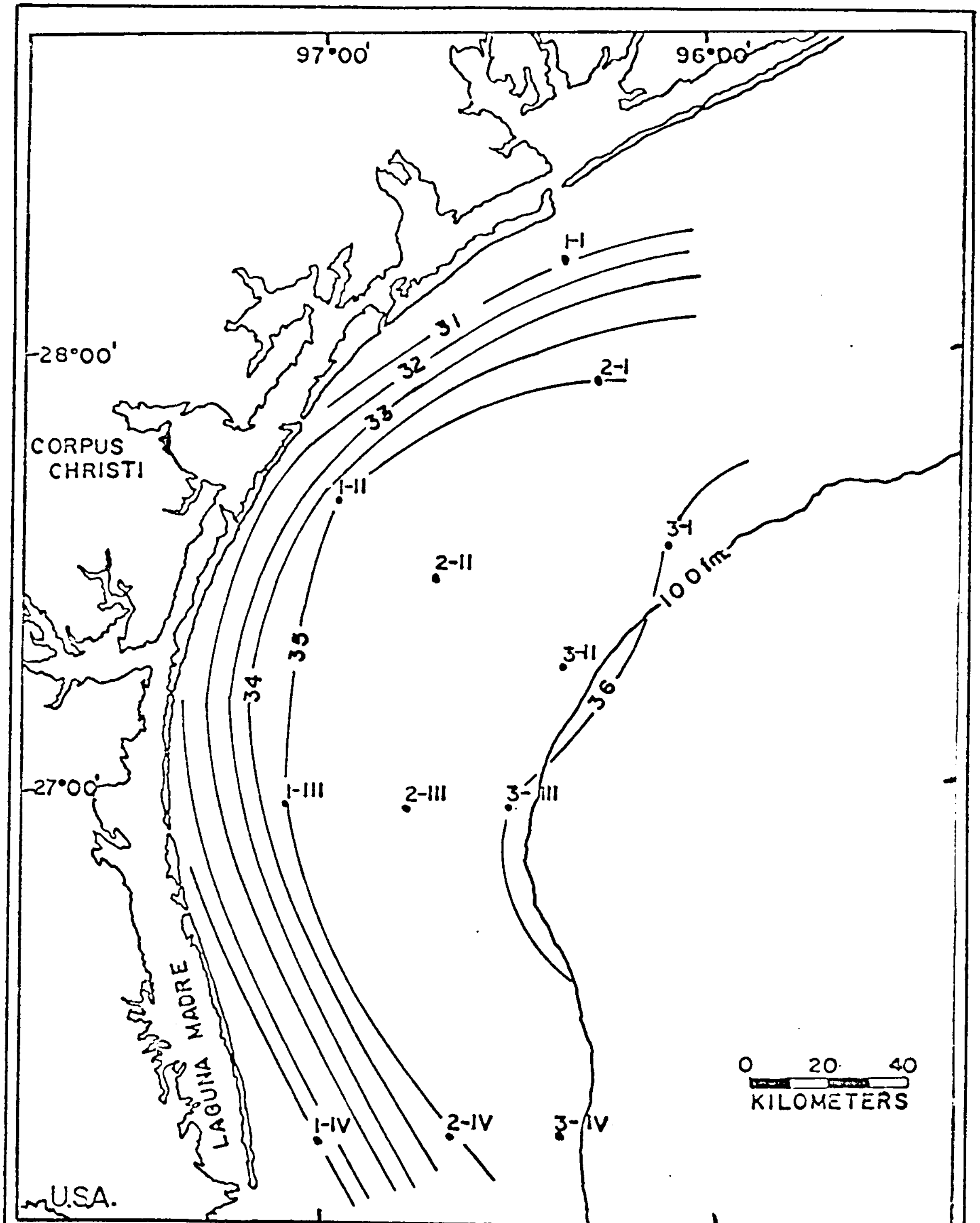


Figure 48. Summer Salinities (ppt) at 10 m.

for the spring, and fairly strong (intermediate between the two) during the summer. These relative magnitudes of upwelling are only crudely known. The magnitudes of upwelling were determined by the relative densities of the upwelled species, whereby the interpretation is that the more upwelled species present, the stronger the upwelling.

There is some physical data that supports these contentions of upwelling, or encroachment of deeper Gulf waters onto the shelf. The draft report on productivity and low-molecular-weight hydrocarbons by W. M. Sackett (1976) states "dissolved oxygen at all depths during the summer period for all stations, with the exceptions of 2/I and 3/I,. . . . (are best). . . explained by water from deeper than 200 m of the open Gulf moving onto the shelf at this period". Sackett's data on silicate, phosphate and nitrate also suggests encroachment or upwelling of deeper waters at different times onto the shelf.

Winter bottom temperatures (Figure 31) suggested an encroachment or upwelling of waters at 3/II and 3/III and the offshore winter fauna (0 in Figure 8) might represent this upwelling (*S. scalaris* may be an upwelling species). The winter bottom salinity map (Figure 32) might suggest an encroachment of deeper waters illustrated by the shoreward displacement of the 36 ppt contour. Spring bottom temperatures (Figure 33) and spring bottom salinities (Figure 34) both suggested encroachment shoreward through 3/II by the displacement shoreward of the 22° isotherm and the 36 ppt salinity contour. The spring season appeared to exhibit the strongest upwelling, and a separate spring upwelling group (SU on Figure 8) clusters out. Summer upwelling (Figure 2) appeared to be of intermediate magnitude between the winter "minimum" and the spring "maximum". It is interesting to note that all these upwellings occur "under" encroachments of offshore "shallow" radiolarian faunas. This probably indicated that a large package of shallow to deep water was pushed onto the shelf, or that the encroachment of shallow water "dragged" the deeper water with it. It should be emphasized that what we are terming as upwelling is not a boiling up of deep water to the surface, which might create a phytoplankton bloom, but rather a bowing up of deeper water and an encroachment of this deeper water onto the shelf.

The routes of currents were determined by the same manner as described for the determination of upwelling. It is hoped that with more data and more estimations, rough measures of volumes transported may be derived. The upwelling regions were designated by the "u's" on Figure 2 (the larger the u the greater the upwelling), and the current transports were designated by the open arrows [the width of the arrow designating the boundaries of the current and the number of lines in the arrow the relative strength (a double line is stronger than a single line)].

Notes on the Niches of Radiolarians and Planktonic Foraminiferans

The possible niches of radiolarians were suggested by Casey (Casey, In Press a). The term niche refers to the organism's place in the ecosystem, and possible radiolarian niches are illustrated in Figure 49. The current study suggested that many radiolarians do indeed occupy the niche labelled Polycystins (herbivores and microherbivores) in Figure 49. In fact, most of the radiolarians probably occupy this niche (or, in other words consume nannophytoplankton). The existence of such a niche is suggested by plankton samples in the spring, when the radiolarians were excluded from the innermost spring stations, which were occupied by the large centric diatom bloom. We suggest that radiolarians feed mainly on nannophytoplankton, and therefore, their food source was eliminated by the bloom of large centric diatoms that were too large to be consumed by

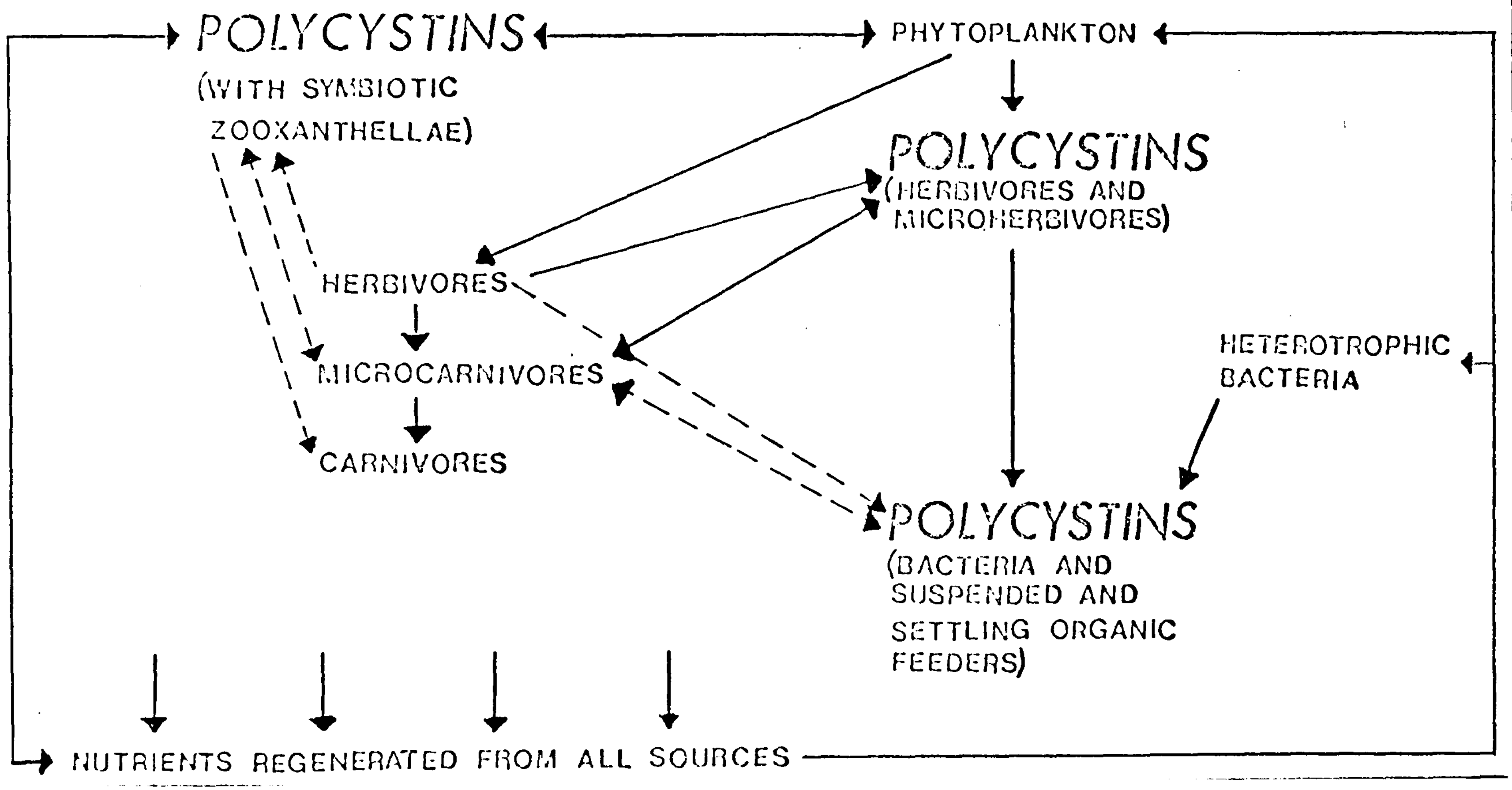


Figure 49. Probable Niche of Polycystin Radiolarians. (Casey, In Press a)

the polycystin radiolarians. This niche was also suggested in a less dramatic way (but perhaps better) by the general increase in radiolarian density and diversity offshore on the STOCS and apparently other shelves of the world's oceans. Hulburt and Corwin (1972) observed a change from a coccolithophorid dominated flora (coccoliths and other nannophytoplankton are probably radiolarian food sources) to one dominated by diatoms, going from offshore into the shallow waters over the continental shelf. They noted this in the eastern and central Gulf and have suggested it to be a wide geographic phenomena (Hulburt and Corwin, 1972). In fact, all the radiolarian niches suggested by Casey (In Press a) are occupied by radiolarians in the study area. The polycystins (with symbiotic zooxanthellae) were represented in the study area by *Choenicosphaera* sp., *Collosphaera tuberosa, Disolenia zanquebarica* and *Siphonosphaera polysiphonia*. The upwelling species most likely represented the bacteria and the suspended and settling organic feeders niche. In fact, many more than those herein designated as upwelling species probably fell within this niche; the radiolarians occur at depths below reasonable phytoplankton densities, and, in some cases, peak below the pigment depth.

Bauer (1976), in investigating stratified tows from the Florida Gulf shelf, noted that planktonic foraminifera occur mainly in the upper 50 m; however, radiolarians not only occur in abundance in the upper 50 m but also to the depths of the shelf break. This, and the other data referred to, suggests that radiolarians and planktonic foraminifera are important intermediaries in the relatively longer food chains of offshore waters (four or five trophic levels), and their "importance" in the food chain decreases inshore and especially under conditions of large centric diatom blooms (where they may be fewer trophic levels).

Benthonic Foraminifera in the Water Column

Benthonic foraminifera were noted previously in plankton tows from nearshore and offshore regions (Casey, 1966). However, their occurrence in such tows was generally ascribed to a stirring up of the bottom. In this study a number of living (stained with rose Bengal) benthonic foraminifera were collected in our plankton tows (see Table 2 for a list of occurrences showing species, number per tow, station number and depth of each station). Most of these were probably the result of a stirring of the water column and perhaps a suspension in the nepheloid layer; however, the consistent occurrence of at least one species, *Bolivina lowmani*, suggested that it is a meroplanktonic stage of the adult benthonic form (Table 2). This species was especially abundant in the inner stations during the spring and appeared to be associated with the incursion of the spring "fresh" water lens ("Mississippi Water"). Another planktonic-benthonic species, which may be a potential indicator, is *Uvigerina peregrina*; this species is a well-known benthonic indicator of outer-shelf and upper-slope depths and its occurrence in the outermost plankton tows during the spring gives even more substance to the suggestion of a strong spring upwelling in this region.

Relict Populations

One of the most interesting academic aspects of this study was the discovery of a relict population of radiolarians in the study area. Plankton tows from the study area yielded radiolarians previously believed to be extinct. From other current studies we have found that these radiolarians appear to occur in other portions of the Gulf and to some extent in the Caribbean, but were best represented (by density and diversity) in the STOCS study area. These findings are not only of great academic interest, as shall be discussed; but are also of economic interest since a number of these species have been utilized for biostratigraphy (one species has a biostratigraphic zone named after it), which is of importance to geologic dating and, therefore, oil exploration.

Relict radiolarians collected in plankton tows and stained with rose Bengal include *Spongaster pentas*, *Spongaster berminghami*, *Spongaster cruciferus*, a "circular" spongaster and an "elliptical" spongaster (all alive and well). The evolution of *Spongaster pentas* and *Spongaster berminghami* occurred about 4.5 million years ago in the tropical Pacific (Theyer and Hammond, 1974) and is used to define the base of the *Spongaster pentas* Zone (Riedel and Sanfilippo, In Press). *Spongaster berminghami* apparently became extinct (at least in the Pacific) shortly thereafter, and *S. pentas* apparently became extinct approximately 3.6 million years ago (Casey, In Press b). The "circular" and "elliptical" spongodiscids are believed to have been the ancestors of *S. berminghami* and they were also found in the plankton tows, as were specimens of *Spongaster cruciferus*, which appear similar to the same species of the California Eocene.

These species represent a relict radiolarian fauna and their presence suggests some intersting consequences of both biostratigraphic and paleo-oceanographic significance. The conclusion, that the geologic and geographic ranges of some of the species used in Riedel and Sanfilippo's zonation were provincial, is of biostratigraphic significance. This provinciality is a real problem because the late Neogene part of Riedel and Sanfilippo's zonation was mainly developed using tropical Pacific cores. The findings here suggest that the radiolarian biostratigraphy (and perhaps other microfossil biostratigraphies) in the strato-type localities of the late Neogene in Europe, should be quite different from the "warm-water" Pacific zonation of Riedel and Sanfilippo. Correlation attempts to the

Pacific and European stratotype radiolarians have met with limited success, probably due in large part to the problem of provinciality herein mentioned.

This problem was not noted before, probably because the sediments and rocks of the low-latitude Atlantic and its margin are usually void of radiolarians in the post-Miocene. We studied the upper few centimeters of Holocene sediments in the Gulf of Mexico and Caribbean since this finding in the STOCS study area and found specimens of *Spongaster pentas* and *Spongaster berminghami*.

The paleooceanographic significance is perhaps of even more importance than the biostratigraphic significance. The Atlantic and Pacific appeared to exhibit more or less "cosmopolitan warm water" radiolarian biostratigraphies until at least the mid-Miocene. Some time after mid-Miocene there appeared to be a divergence of the radiolarian faunas and a development of greater provincialism. The reasons for this divergence were apparently related to geographic and climatic isolation and resultant allopatric speciation and differential geologic ranges of these isolated populations.

The geographic isolation of the tropical Pacific from the tropical Atlantic may have been due to the uplift of the Panamanian Block to "effective sill" during the Miocene, approximately 4.5 million years ago. Isolation is placed at that time, or near the Miocene-Pliocene boundary. Prior to this time the spongaster faunas of the Gulf and Caribbean resemble those of the Pacific, but diverge shortly thereafter. [The sill depth of the Panamanian Block was about 500 m (Bandy and Casey, 1973) 4.5 million years ago.] Therefore, the isolation may well be twofold: restricted circulation due to the emergence of the Panamanian Block; and cooling that resulted in the initiation and development of Neogene glaciations and water mass regimes (Casey, 1973).

Water mass regimes and radiolarian faunas similar to the present may have been established by mid-Miocene and that Atlantic and Pacific warm-water faunas were isolated from one another at approximately the base of the *Spongaster pentas* Zone, about 4.5 million years ago, or about the Miocene-Pliocene boundary. We suggest that the STOCS study area, and perhaps to a lesser extent, the rest of the Gulf of Mexico and Caribbean, has maintained, in part, relict radiolarian faunas (Casey, McMillen and Bauer, 1975).

The waters over the study area and the adjacent regions, presently, may well be close to "Miocene type waters". If so, why have the spongasters been the only or main survivors? What about the hundreds of other Miocene radiolarian species that died? We believe that we may have generated the answer to this question on the dendrograms derived from multivariant analysis.

The R-mode cluster of live radiolarians (Figure 8) separates the relict radiolarians from the others (they are not associated with any season and only associate at a low similarity level with anything). *Spongaster pentas* is attached at a low (and probably insignificant) level with the winter group. This is somewhat interesting, for it is within the winter group that *Spongaster cruciferus* is associated. However, *S. cruciferus* associated at a "high level" with a few others; again this high level was due to a few occurrences, and may be excluded with more sampling. *Spongaster ?pentas* and the "circular" and "elliptical" spongasters all cluster out together between the spring upwelling (SU) and summer (S) radiolarian assemblages.

This exclusion of the radiolarian seasonal cluster groups may imply that either the relict radiolarian could get along with any group (which would be a way to survive) or that they were in an unspecialized niche (can consume a variety of nannophytoplankton or are detritus feeders) and survived as the rest of the populations evolved "around them". This last suggestion is intriguing, and to some extent may be enforced by the location of these relict radiolarians on the R-mode cluster of radiolarians, foraminifera and pteropods (Figure 12). Here again the *Spongaster pentas* and *S. cruciferus* were well removed from all other groups, with *S. cruciferus* being so removed due to few specimens collected. The "circular" and "elliptical" spongasters separated with, but were somewhat removed from, *Globigerina pachyderma* and *Uvigerina peregrina*. These were separated into relict shallow (Rs) and relict deep (Rd) components with the spongasters being shallow and the foraminifera deep. We believe that this is very significant, as all the relict radiolarians were associated with very shallow water radiolarians. Perhaps this is associated in some way with their survival as adaptors to the "Miocene eurythermal and euryhaline conditions" that were maintained in their present distributional ranges. *Globigerina pachyderma* is the only "relict" foraminiferan seen in the plankton except for one occurrence of what we believe might have been *Globorotalia tosaensis*. *Globigerina pachyderma* is not a relict in the sense that we have been using the term as applied to the radiolarians. Perhaps a better term for it would be a "local relict" for it lives today in high latitude faunas. It was found in the Gulf by Phleger (1951) and he suggested that it was relict either as a holdover from the colder Pleistocene conditions of the Gulf, or it is introduced sporadically around the southern tip of Florida. Our data to date cannot distinguish which, if either, of Phleger's suggestions are correct, but the data does give a clue to where and why *Globigerina pachyderma* exists today as a cold water form in the tropical and subtropical Gulf. *G. pachyderma* clustered out with *Uvigerina peregrina*, a benthonic indicator of outer-shelf and upper-slope regions, which is found occasionally in the plankton. *U. peregrina's* association with *G. pachyderma* may suggest that both are upwelling forms, and that *G. pachyderma*'s natural habitat is in the deeper and colder waters of the offshore region, an area more conducive for a normally high latitude form.

Down Core Studies

Approximately 200 samples [taken from USGS gravity cores 12, 38, 42, 70, 81, 82, 88, 95, 114, 115, 157, 160, 176, 193, 214, 241 and 256 (see Figure 50 for locations)] were sampled at 20-cm intervals in amounts of approximately 27 cc each. Seven of the cores proved worthy of micropaleontological analysis (cores 70, 88, 95, 114, 115, 157 and 256) and were processed for microfossils. For taxonomic work, the sample was processed by washing through a 63 μm screen. Counts and species identifications were made using a reflecting light microscope at magnification to 120X.

Four gravity cores were used for paleomagnetic studies (cores 42, 70, 95 and 115). These cores were sampled with paleomagnetic boxes at 20-cm intervals. Because of their relatively low magnetic intensities (10^{-4} to 10^{-5} emu), these samples were studied using the cryogenic magnetometer at the University of Texas, Marine Science Institute, Galveston Geophysical Laboratory. Samples were taken from the middle of the core to avoid contamination and possible man-made "reworking" due to the coring process. Each sample was marked to indicate core orientation. Natural remnant magnetization (NRM) was determined for the horizontal and vertical components of each sample. Secondary viscous components were satisfactorily removed by alternation field demagnetization to 200 oersteds. From these data, the total intensity, inclination and declination of each sample were derived.

Three cores were useful for a study of shelf history (USGS cores 88, 115 and 256). Following the technique of Kennett and Huddleston (1972), attempts were made to biostratigraphically date the cores and to determine

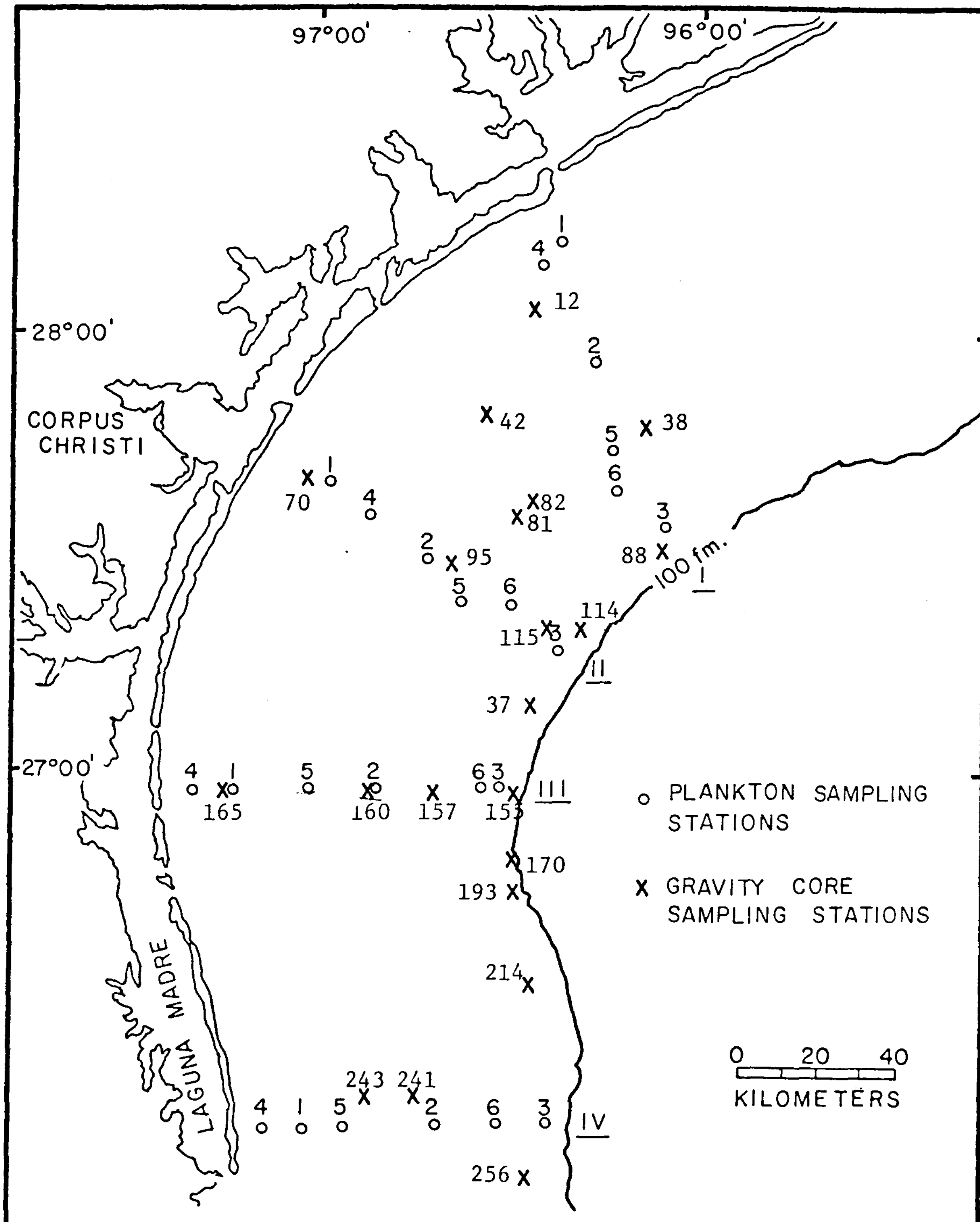


Figure 50. Plankton and Gravity Core Sampling Station Locations.

the paleotemperature (related to time) of one of the cores. The abundant occurrences of the *Globorotalia menardii* complex, *Pulleniatina obliquiloculata* and *Sphaeroidinella dehiscens* (all or any) were used to designate warm water conditions (interglacial). Cold water (glacial) conditions were indicated by *Globigerina bulloides* and *G. falconensis* in the absence of, or with few, warm forms. A marginally warm interval was indicated by *Globorotalia truncatulinoides* and *Globigerinoides sacculifer*. Core OCS-GC 88 was the best for determining a relative paleotemperature curve using the above-mentioned criteria (Figure 51).

Ericson and Wollin (1956, 1968), for the tropical and subtropical Atlantic, and Kennett and Huddlestun (1972), for the Gulf of Mexico, utilized a semi-quantitative evaluation of the relative abundance of the *Globorotalia menardii* complex to develop a sequence of zones designated Q-Z in order of decreasing age. These zones represented alternating warm and cold intervals and were supported by oxygen isotope curves. Of interest were zones Z, Y and X which apparently were represented in at least a few of the South Texas shelf cores. The age of the Z-Y boundary was the Holocene-Pleistocene boundary [about 10,000 to 11,000 years before present (ybp)]; and the Y-X boundary was most likely a datum within the Pleistocene designating the base of the last glacial (about 90,000 to 95,000 ybp). Core OCS-GC 88 (Figure 51) penetrated to the X zone and was about 10,000 years between 40 and 60 cm and 90,000 years between 140 and 160 cm. This core was composed of lightly bioturbated mud (Berryhill *et al.*, 1976), with shell remains in the interval designated herein as the Y zone. Rates of sedimentation for the Holocene portion (Z zone) were about 4 cm/1000 yrs and about 1 cm/1000 yrs for the period representing the last glacial (Y zone). Core OCS-GC 115 (Figure 52) did not penetrate the Z zone; therefore, a minimum sedimentation rate of about 15 cm/1000 yrs was indica-

DEPTH IN CORE IN CM.	PLANKTONIC FORAMINIFERA: WARM: G. MENARDII	P. OBLIQUELOCULATA	S. DEHISCENS	MARG. WARM: G. TRUNCATULINOIDES	G. SACCULIFER	COLD: G. INFLATA	G. FALCONENSIS	G. BULLOIDES	G. DIGITATA	PALEOTEMPERATURES (COLD – WARM)	BIOSTRATIGRAPHIC ZONES KENNET AND HUDDLESTUN TECHNIQUE MODIFIED	BENTHONIC FORAMINIFERA (DEEPER →): A. BECCARII	B. LOWMANI	BULIMINELLA	N. BASILOBA	FURSENLOINA	SIPHONINA	CIBICIDES	EPONIDES	BRIZALINA (OTHER THAN LOWMANI)	U. PEREGRINA	OTHER: BRYOZOANS ABUNDANT	ABUNDANT SHELL DEBRIS	ECHINOID SPINES	DEPTH OF DEP. (INNER TO MID SHELF – OUTER SHELF)	BENTHONIC FORAM./PLANKTONIC FORAM.
0-3	X	X	X	X	X						Z	R	R	R	R	R	C	A	R	C	C					40/60
20-23	X	X	X	X	X							R	R	R	R	R	C	A	R	A	C					50/50
40-43	X	X	X	X	X							R	R-C	R	R	R	C-R	C	R	A	C-R					50/50
60-63	R	X		X								R	R-C	R	R-C	R-C	R	C	R-C	C	R	X				60/40
80-83	R	R		X	X							R-C	C	R-C	R-C	R-C	R	C	R-C	C-R	R	X				70/30
100-103	R	X		X	X						Y	C	C	R-C	C	C-R	R	C-R	C	C-R	R	X	X			80/20
120-123				X			X	X				C-R	C	R-C	C	C-R	R	C-R	C-R	C-R	R		X	X		90/10
140-143				X		X	X	X				C	C	C	C-R	C	R	R-C	C-R	C	R			X		95/5
160-163	X	X		X							X	R	R-C	R	R	R	A	A	R	A	C					50/50

Figure 51. Biostratigraphy, Paleotemperatures and Paleodepths Determined from Planktonic Foraminiferans, Benthonic Foraminiferans and Other Organisms. X=present, R=rare (less than 1% of benthonic foraminiferans), C=common (about 5%), A=abundant (about 10% or more). For Core OCS-GC 88.

DEPTH IN CORE IN CM.	WARM			MARG. WARM		COLD				PALEOTEMPERATURES		BIOSTRATIGRAPHIC ZONES KENNETT AND HUDDLESTUN
	G. MENARDII	P. OBLIQUELOCULATA	S. DEHISCENS	G. TRUNCATULINOIDES	G. SACCULIFER	G. INFLATA	G. FALCONENSIS	G. BULLOIDES	G. DIGITATA	COLD	WARM	
0-3	X	X										Z
20-23	X	X										
40-43	X	X		X								
60-63	X	X		X								
80-83	X	X		X								Z
100-103	X	X		X								
120-123	X	X		X								
140-143	X	X		X								Z
150-153	X	X		X								

Figure 52. Biostratigraphy and Paleotemperatures for OCS-GC 115.
X = common.

ted. Core OCS-GC 256 (Figure 53) represented the slowest sedimentation rates of the three cores with rates of about 3 cm/1000 yrs for the Holocene, 0.6 cm/1000 years for the last glacial (Y zone), and an unknown amount for the X zone.

These cores were taken from stations on the outer shelf that were below sea level during the times represented in the cored intervals. The Y zone was "compressed" in relation to the Z zone due to a drop in sea level at this time (Y time), resulting in slow rates of deposition and probable erosion. Shell remains of macroinvertebrates were noted in the Y interval of core OCS-GC 88 (Berryhill *et al.*, 1976), and shell hash (of macroinvertebrates) and terrigenous sands were noted in the Y interval in core OCS-GC 256. The shell hashes most likely represented a scouring and reworking of sediments during the lowering of sea level. Also, during this lowering in sea level, shallow water foraminiferans invaded the region of core OCS-GC 88 (Figure 51).

Samples from cores 42, 70, 95 and 115 were taken to determine paleomagnetism (See Table 3 for paleomagnetic data). Figures 54 through 57 give the average total intensity, inclination and declination for the samples of each core.

Inshore areas are more affected by sedimentation rates and processes than offshore regions. There is a great volume of sediment being carried into the Gulf from a system of several major rivers by a counter-clockwise current. These two factors make the northwest Gulf of Mexico a clastic reservoir. In this case, perhaps the absence of any polar reversals in the outer shelf locations is just as significant as the large number of reversals in the inshore stations. Considering that the inclinations in Figure 56 are true indications of normal remnant magnetizations, the reversals of core 70 could indicate a high rate of sedimentation in a magnetic

DEPTH IN CORE IN CM.	G. MENARDII (WARM)	P. OBLIQUELOCULATA (WARM)	S. DEHISCENS (WARM)	G. TRUNCATULINOIDES (MARG. WARM)	G. SACCULIFER (MARG. WARM)	G. INFLATA (COLD)	G. FALCONENSIS (COLD)	G. BULLOIDES (COLD)	G. DIGITATA (COLD)	BIOSTRATIGRAPHIC ZONES KENNETT AND HUSSLESTUN
0-3	X	X		X						Z
20-23		X		X						Z
40-43	R	R		X				X		Y
80-83				X	X			X		Y
100-103	X	X		X						X
120-123	X	X		X						X
130-133	X	X		X						X

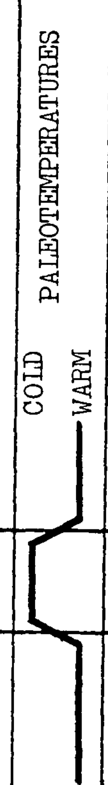


Figure 53. Biostratigraphy and Paleotemperatures for OCS-GC 256.
X = common, R = rare.

TABLE 3

PALEOMAGNETIC DATA FOR CORE SAMPLES

CORE NUMBER	DEPTH OF INTERVAL	MOMENT	DECLINATION	INCLINATION
Normal Remnant Magnetization				
70	0-3 cm	.08035	355.7108	8.8561
70	20-23 cm	.16305	14.95735	-13.38665
70	40-43 cm	1.138	32.7026	3.793
70	60-63 cm	1.0159	20.2484	-36.9571
70	80-83 cm	4.276	45.1398	-18.7504
70	100-103 cm	1.6745	15.1114	-6.49775
70	120-123 cm	1.15865	334.273	-42.377775
70	140-143 cm	3.3032	315.00269	-50.78803
70	160-163 cm	2.92675	254.8958	-55.4293
Demagnetization @ 200 Oersteds				
70	0-3 cm	.3969	270.4275	40.3485
70	20-23 cm	.19635	305.9309	22.4469
70	40-43 cm	.2699	19.91195	-14.64195
70	60-63 cm	.36455	21.6829	-8.99545
70	80-83 cm	1.58455	64.15955	-22.7132
70	100-103 cm	.8068	352.53901	-17.3415
70	120-123 cm	.677	327.4829	-84.2209
70	140-143 cm	2.0652	309.3628	-38.85085
70	160-163 cm	1.71465	289.66535	-33.53465
Normal Remnant Magnetization				
42	3-6 cm	3.46475	91.8468	-12.1225
42	18-20 cm	1.82335	176.8289	73.27005
42	21.5-23 cm	2.6057	118.5031	-37.90466
42	41-43 cm	2.3824	39.80957	41.4856
42	53-55 cm	2.19175	83.73338	-3.6475
42	57-59 cm	2.2894	139.4006	27.1527
42	80-82 cm	.44515	205.44885	17.4495
42	87-89 cm	2.73885	229.48545	50.06025
42	97-99 cm	4.1847	193.15028	15.38203
Demagnetization @ 200 Oersteds				
42	3-6 cm	1.15845	92.338	-23.7426
42	18-20 cm	1.2568	244.64495	60.76475
42	21.5-23 cm	.60425	183.95395	-8.928
42	41-43 cm	.8955	200.14945	81.29845
42	53-55 cm	.28635	156.8979	10.68766
42	57-59 cm	.8520	190.17385	37.2666
42	80-82 cm	.26815	248.92055	10.5488
42	87-89 cm	1.30435	256.8795	35.4209
42	97-99 cm	2.4347	221.0759	15.91125
42	100-102 cm	1.52216	287.8149	68.080405

TABLE 3. CONT.'D

CORE NUMBER	DEPTH OF INTERVAL	MOMENT	DECLINATION	INCLINATION
Normal Remnant Magnetization				
95	0-3 cm	6.3492	3.1742	56.91415
95	20-23 cm	1.12	94.7042	-79.7415
95	40-43 cm	7.5943	90.9866	46.7539
95	60-63 cm	3.0845	12.91545	21.71885
95	80-83 cm	9.3953	24.80105	37.9431
95	100-103 cm	4.77045	112.50855	57.9884
95	120-123 cm	8.6353	86.72875	54.66175
95	140-143 cm	3.66355	47.156	28.58565
95	160-163 cm	9.04175	86.46925	64.3937
Demagnetization @ 200 Oersteds				
95	0-3 cm	4.792	29.8994	48.62175
95	20-23 cm	2.9904	316.6232	-69.1731
95	40-43 cm	3.27745	68.81915	70.76065
95	60-63 cm	1.37445	326.0891	50.45025
95	80-83 cm	4.3092	33.88965	43.70185
95	100-103 cm	2.9699	101.3507	74.0262
95	120-123 cm	3.68335	94.97115	67.4188
95	140-143 cm	.9071	44.26505	40.40025
95	160-163 cm	4.7032	137.75225	77.06315
Normal Remnant Magnetization				
115	0-3 cm	15.1637	168.13515	50.2882
115	20-23 cm	15.9424	158.0736	54.4572
115	40-43 cm	13.7912	166.10035	43.23275
115	60-63 cm	17.9213	129.45615	29.90155
115	80-83 cm	19.69505	157.66955	38.3868
115	100-103 cm	12.56223	153.6257	34.0528
115	120-123 cm	15.63565	164.4835	46.3392
115	140-143 cm	12.2921	179.9599	61.78345
Demagnetization @ 200 Oersteds				
115	0-3 cm	9.78845	178.2757	45.24625
115	20-23 cm	9.11985	163.6845	52.55335
115	40-43 cm	8.6764	170.462	40.4834
115	60-63 cm	7.1379	155.7715	36.5499
115	80-83 cm	11.2735	163.02185	33.24255
115	100-103 cm	8.5443	168.7363	36.8625
115	120-123 cm	8.9953	186.52135	39.24065
115	140-143 cm	4.1704	272.68805	50.85265

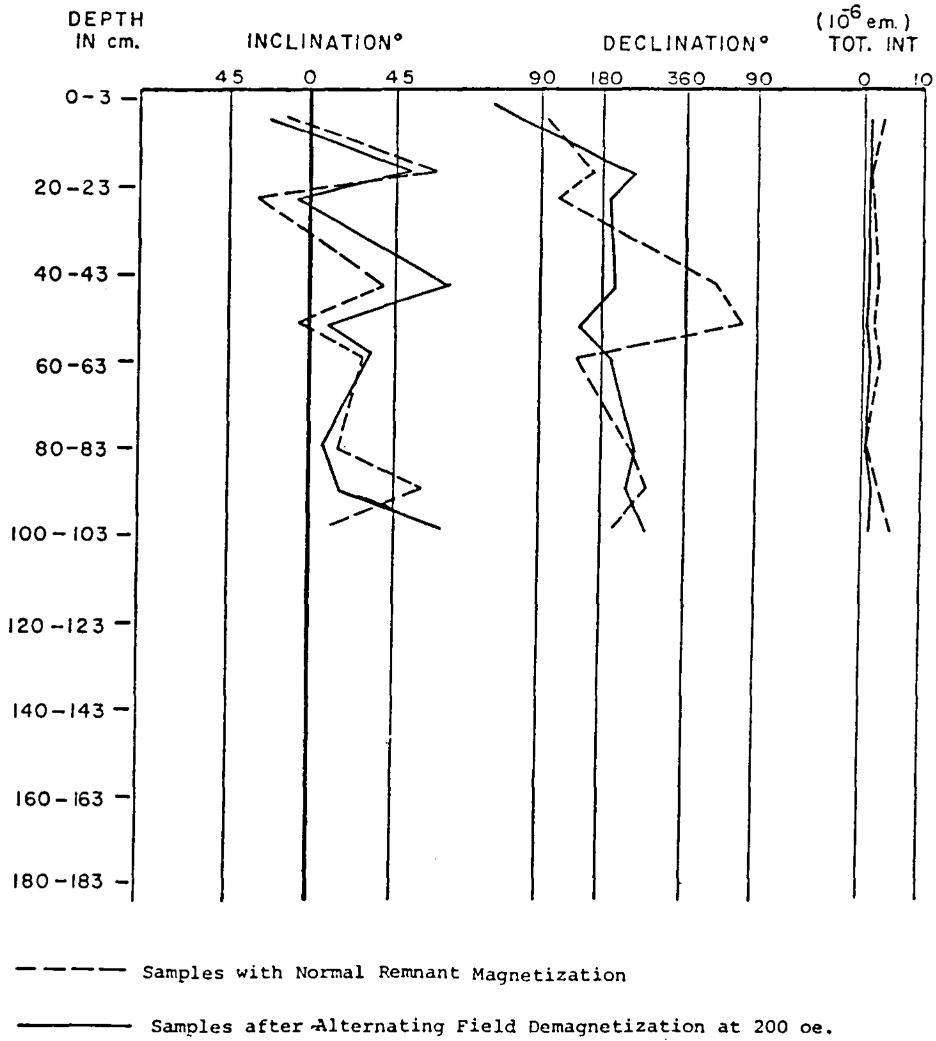


Figure 54. Average Total Intensity, Inclination and Declination Per Sample at Depth for OCS-GS Core No. 42.

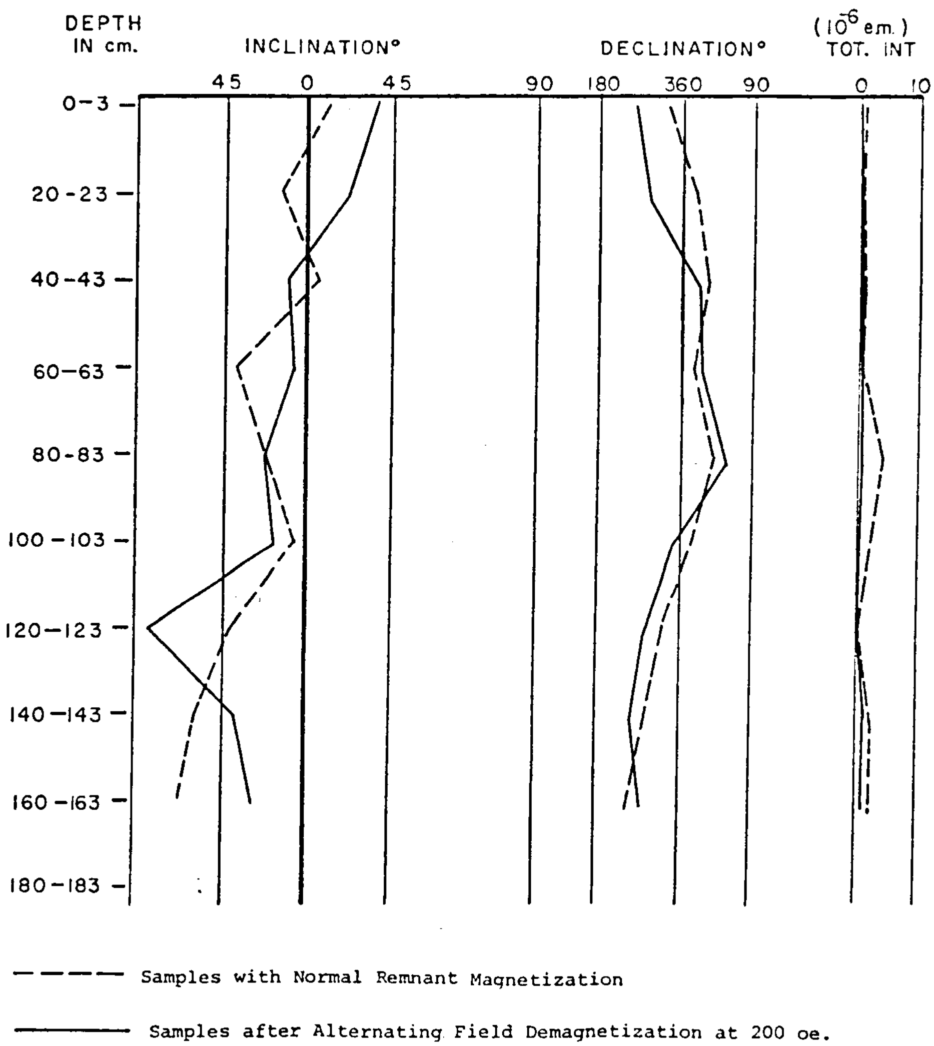


Figure 55. Average Total Intensity, Inclination and Declination per Sample at Depth for OCS-GS Core No. 70.

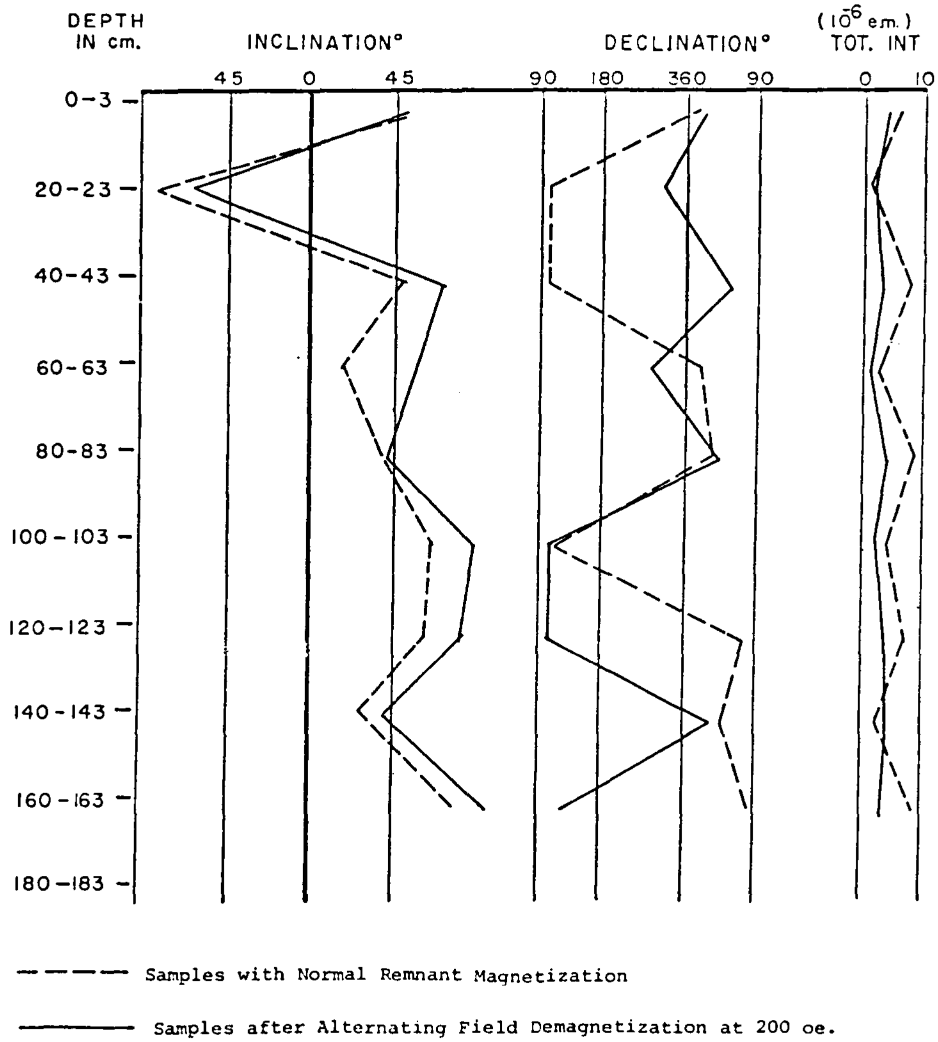
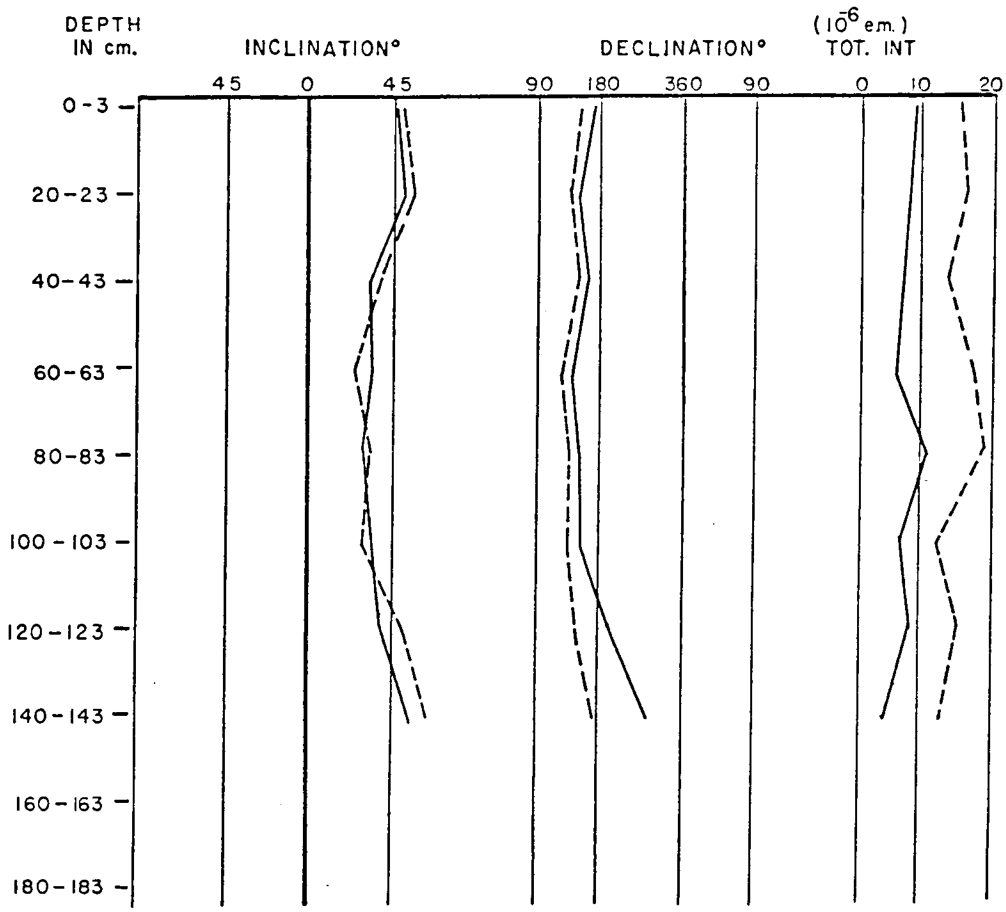


Figure 56. Average Total Intensity, Inclination and Declination per Sample at Depth for OCS-GS Core No. 95.



———— Samples with Normal Remnant Magnetization

———— Samples after Alternating Field Demagnetization at 200 oe.

Figure 57. Average Total Intensity, Inclination and Declination per Sample at Depth for OCS-GS Core No. 115.

reversed field. Core 115 was as normal as would be expected from the biostratigraphy (Figure 52). Cores 42 and 95 may well represent transitional phases between areas of high and no deposition on the shelf, with respect to a particular time interval. Sedimentation varies proportionately to position of the shelf. There is a sand-sized fraction increase toward shore indicating a higher energy regime toward shore. Core 115 was taken from a location dominated mainly by clay deposition, representative of biogenous pelagic sedimentation and suspended sediment influx. This homogeneous clay occurred only at the outer shelf edge. Also sedimentation rate can be a controlling factor in compression, diagenesis, and lithification of sediments, all of which control the degree of magnetic orientation. Areas of high rates of sedimentation have shown anomalous magnetic inclinations. A wide range of paleoenvironments may be represented by this different sedimentation. In our analysis, a lack of polar reversals was just as significant as the presence of them.

CONCLUSIONS AND INDICATORS

From the previous results and discussion it was apparent to us that the shelled microplankton and microbenthon were very good environmental indicators. Our studies indicated that these organisms may be efficiently used to: 1) indicate water mass distributions and movements by use of indicator species and cluster groupings; 2) denote areas and relative magnitudes of upwellings and volumes and routes of currents; and 3) give indications of such things as the length of food chains (through the niche examples), and short term "health" (plankton tows and bottle samples), medium term "health" (the benthonic foraminifera), and long term "health" (the relict populations and down core studies) of the study area.

We therefore, consider one of our main objectives and contributions to be the designation of certain shelled microzooplankton and shelled microzoobenthon as indicators of various aspects of the STOCS area. These indicators have been mentioned, throughout the text and related to the specific phenomena that they indicate. However, it was considered worthwhile to mention them in this section since they are our main conclusions. The indicators are listed in abbreviated form in Table 4.

Our indicators fall into three categories: those indicative of immediate, seasonal (or yearly), and historical oceanographic conditions. Most of our effort has concerned itself with indicators of the immediate "health" of the STOCS because this is what is most useful for a monitoring program.

Immediate Indicators

Indicators of circulation include: 1) the presence of high concentrations of nassellarians, indicative of offshore waters, on the shelf indicating the movement of offshore waters onto the shelf; 2) isolated highs of nassellarians and polycystin radiolarians in general (nassellarians and spumellarians) on the shelf indicative of a pond of offshore water invading the shelf (these ponds may be common in winter); 3) the presence of *Spongotrochus glacialis*, *Chonchasma sphaerulites*, *Conchoceras caudatum*, *Tetrapyle octacantha*, *Uvigerina peregrina* and maybe *Spirocyrtis scalaris* (any of the mentioned), indicative of deeper (probably from 200 m or so) Gulf waters being upwelled and perhaps encroaching onto the shelf; 4) large concentrations of solitary centric diatoms and or *Brizalina lowmani* away from shallow waters are usually indicative of shallow water displacement; 5) high concentrations of Acantharians are usually indicative of freshwater runoff and in the STOCS area appear to be tags of the movement of fresh water such as the movement of the "Mississippi River water mass"

TABLE 4

INDICATORS OF OCEANOGRAPHIC CONDITIONS

Immediate Indicators:

Circulation -

1) High concentrations nassellarians=offshore (invade shelf as ponds and "fingers")
2) Upwelling or upbowing and movement of deeper open ocean Gulf water onto STOCS=presence of *Spongotrochus glacialis*, maybe *Spirocyrtis scalaris*, *Tetrapyle octacantha*, *Chonochasma sphaerulites*, *Conchoceras caudatum* and suspended *Uvigerina peregrina*.
3) Nearshore waters out to sea=high concentrations of solitary centric diatoms and or *Brizalina lowmani* in suspension.
4) A tag of brackish water movement=high concentrations of acantharians.

Depth and Benthic Position-

1) Inner and mid-shelf depths (Stations 1 and 2)=presence (usually dominance of) of *Ammonio beccari*, *Brizalina lowmani* and *Nonionella basiloba*.
2) Mid-shelf (Station 2)=*Fursenkoina pontoni*.
3) Outer shelf (Station 3)=*Uvigerina peregrina*, *Bolivina subspinescens*, *Brizalina spinata*, *Cibicides*, *Siphonina* and species of *Brizalina* and *Bolivina* not mentioned as indicators of other areas.
4) Northern STOCS (Transect I and II)=*Ammonia beccari* and *Brizalina lowmani* as dominants.
5) Southern STOCS (Transects III and IV)=*Nonionella basiloba* and *Buliminella* as dominants.

Eutrophism to Oligotrophism-

1) Solitary centric and acantharian blooms=eutrophism.
2) Mesotrophism-high concentration of radiolarians (especially nassellarians).
3) Oligotrophism=low concentrations of radiolarians (offshore types).

Seasonal (or Yearly) Indicators

Seasonality -

1) *Theopilium tricostatum*, *Spirocyrtis scalaris*, *Globigerina falconensis* and *G. quinqueloba* as dominants indicate winter.
2) Acantharians and *?Acanthocyrtidium ophiurensis* as dominants might indicate spring.

TABLE 4 CONT.'D

3) *Lamprocyclas maritalis, Euchitonia elegans, Globigerina bulloides* and *Globigerinoides ruber* as dominants indicate summer.

4) Spring also indicated by the SDI (Spring Diatom Increase), bloom of acantharians, and the drop in densities of polycystin radiolarians and planktonic foraminiferans.

5) Seasonality indicators of benthon dominants include: *Nonionella basiloba* and *Brizalina lowmani* for winter; and, *Brizalina spinata* and species of *Buliminella, Cibicides* and *Fursenkoina* for spring.

Eutrophism to Oligotrophism-

1) Eutrophism=an increase in *Brizalina lowmani* to dominance with a general decline in benthonic foraminiferal standing corp.

2) Oligotrophism=shared dominance of many benthonic foraminiferan species and a general increase in benthonic foraminiferan standing crops.

Historical Indicators

STOCS Area Relatively Unchanged for Millions of Years (in Part)

1) Relict populations of *Spongaster pentas, S. berminghami, S. cruciferus,* "circular" and "eliptical" spongasters.

elliptical

Down Core "Micropaleontological Indicators"

1) Paleotemperatures=Interglacial or warm (*Globorotalia menardii* complex, *Pulleniatina obliquiloculata* and *Sphaeroidinella dehiscens*); marginally warm (*Globorotalia truncatulinoides* and *Globigerinoides sacculifer*); and, cold water or glacial (*Globigerina bulloides* and *Globigerina falconensis*).

2) Sea level changes are indicated by the changes downcore in the dominance of the species indicative of depth under immediate indicators-depth and benthic position in this table.

in the spring; 6) deflections in the contours of radiolarian densities and diversities are indications of the direction of shelf water movement and these can, in turn, be tied to: nearshore movements to the offshore [by deflection of high concentrations of acantharians or spumellarians (especially the armed, spongy ones) offshore]; shallow offshore water movement onto the shelf (by high concentrations of radiolarians in general and especially nassellarians and high concentrations of planktonic foraminifera); deeper or bottom offshore and deeper or bottom shelf water (by following those species mentioned as indicators of upwelling, onto and around the shelf).

Indicators of depth and benthic position on the shelf include: *Ammonia beccari*, *Brizalina lowmani* and *Nonionella basiloba*, indicative of inner and mid-shelf depths (Stations 1 and 2); *Fursenkoina pontoni*, indicative of mid-shelf (Station 2); and, *Uvigerina peregrina*, *Bolivina subspinescens*, *Brizalina spinata*, *Cibicides*, *Siphonina* and species of *Brizalina* and *Bolivina* not mentioned as indicators of other areas, appear to be indicative of the outer shelf (Station 3).

The dominances of *Ammonia beccarii* and *Brizalina lowmani* are indicative of the northern two transects (Transects I and II); and the dominances of *Nonionella basiloba* and species of *Buliminella* are indicative of the southern two transects (Transects III and IV).

Seasonal Indicators

Indicators of eutrophic and oligotrophic conditions include: 1) solitary centric diatoms and acantharians in abundance (blooms) are indicative of eutrophism in the water column; and, 2) high concentrations of radiolarians (especially nassellarians) are indicative of "oligotrophism" (really mesotrophism) in the water column and usually represent offshore water (that is, more "oligotrophic" than the shelf waters penetrating the shelf).

Indicators of seasonality for the plankton include: 1) *Theopilium tricostatum, Spirocyrtis scalaris, Globigerina falconensis* and *Globigerina quinqueloba,* indicative of STOCS winter; 2) acantharians and *?Anthocyrtidium ophiurensis,* indicative of STOCS spring; and, 3) *Lamprocyclas maritalis, Euchitonia elegans, Globigerina bulloides* and *Globigerinoides ruber*, indicative of summer. Highly visible indicators of the spring plankton are the SDI (spring diatom increase), the bloom of acantharians and the drop in densities of polycystin radiolarians and planktonic foraminiferans. Indicators of seasonality in the benthon include: 1) *Nonionella basiloba* and *Brizalina lowmani* that dominate in the winter; and, 2) *Brizalina spinata,* species of *Buliminella, Cibicides* and *Fursenkoina* that dominate in the spring along with an increase in benthonic foraminiferan standing crops. A dominance of *Brizalina lowmani* in sediment samples (sometimes associated with a general decline in benthonic foraminiferal standing crop) is indicative of the reflection of eutrophism in the overlying waters.

Historical Indicators

Down Core, Relict and Micropaleontological

Indicators that the Gulf of Mexico and STOCS study area have been relatively unchanged over millions of years when compared to other regions of the world in general are the presence of *Spongaster pentas, S. berminghami, S. cruciferus,* "circular" spongasters and "elliptical" spongasters that exist in the area but died out in other areas about 4 million years ago.

Down core indicators (micropaleontological indicators) include: 1) the *Globorotalia menardii* complex, *Pulleniatina obliquiloculata* and *Sphaeroidinella dehiscens* that are indicative of interglacial or warm water conditions; 2) *Globorotalia truncatulinoides* and *Globigerinoides* *sacculifer* that are marginally warm indicators; and 3) *Globigerina bulloides* and *Globigerina falconensis* that are cold water or glacial indicators. Indicators for changes in sea level are the same that are used for depth position on the present day shelf.

It is also a worthwhile exercise to attempt to use some of these indicators to review the basic physical oceanographic patterns of the STOCS, 1975. Figure 2 illustrates the general physical oceanographic patterns derived from Berryhill (1976) and Smith (personal communication and Parker, 1976) and the related "physical oceanographic patterns" derived from studies of the shelled microplankton studied by our group for the STOCS, 1975.

There apparently was a net transport to the southwest during the winter, most probably related to "northers". There was an apparent drift all along the shelf, with perhaps enough coriolis effects to produce an upbowing of deep shelf waters onto the shelf and a breakoff and transport of ponds of offshore water onto the shelf (Figure 2). During the spring there was a lens of Mississippi River water moving south and offshore producing a strong "estuarine upwelling" along with a net transport south. The combination of the coriolis effect and fresh water moving offshore producing the "open ocean estuarine effect" upwelling described above, appeared to produce the greatest upwelling of any season. The summer pattern showed the effects of shallow open Gulf water impinging on the shelf, with some upwelling.

Appendicies A through G contain the raw and processed data supportive of this report on the shelled microplankton, general microplankton and microzoobenthon of the STOCS for 1975.

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APPENDICIES

APPENDIX A

1975 Q-Mode Cluster Characteristics

Explanation of Table:

This table is a key to Figure 13, Page 31 of the text.

APPENDIX A CONT.'D

WIN 1 Stations 2/III and 3/I, 3/II, 3/III, 10 m and 25 m (1/2 photic zone) characterized by silicoflagellates (1%) presence of *Oikopleura* (1%), meroplanktonic polychaete (1%) and acantharians (3%).

WIN 2 Stations 2/II and 1/IV 10-18 m characterized high percentage phytoplankton (85%) centric solitary diatoms dominant (72%) zooplankton (10%).

WIN 3 Stations 1/IV and 3/IV 7-10 m phytoplankton composed of centric solitary diatoms (46%) and dinoflagellates (15%) copepod-naupliar larvae total (26%), presence of echinoderm larvae (2%).

WIN 4 Stations 1/I and 2/I, 2/IV and 3/IV, and 3/II, predominantly 1/2 photic zone, phytoplankton totals include diatoms (49%) [centric dominant (40%)], dinoflagellates (4%)(*Ceratium*); calanoid copepod-naupliar larvae total similar to WIN 3 (27%); also characterized by presence of acantharians (2%), coelenterates (1%), and meroplanktonic polychaetes (1%).

WIN 5 Stations 2/I and 3/I, phytoplankton totals (51%) include no dinoflagellates; pennates dominant (34%); shelled microplankton very abundant, spumellarians (1%) acantharians (9%) benthonic foraminiferans (1%), fecal pellets quite high (26%), calanoid copepod-naupliar larvae totals very low (3%).

SPR 1 Stations 1/II and 1/I, (1/2 photic zone), low salinity waters, only zooplankton present are coelenterates (5%), phytoplankton (65%), centric solitary diatoms and pennate colonial diatoms dominate; very high number fecal pellets (27%).

SPR 2 Stations 2/II and 2/IV, 1/II, 1/I and 1/IV, 10 m, low salinity, zooplankton (3%), phytoplankton (93%), pennate colonial diatoms dominant.

SPR 3 Stations 1/IV and 2/IV (1/2 photic zone), 11 and 14 m, characterized by presence of benthonic foraminiferans (2%), coelenterates (1%), meroplanktonic polychaetes (8%), clams (2%).

SPR 4 Stations 3/II and 3/III and 2/II, characterized by *Ceratium* (12%) *Trichodesmium* bloom (15%), and tintinnids (12%), developing eggs (1%), diatoms relatively low (42%).

SPR 5 Stations 2/I and 3/II characterized by presence of harpacticoid copepods (2%) in water column and high abundance of fecal pellets (26%).

SUM 1 Stations 1/II and 1/IV (1/2 photic zone), 13 and 11 m characterized by high relative abundance of tintinnids (14%), meroplanktonic polychaetes (6%) and presence of *Oikopleura* (1%).

APPENDIX A CONT.'D

SUM 2 Stations 1/II and 1/III and 2/IV, 10 m, characterized by higher percentage phytoplankton (68%), than SUM 1 and greater abundance of copepods (6%), meroplanktonic polychaetes present in lower amount (1%).

SUM 3 Stations 2/I and 3/I and 3/III, (1/2 photic zone and 10 m), characterized by extremely low phytoplankton total (22%) and extremely high calanoid copepod-naupliar larvae total (45%).

SUM 4 Stations 3/II, 3/III, 3/IV, 77-105 m, deep water cluster, very low phytoplankton total (31%), foraminiferans relatively high; benthonic foraminiferans (2%), planktonic foraminiferans (1%), coelenterates, holoplanktonic and meroplanktonic polychaetes all present at 1% level; best representation of copepod groups; calanoid (5%), harpacticoid (1%), cyclopoid (2%), only cluster with ostracods present (4%), fecal pellets high (22%).

SUM 5 Stations 3/I, 2/III, 10 m, phytoplankton total (53%), dominated by centric solitary diatoms (16%) and dinoflagellates (21%), many rare groups spumellarians (2%), planktonic foraminiferans (1%), shelled pteropods (1%), clams (1%), and echinoderm larvae (1%) present; highest percentage of calanoid copepods in 1975 (23%).

APPENDIX B

SUMMARY OF MICROPLANKTON GROUP ABUNDANCES AND STATISTICAL INFORMATION COMPUTED FROM 1975 NISKIN DATA

Explanation of Table:

Maximum = greatest number of the particular organism found in any one sample

Minimum = least number of particular organism occurring in any one sample

Mean = average number of the particular organism computed from all samples

Standard Deviation = the average range of the number of organisms about the mean (+ or -)

Coefficient of Variation = the standard deviation divided by the mean (used to determine if the mean has any real significance)

No. of Occurrence = total number of samples in which a particular organism was counted

Mean of Presence = mean number of organisms computed only from those samples in which the organism was counted.

Sum of Presence = a measure similar to the mean value which takes into account the number of occurrence, mean, and mean of presence; a more conservative estimate than either mean value

APPENDIX B CONT.'D

		MAXIMUM	MINIMUM	MEAN	STANDARD DEVIATION	COEFF. OF VARIATION	NO. OF OCCUR.	MEAN OF PRESENCE	SUM OF PRESENCE
1	CEN SOL DIATOMS	0.75	0.0	0.22	0.16	0.73	97	0.22	21.
2	CEN COL DIATOMS	0.42	0.0	0.06	0.09	1.61	54	0.11	6.
3	PEN SOL DIATOMS	0.35	0.0	0.06	0.06	0.94	90	0.06	6.
4	PEN COL DIATOMS	0.94	0.0	0.13	0.17	1.35	78	0.16	12.
5	PERIDINIUM	0.09	0.0	0.01	0.01	1.77	38	0.02	1.
6	GONYAULAX	0.06	0.0	0.00	0.01	2.37	21	0.02	1.
7	DINOPHYSIS	0.11	0.0	0.00	0.01	2.79	20	0.02	0.
8	CERATIUM	0.24	0.0	0.04	0.05	1.19	72	0.02	0.
9	NOCTILUCA	0.18	0.0	0.00	0.02	7.53	5	0.06	4.
10	DINOFLAGELLATES	0.06	0.0	0.00	0.01	3.42	12	0.05	0.
11	SILICOFLAGELLATE	0.02	0.0	0.00	0.00	2.71	13	0.02	0.
12	EBRIDIANS	0.01	0.0	0.00	0.00	6.96	2	0.01	0.
13	TRICHODESMIUM	0.27	0.0	0.02	0.05	2.41	36	0.01	0.
14	COCCOLITHOPHORES	0.0	0.0	0.0	0.0	0.0	0	0.06	2.
15	SPUMELLARIANS	0.04	0.0	0.00	0.01	2.28	20	0.0	0.
16	NASSELLARIANS	0.01	0.0	0.00	0.00	4.87	4	0.02	0.
17	ACANTHARIANS	0.21	0.0	0.02	0.03	2.15	36	0.01	0.
18	PHAEODARIANS	0.0	0.0	0.0	0.0	0.0	0	0.04	2.
19	BEN FORAMS	0.10	0.0	0.00	0.01	3.39	18	0.0	0.
20	PLANK FORAMS	0.08	0.0	0.00	0.01	2.17	30	0.02	0.
21	TINTINNIDS	0.25	0.0	0.03	0.04	1.26	71	0.02	0.
22	CILIATA	0.0	0.0	0.0	0.0	0.0	0	0.05	3.
23	EGGS	0.03	0.0	0.00	0.00	3.57	9	0.0	0.
24	COELENTERATES	0.05	0.0	0.00	0.01	2.22	25	0.01	0.
25	SIPHONOPHORES	0.01	0.0	0.00	0.00	9.90	1	0.02	0.
26	CTENOPHORES	0.0	0.0	0.0	0.0	0.0	0	0.01	0.
27	SALP (DOLIOLUM)	0.02	0.0	0.00	0.00	4.19	6	0.0	0.
28	SALP (OIKOPEURA)	0.06	0.0	0.00	0.01	3.71	9	0.01	0.
29	SHELLED PTEROPOD	0.05	0.0	0.00	0.01	1.87	30	0.03	0.
30	NON-SHELLED PTER	0.01	0.0	0.00	0.00	9.90	1	0.01	0.
31	CHAETOGNATHS	0.06	0.0	0.01	0.01	1.38	51	0.01	0.
32	HOLOP POLYCHAETE	0.02	0.0	0.00	0.00	4.58	5	0.02	1.
33	MEROP POLYCHAETE	0.10	0.0	0.01	0.02	2.05	32	0.01	0.
34	EUPHAUSIDS	0.02	0.0	0.00	0.00	9.90	1	0.03	1.
35	SHRIMP	0.0	0.0	0.0	0.0	0.0	0	0.02	0.
36	MYSIDS	0.01	0.0	0.00	0.00	9.90	1	0.0	0.
37	"MYSID STAGE"	0.0	0.0	0.0	0.0	0.0	0	0.01	0.
38	AMPHIPODS	0.0	0.0	0.0	0.0	0.0	0	0.0	0.
39	ISOPODS	0.0	0.0	0.0	0.0	0.0	0	0.0	0.
40	CUMACEANS	0.01	0.0	0.00	0.00	9.90	1	0.0	0.
41	CAL COPEPODS	0.45	0.0	0.06	0.07	1.08	87	0.01	0.
42	HARPACT COPEPODS	0.04	0.0	0.00	0.01	2.75	15	0.07	6.
43	CYCLOP COPEPODS	0.03	0.0	0.00	0.01	2.42	18	0.02	0.
44	LUCIFER	0.0	0.0	0.0	0.0	0.0	0	0.01	0.
45	NAUPLIAR LARVAE	0.47	0.0	0.15	0.11	0.76	92	0.0	0.
46	MEGALOPS	0.01	0.0	0.00	0.00	6.96	2	0.16	14.
47	ZOEA LARVAE	0.02	0.0	0.00	0.00	9.90	1	0.01	0.
48	OSTRACODS	0.16	0.0	0.00	0.02	5.03	13	0.02	0.
49	CLADOCERA PODON	0.02	0.0	0.00	0.00	7.35	2	0.03	0.
50	CLADOCERA EVADNE	0.02	0.0	0.00	0.00	5.89	3	0.02	0.
51	ECHINODERM	0.10	0.0	0.00	0.02	4.41	16	0.02	0.
52	SNAIL VELIGERS	0.0	0.0	0.0	0.0	0.0	0	0.03	0.
53	CLAMS	0.23	0.0	0.01	0.02	3.76	24	0.0	0.
54	BRYOZOANS	0.0	0.0	0.0	0.0	0.0	0	0.03	1.
55	TROCHOPHORES	0.01	0.0	0.00	0.00	9.90	1	0.0	0.
56	TUNICATES	0.01	0.0	0.00	0.00	9.90	1	0.01	0.
57	DEVELOPING EGGS	0.03	0.0	0.00	0.01	2.93	13	0.01	0.
58	FISH EGGS	0.01	0.0	0.00	0.00	9.90	1	0.01	0.
59	JUVENILE FISH	0.0	0.0	0.0	0.0	0.0	0	0.01	0.
60	FECAL PELLETS	0.67	0.0	0.09	0.12	1.31	62	0.0	0.
								0.11	9.

APPENDIX C

ERROR OF ESTIMATE

TABLE 1

COUNTING REPLICATES USED IN ERROR ANALYSIS

Explanation of Table:

A sample was taken with sufficient numbers of organisms present in order to test the error of estimate present in using averages computed from only counting 100 organisms. The first 100 organisms counted are replicate 1, the second 100 are replicate 2, and so on. This replicate information is used to compute the mean values for subsamples of 100, 200 and so on for the ANOVA test.

Replicates	1	2	3	4	5
Total Number Groups	9	9	9	9	9
Centric Solitary Diatoms	43	44	36	45	38
Centric Colonial Diatoms	16	40	34	28	33
Pennate Solitary Diatoms	1	3	2	1	0
Pennate Colonial Diatoms	28	10	22	23	24
Ceratium	2	0	1	0	0
Peridinium	1	2	1	2	0
Noctiluca	1	0	0	0	0
Naupliar Larvae	1	0	0	0	0
Fecal Pellets	7	1	4	1	5

TABLE 2

COMPUTATION OF TOTAL ERROR OF ESTIMATE
IN COUNTING PROCEDURES USED (NISKIN DATA)

	Mean	Standard Deviation	Coefficient Of Variation	Percent of Total Variation
Centric Solitary Diatoms	41.2	3.96	.048	1.98
Centric Colonial Diatoms	30.2	9.01	.149	4.50
Pennate Solitary Diatoms	1.4	1.14	.407	.57
Centric Colonial Diatoms	21.4	6.76	.158	3.38
Peridinium	1.2	.84	.349	.42
Fecal Pellets	3.6	2.61	.36	1.30
Total Variation in Counting Procedure =				12.15

TABLE 3

ANALYSIS OF VARIANCE PROBLEM USED TO TEST COUNTING PROCEDURES

Explanation of Table:

The problem was set up to test whether or not a subsample of 100 organisms was statistically different from one of 200, 300 and so on. That is, are the realtive abundance averages obtained for counts of 100 organisms significantly different from relative abundance averages obtained by counting 200, 300, and so on? In this case the results of the ANOVA test indicate the differences are not significant.

TABLE 3

ANALYSIS OF VARIANCE PROBLEM USED TO TEST COUNTING PROCEDURES

H_0: The difference between replicates is due to random effects (*i.e.* the same population is represented in each subsample).

The measurements represent the mean values for the organisms present in each sample.

Subsample Number	1	2	3	4	5
Count Totals	100	200	300	400	500
	43	43.5	41	42	41.2
	16	28	30	29.5	30.2
	1	2	2	1.25	1.4
	28	19	20	20.75	21.4
	1	1.5	1.33	1.5	1.2
	7	4	4	3.25	3.6
X_i =	96	98	98.33	98.25	99

$X_{..} = 489.58$

$\bar{\bar{X}} = 97.916$

$X^2_{..} = 239688$

$$A = \sum_i \frac{X^2_{i.}}{J} = 7990.47515 \qquad B = \frac{X^2_{..}}{IJ} = 7989.6$$

$$C = \sum_i \sum_j X^2_{ij} = 15165.65664$$

ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Columns	A–B	4	0.87515	0.00762
Within Columns	C–A	25	7174.78125	
Total	C–B	29	7175.65664	

F of rejection (4 and 25 degrees of freedom, 99.9 confidence level) = 6.49

FIGURE 1

GRAPH OF GROUPS VS NUMBER OF ORGANISMS COUNTED

Explanation of Figure:

The graph is used to depict whether or not under representation of the total number of microplankton groups (*i.e.* different types of organisms) is factor in only counting 100 organisms. In this case it is not.

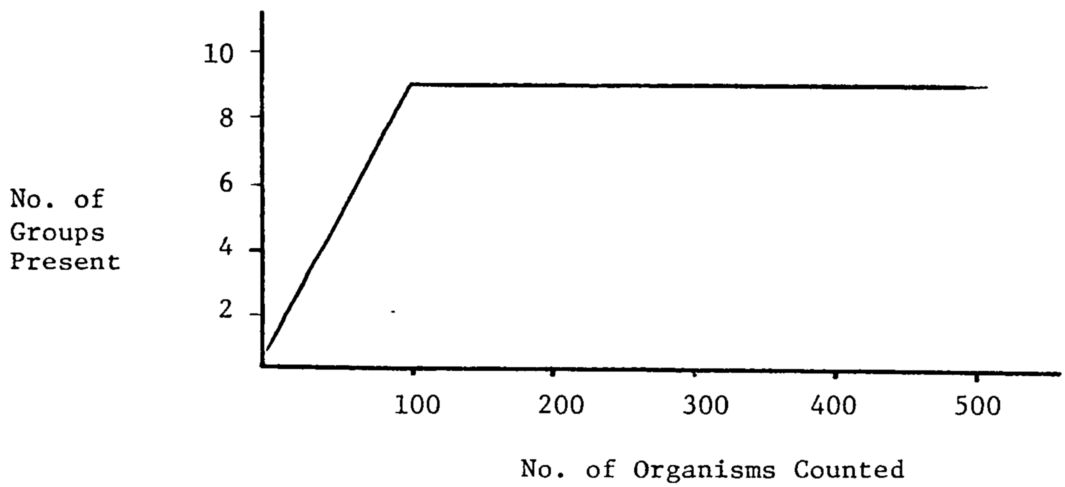

Figure 1. Groups Vs. Number of Organisms Counted.

APPENDIX D

SPECIES LIST OF RADIOLARIA AND FORAMINIFERA

SPECIES LIST OF RADIOLARIA AND FORAMINIFERA

SUBCLASS RADIOLARIA
SUPERORDER POLYCYSTINA
ORDER SPUMELLARIA

FAMILY COLLOSPHAERIDAE
- *Choenicosphaera* sp.
- *Collosphaera tuberosa*
- *Disolenia zanquebarica*
- *Siphonosphaera polysiphonia*

FAMILY ACTINOMMIDAE
SUBFAMILY ARTISCINAE
- *Cypassis irregularia*
- *Ommatartus tetrathalamus*

SUBFAMILIES NOT DESIGNATED
- *Actinoma* 1
- *Actinoma* cf. *medianum*
- *Astrosphaera* 3
- Astrosphaerid 1
- Astrosphaerid 2
- Astrosphaerid 3
- Cenosphaerid 1
- Cenosphaerid 4
- Cenosphaerid 5
- *Cladococcus scoparus*
- Cubosphaerid 1
- Cubosphaerid 2
- *Drymosphaera polygonalis*
- Radiolarian 1
- Radiolarian 2
- Radiolarian 3
- Sphaerid 1
- Sphaerid 2
- *Spongosphaera streptacantha*
- *Stylacontrarium bispiculum*

FAMILY PHACODISCIDAE
- *Heliodiscus asteriscus*

FAMILY SPONGODISCIDAE
- *Euchitonia furcata*
- *Euchitonia elegans*
- *Hymeniastrum profundum*

"Spongasters"
- "Circular" spongaster
- "Elliptical" spongaster
- *Spongaster berminghami*
- *Spongaster cruciferus*
- *Spongaster pentas*
- *Spongaster tetras irregularis*
- *Spongaster tetras tetras*
- *Spongobrachium ellipticum*

"Spongotrochids"
Spongotrochus geddessi
Spongotrochus glacialis

Others
Spongosphaerid 1

FAMILY PYLONIIDAE
Hexapyle dodecantha
Tetrapyle octacantha 1
Tetrapyle octacantha 2

ORDER NASSELLARIA
SUBORDER SPYRIDA
Acanthodesma viniculata
Spyroid 3
Spyroid 4

SUBORDER CYRTIDA
FAMILY PLAGONIIDAE
Callimitra sp.
Helotholus 1
Helotholus 3
Lophophaena sp.
Peridinium spinipes
Pteropilium stratiloides
Theopilium tricostatum

FAMILY THEOPERIDAE
Bathypyramis
Calocyclas 1
Calocyclas 2
Eucyritidium accuminatum
Lithopera bacca
Nassellarian 1
Pterocanium praetextum praetextum
Pterocanium praetextum eucolpum
Pterocanium trilobum

FAMILY PTEROCORYTHIDAE
Anthocyrtidium cineraria
Lamprocyclas maritalis polypora
Lamprocyclas maritalis maritalis
Lipmanella vichowii
Pterocorys sp.
Pterocorys zancleus
Theocorythium trachelium dianae
Theocorythium trachelium trachelium

FAMILY ARTOSTROBIIDAE
Spirocyrtis 2
Spirocyrtis scalaris

FAMILY CANNOBOTRYIDAE

Botryocyrtis scutum

SUPERORDER ACANTHARINA

Acantharian spp.

SUPERORDER PHAEODARINA

Conchasma sphaerulites
Conchoceras caudatum

PLANKTONIC FORAMINIFERA SPECIES

Globigerina bulloides
Globigerina bulloides falconensis
Globigerina falconensis
Globigerina cf. *incompta*
Globigerina pachyderma
Globigerina quinqueloba
Globigerina rubescens
Globigerina sp.
Globigerinella aequilateralis
Globigerinoides ruber
Globigerinoides tenellus
Globorotalia cf. *tosaensis*
Globorotalia truncatulinoides
Orbulina universa
Pulleniantina obliquiloculata

BENTHONIC FORAMINIFERA TAKEN IN PLANKTON TOWS

Angulogerina bella
Bolivina spinata var. *costata*
Bolivina lowmani
Bolivina subaenariensis var. *mexicana*
Bolivina sp.
Bulmina aculeata
Cassidulina curvata
Cassidulina subglobosa
Cibicides concentricus
Cibicides mollis
Eponides tumidulus
Eponides sp.
Fissurina cf. *crassicarinata*
Fissurina sp.
Gyroidina sp.
Marginulina sp.
Neoeponides antillarum
Nonionella basiloba
Planulina sp.
Quinqueloculina compta

Russella cf. *miocenica*
Strebulus beccari
Uvigerina auberiana var. *laevis*
Uvigerina hispido-costata
Uvigerina peregrina
Valvulineria cf. *araucana*

BENTHONIC FORAMINIFERA

ORDER FORAMINIFERIDA
SUBORDER TEXTULARIINA
FAMILY SACCAMMINIDAE
Lagenammina atlantica (Cushman)

FAMILY HORMOSINIDAE
Reophax comprima (Phleger and Parker)

FAMILY LITUOLIDAE
Ammoscalaria pseudospiralis (Williamson)

FAMILY TEXTULARIIDAE
Bigenerina irregularis Phleger and Parker
Siphotextularia affinis (Fornasini)
Siphotextularia rolshauseni Phleger and Parker
Textularia candeiana d'Orbigny
Textularia parvula Cushman

FAMILY ATAXOPHRAGMIDAE
Eggerella scabra (Williamson)
Gaudryina cf. *aequa* Cushman

SUBORDER MILIOLINA
FAMILY MILIOLIDAE
Miliolinella warreni Anderson
Quinqueloculina compta Cushman
Quinqueloculina oblonga Reuss

SUBORDER ROTALINA
FAMILY NODOSARIIDAE
Dentalina sp.
Lagena nubulosa Cushman
Lagena spirata Bandy
Lenticulina calcar (Linne)
Saracenaria sp.

FAMILY TURRILINIDAE
Buliminella elegantissima (d'Orbigny)
Buliminella cf. *bassendorfensis* Cushman and Parker
Spirobolivina sp.

FAMILY BOLIVINITIDAE

Bolivina subspinescens Cushman
Brizalina barbata (Phleger and Parker)
Brizalina fragilis (Phleger and Parker)
Brizalina hastata (Phleger and Parker)
Brizalina lowmani (Phleger and Parker)
Brizalina mexicana (Cushman)
Brizalina ordinaria Phleger and Parker
Brizalina spinata (Cushman)
Rectobolivina advena (Cushman)

FAMILY BULIMINIDAE

Bulimina aculeata d'Orbigny
Bulimina gibba Fornasini
Bulimina marginata d'Orbigny
Reussella atlantica Cushman

FAMILY UVIGERINIDAE

Sagrina pulchella (d'Orbigny) var. *primitiva* (Cushman)
Trifarina bella (Phleger and Parker)
Trifarina jamaicensis (Cushman and Todd)
Uvigerina bellula Bandy
Uvigerina parvula Cushman
Uvigerina peregrina Cushman

FAMILY DISCORBIDAE

Bucella hannae (Phleger and Parker)
Cancris sagra (d'Orbigny)
Epistominella vitrea Parker
Stetsonia minuta Parker

FAMILY SIPHONINIDAE

Siphonina bradyana Cushman
Siphonina pulchra Cushman

FAMILY ROTALIIDAE

Ammonia beccarii (Linne)
Ammonia pauciloculata (Phleger and Parker)

FAMILY ELPHIDIIDAE

Elphidium gunteri Cole
Elphidium poeyanum (d'Orbigny)

FAMILY EPONIDIDAE

Eponides repandus (Fichtel and Moll)
Neoeponides antillarum (d'Orbigny)

FAMILY CIBICIDIDAE

Cibicides aff. *floridanus* (Cushman)
Cibicides mollis Phleger and Parker
Cibicides sp.
Cibicides umbonatus Phleger and Parker

FAMILY CAUCASINIDAE

Fursenkoina complanata (Egger)
Fursenkoina compressa (Bailey)
Fursenkoina pontoni (Cushman)
Fursenkoina spinicostata (Phleger and Parker)
Virgulinella pertusa Reuss

FAMILY LOXOSTOMIDAE

Loxostomum sp.

FAMILY CASSIDULINIDAE

Cassidulina subglobosa Brady

FAMILY NONIONIDAE

Florilus astricta (McCulloch)
Florilus atlanticus (Cushman)
Florilus grateloupi (d'Orbigny)
Nonionella basiloba Cushman and McCulloch

FAMILY ANOMALINIDAE

Hanzawaia strattoni (Applin)
Milonis barleeanus (Williamson)

FAMILY CERATOBULIMINIDAE

Hoeglundina elegans (d'Orbigny)

APPENDIX E

GENERAL MICROPLANKTON DATA SHEET

PLANKTON DATA SHEET - MICROPALEONTOLOGY LAB. RICE UNIVERSITY

STATION ________ TYPE OF SAMPLE ________ DATE ________

DEPTH ________ TIME OF DAY ________

OTHER ________

% SAMPLE USED = ____

SHADED = AMOUNT AREA COVERED IN COUNTING 100

PHYTOPLANKTON

- DIATOMS
  - CENTRIC SOLITARY ________
  - CENTRIC COLONIAL ________
  - PENNATE SOLITARY ________
  - PENNATE COLONIAL ________
- DINOFLAGELLATES
  - PERIDINIUM ________
  - GONYAULAX ________
  - DINOPHYSIS ________
  - CERATIUM ________
  - NOCTILUCA ________
  - OTHER ________
- SILICOFLAGELLATES ________
- EBRIDIANS ________
- TRICHODESMIUM ________
- COCCOLITHOPHORES ________
- NAKED FLAGELLATES ________
- OTHER ________

____

____

ZOOPLANKTON

- PROTOZOA
  - RADIOLARIANS
    - SPUMELLARIANS ________
    - NASSELLARIANS ________
    - ACANTHARIANS ________
    - PHAEODARIANS ________
  - FORAMINIFERANS
    - BENTHONIC ________
    - PLANKTONIC ________
  - TINTINNIDS ________
  - CILIATA (OTHER THAN TINTINNIDS) ________

    ____
  - OTHER PROTOZOA ________

    ____

METAZOA

- EGGS ________
- COELENTERATES ________
- SIPHONOPHORES ________
- CTENOPHORES ________
- SALPS
  - DOLIOLUM ________
  - OIKOPEURA ________

____

____

PTEROPODS

- SHELLED ________
- NON-SHELLED ________

CHAETOGNATHS ________

POLYCHAETES

- HOLOPLANKTONIC ________
- MEROPLANKTONIC ________

CRUSTACEANS

- EUPHAUSIDS ________
- SHRIMP ________
- MYSIDS ________
- "MYSID STAGE" ________
- AMPHIPODS ________
- ISOPODS ________
- CUMACEANS ________
- COPEPODS
  - CALANOID ________
  - HARPACTICOID ________
  - CYCLOPOID ________
- LUCIFER ________
- NAUPLIAR LARVAE ________
- MEGALOPS ________
- ZOEA ________
- OSTRACODS ________
- CLADOCERANS
  - PODON ________
  - EVADNE ________

MEROPLANKTON OF BENTHONIC INVERTS

- ECHINODERM ________
- SNAILS (VELIGERS) ________
- CLAM ________
- BRYOZOAN ________
- TROCHOPHORE ________
- TUNICATE (TADPOLE) ________
- OTHER ________

  ____

MEROPLANKTON OF NEKTON

- DEVELOPING EGG ________
- FISH EGG ________
- JUVENILE FISH ________

FECAL PELLETS ________

____

ORGANIC DETRITUS ________

SEDIMENT ________

APPENDIX F

DATA SHEETS FOR SHELLED MICROZOOPLANKTON-MICROZOOBENTHON, WINTER, SPRING AND SUMMER 1975

Explanation:

Densities (Numbers/m^3)

SHELLED ZOOPLANKTON DENSITIES-B.L.M.STUDY

DENSITIES(NOS./CU.M.)-WINTER-1974

RADIOLARIAN SPECIES-LIVES

SPECIES NAME	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
	STATION NUMBER AND TRANSECT											
S.TETRAS TETRAS	0.0	3.29	0.60	0.0	0.0	0.60	0.0	1.65	4.33	0.0	0.0	0.0
S.BERMINGHAMI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.66	0.0	0.0	0.0
S.CRUCIFERUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.66	0.0	0.0	0.0
S.PENTAS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
CIRC.SPONGADISC	0.0	1.64	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
ELLIP.SPONGODISC	0.0	0.82	0.0	0.0	0.0	0.0	0.0	0.0	0.66	0.0	0.0	0.0
S.(AFF)ELLIPTIC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H.PROFUNDUM AD.	0.0	0.58	0.30	0.0	1.47	0.90	0.0	1.65	5.67	0.0	4.51	1.55
H.PROFUNDUM JUV	0.0	1.64	0.60	3.21	0.0	0.90	0.0	4.97	5.00	0.0	7.52	1.94
ASTROSPHAERA 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
E.FURCATA	0.0	0.82	0.0	0.0	0.0	0.0	0.0	0.55	1.33	0.0	1.50	0.38
E.ELEGANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.75	0.0
?S.GEDDESSI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.66	0.0	0.0	0.0
S.GLACIALIS AD.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	1.55
S.GLACIALIS JUV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.0	0.38
CHUENICOSPHAERA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H.ASTERISCUS	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CENOSPHAERA 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.SIPHON.POLYSI	0.0	0.0	0.0	0.0	0.0	3.32	0.0	0.0	0.0	0.0	0.0	0.0
C.IRREGULARIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CYBOSPHAERID 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.66	0.0	0.0	0.0
SPHAERID 1	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
ACTINOMA 1	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	1.16
CUBOSPHAERID 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
ASTROSPHAERID 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0

ASTROSPHAERID 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
SPHAERID 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
D.TETRATHALAMUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.33	0.0	0.0	0.0
T.OCTACANTHA 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S.STREPTACANTHA	0.0	0.0	0.30	0.0	0.75	0.0	0.0	1.65	4.00	4.24	0.0	0.0
D.POLYGONALIS	0.0	0.0	0.30	0.0	0.0	0.0	0.0	1.65	0.0	0.0	0.0	0.0
S.BISPICULUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.65	0.0	0.0	0.0
S.BISPICULUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.0	0.38
SPONGOSPHAERID 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
RADIOLARIAN 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
RADIOLARIAN 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
A.(CF)MEDIANUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.SCOPARIUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CENOSPHAERA 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H.DODECANTHA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.CAUDATUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.SPHAERULITES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D.ZANGUEBARICA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.TUBEROSA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COLLOSPHAERID 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPUMELLARIAN 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CENOSPHAERID 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.QUADRANGULA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CUBOSPHAERID 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CENOSPHAERID 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A.VINICULATA	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
SPYROID 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P.SPINIPES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.65	0.0	0.0	0.0
HELOTHOLUS 1	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.33	0.0	0.0	0.0
HELOTHOLUS 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
?LOPHOPHAENA SP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.65	0.0	0.0	0.0

L.BACCA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PTEROCORYS SP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P.ZANCLEUS	0.0	0.0	1.20	0.0	0.0	0.30	0.0	1.10	1.00	0.0	0.0	0.77
L.VICHOWII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.10	0.33	0.0	0.0	0.0
P.TRILOBUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.66	0.0	0.0	0.0
NASSELASIUM 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T.TRICOSTATUM	0.0	0.0	0.99	0.0	0.0	0.0	0.0	1.10	2.33	0.0	0.0	0.38
CALOCYCLAS 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
CALOCYCLAS 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
E.ACUMINATUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.33	0.0	0.0	0.77
E.(CF)ACUMINATUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S.SCALARIS	0.0	0.0	0.0	0.0	0.0	0.30	0.0	1.65	0.33	0.0	0.0	0.0
SPIROCYRTIS 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.38
P.PRAET.PRAET	0.0	0.0	0.30	0.0	0.0	0.30	0.0	1.10	4.00	0.0	0.75	0.77
P.PRAET.EUCOLP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.33	0.0	0.0	0.0
A.CINERIA	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
B.SCUTUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
CALLIMITRA SP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
T.TRACH.DIANAE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T.TRACH.TRACH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
?P.STRATILOIDES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SPECIES ZOOPLANKTON DENSITIES-S.L.M.STUDY

DENSITIES(NOS./CU.M.)-SPRING-1975

RADIOLARIAN SPECIES-LIVES

SPECIES NAME	STATION NUMBER AND TRANSECT 1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
S.TETRAS TETRAS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
S.BERMINGHAMI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S.CRUCIFERUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S.PENTAS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CIRC.SPONGADISC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ELLIP.SPONGODISC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S.(AFF)ELLIPTIC	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
H.PROFUNDUM AD.	0.0	0.0	0.0	0.0	0.0	0.60	0.0	0.55	0.0	0.0	0.0	0.38
H.PROFUNDUM JUV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
ASTROSPHAERA 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.FURCATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.ELEGANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
?S.GEDDESSI	0.0	0.0	0.0	0.0	0.0	0.60	0.0	0.0	0.33	0.0	0.0	0.0
S.GLACIALIS AD.	0.0	0.0	0.0	0.0	0.0	0.60	0.0	1.10	0.0	0.0	0.0	0.38
S.GLACIALIS JUV	0.0	0.0	2.64	0.0	0.0	0.30	0.0	0.0	0.66	0.0	0.0	0.0
CHOENICOSPHAERA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
H.ASTERISCUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
CENOSPHAERA 1	0.0	0.82	0.0	0.0	0.0	1.81	0.0	1.10	4.67	0.0	0.0	0.0
C.SIPHON.POLYSI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.IRREGULARIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
CYBOSPHAERID 2	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
SPHAERID 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACTINOMA 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	[illegible]	0.66	0.0	0.0	0.0
CUBOSPHAERID 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ASTROSPHAERID 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ASTROSPHAERID 3	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.55	0.33	0.0	0.0	0.0
SPHAERID 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D.TETRATHALAMUS	0.0	0.82	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
T.OCTACANTHA 2	0.0	0.0	0.26	0.0	0.0	0.0	0.0	0.65	0.0	0.0	0.0	0.38
S.STREPTACANTHA	0.0	0.82	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
D.POLYGONALIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S.BISPICULUM	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
S.BISPICULUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPONGOSPHAERID 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RADIOLARIAN 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RADIOLARIAN 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A.(CF)MEDIARUM	0.0	0.0	1.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.SCOPARIUS	0.0	0.0	0.0	0.0	0.0	0.60	0.0	0.0	0.33	0.0	0.0	0.38
CENOSPHAERA 4	0.0	0.0	0.0	0.0	0.0	1.20	0.0	0.55	0.0	0.0	0.0	0.0
H.DODECANTHA	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
C.CAUDATUM	0.0	0.0	0.0	0.0	0.0	0.60	0.0	0.0	0.65	0.0	0.0	0.0
C.SPHAERULITES	0.0	0.0	0.0	0.0	0.0	4.83	0.0	0.0	4.00	0.0	0.0	0.0
D.ZANGUEBARICA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.66	0.0	0.0	0.0
C.TUBEROSA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
COLLOSPHAERID 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
SPUMELLARIAN 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.75	0.0
CENOSPHAERID 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
L.QUADRANGULA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
CUBOSPHAERID 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
CENOSPHAERID 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
A.VINICULATA	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
SPYROID 3	0.0	1.64	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P.SPINIPES	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
HELOTHOLUS 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HELOTHOLUS 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
?LOPHOPHAENA SP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

L.BACCA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.38
PTEROCORYS SP	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
P.ZANCLEUS	0.0	0.0	0.0	0.0	0.0	2.72	0.0	1.65	0.66	0.0	0.0	0.0
L.VICHOWII	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
P.TRILOBUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NASSELARIUM 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
T.TRICCOSTATUM	0.0	0.0	0.0	0.0	0.0	0.60	0.0	0.0	0.0	0.0	0.0	0.0
CALOCYCLAS 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CALOCYCLAS 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.ACUMINATUM	0.0	0.0	0.26	0.0	0.0	0.0	0.0	0.0	0.66	0.0	0.0	0.38
E.(CF)ACUMINATUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
S.SCALARIS	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
SPIROCYRTIS 2	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.33	0.0	0.0	0.0
P.PRAET.PRAET	0.0	0.0	0.0	0.0	0.0	0.60	0.0	0.55	0.0	0.0	0.0	0.0
P.PRAET.EUCOLP	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
A.CINERIA	0.0	0.0	0.0	0.0	0.0	2.11	0.0	0.0	1.00	0.0	0.0	0.0
B.SCUTUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CALLIMITRA SP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T.TRACH.DIANAE	0.0	0.0	0.0	0.0	0.0	0.30	0.0	1.10	0.0	0.0	0.0	0.0
T.TRACH.TRACH	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
?P.STRATILCIDES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0

SHELLED ZOOPLANKTON DENSITIES-B.L.M.STUDY

DENSITIES(NOS./CU.M.)-SUMMER-1975

RADIOLARIAN SPECIES-LIVES

SPECIES NAME	STATION NUMBER AND TRANSECT											
	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
P.PRAET.PRAET	0.0	0.0	0.26	0.0	1.44	0.64	0.0	0.0	0.33	0.0	0.0	1.17
S.TETRAS TETRAS	0.0	0.0	0.53	0.0	2.67	0.0	1.42	0.0	0.0	0.0	0.75	0.78
S.BERMINGHAMI	0.0	0.84	0.26	0.0	1.44	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S.PENTAS	0.0	0.0	0.0	0.0	1.44	0.0	1.42	0.0	0.0	0.0	0.0	0.0
S.?PENTAS	0.0	0.0	0.26	0.0	2.17	0.97	0.0	0.63	0.33	0.0	0.75	0.0
S.GEDDESSI	0.0	0.0	0.79	0.0	0.72	0.32	1.42	0.54	0.33	0.0	0.0	0.0
T.OCTACANTHA 1	0.0	0.0	0.0	0.0	0.0	0.97	0.0	0.0	0.67	0.0	0.0	0.0
PHAEO.SPP.	0.0	0.0	0.26	0.0	0.0	0.0	0.0	0.0	0.67	0.0	0.0	1.17
OBLONGA SP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.67	0.0	0.0	0.0
CENOSPHAERA 6	0.0	0.0	0.53	0.0	0.0	0.32	0.0	2.18	0.0	1.31	0.0	0.78
LOPHOCERP	0.0	0.0	0.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CIRC.SPONGADISC	0.0	0.0	0.0	0.0	1.44	0.32	0.0	1.09	0.0	0.0	0.75	0.39
ELLIP.SPONGODISC	0.0	0.0	0.0	0.0	1.44	0.32	0.0	0.0	0.0	0.0	0.0	0.0
H.PROFUNDUM AD.	0.0	0.84	1.58	1.81	9.39	0.64	0.66	3.27	0.0	0.0	2.26	0.78
H.PROFUNDUM JUV	0.0	1.69	2.36	0.0	25.28	3.11	2.83	6.17	2.67	0.0	0.0	0.78
ACANTHARIAN SP.	0.0	0.84	0.0	0.0	0.0	0.64	0.0	0.0	0.0	0.0	0.0	0.0
L.MARITALIS POLY	0.0	0.84	0.26	0.0	2.17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.FURCATA	0.0	0.0	0.26	0.0	0.0	0.0	0.0	1.63	0.0	0.0	0.0	0.0
E.ELEGANS	0.0	0.0	1.32	0.0	4.33	0.0	0.0	3.81	0.67	0.0	0.0	0.0
S.TETRAS IRREG.	0.0	0.0	0.0	0.0	0.72	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.SPINUS	0.0	0.0	0.0	0.0	0.72	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.B.COLLOSE.	0.0	0.0	0.0	0.0	0.0	0.32	0.0	0.0	0.0	0.0	0.0	0.0
B.INVAGINATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.36	0.0	0.0	0.0	0.0
D RING 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.51	0.0
S.GLACIALIS AD.	0.0	0.0	0.26	0.0	0.0	0.32	0.0	0.54	1.00	0.0	0.0	0.0

S.GLACIALIS JUV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.54	0.0	0.0	0.0	0.39
CYROSPHAERID 2	0.0	0.0	0.26	0.0	0.0	0.32	0.0	0.0	0.0	0.0	0.0	0.0
ACTINCMA 1	0.0	10.11	0.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
O.TETPATHALAMUS	0.0	0.0	0.53	0.0	2.17	0.0	0.0	0.0	0.0	0.0	0.0	0.39
S.STREFTACANTHA	0.0	0.84	0.79	0.0	2.17	0.0	0.0	0.54	0.0	0.0	0.0	0.39
D.PCLYCCNALIS	0.0	0.0	0.0	0.0	0.72	1.27	0.0	0.54	0.33	0.0	0.0	0.0
S.BISPICULUM	0.0	0.0	0.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.CAUDATUM	0.0	0.0	0.0	0.0	0.0	0.64	0.0	0.0	0.0	0.0	0.0	0.0
C.SPHAERULITES	0.0	0.0	0.53	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P.ZANCLEUS	1.97	0.0	0.0	0.0	0.0	0.0	0.0	1.09	0.0	0.0	0.0	0.39
L.VICHCWII	0.0	0.84	0.79	0.0	0.0	0.0	0.0	2.18	0.0	0.0	0.0	0.0
SFIRCCYRTIS 2	0.0	0.0	0.0	0.0	0.0	0.32	0.0	0.0	0.0	0.0	0.0	0.39
A.CINERIA	0.0	0.0	0.26	0.0	0.0	0.64	0.0	0.0	0.0	0.0	0.0	0.0

SELECTED ZOOPLANKTON DENSITIES-B.L.W.STUDY

DENSITIES(NOS./CU.M.)-WINTER-1974

RADIOLARIAN SPECIES-DEALS

SPECIES NAME	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
H.PROFUNDUM JUV	0.0	0.82	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CENOSPHAERA 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.IRREGULARIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACTINOMMA 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.38
ASTROSPHAERID 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T.OCTACANTHA 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
ASTROSPHAERID 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
S.STREPTACANTHA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
D.POLYGONALIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RADIOLARIAN 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.41	0.0	0.0
A.(CF)MEDIARUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H.DODECANTHA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPYROID 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P.ZANCLEUS	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.77
L.VICHOWII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
T.TRICOSTATUM	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
CALOCYCLAS 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
S.SCALARIS	0.0	0.0	1.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

STATION NUMBER AND TRANSECT

SPELLED ZOOPLANKTON DENSITIES-B.L.M.STUDY

DENSITIES(NOS./CU.M.)-SPRING-1975

~~RADIOLARIAN SPECIES-DEADS~~

SPECIES NAME	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
H.PROFUNDUM JUV	0.0	0.82	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
~~CENOSPHAERA 1~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	0.0	0.0	0.0	0.0	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~
C.IRREGULARIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACTINOMA 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.38
ASTROSPHAERID 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
~~T.OCTACANTHA 1~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	0.0	0.0	0.0	0.0	~~0.0~~	~~0.0~~	~~0.0~~	~~0.38~~
ASTROSPHAERID 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
S.STREPTACANTHA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
D.POLYGONALIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
~~RADIOLARIAN 1~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	0.0	0.0	0.0	0.0	~~0.0~~	~~1.41~~	~~0.0~~	~~0.0~~
A.(CF)MEDIARUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H.DODECANTHA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPYROID 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
~~P.ZANCLEUS~~	0.0	0.0	~~0.0~~	0.0	0.0	0.30	0.0	0.0	~~0.0~~	~~0.0~~	~~0.0~~	~~0.77~~
L.VIRCHOWII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
T.TRICOSTATUM	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
CALOCYCLAS 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
~~S.SCALARIS~~	0.0	~~0.0~~	~~1.20~~	0.0	0.0	0.0	0.0	~~0.0~~	~~0.0~~	0.0	~~0.0~~	0.9

SHELLED ZOOPLANKTON DENSITIES-B.L.M.STUDY

DENSITIES(NOS./CU.M.)-SUMMER-1975

RADIOLARIAN SPECIES-DEADS

SPECIES NAME	STATION NUMBER AND TRANSECT											
	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
L.MARITALIS POLY	0.0	0.0	0.53	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L.VICHOWII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S.GLACIALIS JUV	0.0	0.0	0.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T.OCTALANTHA 1	0.0	0.0	0.26	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
OBLONGA SP.	0.0	0.0	0.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SPELLED ZOOPLANKTON DENSITIES-B.L.M.STUDY

DENSITIES(NOS./CU.M.)-WINTER-1974

FORAMINIFERA-SPECIES-LIVES

SPECIES NAME	STATION NUMBER AND TRANSECT 1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
G.(CF)INCCNFTA	1.76	0.0	0.90	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
G.TENELLUS	1.76	2.46	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G.FALCONENSIS	0.0	9.05	7.66	0.0	2.21	1.51	0.0	1.10	3.33	0.0	0.75	3.49
G.RUBER	0.0	2.46	2.41	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.27	1.16
G.PACHYDERMA	0.0	0.82	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G.RUBESCENS	0.0	0.82	3.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.50	0.38
G.AEQUILATERALIS	0.0	0.82	0.30	0.0	0.0	0.60	0.0	0.0	0.33	0.0	0.75	0.0
G.(?)QUINQUELOBA	0.0	3.29	2.72	0.0	0.0	1.81	0.0	0.0	0.66	0.0	4.51	0.38
G.BULLOIDES	0.0	0.0	0.90	0.0	0.0	0.0	0.0	0.55	0.33	0.0	1.50	0.0
G.TRUNCATULINOID	0.0	0.0	3.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.88
G.BULL-FALCONEN	0.0	0.0	3.02	0.0	0.0	0.0	0.0	0.55	0.33	0.0	4.51	0.38
G.SP.	0.0	0.0	1.51	0.0	0.0	0.90	0.0	0.0	0.0	0.0	0.0	0.0
P.OBLIQUILOCULA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
G.(CF)TOSAENSIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.75	0.0
O.UNIVERSA	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.PEREGRINA	0.0	0.82	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.HISPIDO-COSTAT	0.0	0.0	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.CONCENTRICUS	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.75	0.0
B.SULAENARIENSIS	0.0	0.0	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.AUBERIANA	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.CURVATA	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B.SPINATA COSTAT	0.0	0.0	0.30	0.0	0.75	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.TUMIDULUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.50	0.0
MARGINULINA SP.	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N.ANTILLARUM	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B.SPINATA-TRANS	0.0	0.0	1.31	0.0	0.0	0.0	0.0	0.0	0.0	1.41	0.75	0.0
N.BASILOEA	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V.(CF)ARAUCANA	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S.BECCARI	0.0	0.0	0.90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.75	0.0
C.(CF)SUBGLOBOSA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.75	0.0
?EPONIDES SP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.75	0.0
L.SPIRATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SPELLED ZOOPLANKTON DENSITIES-B.L.M.STUDY

DENSITIES(NOS./CU.M.)-SPRING-1975

FORAMINIFERA SPECIES-LIVES

SPECIES NAME	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
G.(CF)INCONETA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G.TENELLUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G.FALCONENSIS	0.0	8.22	0.26	0.0	0.0	0.90	0.0	0.55	1.00	0.0	0.75	0.0
G.RUBER	0.0	0.0	0.79	0.0	0.0	0.90	0.0	0.0	2.33	0.0	1.50	0.0
G.PACHYDERMA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G.RUBESCENS	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
G.AEQUILATERALIS	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	1.16
G.(?)QUINQUELOBA	0.0	5.87	1.84	0.0	0.0	0.0	0.0	4.42	0.33	0.0	1.50	0.77
G.BULLOIDES	0.0	0.0	0.26	0.0	0.0	2.72	0.0	0.0	2.00	0.0	0.0	0.38
G.TRUNCATULINOID	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G.BULL-FALCONEN	0.0	0.82	0.0	0.0	0.0	0.0	0.0	2.21	0.33	0.0	0.0	0.38
G.SP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P.OBLIQUILOCULA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G.(CF)TOSAENSIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
O.UNIVERSA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.PEREGRINA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.75	0.0
U.HISPIDO-COSTAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.CONCENTRICUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B.SUBAENARIENSIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.AUBERIANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.CURVATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B.SPINATA COSTAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.TUMIDULUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MARGINULINA SP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N.ANTILLARUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B.SPINATA-TRANS	24.76	2.46	0.0	1.60	3.68	0.0	2.72	0.0	0.0	0.0	0.0	0.0
N.BASILOLA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V.(CF)ARAUCANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S.BECCARI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.(CF)SUBGLOBOSA	0.0	2.46	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
?EPONIDES SP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L.SPIRATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38

SHELLED ZOOPLANKTON DENSITIES-B.L.M.STUDY

DENSITIES(NOS./CU.M.)-SUMMER-1975

FORAMINIFERA SPECIES-LIVES

SPECIES NAME	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
G.FALCONENSIS	0.0	0.0	0.52	0.0	0.0	0.0	0.0	0.54	0.0	0.0	0.75	0.0
G.RUBER	0.0	4.21	1.84	0.0	4.33	0.96	0.0	1.08	3.00	0.0	7.52	3.88
G.AEQUILATERALIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.66	0.0	0.0	0.0
G.(?)QUINQUILOBA	0.0	1.68	0.26	0.0	2.16	0.0	0.0	4.35	1.00	0.0	0.75	1.16
G.BULLOIDES	0.0	0.84	4.75	0.0	19.49	3.57	1.41	2.72	3.33	0.0	5.27	2.72
O.UNIVERSA	0.0	0.0	0.0	0.0	0.0	0.32	0.0	0.0	0.0	0.0	0.0	0.77
H.PELAGICA	0.0	0.0	0.79	0.0	0.0	0.96	0.0	0.54	1.33	0.0	0.0	0.0
B.SPINATA-TRANS	39.31	0.0	0.26	0.0	9.38	0.0	2.83	0.0	0.0	1.31	4.51	0.77

SHELLED ZOOPLANKTON DENSITIES-J.L.M.STUDY

DENSITIES(NOS./CU.M.)-WINTER-1974

FORAMINIFERA SPECIES-DEADS

SPECIES NAME	STATION NUMBER AND TRANSECT											
	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
G.(CF)INCOMPTA	0.0	0.0	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G.FALCONENSIS	0.0	0.0	1.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G.RUBER	0.0	0.0	1.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
G.RUBESCENS	0.0	0.62	0.90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G.AEQUILATERALIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G.(?)QUINQUELOBA	0.0	0.0	3.02	0.0	0.0	0.90	0.0	1.10	0.0	1.41	0.0	0.0
G.BULLOIDES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
G.BULL-FALCONEN	0.0	0.0	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G.SP.	0.0	0.0	0.60	0.0	0.0	0.60	0.0	0.0	0.33	0.0	0.0	0.0
C.CONCENTRICUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.75	0.0
O.AUBERIANA	0.0	0.0	1.61	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
.HISPIDO-COSTAT	0.0	0.0	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.TUMIDULUS	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.25	0.0
FISSURINA SP.	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BOLIVINA SP.	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A.BELLA	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.COMPTA	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B.ACULEATA	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R.(CF)MIOCENICA	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
?GYROIDINA SP.	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
?EPONIDES SP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.75	0.0
N.(?)EXPONENS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.SUBAENARIENSIS	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F.(CF)CRASSICAR	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.MOLLIS	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MARGINULINA SP.	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N.ANTILLARUM	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SHELLED ZOOPLANKTON DENSITIES-J.L.M.STUDY

DENSITIES(NOS./CU.M.)-SPRING-1975

FORAMINIFERA SPECIES-DEADS

SPECIES NAME	STATION NUMBER AND TRANSECT											
	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
G.(CF)INCOMPTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G.FALCONENSIS	0.0	0.0	0.0	0.0	0.0	0.60	0.0	0.0	0.0	0.0	0.0	0.0
G.RUBER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
~~G.RUBESCENS~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~
G.AEQUILATERALIS	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
G.(?)QUINQUELOBA	0.0	0.0	0.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G.BULLOIDES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
~~G.BULL-FALCONEN~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.33~~	~~0.0~~	~~0.0~~	~~0.0~~
G.SP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.CONCENTRICUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.AUBERIANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
~~.HISPIDO-COSTAT~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	0.0	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~
E.TUMIDULUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FISSURINA SP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BOLIVINA SP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
~~A.BELLA~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	0.0	~~0.0~~	~~0.0~~
B.COMPTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B.ACULEATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R.(CF)MIOCENICA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
~~?GYROIDINA SP.~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	0.0	~~0.0~~	~~0.0~~	~~0.0~~
?EPONIDES SP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N.(?)EXPONENS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
B.SUBAENARIENSIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
~~P.(CF)CRASSICAR~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~
C.MOLLIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MARGINULINA SP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N.ANTILLARUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SHELLED ZOOPLANKTON DENSITIES-J.L.M.STUDY

DENSITIES(NOS./CU.M.)-SUMMER-1975

FORAMINIFERA SPECIES-DEADS

SPECIES NAME	STATION NUMBER AND TRANSECT											
	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
G.(?)QUINQUELOBA	0.0	0.0	0.0	0.0	0.72	0.0	0.0	0.54	0.0	0.0	0.0	0.0
G.BULLOIDES	1.96	0.0	0.26	0.0	0.0	0.32	0.0	0.0	0.0	0.0	0.0	0.0

SHELLED ZOOPLANKTON DENSITIES-S.L.M.STUDY

DENSITIES(NOS./CU.M.)-WINTER-1974

PTEROPOD SPECIES-LIVES

SPECIES NAME	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
L.(CF)INFLATA	1.76	0.0	0.0	0.0	0.0	2.72	0.0	0.0	0.33	0.0	0.0	0.28
L.HELICOIDES	7.07	2.46	0.90	1.60	1.47	4.83	0.0	10.50	7.01	15.56	36.13	2.33
LIMACINA 1	1.76	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.ACICULA	0.0	1.64	0.0	0.45	0.73	0.30	0.0	1.10	1.66	0.0	15.81	0.0
L.BULLIMOIDES RT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L.INFLATA	0.0	1.64	3.02	0.0	0.73	1.51	0.0	0.55	3.07	4.24	3.76	8.55
?L.INFLATA RT	0.0	1.64	0.30	0.0	2.94	0.0	0.0	0.0	3.00	1.41	0.0	0.0
L.LESUEURI	0.0	0.0	0.0	4.62	0.0	0.0	0.0	0.0	0.0	0.0	1.50	1.16
?L.INFLATA2 RT	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
?L.INFLATA3 RT	0.0	0.0	0.0	0.0	0.0	0.60	0.0	0.0	0.0	0.0	0.0	1.55
?L.RETROVERSA RT	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
?L.(CF)INFLATA 1	0.0	0.0	0.0	0.0	0.0	1.20	0.0	0.0	0.0	0.0	4.51	0.0
?L.HELICOIDES	0.0	0.0	0.0	0.0	0.0	0.0	2.72	0.0	0.0	0.0	0.0	0.0
E.CAMPYLURA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	1.00	0.0	0.0	0.77
?L.INFLATA4 RT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
?L.TROCHIFORMIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
C.VIRG CONSTRIC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.75	0.0
?L.INFLATA5 RT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.27	0.77
?L.LESUEURI RT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
?P.RETICULATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P.?RETICULATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LIMACINA SP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LIMACINA 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
?L.INFLATA6 RT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
?L.RETROVERSA RT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SPECIES ZOOPLANKTON DENSITIES—B.L.M. STUDY

DENSITIES(NOS./CU.M.)—SPRING—1975

PTEROPOD SPECIES—LIVES

SPECIES NAME	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
L.(CF)INFLATA	0.0	6.22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.73	0.0	4.27
L.HELICOIDES	7.07	4.11	9.26	0.0	0.0	0.90	4.60	0.0	0.33	12.73	6.28	6.61
LIMACINA 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
~~C.ACICULA~~	0.0	0.0	0.0	0.0	20.64	0.0	6.80	2.21	0.33	0.0	7.52	6.99
L.BULLIMOIDES RT	0.0	39.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L.INFLATA	0.0	23.60	0.0	0.0	29.42	7.66	0.0	4.42	2.07	0.0	3.01	0.38
?L.INFLATA RT	0.0	0.0	0.0	0.0	0.75	0.0	0.0	0.0	0.0	0.0	1.50	0.0
~~L.LESUEURI~~	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	1.50	0.0
?L.INFLATA2 RT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
?L.INFLATA3 RT	0.0	2.46	0.0	0.0	6.05	0.30	0.0	4.97	0.0	0.0	0.75	1.94
?L.RETROVERSA RT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
~~?L.(CF)INFLATA 1~~	1.70	0.0	0.0	0.0	0.0	1.81	0.0	0.0	0.0	0.0	0.0	0.0
?L.HELICOIDES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.0	0.0
C.CAMPYLURA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.66	0.0	0.75	0.77
?L.INFLATA4 RT	0.0	0.0	0.0	0.0	0.75	0.0	0.0	0.0	0.0	0.0	0.0	0.0
~~?L.TROCHIFORMIS~~	0.0	0.0	0.0	1.00	3.06	0.0	0.0	0.0	0.0	0.0	0.0	0.38
C.VIRG CONSTRIC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
?L.INFLATA5 RT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.02	6.22
?L.LESUEURI RT	0.0	3.75	0.0	1.00	10.52	0.0	0.0	0.0	0.0	1.41	0.0	0.0
~~?P.RETICULATA~~	0.0	0.0	0.0	0.0	0.0	0.60	0.0	0.0	0.0	0.0	0.0	0.0
P.?RETICULATA	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
LIMACINA SP	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
LIMACINA 3	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	1.41	17.31	0.0
~~?L.INFLATA5 RT~~	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.70	1.00	0.0	0.0	0.0
?L.RETROVERSA RT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.75	0.0

SHELLED ZOOPLANKTON DENSITIES-B.L.M.STUDY

DENSITIES(NOS./CU.M.)-SUMMER-1975

PTEROPOD SPECIES-LIVES

SPECIES NAME	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
C.ACICULA	3.93	3.37	0.79	3.21	33.21	4.50	33.97	36.47	0.0	65.52	12.04	1.55
L.INFLATA	0.0	0.0	1.58	0.0	4.33	2.57	1.41	5.98	1.00	0.0	1.50	0.39
?L.INFLATA RT	0.0	0.0	0.79	0.0	0.72	0.96	7.07	3.81	0.0	11.79	3.76	0.0
L.LESUEURI	0.0	4.21	2.11	0.0	36.10	4.82	0.0	42.46	3.67	3.93	85.82	1.94
E.CAMPYLURA	0.0	1.68	1.05	0.0	1.44	9.00	0.0	1.63	0.0	0.0	0.0	0.0
?L.TROCHIFORMIS	0.0	2.52	0.0	0.0	4.33	0.32	0.0	0.0	0.0	2.62	0.0	0.0
?L.LESUEURI RT	5.69	5.89	0.26	0.0	2.16	1.26	0.0	16.87	1.33	9.17	6.02	0.77
L.TROCHIFORMIS	0.0	0.0	0.0	0.0	0.0	0.32	0.0	0.0	0.33	0.0	0.75	0.0
L.BULLIMOIDES RT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.62	0.0	0.0	0.0	0.0

SHELLED ZOOPLANKTON DENSITIES-B.L.M. STUDY

DENSITIES(NOS./CU.M.)-WINTER-1974

PTEROPOD SPECIES-DEADS

SPECIES NAME	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
	STATION NUMBER AND TRANSECT											
L.(CF) INFLATA	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
L.HELICOIDES	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.75	0.0
C.ACICULA	0.0	0.0	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L.INFLATA	0.0	0.0	1.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L.LESUEURI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
?L.(CF)INFLATA 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.CAMPYLURA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
?L.TROCHIFORMIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0

SHELLED ZOOPLANKTON DENSITIES-B.L.M. STUDY

DENSITIES(NOS./CU.M.)-SPRING-1975

PTEROPOD SPECIES-DEADS

SPECIES NAME	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
	STATION NUMBER AND TRANSECT											
L.(CF)INFLATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
L.HELICOIDES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
C.ACICULA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L.INFLATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.55	0.0	0.0	0.0	0.0
L.LESUEURI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
?L.(CF)INFLATA 1	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0	0.0
E.CAMPYLURA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
?L.TROCHIFORMIS	0.0	0.0	0.0	0.0	0.75	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SHELLED ZOOPLANKTON DENSITIES-G.L.W.STUDY

DENSITIES(NOS./CU.M.)-WINTER-1974

OSTRACOD SPECIES-LIVES

SPECIES NAME	STATION NUMBER AND TRANSECT 1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
SPECIES 1	0.0	0.0	0.0	0.0	0.75	0.0	1.36	0.0	0.0	1.41	3.76	0.0
SPECIES 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.75	0.0
SPECIES 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SHELLED ZOOPLANKTON DENSITIES-G.L.W.STUDY

DENSITIES(NOS./CU.M.)-SPRING-1975

OSTRACOD SPECIES-LIVES

SPECIES NAME	STATION NUMBER AND TRANSECT 1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
SPECIES 1	0.0	139.59	0.0	11.25	12.33	0.60	0.0	5.52	1.66	1.41	7.52	2.72
SPECIES 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPECIES 3	0.0	39.50	0.0	0.0	0.0	0.0	0.0	0.55	0.33	0.0	1.50	0.77

SHELLED ZOOPLANKTON DENSITIES-B.L.M.STUDY

DENSITIES(NOS./CU.M.)-WINTER-1974-75

BENTHONIC FORAMS-LIVES

SPECIES NAME	STATION NUMBER AND TRANSECT 1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
R.COMPRIMA	0.0	0.0	0.0	0.0	11.00	0.0	0.40	0.0	0.90	3.00	0.50	0.0
A.PSEUDOSPIRALIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.00	0.0	0.0
S.AFFINIS	0.0	7.60	0.0	4.30	0.0	0.0	0.60	0.0	0.0	0.0	0.0	0.0
T.CANDEIANA	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T.PARVULA	1.10	0.60	0.0	2.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.SP.	0.0	0.80	0.0	4.30	0.0	0.0	0.80	0.0	0.0	0.80	0.0	0.0
B.LOWMANI	44.20	54.20	0.0	48.90	37.00	0.0	10.00	3.20	1.80	13.50	4.20	0.80
B.BASSENDORFENSI	1.10	2.30	0.0	4.30	11.00	0.0	5.40	0.0	0.0	3.00	0.50	0.0
E.ACULEATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	0.0	0.0	0.0
B.MARGINATA	0.0	1.50	0.0	0.0	0.0	0.0	0.20	0.0	0.0	1.30	0.0	0.0
R.ATLANTICA	0.0	0.80	0.0	0.0	0.0	0.0	0.0	6.50	0.90	0.0	0.0	0.0
S.PULCHELLA.PRIM	0.0	0.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.50	0.0
T.BELLA	1.00	7.60	0.0	0.0	0.0	0.0	0.0	9.70	0.0	0.0	1.10	0.0
U.PARVULA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.50	3.50	0.0	0.0	22.70
U.PEREGRINA	0.0	0.0	11.10	0.0	0.0	0.0	0.0	0.0	6.10	0.0	0.0	1.60
B.HANNAI	0.0	3.10	0.0	0.0	0.0	0.0	0.0	6.50	0.0	0.0	1.10	0.0
C.SAGRA	0.0	0.0	0.0	0.0	0.0	33.30	0.0	0.0	0.90	0.80	1.60	2.70
E.VITREA	2.10	3.60	0.0	0.0	0.0	0.0	0.60	0.0	0.0	1.50	0.0	0.0
S.BRADYANA	0.0	0.0	33.30	0.0	0.0	0.0	0.0	0.0	3.50	0.0	0.50	3.10
S.PULCHRA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.80
A.BECCARII	0.0	0.80	0.0	6.20	0.0	0.0	3.80	0.0	0.0	4.50	0.50	0.0
A.FAUCILECULATA	0.0	0.0	0.0	0.0	0.0	0.0	0.40	0.0	0.0	0.0	0.0	0.0
E.GUNTERI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.10	0.0
E.POEYANUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.30	1.60	0.0
E.REPANDUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	0.0	0.50	5.50

N.ANTILLARUM	0.0	0.0	11.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.MOLLIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.80	0.0	0.0	6.30
C.UMBONATUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.70	0.0	0.0	0.0
F.FONTENI	26.30	4.60	0.0	0.0	0.0	0.0	2.30	16.10	15.80	12.80	39.50	13.30
C.SUBGLOBOSA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.80	0.0	0.50	1.60
F.ASTRICTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.60
F.ATLANTICUS	3.20	0.0	0.0	0.0	16.00	0.0	1.30	0.0	0.90	6.80	7.40	0.0
F.GRATELOUPI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.60	0.0	0.50	1.60
N.BASILOBA	15.60	0.0	0.0	17.00	21.00	0.0	73.30	6.50	8.80	37.60	30.00	3.10
H.STRATTONI	0.0	0.90	0.0	0.0	0.0	0.0	0.0	22.60	6.10	3.00	4.20	14.10
M.BARLEEANUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.30
L.SP.	0.0	0.0	0.0	2.10	0.0	0.0	0.20	0.0	0.0	0.0	0.0	0.0
C.SP.	0.0	0.0	22.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.50	0.0
B.SPINATA	2.10	0.0	0.0	0.0	0.0	0.0	0.60	19.40	6.10	2.30	1.60	11.70
R.ADVENA	0.0	0.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B.FRAGILIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.50	2.30
B.HASTATA	1.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.50	2.30
B.SUBSPINESCENS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.20	4.40	0.0	0.0	0.0
S.SP.	0.0	0.0	0.0	2.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B.ELEGANTISSIMA	0.0	0.0	0.0	2.10	5.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
M.WARRENI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.80
B.IRREGULARIS	0.0	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D.SP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	0.0	0.0	0.0
L.CALCAR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.80
L.NEBULOSA	0.0	0.0	0.0	0.0	0.0	33.30	0.0	0.0	0.0	0.0	0.0	0.0
B.BARBATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	0.0	0.0	0.0
B.ORDINARIA	0.0	0.0	0.0	0.0	0.0	0.0	0.40	0.0	0.0	0.0	0.0	0.0
U.BELLULA	0.0	0.0	22.20	0.0	0.0	0.0	0.0	0.0	9.70	0.0	0.0	1.60
Q.COMPTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.80	0.0	0.0
S.MINUTA	1.00	0.80	0.0	0.0	0.0	0.0	0.40	0.0	0.0	0.0	0.0	0.0
C.FLORIDANUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	0.0	0.0	0.0
F.COMPRESSA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.60	0.0	0.0	0.0
1F.SPINICOSTATA	0.0	0.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V.PERTUSA	0.0	0.0	0.0	0.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H.ELEGANS	0.0	0.0	0.0	0.0	0.0	33.30	0.0	0.0	0.0	0.0	0.0	0.0
L.ATLANTICA	0.0	0.0	0.0	2.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S.COMPLANATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.10	0.0
B.SUBAENARIENSIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	0.0	0.0	0.0

SHELL ZOOPLANKTON DENSITIES-D.L.M.STUDY

DENSITIES(NOS./CU.M.)-SPRING-1975

BENTHONIC FORAMS-LIVES

SPECIES NAME	STATION NUMBER AND TRANSECT											
	1-I	2-I	3-I	1-II	2-II	3-II	1-III	2-III	3-III	1-IV	2-IV	3-IV
P.COMPRIMS	0.10	0.0	0.0	0.0	0.0	0.0	0.50	0.0	0.0	1.50	0.0	0.0
A.PSEUDOSPIRALIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0	2.00	0.0	0.0
S.AFFINIS	0.0	1.20	0.0	0.0	0.0	0.0	0.0	2.10	0.0	1.50	0.0	0.0
T.CANDEIANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.0
T.PARVULA	0.0	[illegible]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.SP.	0.0	0.0	0.0	0.0	0.0	0.0	2.60	0.0	0.0	9.40	0.0	0.0
B.LOWMANI	70.50	10.70	0.0	21.40	0.0	0.0	26.30	5.20	3.30	21.30	25.70	2.60
B.BASSINDORFFENSI	[illegible]	4.30	0.0	45.20	2.70	0.0	28.10	2.10	0.0	0.90	0.0	0.0
E.GIBBA	0.0	0.0	0.0	0.0	0.0	0.0	0.20	0.0	0.0	0.0	0.0	0.0
B.ACULEATA	0.0	0.0	0.0	0.0	0.0	0.0	0.20	0.0	0.0	0.0	0.0	0.0
B.MARGINATA	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.00	0.0	0.0
P.ATLANTICA	0.0	0.0	0.0	0.0	0.30	0.0	0.0	1.00	0.0	0.0	0.0	0.0
S.PULCHELLA-PRIM.	0.0	0.0	0.0	0.0	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T.PELLA	0.0	4.30	0.0	0.0	2.30	0.0	0.0	9.40	6.70	0.0	0.0	0.0
U.PARVULA	0.0	0.0	0.0	0.0	0.80	0.0	0.0	2.10	3.30	0.0	0.0	2.60
U.PEREGRINA	0.0	1.70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0
E.HANNAI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0
C.SAGRA	0.0	4.00	0.0	0.0	3.10	0.0	0.0	0.0	0.0	1.00	1.00	0.0
E.VITREA	0.0	0.0	0.0	2.40	0.0	0.0	0.70	0.0	0.0	3.30	0.0	7.70
S.BRADYANA	0.0	0.0	0.0	0.0	0.0	6.90	0.0	3.10	0.0	0.0	0.0	5.10
S.PULCHRA	0.0	0.0	0.0	0.0	0.0	3.50	0.0	0.0	0.0	0.0	0.0	0.0
A.BECCARII	15.70	0.0	0.0	11.90	0.0	0.0	5.00	0.0	0.0	5.90	0.0	0.0
A.PAUCILOCULATA	0.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.GUNTERI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.50	0.0	0.0
E.POEYANUM	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.50	0.0	0.0

E.PEFANCU	0.0	0.0	0.0	0.0	0.0	10.40	0.0	0.0	6.70	0.0	0.0	0.0
N.ANTILLARUM	0.0	0.0	0.0	0.0	0.0	3.50	0.0	0.0	0.0	0.0	0.0	0.0
C.MOLLIS	0.0	0.0	0.0	0.0	0.0	13.60	0.0	3.10	13.00	0.0	3.00	0.0
C.UMBONATUS	0.0	0.0	0.0	0.0	0.0	10.30	0.0	0.0	13.30	0.0	0.0	7.70
F.FONTINI	0.0	44.10	0.0	[illegible]	57.60	20.70	1.80	15.60	6.70	14.40	31.30	7.70
C.SUBGLOBOSA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.10	3.30	0.0	1.00	0.0
F.ASTRICTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.20	0.0	0.0	1.00	0.0
F.ATLANTICUS	0.0	2.40	0.0	0.0	0.0	0.0	0.0	0.0	3.30	2.00	2.00	0.0
F.GRATELOUPI	0.0	3.30	0.0	0.0	4.70	3.50	0.20	5.70	0.0	2.50	10.50	0.0
N.BASILOBA	0.70	10.70	0.0	4.80	19.90	0.0	28.30	7.30	0.0	15.30	12.90	18.00
H.STRATTONI	0.0	0.0	0.0	0.0	3.10	2.50	0.0	10.40	6.70	5.40	8.90	15.40
M.BARLEEANUS	0.0	[illegible]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L.SP.	0.10	0.0	0.0	4.80	0.80	0.0	1.00	0.0	0.0	0.0	0.0	0.0
C.SP.	0.0	0.0	0.0	0.0	0.0	6.90	0.0	4.20	13.30	0.0	0.0	2.60
B.SPINATA	0.0	8.30	0.0	0.0	12.50	6.90	0.20	13.50	16.70	2.00	8.90	15.40
R.ADVENA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0
B.FRAGILIS	0.0	0.0	0.0	0.0	0.0	6.90	0.0	0.0	0.0	0.0	0.0	7.70
B.HASTATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.50
B.SUBSPINESCENS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.30	0.0	0.0	0.0	0.0
E.SP.	0.0	0.0	0.0	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0
B.ELEGANTISSIMA	8.20	0.0	0.0	4.80	0.0	0.0	4.10	0.0	0.0	0.50	0.0	0.0
B.IRREGULARIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C.FLORIDANUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F.COMPRESSA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SARACENARIA.SP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.60
L.SPIRATA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.30	0.0	0.0	2.60
Q.OBLONGA	0.0	0.0	0.0	0.0	0.0	0.0	0.20	0.0	0.0	0.0	0.0	0.0
T.JAMAICENSIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T.JAMAICENSIS	0.0	0.0	0.0	0.0	0.0	3.50	0.0	0.0	0.0	0.0	0.0	0.0
G.AEQUA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.0	0.0	0.0

APPENDIX G

DATA FROM NISKIN (DISCRETE DEPTH) SAMPLING

Explanation:

The Niskin samples are listed serially (1-135) down the left hand side of each page.

Numbers corresponding to the microplankton groups counted are listed serially, left to right, above each column of data entries for samples 1-135. (The key to the microplankton groups is presented on the following page.) Example: Column 1 for samples 1-135 represents the counts of centric solitary diatoms present in each sample.

The data entries represent the percent abundance of a given group for a given sample (0.12 = 12% of 100 organisms counted for that sample).

Next to each sample number is a sample label code. Interpretation of the label code is as follows:

Number 1 1/IVBCN12101115 =

1/IV - Station and Transect
BCN - Sample Code
12 - Month of Sample Collection
10 - Day of Sample Collection
1115 - Time of Sample Collection

In some cases, the last column has depth interval information: (p or pz = photic zone, 5 or .5 = 1/2 photic zone, P-B = 1/2 between base of photic zone and bottom and B = bottom).

* = denotes samples in which individual cell was counted as a single colonial centric diatom; in all others, the entire colony was counted as a single colonial centric diatom (to convert the individual cell count to the colonial count divide the cell count by 5).

KEY TO MICROPLANKTON GROUPS

DATA CHECK OF 1975 NISKIN SAMPLES

NUMBER OF GROUPS 60
NUMBER OF CHARACTERS 60
NUMBER OF SAMPLES 98

VARIABLE FORMAT (I2,4A4,2X,20F3.2/20X,20F3.2/20X,20F3.2)

OUTPUT FORMAT (I2,4A4,2X,60F4.2)

VARIABLES IN GROUP 1

1	CEN SOL DIATOMS
2	CEN COL DIATOMS
3	PEN SOL DIATOMS
4	PEN COL DIATOMS
5	PERIDINIUM
6	GONYAULAX
7	DINOPHYSIS
8	CERATIUM
9	NOCTILUCA
10	DINOFLAGELLATES
11	SILICOFLAGELLATE
12	EBRIDIANS
13	TRICHODESMIUM
14	COCCOLITHOPHORES
15	SPUMELLARIANS
16	NASSELLARIANS
17	ACANTHARIANS
18	PHAEODARIANS
19	BEN FORAMS
20	PLANK FORAMS
21	TINTINNIDS
22	CILIATA
23	EGGS
24	COELENTERATES
25	SIPHONOPHORES
26	CTENOPHORES
27	SALP (DOLIOLUM)
28	SALP (OIKOPEURA)
29	SHELLED PTEROPOD
30	NON-SHELLED PTER
31	CHAETOGNATHS
32	HOLOP POLYCHAETE
33	MEROP POLYCHAETE
34	EUPHAUSIDS
35	SHRIMP
36	MYSIDS
37	"MYSID STAGE"
38	AMPHIPODS
39	ISOPODS
40	CUMACEANS
41	CAL COPEPODS
42	HARPACT COPEPODS
43	CYCLOP COPEPODS
44	LUCIFER
45	NAUPLIAR LARVAE
46	MEGALOPS
47	ZOEA LARVAE
48	OSTRACODS
49	CLADOCERA PODON
50	CLADOCERA EVADNE
51	ECHINODERM
52	SNAIL VELIGERS
53	CLAMS
54	BRYOZOANS
55	TROCHOPHORES
56	TUNICATES
57	DEVELOPING EGGS
58	FISH EGGS
59	JUVENILE FISH
60	FECAL PELLETS

NUMBER	SAMPLE NAME	1	2	3	4	5	6	7	8	9	10
1	1/1VBCN12101115	0.75	0.01	0.05	0.0	0.02	0.0	0.04	0.01	0.01	0.0
2	1/11AKM12101310	0.44	0.12	0.07	0.05	0.01	0.0	0.02	0.0	0.0	0.0
3	1/11AKO12051300.	0.41	0.09	0.04	0.02	0.0	0.0	0.0	0.02	0.18	0.0
4	2/111AWT12250945	0.11	0.30	0.03	0.14	0.0	0.02	0.0	0.0	0.0	0.0
5	1/111ATU1241700.	0.15	0.05	0.0	0.01	0.03	0.03	0.0	0.01	0.0	0.0
6	1/111ATS12101700	0.42	0.06	0.01	0.04	0.0	0.0	0.0	0.0	0.0	0.0
7	3/111AZR12251115	0.06	0.40	0.03	0.17	0.01	0.0	0.0	0.02	0.0	0.0
8	3/11AQP12251200.	0.06	0.23	0.06	0.09	0.0	0.0	0.0	0.02	0.0	0.0
9	3/11AQN12101245	0.09	0.14	0.04	0.16	0.01	0.0	0.0	0.02	0.0	0.0
10	3/11AZP12101115	0.10	0.32	0.05	0.31	0.0	0.0	0.0	0.0	0.0	0.0
11	2/111AWR12100945	0.07	0.35	0.03	0.36	0.01	0.0	0.0	0.01	0.0	0.0
12	1/1AHA12100900	0.32	0.14	0.04	0.08	0.02	0.0	0.0	0.04	0.0	0.0
13	1/1AGZ12030900.5	0.33	0.19	0.02	0.05	0.0	0.02	0.03	0.04	0.01	0.01
14	2/1AEL12101730	0.10	0.05	0.11	0.15	0.0	0.0	0.0	0.0	0.0	0.0
15	2/1AEO12051045.5	0.09	0.25	0.07	0.12	0.0	0.0	0.01	0.01	0.01	0.0
16	3/1ABZ12251500.5	0.08	0.08	0.09	0.12	0.0	0.0	0.0	0.0	0.0	0.0
17	3/1ABY12101500	0.09	0.42	0.03	0.11	0.01	0.0	0.0	0.0	0.0	0.0
18	3/1C1U4101930	0.19	0.0	0.01	0.02	0.02	0.02	0.0	0.06	0.0	0.01
19	3/1VFMG9921150B	0.06	0.0	0.35	0.02	0.0	0.0	0.0	0.01	0.0	0.0
20	3/1VFME9771040P-	0.07	0.0	0.16	0.13	0.0	0.0	0.0	0.03	0.0	0.0
21	3/1VFMA9311145.5	0.16	0.0	0.10	0.0	0.05	0.0	0.0	0.06	0.0	0.0
22	2/1VFIX9131723.5	0.29	0.02	0.11	0.01	0.0	0.02	0.0	0.03	0.0	0.0
23	1/1VFFV9130930.5	0.34	0.0	0.08	0.09	0.01	0.01	0.0	0.04	0.0	0.0
24	1/111EW09091545.	0.25	0.21	0.03	0.02	0.01	0.0	0.0	0.0	0.0	0.0
* 25	3/1VFMC9621145PZ	0.11	0.03	0.10	0.04	0.03	0.0	0.0	0.06	0.0	0.0
26	3/11ESL91051040B	0.14	0.0	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 27	3/11ESH9581040PZ	0.28	0.03	0.02	0.0	0.03	0.0	0.0	0.06	0.0	0.02
28	3/11ESF9291040.5	0.03	0.0	0.05	0.0	0.0	0.0	0.0	0.06	0.0	0.0
29	2/111EZP9261835.	0.08	0.0	0.02	0.01	0.0	0.0	0.0	0.02	0.0	0.0
30	3/11ESJ9811040P-	0.22	0.0	0.05	0.03	0.01	0.0	0.0	0.01	0.0	0.0

31	3/11ESD9101040	0.20	0.0	0.04	0.0	0.0	0.0	0.0	0.09	0.0	0.01
32	3/111FCE9921652P	0.15	0.0	0.04	0.10	0.0	0.0	0.0	0.04	0.0	0.0
* 33	3/111FCC9581652P	0.15	0.10	0.03	0.0	0.03	0.0	0.0	0.05	0.0	0.02
34	3/111FCG9921652Q	0.15	0.0	0.02	0.19	0.0	0.0	0.0	0.02	0.0	0.0
35	3/111FCA9291652.	0.18	0.02	0.03	0.0	0.0	0.0	0.0	0.08	0.0	0.0
36	3/111FBY9101652	0.08	0.0	0.11	0.0	0.0	0.04	0.02	0.24	0.0	0.0
37	2/11EPH9251430.5	0.16	0.0	0.03	0.0	0.01	0.0	0.0	0.18	0.0	0.0
38	1/11EHC9111344.5	0.42	0.02	0.07	0.05	0.0	0.0	0.0	0.02	0.0	0.0
* 39	3/1EJN81341708B	0.16	0.05	0.02	0.05	0.0	0.0	0.0	0.05	0.0	0.0
* 40	3/1EJH8521708PZ	0.05	0.06	0.01	0.0	0.04	0.05	0.0	0.07	0.0	0.01
41	3/1EIW8261708.5	0.09	0.0	0.0	0.04	0.0	0.0	0.0	0.06	0.0	0.0
42	3/1EIU8101708	0.18	0.0	0.02	0.0	0.02	0.02	0.0	0.17	0.0	0.0
43	2/1EFS8201820.5	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.07	0.0	0.0
44	1/1EC08181919.5	0.38	0.04	0.10	0.06	0.0	0.0	0.02	0.02	0.0	0.0
45	3/1EJL8931708P-B	0.30	0.0	0.0	0.02	0.0	0.02	0.0	0.10	0.0	0.06
46	3/111DCC5691200P	0.16	0.0	0.10	0.20	0.0	0.0	0.0	0.03	0.0	0.0
47	3/111DMR5381200P	0.18	0.0	0.06	0.23	0.0	0.0	0.0	0.18	0.0	0.0
48	3/111DCA5191200.	0.10	0.0	0.05	0.16	0.02	0.02	0.0	0.19	0.0	0.0
49	3/111DBY5101200	0.20	0.0	0.02	0.20	0.01	0.0	0.0	0.13	0.0	0.0
50	3/11CSJ512017158	0.06	0.0	0.15	0.11	0.0	0.0	0.0	0.02	0.0	0.0
51	3/11CSH5711715P-	0.13	0.0	0.03	0.34	0.0	0.01	0.0	0.03	0.0	0.01
52	3/11CSF5121715.5	0.11	0.27	0.03	0.0	0.01	0.0	0.0	0.15	0.0	0.0
53	3/11CSD5101715	0.17	0.0	0.04	0.11	0.02	0.0	0.0	0.12	0.0	0.0
54	1/111CWQ5081700.	0.65	0.04	0.02	0.11	0.0	0.0	0.0	0.0	0.0	0.0
* 55	3/111DCE51001200	0.18	0.05	0.14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 56	3/1VDLV4911015H	0.23	0.02	0.05	0.08	0.0	0.01	0.0	0.01	0.0	0.0
57	3/1VDLT4531015P-	0.19	0.0	0.02	0.08	0.0	0.0	0.0	0.04	0.0	0.0
58	3/1VDMT4351015PZ	0.15	0.0	0.05	0.22	0.04	0.0	0.0	0.01	0.0	0.02
59	3/1VDLR4171015.5	0.18	0.02	0.17	0.06	0.02	0.06	0.01	0.14	0.0	0.0
* 60	3/1VDLP4101015	0.15	0.03	0.04	0.16	0.09	0.0	0.03	0.08	0.0	0.01

61	2/IICPG4151010.5	0.13	0.05	0.09	0.20	0.0	0.0	0.0	0.0	0.0	0.0
62	1/IICMC4051025.5	0.34	0.0	0.03	0.18	0.05	0.02	0.0	0.01	0.0	0.0
* 63	3/ICJN413019308	0.44	0.02	0.05	0.04	0.0	0.0	0.0	0.0	0.0	0.0
* 64	3/ICJL4901930P=8	0.16	0.06	0.11	0.21	0.0	0.0	0.0	0.01	0.0	0.0
65	3/ICIW4251930.5	0.20	0.0	0.12	0.07	0.0	0.01	0.01	0.08	0.0	0.0
66	2/ICFS4201345.5	0.03	0.02	0.16	0.02	0.0	0.0	0.0	0.0	0.0	0.0
67	1/ICCU4021730.5	0.34	0.04	0.03	0.26	0.02	0.0	0.0	0.0	0.0	0.0
68	2/IVDIN5111025.5	0.23	0.22	0.01	0.16	0.01	0.04	0.01	0.03	0.0	0.0
69	3/IVBOR1361120.5	0.30	0.16	0.06	0.01	0.0	0.01	0.0	0.07	0.0	0.0
70	2/IVBFP1361310.5	0.14	0.18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
71	1/IVBCP1071000.5	0.56	0.0	0.0	0.0	0.02	0.0	0.02	0.11	0.0	0.0
72	3/IIBKD1151045P	0.18	0.0	0.06	0.03	0.0	0.01	0.0	0.0	0.0	0.0
* 73	3/IIBKB1991045PZ	0.38	0.07	0.07	0.22	0.0	0.0	0.0	0.0	0.0	0.0
* 74	3/IBJK11091330P=	0.24	0.02	0.22	0.13	0.01	0.0	0.0	0.0	0.0	0.0
* 75	3/IBIP1841330PZ	0.40	0.05	0.09	0.09	0.0	0.0	0.0	0.01	0.0	0.0
76	2/IIANN1181745.5	0.72	0.03	0.0	0.03	0.01	0.0	0.01	0.0	0.0	0.0
77	2/IIANL1101745	0.69	0.11	0.01	0.04	0.01	0.0	0.0	0.01	0.0	0.0
78	1/IVDFN5141535.5	0.15	0.0	0.09	0.28	0.05	0.01	0.04	0.10	0.0	0.0
79	2/IIICZP5231645.	0.15	0.0	0.12	0.09	0.02	0.01	0.01	0.17	0.0	0.0
80	3/IVBDP1101120	0.37	0.0	0.0	0.01	0.01	0.0	0.02	0.06	0.0	0.0
* 81	1/IICMA4101025	0.14	0.04	0.11	0.62	0.01	0.0	0.0	0.0	0.0	0.0
* 82	1/IVDFL5101535	0.17	0.06	0.24	0.46	0.0	0.0	0.0	0.03	0.0	0.0
* 83	2/IVBFN1101310	0.22	0.02	0.07	0.0	0.0	0.0	0.0	0.05	0.0	0.0
84	2/IICPE4101010	0.17	0.0	0.0	0.76	0.0	0.0	0.0	0.0	0.0	0.0
85	2/IVDIL5101025	0.18	0.0	0.03	0.63	0.0	0.0	0.0	0.03	0.03	0.0
86	3/IVFLY9101145	0.13	0.0	0.06	0.02	0.0	0.0	0.02	0.05	0.0	0.04
87	1/ICCM4101730	0.03	0.0	0.02	0.94	0.0	0.0	0.0	0.0	0.0	0.0
* 88	2/ICFQ4101345	0.07	0.02	0.14	0.07	0.0	0.0	0.0	0.04	0.0	0.0
* 89	1/IECM8101919	0.19	0.16	0.05	0.23	0.0	0.0	0.0	0.0	0.0	0.0
* 90	1/IIIEW09101545	0.41	0.12	0.03	0.12	0.01	0.0	0.02	0.01	0.0	0.0
91	2/IEFQ8101820	0.06	0.0	0.09	0.07	0.0	0.0	0.0	0.12	0.0	0.02
92	2/IIIEZN9101835	0.14	0.0	0.04	0.0	0.0	0.0	0.11	0.09	0.0	0.0
93	2/IIEPF9101430	0.08	0.0	0.06	0.0	0.0	0.0	0.02	0.12	0.0	0.0
94	1/IIEMA9101344	0.68	0.0	0.02	0.02	0.0	0.0	0.0	0.04	0.0	0.0
* 95	1/IIICW05101700	0.33	0.06	0.01	0.26	0.0	0.0	0.0	0.0	0.0	0.0
* 96	2/IVFIV9101723	0.30	0.04	0.03	0.27	0.0	0.0	0.02	0.01	0.0	0.0
97	1/IVFFT9100930	0.23	0.0	0.07	0.02	0.0	0.0	0.0	0.0	0.0	0.0
98	2/IICZN5101650	0.15	0.0	0.07	0.26	0.0	0.0	0.0	0.06	0.0	0.0

NUMBER	SAMPLE NAME	11	12	13	14	15	16	17	18	19	20
1	1/IVBCN12101115	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0
2	1/IIAKM12101310	0.01	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.01	0.0
3	1/IIAKO12051300.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2/IIIAWT12250945	0.01	0.0	0.24	0.0	0.0	0.0	0.01	0.0	0.0	0.0
5	1/IIIATU1241700.	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.01	0.01
6	1/IIIATS12101700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	3/IIIAZR12251115	0.02	0.0	0.0	0.0	0.0	0.0	0.05	0.0	0.0	0.02
8	3/IIAQP12251200.	0.0	0.0	0.01	0.0	0.0	0.0	0.06	0.0	0.0	0.01
9	3/IIAQN12101245	0.01	0.0	0.0	0.0	0.0	0.0	0.03	0.0	0.01	0.0
10	3/IIAZP12101115	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0
11	2/IIIAWR12100945	0.0	0.0	0.02	0.0	0.0	0.0	0.04	0.0	0.01	0.0
12	1/IAHA12100900	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.02	0.0
13	1/IAGZ12030900.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	2/IAEL12101730	0.0	0.0	0.0	0.0	0.02	0.0	0.07	0.0	0.01	0.01
15	2/IAEO12051045.5	0.0	0.0	0.01	0.0	0.0	0.0	0.07	0.0	0.01	0.0
16	3/IABZ12251500.5	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	3/IABY12101500	0.0	0.0	0.01	0.0	0.0	0.0	0.02	0.0	0.0	0.0
18	3/ICIU4101930	0.0	0.0	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.09
19	3/IVFMG9921150B	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0
20	3/IVFME9771040P-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0
21	3/IVFMA9311145.5	0.0	0.0	0.0	0.0	0.01	0.0	0.04	0.0	0.0	0.0
22	2/IVFIX9131723.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	1/IVFFV9130930.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	1/IIIEW09091545.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 25	3/IVFMC9621145PZ	0.0	0.0	0.03	0.0	0.01	0.0	0.07	0.0	0.0	0.0
26	3/IIESL91051040B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 27	3/IIESH9581040PZ	0.0	0.0	0.01	0.0	0.0	0.0	0.01	0.0	0.0	0.0
28	3/IIESF9291040.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
29	2/IIIEZP9261635.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	3/IIESJ9811040P-	0.0	0.0	0.04	0.0	0.01	0.0	0.01	0.0	0.0	0.0

	31	3/IIESD9101040	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.01
	32	3/IIIFCE9921652P	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	33	3/IIIFCC9581652P	0.0	0.0	0.03	0.0	0.0	0.01	0.0	0.0	0.0	0.01
	34	3/IIIFCG9921652B	0.02	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0
	35	3/IIIFCA9291652.	0.0	0.0	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.01
	36	3/IIIFBY9101652	0.0	0.0	0.05	0.0	0.0	0.0	0.01	0.0	0.0	0.01
	37	2/IIEPH9251430.5	0.0	0.0	0.0	0.0	0.03	0.0	0.0	0.0	0.0	0.01
	38	1/IIEMC9111344.5	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	39	3/IEJN81341708B	0.01	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	40	3/IEJH8521708PZ	0.0	0.01	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	41	3/IEIW8261708.5	0.01	0.0	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.01
	42	3/IEIU8101708	0.0	0.0	0.16	0.0	0.04	0.0	0.0	0.0	0.0	0.03
	43	2/IEFS8201820.5	0.0	0.0	0.0	0.0	0.02	0.0	0.0	0.0	0.01	0.01
	44	1/IEC08181919.5	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0
	45	3/IEJL8931708P-B	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.01
	46	3/IIIDCC5691200P	0.0	0.0	0.0	0.0	0.0	0.01	0.01	0.0	0.0	0.01
	47	3/IIIDMR5381200P	0.0	0.0	0.05	0.0	0.0	0.0	0.03	0.0	0.0	0.01
	48	3/IIIDCA5191200.	0.0	0.0	0.0	0.0	0.0	0.0	0.04	0.0	0.0	0.0
	49	3/IIIDBY5101200	0.0	0.0	0.12	0.0	0.0	0.0	0.0	0.0	0.0	0.02
	50	3/IICSJ51201715B	0.0	0.0	0.03	0.0	0.01	0.0	0.0	0.0	0.0	0.0
	51	3/IICSH5711715P-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	52	3/IICSF5121715.5	0.0	0.0	0.0	0.0	0.0	0.0	0.04	0.0	0.01	0.0
	53	3/IICSD5101715	0.0	0.0	0.15	0.0	0.0	0.0	0.0	0.0	0.0	0.01
	54	1/IIICW05081700.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	55	3/IIIDCE51001200	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	56	3/IVDLV4911015B	0.0	0.0	0.01	0.0	0.0	0.0	0.04	0.0	0.0	0.0
	57	3/IVDLT4531015P-	0.0	0.0	0.10	0.0	0.0	0.0	0.11	0.0	0.0	0.01
	58	3/IVDHT4351015PZ	0.0	0.0	0.06	0.0	0.02	0.0	0.21	0.0	0.0	0.0
	59	3/IVDLR4171015.5	0.0	0.0	0.0	0.0	0.0	0.0	0.04	0.0	0.0	0.0
*	60	3/IVDLP4101015	0.01	0.0	0.01	0.0	0.03	0.0	0.0	0.0	0.0	0.0

	61	2/1ICPG4151010.5	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.0	0.01	0.0
	62	1/1ICHC4051025.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	63	3/ICJN413019308	0.0	0.0	0.0	0.0	0.0	0.0	0.06	0.0	0.0	0.01
*	64	3/ICJL4901930P-8	0.0	0.0	0.02	0.0	0.0	0.0	0.05	0.0	0.0	0.01
	65	3/ICIW4251930.5	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.0	0.07	0.08
	66	2/ICFS4201345.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	67	1/ICC04021730.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	68	2/IVDIN5111025.6	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.04	0.0
	69	3/IVBOR1361120.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	70	2/IVBFP1361310.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
	71	1/IVBCP1071000.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	72	3/IIBKO1115I045P	0.0	0.0	0.03	0.0	0.01	0.0	0.0	0.0	0.10	0.03
*	73	3/IIBKB1991045PZ	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.02
*	74	3/IBJK1I091330P-	0.0	0.0	0.02	0.0	0.0	0.0	0.11	0.0	0.01	0.01
*	75	3/IBIP1841330PZ	0.0	0.0	0.0	0.0	0.0	0.0	0.16	0.0	0.0	0.0
	76	2/IIANN1181745.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.01
	77	2/IIANL1101745	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.01	0.0
	78	1/IVDFN5141535.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	79	2/IIICZP5231645.	0.0	0.0	0.0	0.0	0.02	0.0	0.01	0.0	0.02	0.02
	80	3/IVBDP1101120	0.0	0.0	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	81	1/IICHA9101025	0.0	0.01	0.0	0.0	0.0	0.0	0.02	0.0	0.0	0.0
*	82	1/IVDFL5101535	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	83	2/IVBFN1101310	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	84	2/IICPE4101010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	85	2/IVDIL5101025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	86	3/IVFLY9101145	0.0	0.0	0.24	0.0	0.03	0.01	0.0	0.0	0.0	0.0
	87	1/ICCM4101730	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	88	2/ICF04101345	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	89	1/IECH8101919	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	90	1/IIIEW09101545	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	91	2/IEF08101820	0.01	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.02
	92	2/IIIEZN9101835	0.01	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	93	2/IIEPF9101430	0.0	0.0	0.12	0.0	0.0	0.0	0.02	0.0	0.0	0.0
	94	1/IIEMA9101344	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	95	1/IIICW05101700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	96	2/IVFIV9101723	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	97	1/IVFFT9100930	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	98	2/IICZN5101650	0.0	0.0	0.27	0.0	0.01	0.0	0.0	0.0	0.0	0.0

	NUMBER	SAMPLE NAME	21	22	23	24	25	26	27	28	29	30
	1	1/1VBCN12101115	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.02	0.0
	2	1/11AKM12101310	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0
	3	1/11AKO12051300.	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	2/111AWT12250945	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0
	5	1/111ATU1241700.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0
	6	1/111ATS12101700	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.01	0.0
	7	3/111AZH12251115	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	8	3/11AQP12251200.	0.03	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0
	9	3/11AQN12101245	0.03	0.0	0.0	0.0	0.0	0.0	0.02	0.01	0.0	0.0
	10	3/11AZP12101115	0.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	11	2/111AWR12100945	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.0	0.0
	12	1/1AHA12100900	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	13	1/1AGZ12030900.5	0.05	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.01	0.0
	14	2/1AEL12101730	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15	2/1AEU12051045.5	0.01	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0
	16	3/1ABZ12251500.5	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	17	3/1ABY12101500	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.0	0.0
	18	3/1C1U4101930	0.03	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0
	19	3/1VFMG9921150B	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	20	3/1VFME9771040P-	0.03	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	21	3/1VFMA9311145.5	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0
	22	2/1VF1X9131723.5	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.04	0.05	0.0
	23	1/1VFFV9130930.5	0.08	0.0	0.0	0.0	0.0	0.0	0.01	0.02	0.0	0.0
	24	1/111EWQ9091545.	0.04	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0
*	25	3/1VFMC9621145PZ	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	26	3/11ESL91051040B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0
*	27	3/11ESH9581040PZ	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	28	3/11ESF9291040.5	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.01	0.0
	29	2/111EZP9261835.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06	0.0	0.0
	30	3/11ESJ9811040P-	0.03	0.0	0.0	0.02	0.01	0.0	0.0	0.0	0.01	0.01

	31	3/IIESD9101040	0.04	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.01	0.0
	32	3/IIIFCE9921652P	0.02	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0
*	33	3/IIIFCC9581652P	0.01	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.01	0.0
	34	3/IIIFCG9921652B	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	35	3/IIIFCA9291652.	0.03	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0
	36	3/IIIFBY9101652	0.09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0
	37	2/IIEPH9251430.5	0.09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	38	1/IIEMC9111344.5	0.21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	39	3/IEJN81341708B	0.02	0.0	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	40	3/IEJH8521708PZ	0.0	0.0	0.0	0.03	0.0	0.0	0.0	0.0	0.01	0.0
	41	3/IEIW8261708.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0
	42	3/IEIU8101708	0.01	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0
	43	2/IEFS8201820.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0
	44	1/IECO8181919.5	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	45	3/IEJL8931708P-B	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	46	3/IIIDCC5691200P	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	47	3/IIIDMR5381200P	0.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	48	3/IIIDCA5191200.	0.13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	49	3/IIIDBY5101200	0.25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	50	3/IICSJ51201715B	0.04	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	51	3/IICSH5711715P-	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	52	3/IICSF5121715.5	0.03	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.01	0.0
	53	3/IICSD5101715	0.13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	54	1/IIICWQ5081700.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	55	3/IIIDCE51001200	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	56	3/IVDLV4911015B	0.05	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0
	57	3/IVDLT4531015P-	0.06	0.0	0.01	0.01	0.0	0.0	0.0	0.0	0.02	0.0
	58	3/IVDMT4351015PZ	0.03	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	59	3/IVDLR4171015.5	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	60	3/IVDLP4101015	0.03	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.02	0.0

	61	2/IICPG4151010.5	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0
	62	1/IICHC4051025.5	0.0	0.0	0.0	0.05	0.0	0.0	0.0	0.0	0.0	0.0
*	63	3/ICJN41301930B	0.0	0.0	0.01	0.01	0.0	0.0	0.0	0.0	0.0	0.0
*	64	3/ICJL4901930P-B	0.05	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	65	3/ICIW4251930.5	0.03	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.01	0.0
	66	2/ICFS4201345.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0
	67	1/ICCU4021730.5	0.0	0.0	0.0	0.05	0.0	0.0	0.0	0.0	0.0	0.0
	68	2/IVDIN5111025.5	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.01	0.0
	69	3/IVBOR1361120.5	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	70	2/IVBFP1361310.5	0.05	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0
	71	1/IVBCP1071000.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	72	3/IIBKD1151045P	0.05	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0
*	73	3/IIBKB1991045PZ	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0
*	74	3/IBJK11091330P-	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	75	3/IBIP1841330PZ	0.02	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0
	76	2/IIANN1181745.5	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0
	77	2/IIANL1101745	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.03	0.01	0.0
	78	1/IVDFN5141535.5	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0
	79	2/IIICZP5231645.	0.15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	80	3/IVBOP1101120	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0
*	81	1/IICMA4101025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	82	1/IVDFL5101535	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.0	0.0	0.0
*	83	2/IVBFN1101310	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.0
	84	2/IICPE4101010	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	85	2/IVDIL5101025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	86	3/IVFLY9101145	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	87	1/ICCM4101730	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	88	2/ICFQ4101345	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	89	1/IECM8101919	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	90	1/IIIEWO9101545	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	91	2/IEFQ8101820	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.01	0.0
	92	2/IIIEZN9101835	0.01	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.01	0.0
	93	2/IIEPF9101430	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	94	1/IIEMA9101344	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	95	1/IIICWO5101700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	96	2/IVFIV9101723	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.0
	97	1/IVFFT9100930	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	98	2/IICZN5101650	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	NUMBER	SAMPLE NAME	31	32	33	34	35	36	37	38	39	40
	1	1/1VBCN12101115	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	1/11AKM12101310	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	1/11AKO12051300.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	2/111AWT12250945	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	5	1/111ATU1241700.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	6	1/111ATS12101700	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	7	3/111AZR12251115	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	8	3/11AQP12251200.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	9	3/11AON12101245	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	10	3/11AZP12101115	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	11	2/111AWR12100945	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	12	1/1AHA12100900	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	13	1/1AGZ12030900.5	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	14	2/1AEL12101730	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15	2/1AEO12051045.5	0.0	0.0	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	16	3/1ABZ12251500.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	17	3/1ABY12101500	0.02	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	18	3/1C1U4101930	0.02	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	19	3/1VFMG9921150B	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	20	3/1VFME9771040P-	0.05	0.01	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	21	3/1VFMA9311145.5	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	22	2/1VF1X9131723.5	0.01	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23	1/1VFFV9130930.5	0.01	0.0	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	24	1/111EWU9091545.	0.01	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	25	3/1VFMC9621145PZ	0.02	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	26	3/11ESL9105104 0B	0.0	0.02	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	27	3/11ESH9581040PZ	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	28	3/11ESF9291040.5	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	29	2/111EZP9261835.	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	30	3/11ESJ9811040P-	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	31	3/IIESD9101040	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	32	3/IIIFCE9921652P	0.0	0.01	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	33	3/IIIFCC9581652P	0.01	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	34	3/IIIFCG9921652B	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	35	3/IIIFCA9291652.	0.04	0.0	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	36	3/IIIFBY9101652	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	37	2/IIEPH9251430.5	0.02	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	38	1/IIEMC9111344.5	0.02	0.0	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	39	3/IEJN8134170 8B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	40	3/IEJH8521708PZ	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	41	3/IEIW8261708.5	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	42	3/IEIU8101708	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	43	2/IEFS8201820.5	0.05	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	44	1/IECQ8181919.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	45	3/IEJL8931708P-B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	46	3/IIIDCC5691200P	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	47	3/IIIDMR5381200P	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	48	3/IIIDCA5191200.	0.01	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0
	49	3/IIIDBY5101200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	50	3/IICSJ51201715B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	51	3/IICSH5711715P-	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	52	3/IICSF5121715.5	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	53	3/IICSD5101715	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	54	1/IIICWQ5081700.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	55	3/IIIDCE51001200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	56	3/IVDLV4911015B	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	57	3/IVDLT4531015P-	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	58	3/IVDMT4351015PZ	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	59	3/IVDLR4171015.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	60	3/IVDLP4101015	0.02	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

61	2/11CPG4151010.5	0.0	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62	1/11CMC4051025.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 63	3/1CJN41301930B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
* 64	3/1CJL4901930P-B	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65	3/1C1W4251930.5	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66	2/1CFS4201345.5	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67	1/1CCD4021730.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68	2/1VDIN5111025.5	0.02	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0
69	3/1VBUR1361120.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70	2/1VBFP1361310.5	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
71	1/1VBCP1071000.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
72	3/11BK011151045P	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 73	3/11BK81991045PZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 74	3/1BJK11091330P-	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 75	3/1BIP1841330PZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76	2/11ANN1181745.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
77	2/11ANL1101745	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
78	1/1VDFN6141535.5	0.02	0.0	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
79	2/111CZP5231645.	0.02	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0
80	3/1VBDP1101120	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 81	1/11CMA4101025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 82	1/1VDFL5101535	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 83	2/1VBFN1101310	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
84	2/11CPE4101010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
85	2/1VDIL5101025	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
86	3/1VFLY9101145	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
87	1/1CCM4101730	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 88	2/1CFQ4101345	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 89	1/1ECM8101919	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 90	1/111EWD9101545	0.03	0.01	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
91	2/1EFQ8101820	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
92	2/111EZN9101835	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
93	2/11EPF9101430	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
94	1/11EMA9101344	0.03	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 95	1/111CWD5101700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* 96	2/1VFIV9101723	0.03	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
97	1/1VFFT9100930	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
98	2/11CZN5101650	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

NUMBER	SAMPLE NAME	41	42	43	44	45	46	47	48	49	50
1	1/IVBCN12101115	0.01	0.0	0.0	0.0	0.03	0.0	0.0	0.0	0.0	0.0
2	1/IIAKH12101310	0.01	0.0	0.0	0.0	0.05	0.0	0.0	0.0	0.0	0.0
3	1/IIAKO12051300.	0.04	0.0	0.0	0.0	0.10	0.01	0.0	0.0	0.0	0.0
4	2/IIIAWT12250945	0.03	0.0	0.0	0.0	0.05	0.0	0.0	0.0	0.0	0.0
5	1/IIIATU1241700.	0.29	0.0	0.0	0.0	0.19	0.0	0.0	0.0	0.0	0.0
6	1/IIIATS12101700	0.06	0.0	0.0	0.0	0.30	0.0	0.0	0.0	0.0	0.0
7	3/IIIAZR12251115	0.03	0.0	0.0	0.0	0.11	0.0	0.0	0.0	0.0	0.02
8	3/IIAQP12251200.	0.08	0.0	0.01	0.0	0.16	0.01	0.0	0.0	0.01	0.01
9	3/IIAQN12101245	0.07	0.0	0.0	0.0	0.21	0.0	0.0	0.0	0.0	0.0
10	3/IIAZP12101115	0.06	0.0	0.0	0.0	0.08	0.0	0.0	0.0	0.0	0.0
11	2/IIIAWR12100945	0.01	0.0	0.0	0.0	0.04	0.0	0.0	0.0	0.0	0.0
12	1/IAHA12100900	0.04	0.0	0.0	0.0	0.15	0.0	0.0	0.0	0.0	0.0
13	1/IAGZ12030900.5	0.01	0.0	0.0	0.0	0.17	0.0	0.0	0.0	0.0	0.0
14	2/IAEL12101730	0.01	0.01	0.0	0.0	0.05	0.0	0.0	0.0	0.0	0.0
15	2/IAED12051045.5	0.03	0.0	0.0	0.0	0.14	0.0	0.0	0.0	0.0	0.0
16	3/IABZ12251500.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	3/IABY12101500	0.02	0.0	0.0	0.0	0.05	0.0	0.0	0.0	0.0	0.0
18	3/ICIU4101930	0.12	0.01	0.0	0.0	0.23	0.0	0.0	0.01	0.02	0.0
19	3/IVFHG9921150B	0.02	0.01	0.0	0.0	0.02	0.0	0.0	0.01	0.0	0.0
20	3/IVFHE9771040P-	0.10	0.0	0.01	0.0	0.08	0.0	0.0	0.0	0.0	0.0
21	3/IVFMA9311145.5	0.06	0.0	0.01	0.0	0.10	0.0	0.0	0.0	0.0	0.0
22	2/IVFIX9131723.5	0.05	0.0	0.0	0.0	0.24	0.0	0.0	0.0	0.0	0.0
23	1/IVFFV9130930.5	0.0	0.0	0.0	0.0	0.17	0.0	0.0	0.0	0.0	0.0
24	1/IIIEWQ9091545.	0.10	0.0	0.0	0.0	0.19	0.0	0.0	0.0	0.0	0.0
* 25	3/IVFHC9621146PZ	0.13	0.0	0.01	0.0	0.25	0.0	0.0	0.0	0.0	0.0
26	3/IIESL910510408	0.07	0.01	0.03	0.0	0.21	0.0	0.0	0.0	0.0	0.0
* 27	3/IIESH9581040PZ	0.16	0.03	0.0	0.0	0.23	0.0	0.0	0.0	0.0	0.0
28	3/IIESF9291040.5	0.01	0.0	0.01	0.0	0.10	0.0	0.0	0.0	0.0	0.0
29	2/IIIEZP9261835.	0.05	0.0	0.0	0.0	0.21	0.0	0.0	0.0	0.0	0.0
30	3/IIESJ9811040P~	0.08	0.0	0.01	0.0	0.15	0.0	0.0	0.01	0.0	0.0

	31	3/IIESD9101040	0.19	0.0	0.01	0.0	0.29	0.0	0.0	0.0	0.0	0.0
	32	3/IIIFCE9921652P	0.02	0.03	0.01	0.0	0.37	0.0	0.0	0.0	0.0	0.0
*	33	3/IIIFCC9581652P	0.09	0.0	0.01	0.0	0.38	0.0	0.0	0.0	0.0	0.0
	34	3/IIIFCG9921652B	0.03	0.0	0.02	0.0	0.20	0.0	0.0	0.16	0.0	0.0
	35	3/IIIFCA9291652.	0.05	0.0	0.0	0.0	0.42	0.0	0.0	0.0	0.0	0.0
	36	3/IIIFBY9101652	0.08	0.0	0.0	0.0	0.20	0.0	0.0	0.0	0.0	0.0
	37	2/IIEPH9251430.5	0.0	0.0	0.0	0.0	0.34	0.0	0.0	0.0	0.0	0.0
	38	1/IIEHC9111344.5	0.02	0.0	0.0	0.0	0.04	0.0	0.0	0.0	0.0	0.0
*	39	3/IEJN81341708B	0.06	0.02	0.0	0.0	0.47	0.0	0.0	0.0	0.0	0.0
*	40	3/IEJH8521708PZ	0.14	0.0	0.0	0.0	0.40	0.0	0.0	0.0	0.0	0.0
	41	3/IEIW8261708.5	0.05	0.0	0.0	0.0	0.21	0.0	0.0	0.0	0.0	0.0
	42	3/IEIU8101708	0.19	0.0	0.0	0.0	0.06	0.0	0.0	0.0	0.0	0.0
	43	2/IEFS8201820.5	0.19	0.0	0.0	0.0	0.47	0.0	0.0	0.0	0.0	0.0
	44	1/IECO8181919.5	0.0	0.0	0.0	0.0	0.21	0.0	0.0	0.01	0.0	0.0
	45	3/IEJL8931708P-B	0.10	0.0	0.0	0.0	0.28	0.0	0.0	0.0	0.0	0.0
	46	3/IIIDCC5691200P	0.02	0.0	0.0	0.0	0.10	0.0	0.0	0.01	0.0	0.0
	47	3/IIIDMR5381200P	0.01	0.0	0.03	0.0	0.14	0.0	0.0	0.0	0.0	0.0
	48	3/IIIDCA5191200,	0.15	0.0	0.0	0.0	0.10	0.0	0.0	0.0	0.0	0.0
	49	3/IIIDBY5101200	0.0	0.0	0.0	0.0	0.05	0.0	0.0	0.0	0.0	0.0
	50	3/IICSJ5120171 5B	0.04	0.0	0.0	0.0	0.29	0.0	0.0	0.01	0.0	0.0
	51	3/IICSH5711715P-	0.05	0.01	0.0	0.0	0.12	0.0	0.0	0.0	0.0	0.0
	52	3/IICSF5121715.5	0.08	0.0	0.0	0.0	0.19	0.0	0.0	0.0	0.0	0.0
	53	3/IICSD5101715	0.04	0.0	0.0	0.0	0.18	0.0	0.0	0.01	0.0	0.0
	54	1/IIICWU5081700.	0.04	0.0	0.0	0.0	0.06	0.0	0.0	0.04	0.0	0.0
*	55	3/IIIDCE51001200	0.10	0.01	0.01	0.0	0.18	0.0	0.0	0.02	0.0	0.0
*	56	3/IVDLV4911015U	0.06	0.02	0.0	0.0	0.23	0.0	0.0	0.0	0.0	0.0
	57	3/IVDLT4531015P-	0.09	0.0	0.01	0.0	0.16	0.0	0.0	0.0	0.0	0.0
	58	3/IVDMT4351015PZ	0.04	0.01	0.0	0.0	0.08	0.0	0.0	0.0	0.0	0.0
	59	3/IVDLR4171015.5	0.07	0.0	0.0	0.0	0.17	0.0	0.0	0.0	0.0	0.0
*	60	3/IVDLP4101015	0.04	0.0	0.0	0.0	0.18	0.0	0.0	0.0	0.0	0.0

	61	2/IICPG4151010.5	0.06	0.0	0.0	0.0	0.14	0.0	0.0	0.0	0.0	0.0
	62	1/IICHC4051025.5	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0
*	63	3/ICJN41301930B	0.05	0.02	0.0	0.0	0.06	0.0	0.0	0.0	0.0	0.0
*	64	3/ICJL4901930P=B	0.04	0.0	0.0	0.0	0.17	0.0	0.0	0.0	0.0	0.0
	65	3/ICIW4251930.5	0.11	0.0	0.0	0.0	0.08	0.0	0.02	0.01	0.0	0.0
	66	2/ICFS4201345.5	0.03	0.0	0.0	0.0	0.05	0.0	0.0	0.0	0.0	0.0
	67	1/ICCO4021730.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	68	2/IVDIN5111025.5	0.01	0.0	0.0	0.0	0.04	0.0	0.0	0.0	0.0	0.0
	69	3/IVBOR1361120.5	0.06	0.0	0.0	0.0	0.21	0.0	0.0	0.0	0.0	0.02
	70	2/IVBFP1361310.5	0.21	0.0	0.01	0.0	0.30	0.0	0.0	0.0	0.0	0.0
	71	1/IVBCP1071000.5	0.04	0.0	0.0	0.0	0.15	0.0	0.0	0.0	0.0	0.0
	72	3/IIBKD11151045P	0.05	0.0	0.02	0.0	0.07	0.0	0.0	0.02	0.0	0.0
*	73	3/IIBKB1991045PZ	0.06	0.0	0.0	0.0	0.10	0.0	0.0	0.0	0.0	0.0
*	74	3/IBJK11091330P=	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	75	3/IBIP1841330PZ	0.0	0.0	0.0	0.0	0.08	0.0	0.0	0.0	0.0	0.0
	76	2/IIANN1181745.5	0.05	0.0	0.01	0.0	0.06	0.0	0.0	0.0	0.0	0.0
	77	2/IIANL1101745	0.01	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0
	78	1/IVDFN6141535.5	0.05	0.0	0.0	0.0	0.07	0.0	0.0	0.0	0.0	0.0
	79	2/IIICZP5231645.	0.02	0.0	0.01	0.0	0.12	0.0	0.0	0.0	0.0	0.0
	80	3/IVBDP1101120	0.14	0.01	0.0	0.0	0.19	0.0	0.0	0.0	0.0	0.0
*	81	1/IICHA4101025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	82	1/IVDFL5101535	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0
*	83	2/IVBFN1101310	0.11	0.0	0.0	0.0	0.19	0.0	0.0	0.0	0.0	0.0
	84	2/IICPE4101010	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	85	2/IVDIL5101025	0.02	0.0	0.0	0.0	0.04	0.0	0.0	0.0	0.0	0.0
	86	3/IVFLY9101145	0.06	0.0	0.0	0.0	0.25	0.0	0.0	0.01	0.0	0.0
	87	1/ICCM4101730	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	88	2/ICFO4101345	0.05	0.04	0.0	0.0	0.14	0.0	0.0	0.0	0.0	0.0
*	89	1/IECM8101919	0.07	0.0	0.0	0.0	0.03	0.0	0.0	0.0	0.0	0.0
*	90	1/IIIEWD9101545	0.08	0.0	0.0	0.0	0.12	0.0	0.0	0.0	0.0	0.0
	91	2/IEFO8101820	0.05	0.0	0.0	0.0	0.37	0.0	0.0	0.0	0.0	0.0
	92	2/IIIEZN9101835	0.45	0.0	0.0	0.0	0.04	0.0	0.0	0.0	0.0	0.0
	93	2/IIEPF9101430	0.07	0.03	0.0	0.0	0.31	0.0	0.0	0.0	0.0	0.0
	94	1/IIEHA9101344	0.08	0.0	0.0	0.0	0.12	0.0	0.0	0.0	0.0	0.0
*	95	1/IIICWD5101700	0.05	0.0	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0
*	96	2/IVFIV9101723	0.06	0.0	0.0	0.0	0.14	0.0	0.0	0.0	0.0	0.0
	97	1/IVFFT9100930	0.01	0.0	0.0	0.0	0.04	0.0	0.0	0.0	0.0	0.0
	98	2/IICZN5101650	0.05	0.0	0.0	0.0	0.08	0.0	0.0	0.0	0.0	0.0

NUMBER	SAMPLE NAME	51	52	53	54	55	56	57	58	59	60
1	1/IVBCN12101115	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1/IIAKM12101310	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1/IIAKU12051300.	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2/IIIAWT12250945	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02
5	1/IIIATU1241700.	0.19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02
6	1/IIIATS12101700	0.02	0.0	0.01	0.0	0.0	0.0	0.0	0.01	0.0	0.01
7	3/IIIAZR12251115	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02
8	3/IIAQP12251200.	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.12
9	3/IIAQN12101245	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.03
10	3/IIAZP12101115	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	2/IIIAWR12100945	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	1/IAHA12100900	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.03
13	1/IAGZ12030900.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.03
14	2/IAEL12101730	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33
15	2/IAEQ12051045.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.13
16	3/IABZ12251500.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.05
17	3/IABY12101500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02
18	3/ICIU4101930	0.0	0.0	0.02	0.0	0.0	0.0	0.02	0.0	0.0	0.03
19	3/IVFMG9921150B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.47
20	3/IVFME9771040P-	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.25
21	3/IVFMA9311145.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.10
22	2/IVFIX9131723.5	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.07
23	1/IVFFV9130930.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06
24	1/IIIEWQ9091545.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.13
* 25	3/IVFMC9621145PZ	0.02	0.0	0.01	0.0	0.0	0.0	0.01	0.0	0.0	0.03
26	3/IIESL9105104OB	0.02	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.44
* 27	3/IIESH9581040PZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.03
28	3/IIESF9291040.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	2/IIIEZP9261835.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.04
30	3/IIESJ9611040P-	0.0	0.0	0.02	0.0	0.0	0.0	0.01	0.0	0.0	0.25

	31	3/IIESD9101040	0.01	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.01
	32	3/IIIFCE9921652P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.17
*	33	3/IIIFCC9581652P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.04
	34	3/IIIFCG9Y21652B	0.0	0.0	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.13
	35	3/IIIFCA9291682.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06
	36	3/IIIFBY9101652	0.0	0.0	0.0	0.0	0.0	0.0	0.03	0.0	0.0	0.02
	37	2/IIEPH9251430.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.11
	38	1/IIEMC9111344.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06
*	39	3/IEJN81341708B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.04
*	40	3/IEJH8521708PZ	0.0	0.0	0.01	0.0	0.0	0.0	0.03	0.0	0.0	0.06
	41	3/IEIW8261708.5	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.04
	42	3/IEIU8101708	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.03
	43	2/IEFS8201820.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.09
	44	1/IECO8181919.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.11
	45	3/IEJL8931708P-B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.07
	46	3/IIIDCC5591200P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.30
	47	3/IIIDHR5381200P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	48	3/IIIDCA5191200.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
	49	3/IIIDBY5101200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	50	3/IICSJ51201715B	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.22
	51	3/IICSH5711715P-	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.22
	52	3/IICSF5121715.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02
	53	3/IICSD5101715	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.0	0.0	0.0
	54	1/IIICWQ5081700.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.04
*	55	3/IIIDCE51001200	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.26
*	56	3/IVDLV4911015B	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.15
	57	3/IVDLT4531015P-	0.0	0.0	0.01	0.0	0.0	0.0	0.01	0.0	0.0	0.04
	58	3/IVDHT4351015PZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.03
	59	3/IVDLR4171015.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	60	3/IVDLP4101015	0.01	0.0	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.01

	61	2/IICPG4151010.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.23
	62	1/IICNC4051025.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.31
*	63	3/ICJN41301930B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.22
*	64	3/ICJL4901930P—B	0.0	0.0	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.04
	65	3/ICIW4251930.5	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.09
	66	2/ICFS4201345.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.67
	67	1/ICCQ4021730.5	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.24
	68	2/IVDIN5111025.5	0.01	0.0	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.02
	69	3/IVBQR1361120.5	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.05
	70	2/IVBFP1361310.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.08
	71	1/IVBCP1071000.5	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06
	72	3/IIBKD1115104SP	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.13
*	73	3/IIBKB1991048PZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06
*	74	3/IBJK11091330P—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.14
*	75	3/IBIP1841330PZ	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.06
	76	2/IIANH1181745.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.03
	77	2/IIANL1101745	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	78	1/IVDFN5141535.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.03
	79	2/IIICZP5231645.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	80	3/IVBDP1101120	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.10
*	81	1/IICMA4101025	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.04
*	82	1/IVDFL5101535	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*	83	2/IVBFN1101310	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.25
	84	2/IICPE4101010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.05
	85	2/IVDIL5101025	0.0	0.0	0.02	0.0	0.0	0.0	0.01	0.0	0.0	0.0
	86	3/IVFLY9101145	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
	87	1/ICCH4101730	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
*	88	2/ICFQ4101345	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.31
*	89	1/IECH8101919	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.27
*	90	1/IIIEWQ9101545	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
	91	2/IEFQ8101820	0.01	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.10
	92	2/IIIEZN9101835	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02
	93	2/IIEPF9101430	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.06
	94	1/IIEMA9101344	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
*	95	1/IIICWD5101700	0.0	0.0	0.23	0.0	0.0	0.0	0.0	0.0	0.0	0.04
*	96	2/IVFIV9101723	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.04
	97	1/IVFFT9100930	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	98	2/IICZN5101650	0.0	0.0	0.01	0.0	0.0	0.0	0.01	0.0	0.0	0.0

The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Minerals Revenue Management** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.