THE PEEL-HARVEY ESTUARINE SYSTEM STUDY (1976 - 1980)

TECHNICAL REPORT

SEDIMENT CONTRIBUTION TO NUTRIENT CYCLING

1981

J.O. Gabrielson

DEPARTMENT OF CONSERVATION AND ENVIRONMENT
BULLETIN No. 96

A TECHNICAL REPORT to
THE PEEL-HARVEY ESTUARINE SYSTEM STUDY (1976-1980)

THE SEDIMENT CONTRIBUTION TO NUTRIENT CYCLING IN THE PEEL-HARVEY ESTUARINE SYSTEM

by

J.O. Gabrielson

Department of Soil Science and Plant Nutrition,
Institute of Agriculture,
The University of Western Australia

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PUBLICATIONS:
THE PEEL-HARVEY ESTUARINE SYSTEM STUDY (1976-1980)

This report is one of 14 technical reports that were presented to the Environmental Protection Authority's Estuarine and Marine Advisory Committee as part of the Peel-Harvey Estuarine System Study (1976-1980).

The publications arising from the study are listed below and are available from the Department of Conservation and Environment, 1 Mount Street, Perth WA 6000.

- The Peel-Harvey Estuarine System Study (1976-1980). A report to the Estuarine & Marine Advisory Committee December 1980. E.P. Hodgkin, P.B. Birch, R.E. Black, and R.B. Humphries, Department of Conservation and Environment, Report No. 9.
- The Peel-Harvey Estuarine System Study. A report by the Estuarine and Marine Advisory Committee to the Environmental Protection Authority, March 1981. Department of Conservation and Environment, Bulletin No. 88.

TECHNICAL REPORTS

BULLETIN No.

89 The Peel Inlet and Harvey Estuary System Hydrology and Meteorology. R.E. Black and J.E. Rosher. June 1980.

90 Sediments and Organic Detritus in the Peel-Harvey Estuarine System. R.G. Brown, J.M. Treloar and P.M. Clifton. August 1980.

91 The Ecology of *Cladophora* in the Peel-Harvey Estuarine System. D.M. Gordon, P.B. Birch and A.J. McComb. 1981.

92 The Decomposition of *Cladophora*. J.O. Gabrielson, P.B. Birch and K.S. Hamel. October 1980.

93 The Control of Phytoplankton Populations in the Peel-Harvey Estuarine System. R.J. Lukatelich and A.J. McComb. 1981.

94 Cyanobacteria and Nitrogen Fixation in the Peel-Harvey Estuarine System. A.L. Huber. October 1980.

95 Phosphatase Activities in the Peel-Harvey Estuarine System. A.L. Huber. October 1980.

96 The Sediment Contribution to Nutrient Cycling in the Peel-Harvey Estuarine System. J.O. Gabrielson. 1981.

97 Aspects of the Biology of Molluscs in the Peel-Harvey Estuarine System, Western Australia. F.E. Wells, T.J. Threlfall and B.R. Wilson. June 1980.

98 The Fish and Crab Fauna of the Peel-Harvey Estuarine System in Relation to the Presence of *Cladophora*. I.C. Potter, R.C.J. Lenanton, N. Loneragan, P. Chrystal, N. Caputi and C. Grant. 1981.

99 Phosphorus Export from Coastal Plain Catchments into the Peel-Harvey Estuarine System, Western Australia. P.B. Birch. October 1980.

100 Systems Analysis of an Estuary. R.B. Humphries, P.C. Young and T. Beer. 1981.

101 Peel-Harvey Nutrient Budget. R.B. Humphries and R.E. Black. October 1980.

102 Nutrient Relations of the Wetlands Fringing the Peel-Harvey Estuarine System. T.W. Rose and A.J. McComb. August 1980.

PREFACE

This is a preliminary report in a continuing study of nutrient cycling in the Peel-Harvey Estuarine System. As such it presents the current status of this study for discussion within the Peel Inlet Study Group and others interested in the study. This discussion and further analysis of the data in light of the results presented in the other team reports will undoubtably lead to new interpretations of some of the information presented in this report and possibly affect the future efforts of this study.

Further work already planned is alluded to in the text of this report. This includes further adsorption/desorption work investigating the effects of pH and redox, the use of phosphorus-32 as a tracer to follow sediment phosphorus release and its uptake by Cladophora (in cooperation with P.B. Birch), more field measurements of sediment-water exchange of phosphorus in enclosures, and a better analysis of sediment trap data as correlated to wind speed and direction (in cooperation with R.J. Luketelich).

Inevitably some abbreviated descriptions have been used in this report. "Peel" and "Harvey" are frequently used instead of the correct forms Peel Inlet and Harvey Estuary; thus, "Peel sediments" refers to sediments found in the Peel Inlet. Readers unfamiliar with this estuarine system are advised to study Hodgkin et al. (1980). N and P, of course, refer to nitrogen and phosphorus respectively. Phosphate, orthophosphate and soluble reactive phosphate (SRP) are used somewhat interchangeably. The measured form is most accurately described as soluble reactive phosphate however.

The help and cooperation of all members of the Peel Inlet Study Group is gratefully acknowledged. Several people should be mentioned individually. Professor Ernest Hodgkin performed the difficult task of coordinating the efforts of the many and diverse groups involved in this study. Dr. Ross Field kept the financial side of our efforts running smoothly. Dr. Denis Kidby and the late Professor Alan Posner willingly gave their professional support, advice and direction to this department's research efforts. Associate Professor Arthur McComb and people in the Botany Water Laboratory gave advice and analytical support. Dr. Bob Humphries and the CRES team provided a conceptual framework through models and supplied water data as quickly as possible. Dr. Peter Birch was a partner in decomposition research, gave field support and was always available for discussing ideas. Kathy Hamel became my laboratory technician in September 1979 and has given thoughtful input into the design and execution of experiments in addition to processing large numbers of samples. Rod Luketelich has cooperated in sedimentation research and provided valuable field support. Ann Huber has cooperated in phosphatase work and supervised a student (Paul Dolan) in his work related to the decomposition of *Cladophora*. Many of the figures were produced by Andrew Gamble and the graphics section at the Department of Conservation and the Environment.

John O. Gabrielson

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INTRODUCTION

Nutrient cycling in natural waters is a complex process involving interactions within and between the water mass and bottom sediments, as well as external inputs and losses. Quantification of the various aspects of this process is made more difficult in a water body such as the Peel-Harvey estuarine system by its shallow depth and wide variations in salinity over the year. Shallow water systems are influenced by exchange with the sediments to a much greater degree than deep water systems.

Riverine nutrient inputs to the Peel-Harvey system are significant for approximately three months of the year. For the rest of the year nutrient levels in the water are controlled by exchange with the ocean and with the bottom sediments. The cycling of phosphorus within the Peel-Harvey system is represented in simplified form in figure 1. Orthophosphate is the form of phosphorus that is available for assimilation by plants and therefore its supply is of major importance to both growth rates and maximum biomass achievable in the system.

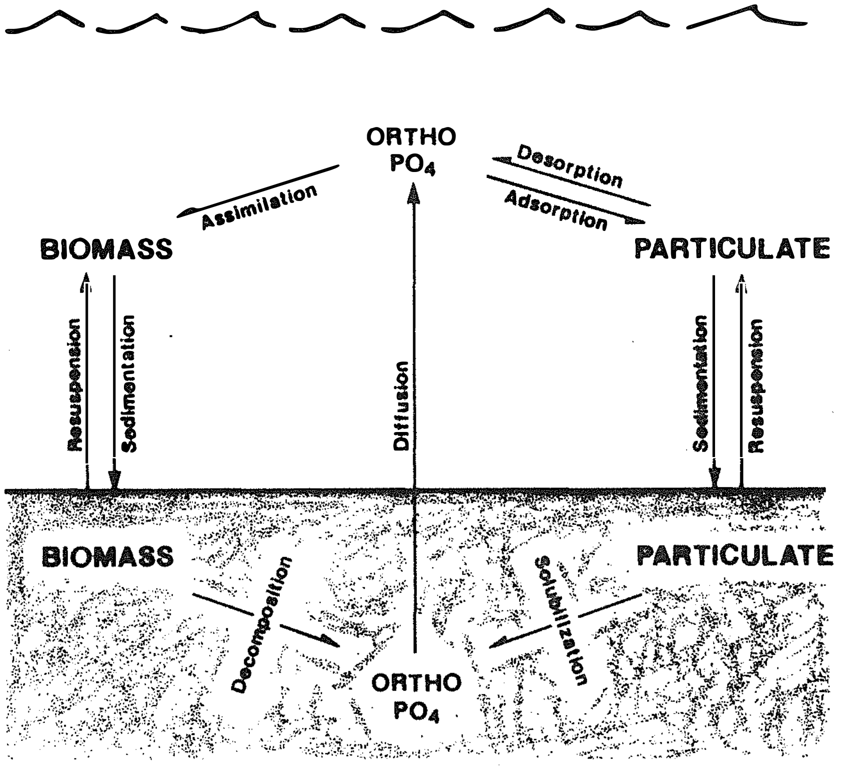
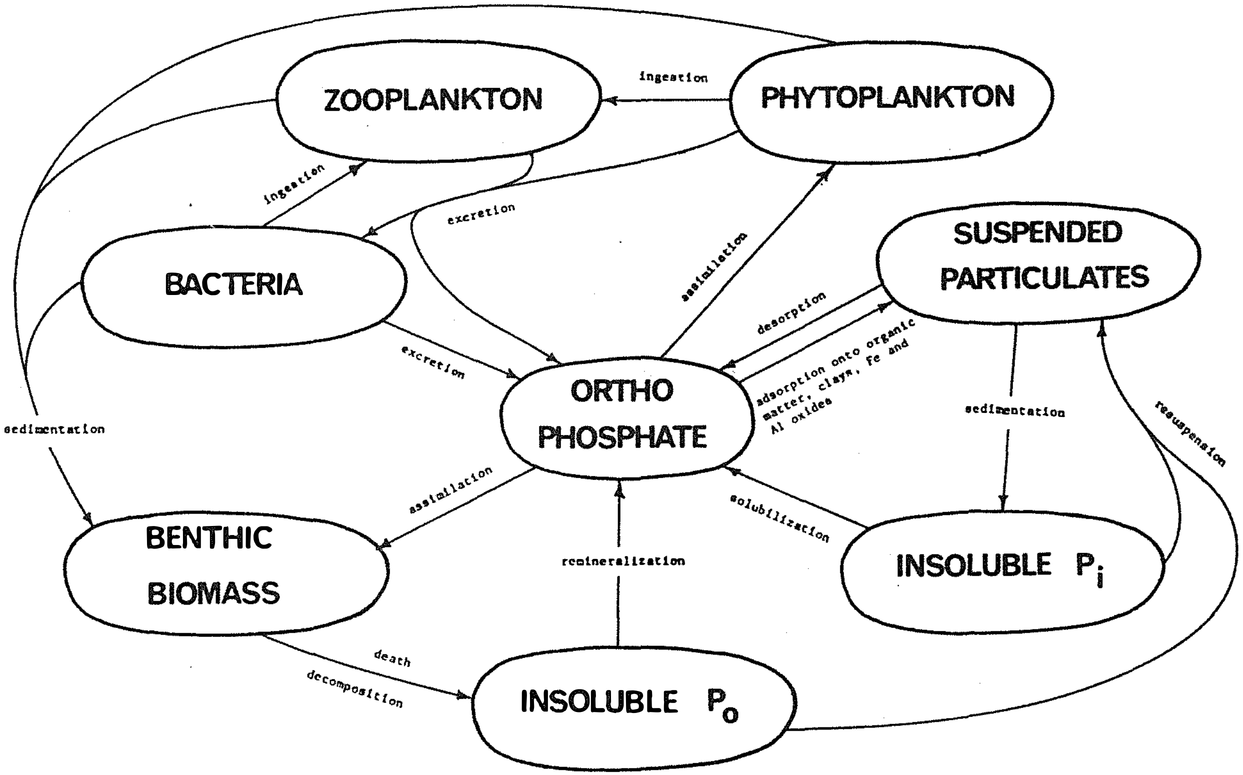


Figure 1 Simplified phosphorus cycle.

The Peel and Harvey have mean depths of approximately one metre and are both well mixed by wind stirring. This stirring causes a great deal of resuspension of sediment (Chapter 8) and consequently accelerates the return of nutrients to the water column. The resuspended phosphorus is in the form of living material, detrital material, inorganic particulates, adsorbed organic and inorganic phosphates, and entrained dissolved phosphate. The dissolved and adsorbed inorganic phosphate fractions will quickly adjust toward equilibrium levels through either adsorption or desorption depending on the concentration of orthophosphate and other compounds in solution. Clays, oxides of iron and aluminium, calcium, and organic matter have all been shown to adsorb phosphates. The adsorption/desorption properties of several representative Peel-Harvey sediments are discussed in Chapter 6.

Dissolved orthophosphate concentrations are typically much higher in sediments than in the water column. This is in part due to the higher solubility, under reducing conditions, of iron complexes onto which phosphate is adsorbed. The concentration gradient between the sediment and overlying water results in diffusion of phosphate from the sediment interstitial water into the water column. The efficiency of phosphate release is reduced by well-oxygenated conditions in the water column and surface sediment layer. Direct release of phosphate from sediments is discussed in Chapter 7.

To some extent nutrients assimilated by planktonic organisms are recycled in the water column, but in a shallow system such as the Peel-Harvey estuarine system most biomass probably settles to the bottom before actually decomposing. The release of nutrients through decomposition involves cell lysis and the breakdown of the cell constituents into inorganic forms reusable for growth by primary producers. This process is mediated by enzymes such as phosphatases which remove phosphate groups from organic phosphorus molecules. The decomposition process for *Cladophora* has been described elsewhere (Gabrielson *et al.* 1980). It should be noted that the decomposition and remineralization process is not 100% efficient and some nutrients are permanently lost to the sediment.



<u>Figure 2.</u> Enhanced phosphorus cycle

Figure 2 gives a more detailed (although still incomplete) picture of phosphorus cycling. Since any or all of these interactions may be occurring simultaneously, it is very difficult to assess short-term nett movement of phosphorus. Given a nett accumulation of sediment over the long term, however, there must also be a nett loss of nitrogen and phosphorus to the sediment. In most bodies of water this loss rate would of course be quite small compared to the overall flux of these nutrients.

The sediments are capable of acting as a buffer to the system, particularly with respect to phosphorus (Pomeroy et al. 1965, Stirling and Wormald 1977). If changes are made in the system, e.g. the removal of biomass, the sediments may respond by becoming a nett source of phosphorus rather than a sink. Figure 3 depicts a displacement of the equilibrium between biomass, sediments and orthophosphate in the water column. The top diagram (Fig. 3a) indicates the present condition of high biomass and nutrient rich sediment. If the biomass were sufficiently reduced it would no longer replenish the sediment as quickly as the sediment released phosphorus. The sediment would thus become a nett source of phosphorus, supplying a growing biomass until a new equilibrium was reached with higher biomass and reduced sediment phosphorus reserves (Fig. 3b). By reducing both biomass and sediment stores of phosphorus (Fig. 3c), a new equilibrium would be established more quickly and at a lower level of biomass than that obtained under the previously specified conditions. These internal mechanisms and their manipulations would of course also be affected by changes in external nutrient loading or flushing.

The nitrogen cycle differs from the phosphorus cycle in the following ways: (1) adsorption-desorption reactions would be relatively unimportant, (2) nitrogen may be supplied from the atmosphere through nitrogen fixation by cyanobacteria (Huber 1980), and (3) nitrogen may be lost to the atmosphere through denitrification.

Most of the above discussion and the work presented in the later chapters of this report has been aimed at phosphorus which is believed to be the more important nutrient to be comsidered in the management of this system, particularly for a reduction in *Cladophora* (Hodgkin *et al.* 1980). Sediment supplies of nitrogen and phosphorus are described in Chapters 2 through 5 of this report. Subsequent chapters deal with some of the important factors in phosphorus cycling as outlined above. An understanding of these factors is crucial to the understanding of the ecology of the Peel-Harvey estuarine system in general and the *Cladophora* problem in particular.

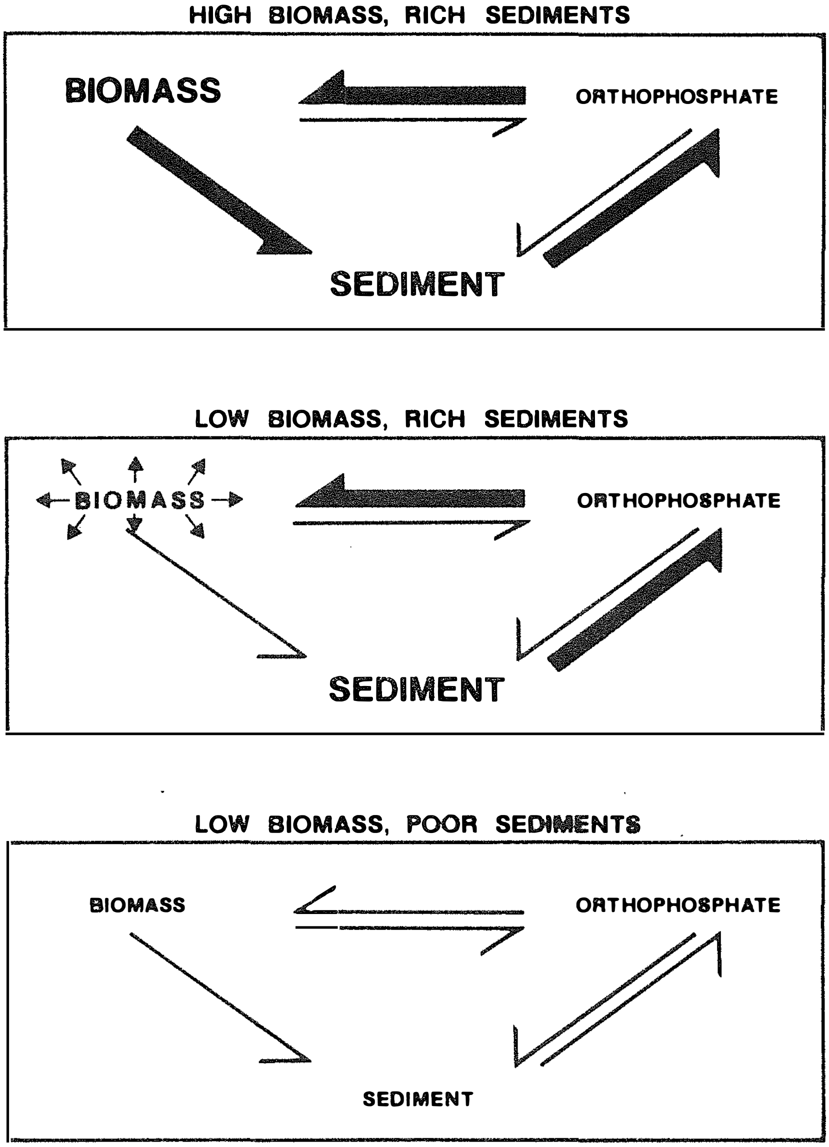


Figure 3 Sediments as a buffer.

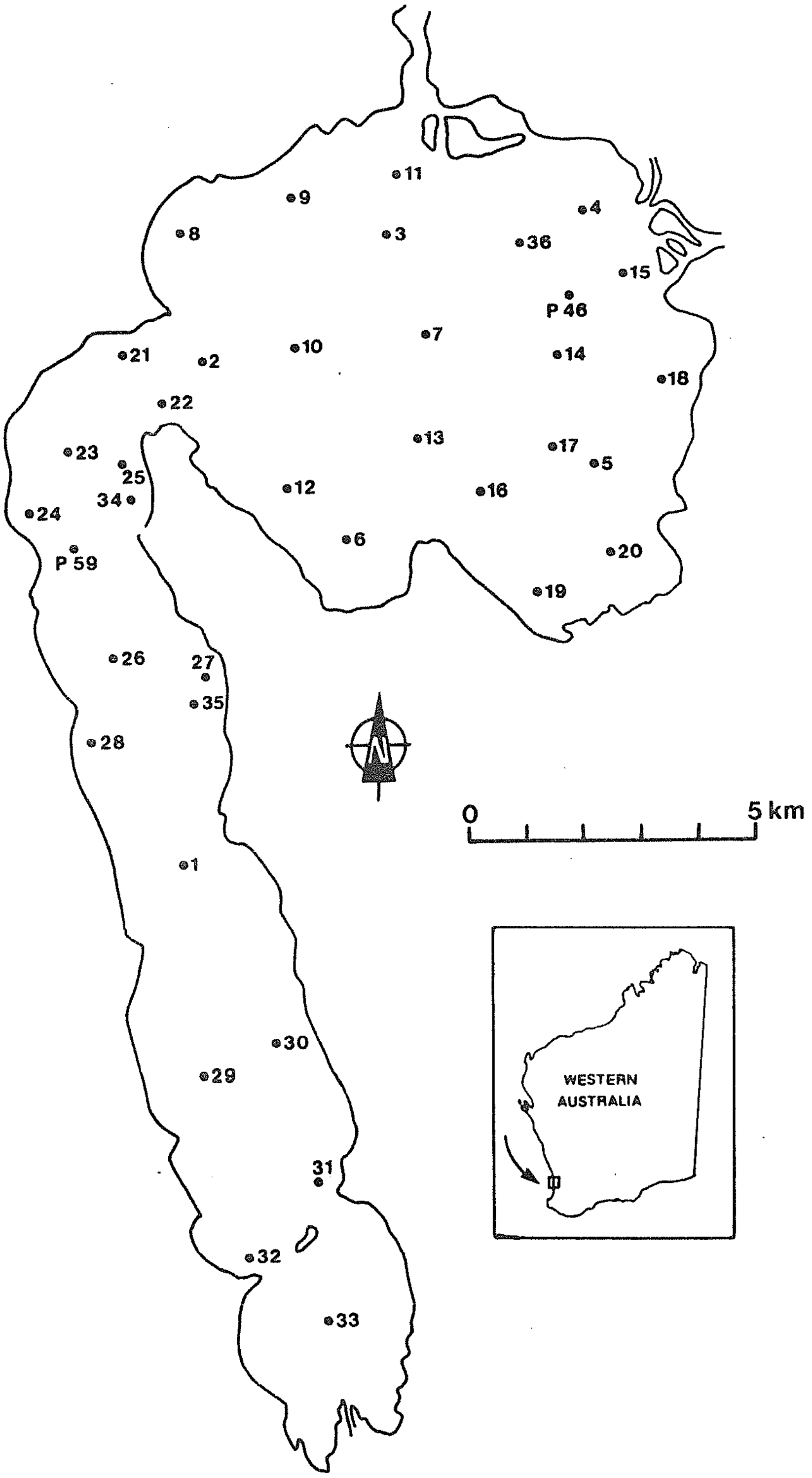


Figure 4 Location of sampling sites in Peel-Harvey Estuarine system.

GRID STUDIES

Four intensive "grid studies" were conducted in cooperation with the Botany Department (University of W.A.) in March 1978, August 1978, March 1979, and September 1979. Both water and sediment samples at each of 36 sites (Fig. 4) were taken to determine the spatial distribution and possible relationships between the various parameters measured. As the water data will be discussed by the Botany group, this discussion will be limited to the sediment data.

At the time of collection, sediments were described with respect to depth of oxidized layer and depth of unconsolidated black ooze at the surface (if present). Moisture content, organic content, extractable phosphate, total phosphorus, extractable nitrate, extractable ammonia and total nitrogen were determined for all sediment samples. For the March 1979 study, organic phosphorus and phosphatase activities were also determined. All methodology is described in Appendix I and detailed data are in Appendix II.

Moisture Content

As expected, black ooze had a much higher moisture content than the underlying sediment, and averaged 60-80% water by weight. The non-ooze surface sediment of the Peel differed significantly from that of the Harvey. The Peel sediments averaged close to 30% water in all four grid studies as opposed to the Harvey sediments whose means varied between 44% and 55% water content. The surface sediments (including black ooze) had their highest mean value in the Peel during the August 1978 study. The Harvey surface sediment did not appear to vary significantly between the four studies.

Organic Matter

Figure 5 shows the distribution of organic matter in the Peel-Harvey system during the four grid studies. Black ooze was always higher in organic content than the underlying sediments. These non-ooze sediments were more organic in the Harvey (6-7% organic) than in the Peel (mean 3% organic content). This was especially true of the central basin sediments. The higher organic areas of the Peel were associated with macrophyte growth areas (Cox Bay, Coodanup and the eastern shelf) and with black ooze. There seems to be a slight trend to higher organic levels in the sediments in the winters as opposed to the summers in the Peel Inlet but not in the Harvey. One final observation is that there was an apparent build up of organic matter in Cox Bay over the period of these four surveys.

Total Phosphorus (Figure 6)

Again, ooze was enriched with respect to total phosphorus relative to the underlying sediments. Higher surface sediment values in the winter for the Peel Inlet reflected higher ooze total phosphorus values in the winter. The underlying (non-ooze) sediments of the Peel had a very stable mean value of approximately 90 ug P per gram dry weight for all four grid studies. The Harvey sediments had higher and more variable phosphorus contents (113-190 ug/g).

Extractable Phosphate (Figure 7)

Values measured for this parameter were again higher in the ooze layers than in the underlying sediments. The August 1978 grid study had significantly higher values of extractable phosphate than any of the other grid studies. The August 1978 mean value of 12.6 ug/g for the Peel crashed to 0.4 ug/g in March 1979 before rising to 0.9 ug/g in September 1979. The winter values in both years were greater than summer values but 1979 was much lower than the 1978 winter mean in both the Peel and Harvey. In all cases the means for the non-ooze sediments were higher in the Harvey than in the Peel. Mean extractable phosphate values represented between 0.3% and 7.6% of the mean total phosphorus contents with the highest percentage in August 1978.

Total Nitrogen (Figure 8)

The black ooze sediments were also enriched in total nitrogen.

Variability was such that, in contrast with the total phosphorus situation, the means for non-ooze sediments in the Harvey were not significantly higher than for those in the Peel. Highest total nitrogen values in the Harvey were in the central basin and northwest shallows. In the Peel, however, highest values were in the shelf oozes.

Extractable Ammonia (Figure 9)

Figure 9 shows a picture similar to that for extractable phosphate (Figure 7), with a big peak in values in August 1978. Ooze values are higher than those of the underlying sediments and non-ooze values are higher in the Harvey than in the Peel. Highest Peel values are in the shelf ooze, and highest Harvey values are in the basin or northwest corner.

Extractable Nitrate (Figure 10)

Extractable nitrates were similar to ammonia in distribution in space and time except that the means of the Peel and Harvey were not significantly different. On average, extractable nitrate is two orders of magnitude lower than extractable ammonia and therefore not quantitatively significant. This would be expected in a generally reducing environment.

Organic Phosphorus and phosphatase (Figure 11)

Organic phosphorus and phosphatase activities in the sediments were measured only for the March 1979 grid study. Organic phosphorus was expectably greater in those areas where organic matter was greatest: on the shelf of the Peel and in the central basin and NW shelf of the Harvey. The non-ooze sediments of the Harvey were higher in organic phosphorus than those of the Peel (means were 44 vs. 16 ug/g dry weight). As a percentage of total phosphorus content these sediments varied from 4% to 52% (mean 19%) in the Peel and 3% to 89% (mean 37%) in the Harvey. Black ooze had a mean of 26% of the total phosphorus as organic phosphorus in both the Peel and Harvey.

Phosphatases are a group of enzymes capable of removing phosphate radicals from organic phosphorus molecules, thus producing orthophosphate which can be asssimilated by photosynthetic organisms. Phosphatase activities measured in March 1979 ranged from 0.19 to 4.50 umoles of p-nitophenyl phosphate released per gram dry weight per hour. Activities were generally higher in the black ooze than in the other sediments (mean of 1.52 vs. 0.75 umoles/g/hr) and also generally higher in the Harvey than in the Peel (1.21 vs. 0.86 umoles/g/hr mean surface activities).

Conclusions

The grid studies present a picture of both spatial and temporal heterogeneity in the sediments of the Peel-Harvey estuarine system. In spite of this the following general statements can be made:

1. The sediments of the Harvey Estuary are generally richer in organic matter, total phosphorus and extractable nitrogen and phosphorus than those of the Peel Inlet.
2. Sediments described as black ooze are generally much enriched relative to their underlying sediments.
3. The highest nutrient concentrations in the Peel sediments are in Cox Bay, off Coodanup and on the eastern shelf.
4. The highest nutrient concentrations in the Harvey sediments are in the central basin and the northwest corner (near Dawesville).
5. Extractable nitrogen and phosphorus fractions were significantly greater in August 1978 than at other grid study times. This may be due to the fact that the highest river inputs experienced during this study occurred in the winter of 1978 (Black and Rosher 1980). The riverine loading may have directly added increased amounts of extractable nutrients to the sediments. Another possible explanation which is not mutually exclusive could be nutrient input by sedimentation of a heavy phytoplankton bloom at that time (Lukatelich and McComb 1981).

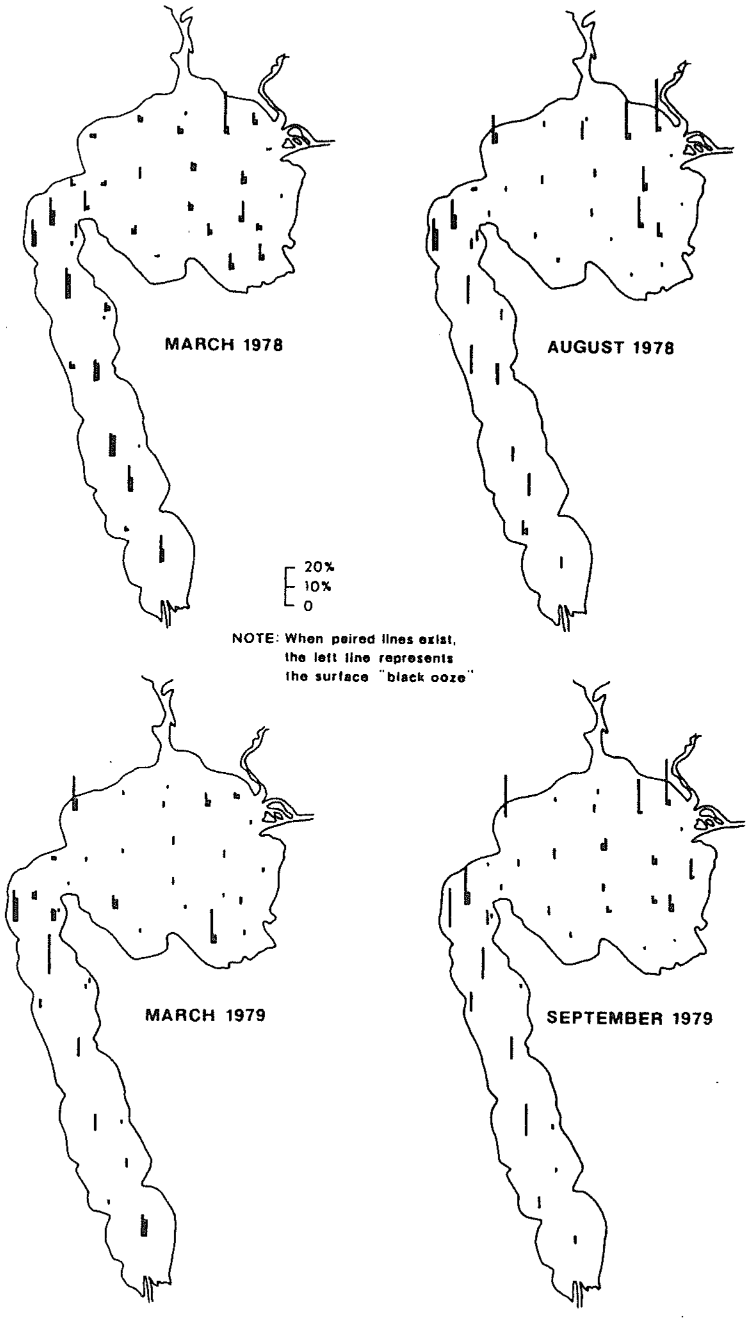
6. Organic phosphorus constituted an average of 20-40% of the total phosphorus in the surface sediments in March 1979 and extracellular phosphatases were present in abundance.

7. The sediment parameters measured in these grid studies were interrelated as can be seen in Table 1. Total nitrogen, total phosphorus, organic matter and wet/dry ratios had particularly strong linear correlations with each other. Appendix IIA has cross correlation matrices for each grid study with Peel and Harvey sediments analysed separately.

Table 1. **Linear correlation coefficients for 44 sediment samples from both Peel and Harvey estuaries in August 1978.**

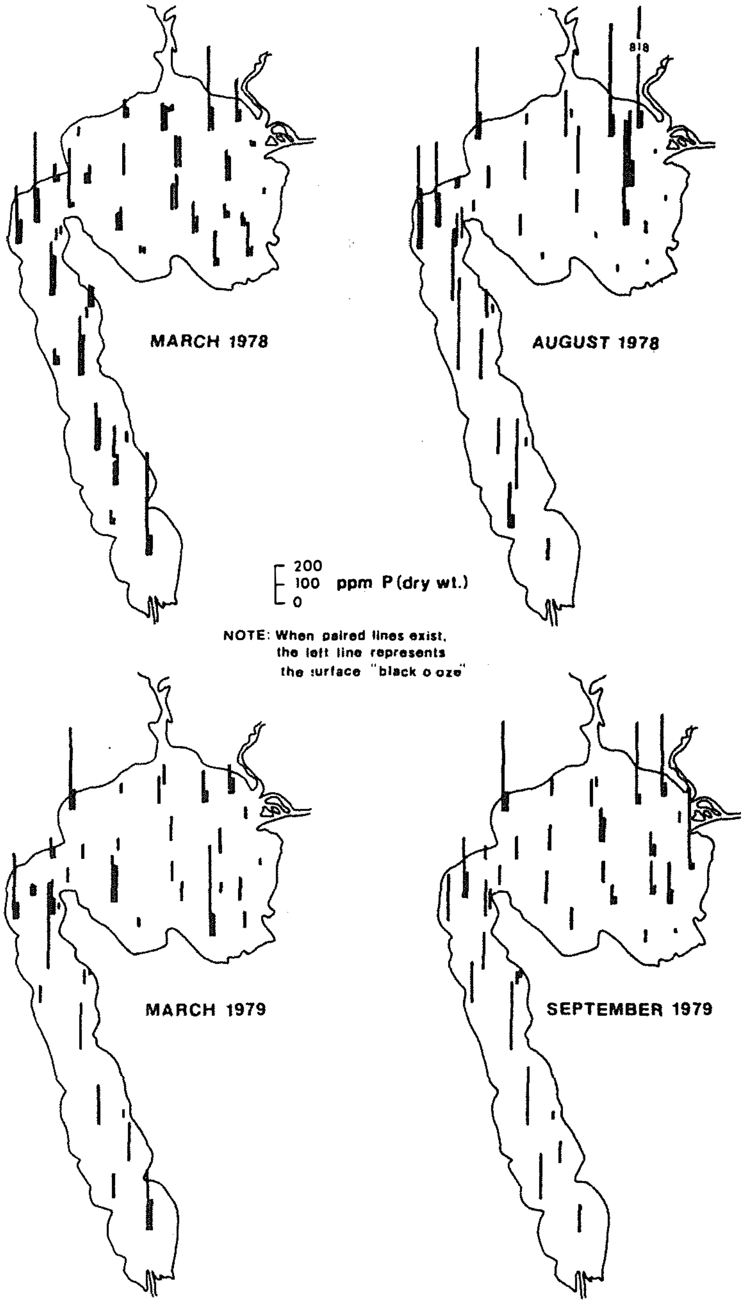
	TN	Ext.NO3	Ext.NH4	TP	Ext.PO4	% OM
Wet/dry	.972	.669	.680	.969	.629	.974
% Org. M	.975	.647	.646	.983	.614	
Ext. PO4	.583	.270	.976	.615		
Total P	.980	.681	.656			
Ext. NH4	.628	.314				
Ext. NO3	.685					

% ORGANIC CONTENT



NOTE: When paired lines exist, the left line represents the surface "black ooze"

Figure 5. Organic matter in sediments

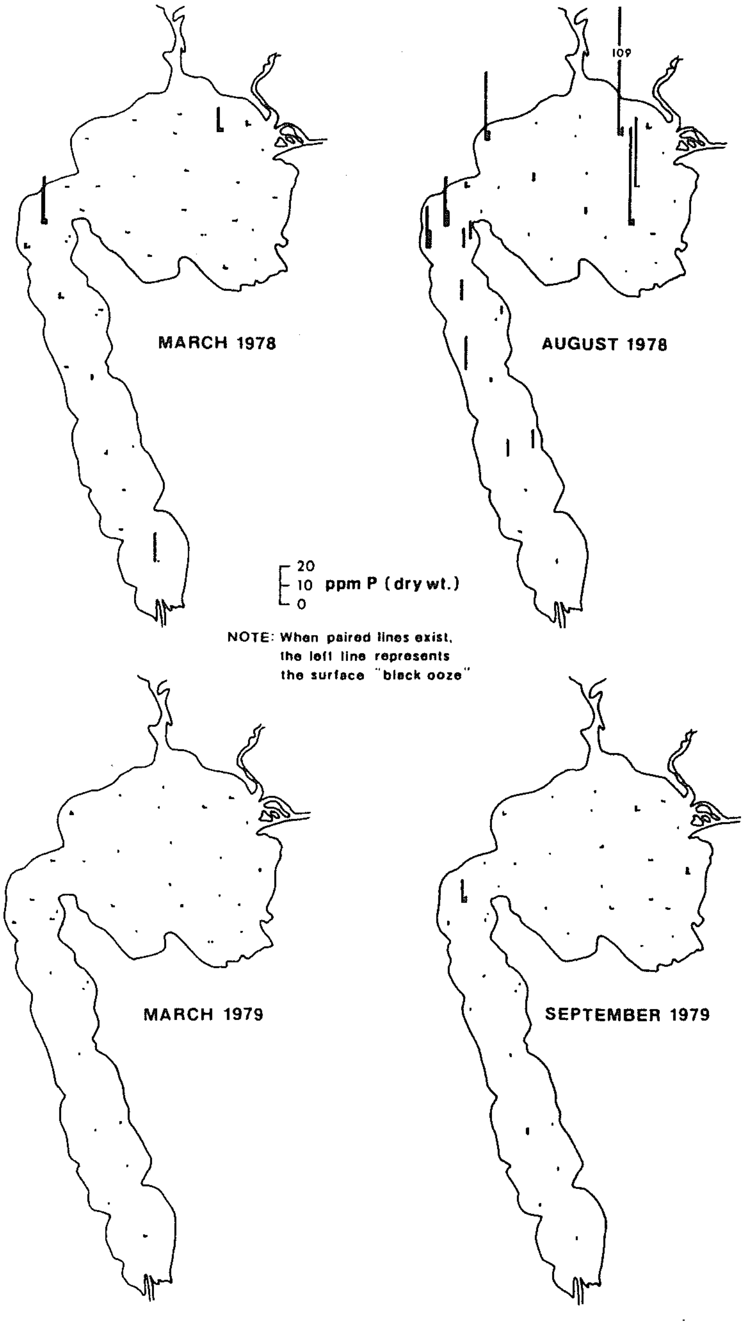


TOTAL PHOSPHORUS

NOTE: When paired lines exist, the left line represents the surface "black ooze"

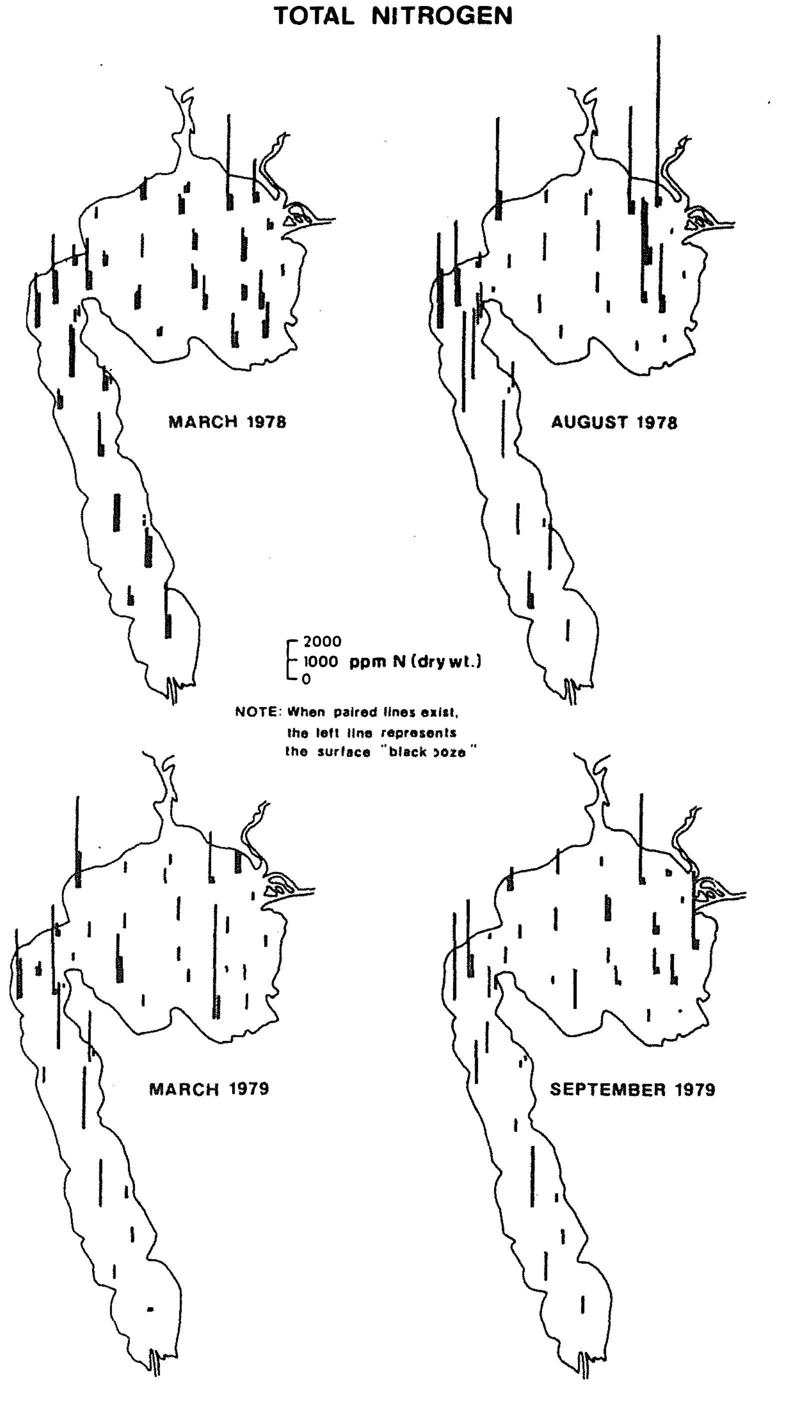
Figure 6. Total phosphorus in sediments

EXTRACTABLE PHOSPHORUS



NOTE: When paired lines exist, the left line represents the surface "black ooze"

Figure 7. Extractable phosphate in sediments



NOTE: When paired lines exist, the left line represents the surface "black ooze"

Figure 8. Total nitrogen in sediments

EXTRACTABLE NH_4-N

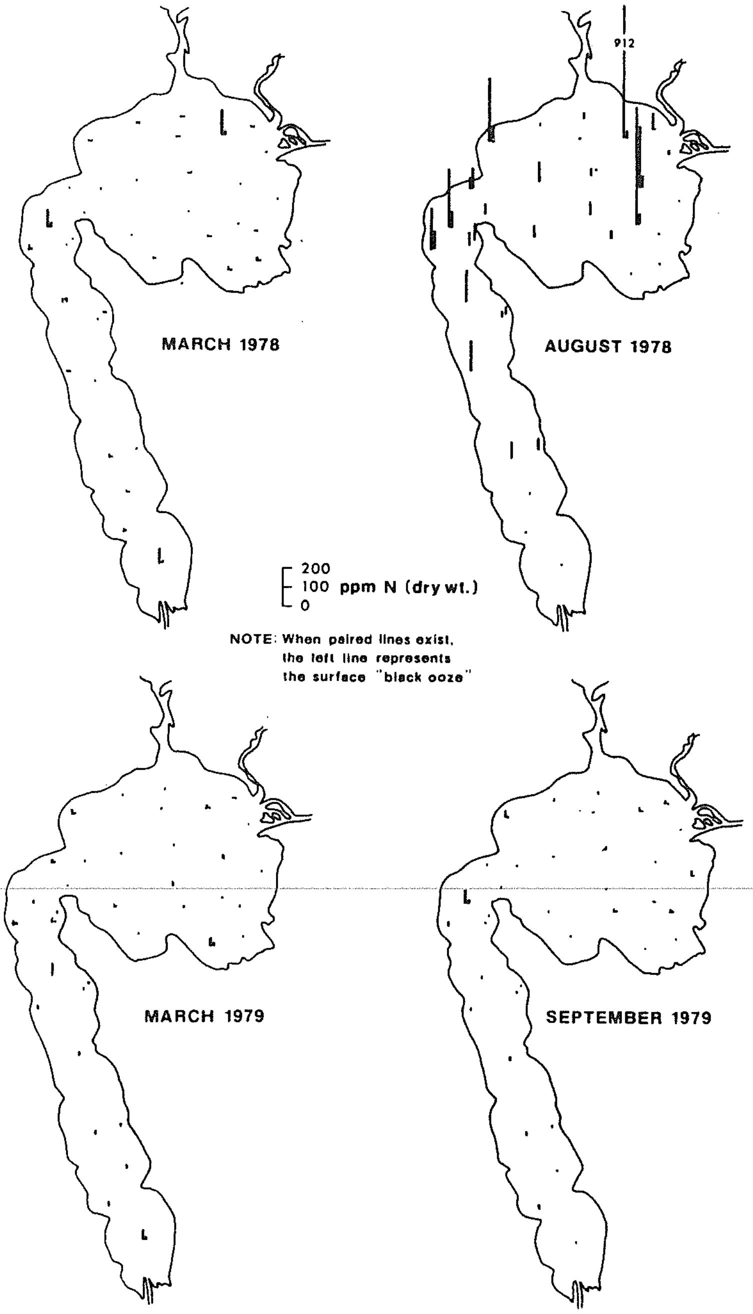
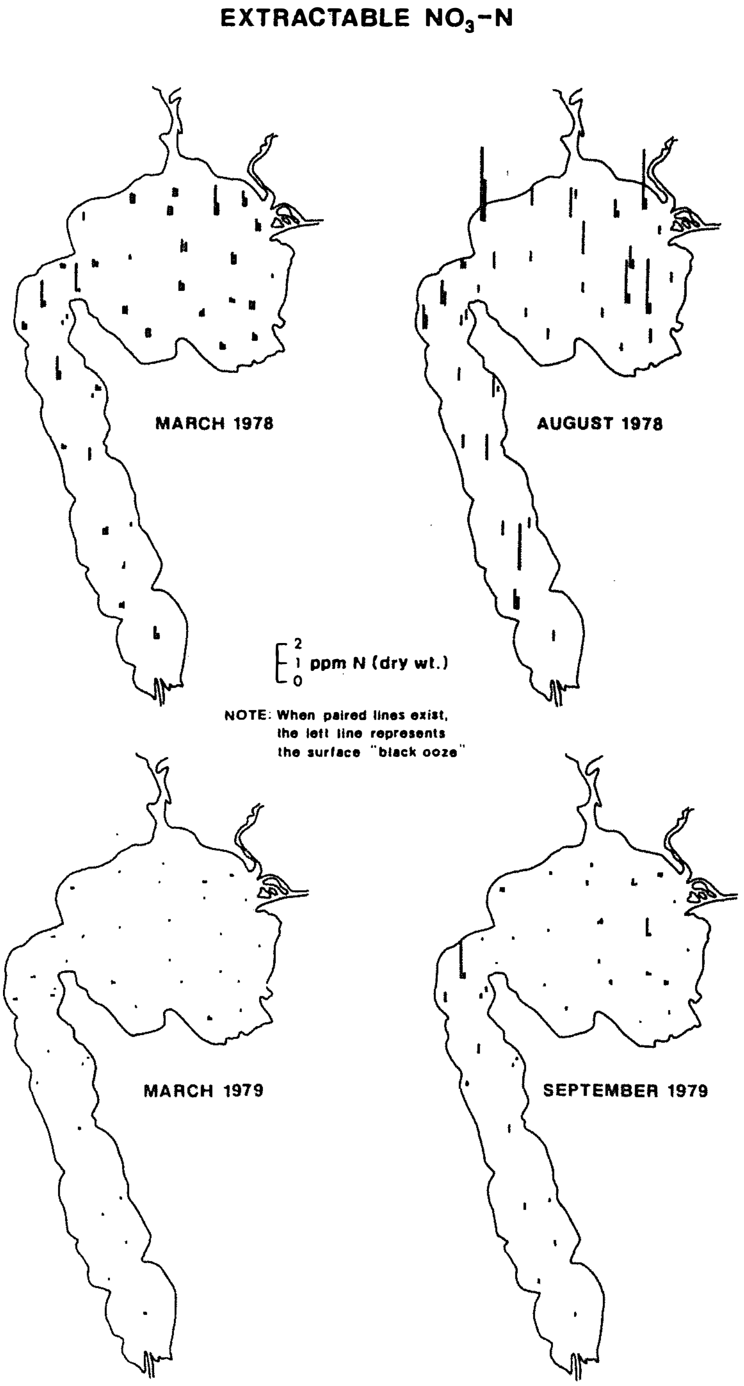


Figure 9. Extractable ammonia in sediments



NOTE: When paired lines exist, the left line represents the surface "black ooze"

Figure 10. Extractable nitrate/nitite in sediments

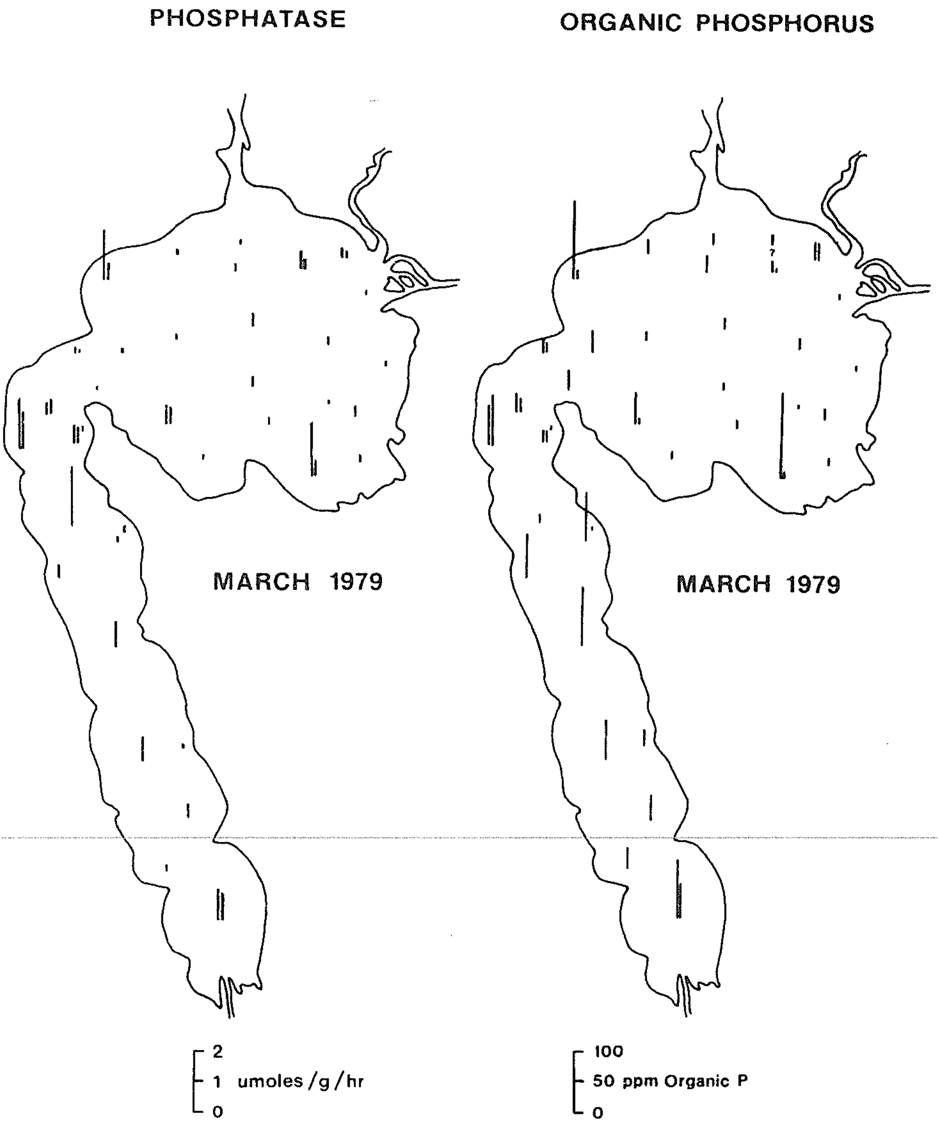


Figure 11. Organic phosphorus and phosphatase in sediments

HIGH FREQUENCY SURFACE SEDIMENT SAMPLING

Since the August 1978 grid study samples had such elevated extractable N and P levels compared to the previous March, it was thought that perhaps this reflected a seasonal pattern. It was therefore decided to sample the surface sediments at some of the routine sampling sites with greater frequency (approximately every three weeks). It was thus hoped that seasonal or shorter term fluctuations might be detectable.

Sampling and analytical methods were as described in the grid study methodology except that the top five centimeters of sediment were sampled regardless of the presence or absence of black ooze. Preliminary sampling of seven locations within a 20 meter radius of Post 46 gave the following coefficients of variation: organic content, 0.17; total phosphorus, 0.14; total nitrogen, 0.17; extractable phosphate, 0.12; and extractable ammonia, 0.43. Thus, although 4 or 5 cores were taken at each site for each composite sample, fairly large diferences in values measured at different times would be necessary to be significant.

Results

In the Peel Inlet surface sediment samples were taken at stations 4, 5, 6, 7, 8, and Post 46. Station 4 (Fig. 12) showed no seasonal trends. The most obvious feature of figure 12 is that all parameters except TN showed a peak on September 14, 1979. The sampling for this data point apparently hit a thicker bed of black ooze as shown by the 74% water content of the combined sample.

Stations 5 and 6 (Figs. 13 & 14) were sampled for a shorter time period and showed no discernable trends. Station 7 (Fig. 15), however, proved to be the most stable surface sediment sampled. Extractable ammonia dropped in May 1979 and has remained fairly constant since then. Other than one anomalously high nitrate value the other parameters have been relatively stable which might also be an indication of less spatial heterogeneity at that location.

At Post 46 both total and extractable nitrogen levels in the surface sediment fell between December 1978 and June 1979 (Fig. 16). Extractable phosphate seemed to increase during this same period and into July 1979. Other parameters were fairly stable.

Station 8 (Fig. 17) displayed the greatest variability of any of the stations sampled frequently. A sharp increase in extractable N and P in December 1978 may be related to a cyanobacteria bloom which was present at that time.

In the Harvey Estuary, only stations 1 and 31 were sampled with any regularity. Station 31 (Fig. 18) did not reveal any seasonal changes. Station 1 (Fig. 19) samples were very consistent in water content at 62% but variable with respect to other parameters. Organic content seemed to increase in the autumn of 1979, decrease during the winter and rise again through the summer of 1979-80. Extractable N and P both showed sharp rises in December 1978, but there were no clear seasonal trends.

Discussion and Conclusions

There are great difficulties in interpreting the changes in values measured from one sampling time to the next at any one site as was attempted in this sampling program. Probably the greatest problem is patchiness in the distribution of sediments and of black ooze layers in particular. When all parameters changed drastically and rapidly this patchiness was probably responsible. However, other factors such as riverine inputs, sedimentation of both autochthanous and allochthanous matter, macrophyte growth and decomposition, and the activities of animals could have significant effects on surface sediment composition.

General seasonal variations were not detected although some of the mechanisms just listed might lead one to expect such a pattern. This sampling period covered a very dry winter which may be part of the reason that extractable nitrogen and phosphorus levels did not increase during the winter. Large scale short-term variations did occur at some stations, e.g. stations 1, 4, and 8. Some of these changes were undoubtably due to patchiness as total N and P levels also changed more quickly than could be explained by other mechanisms. Stations 1 and 8 were the only stations sampled on December 20, 1978 and both showed big increases over the previous week in extractable N and P. As Huber (1980) has documented, an extensive bloom of cyanobacteria occurred during the period from November 1978 - January 1979. Sedimentation and decomposition of material produced in this bloom may have led to the observed increases in extractable N and P. Sharp drops in total N and P in the water at station 1 at the same time indicate a loss from the water that also supports the idea of sedimenting biomass. Explanations of other changes in sediment composition may come from comparison with data being developed by others in the Peel Inlet study group.

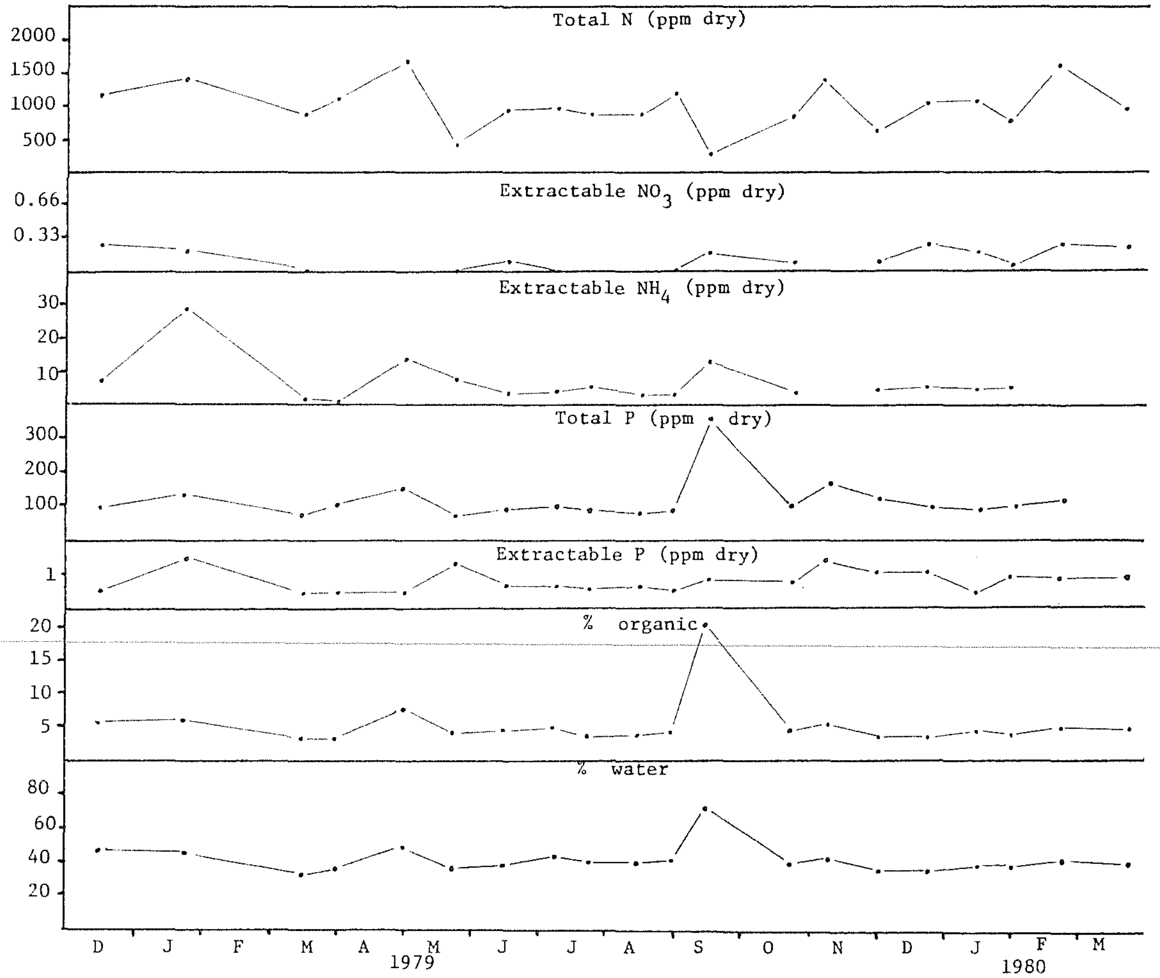


Figure 12. Sediment parameter time series, Station 4

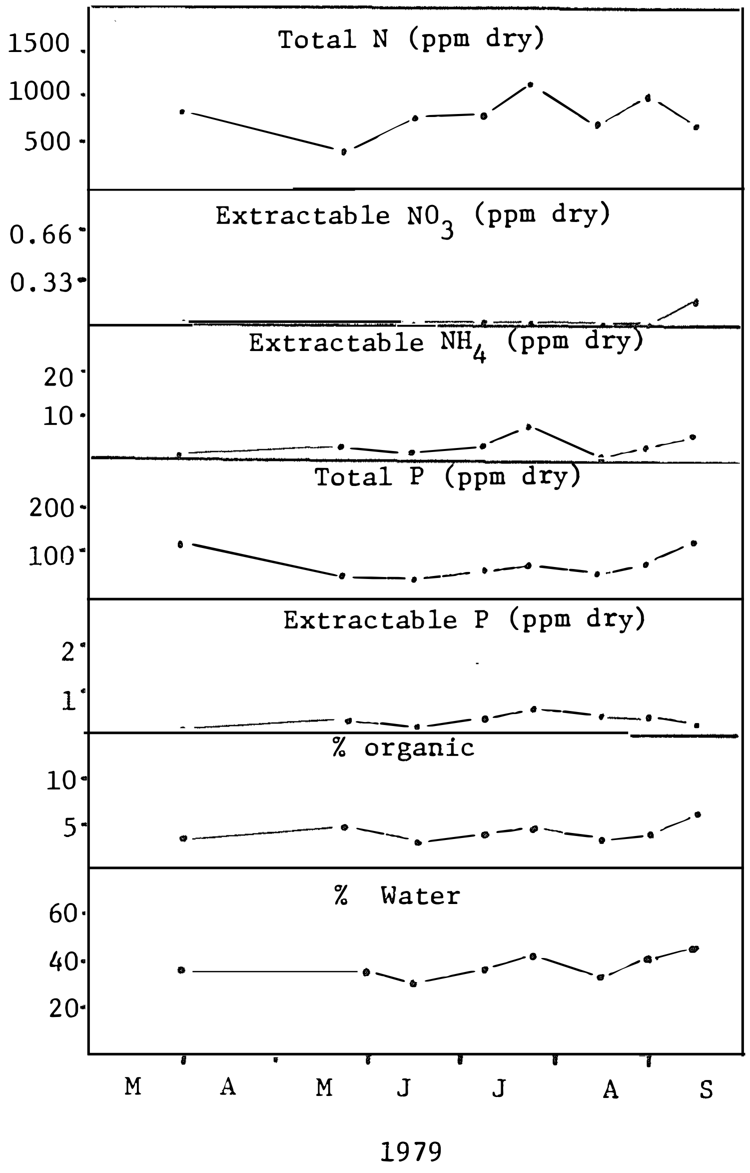


Figure 13. Sediment parameter time series, Station 5

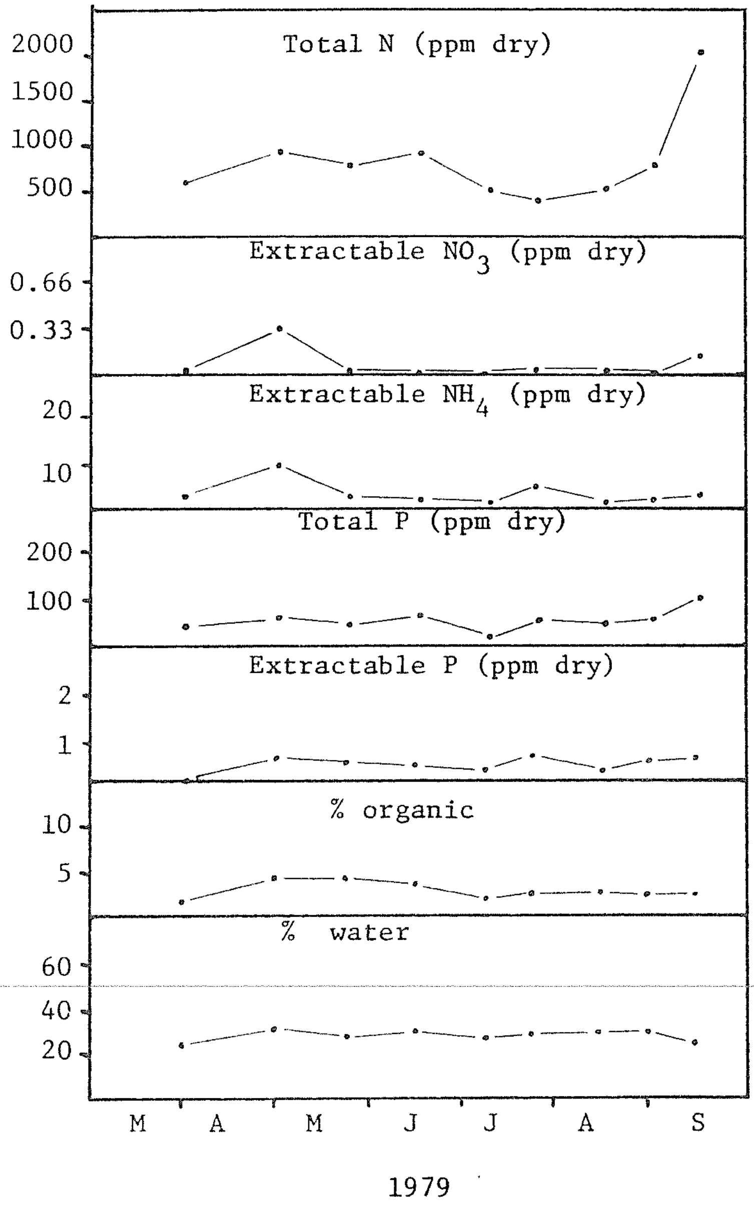


Figure 14. Sediment parameter time series, Station 6

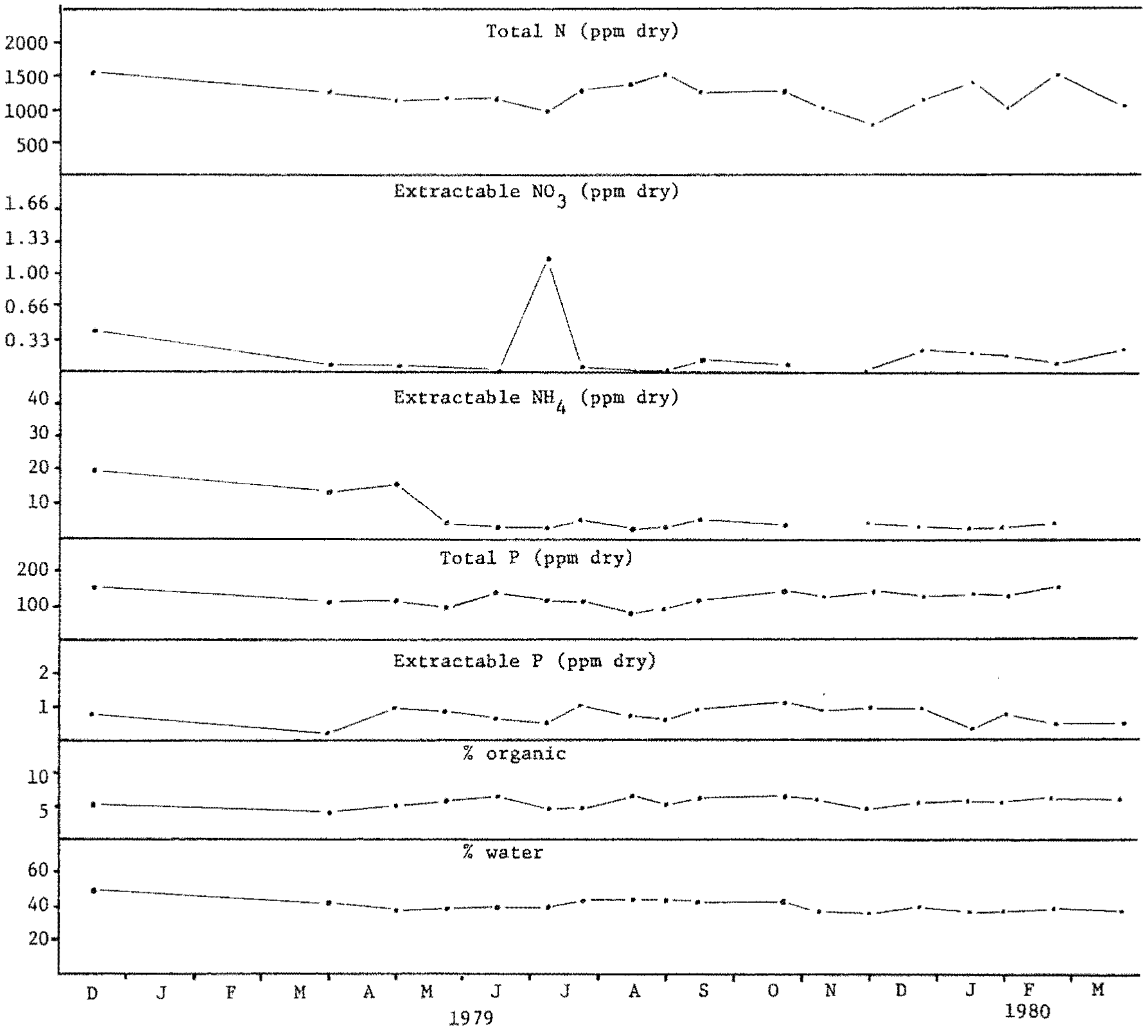


Figure 15. Sediment parameter time series, Station 7

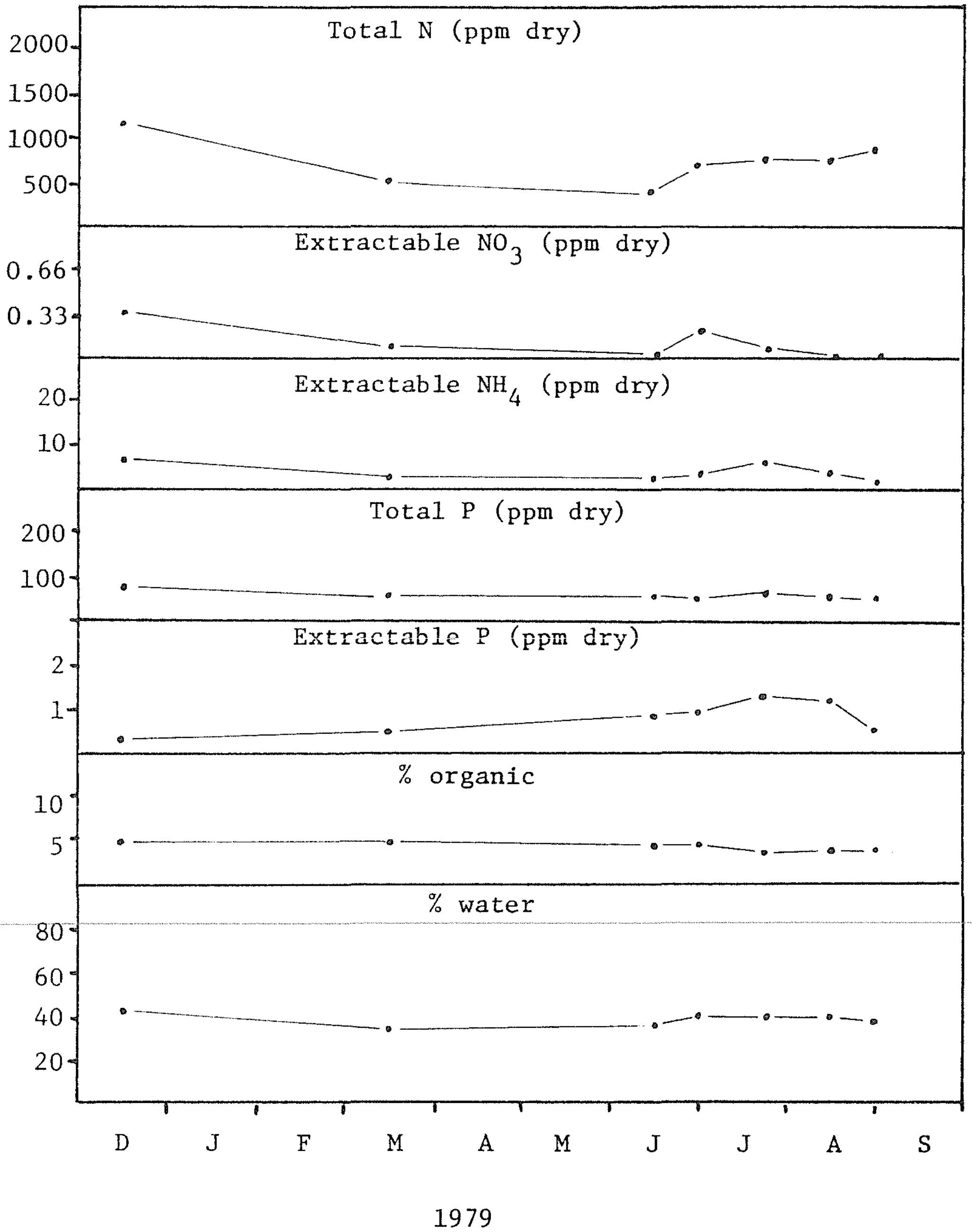


Figure 16. Sediment parameter time series, Post 46

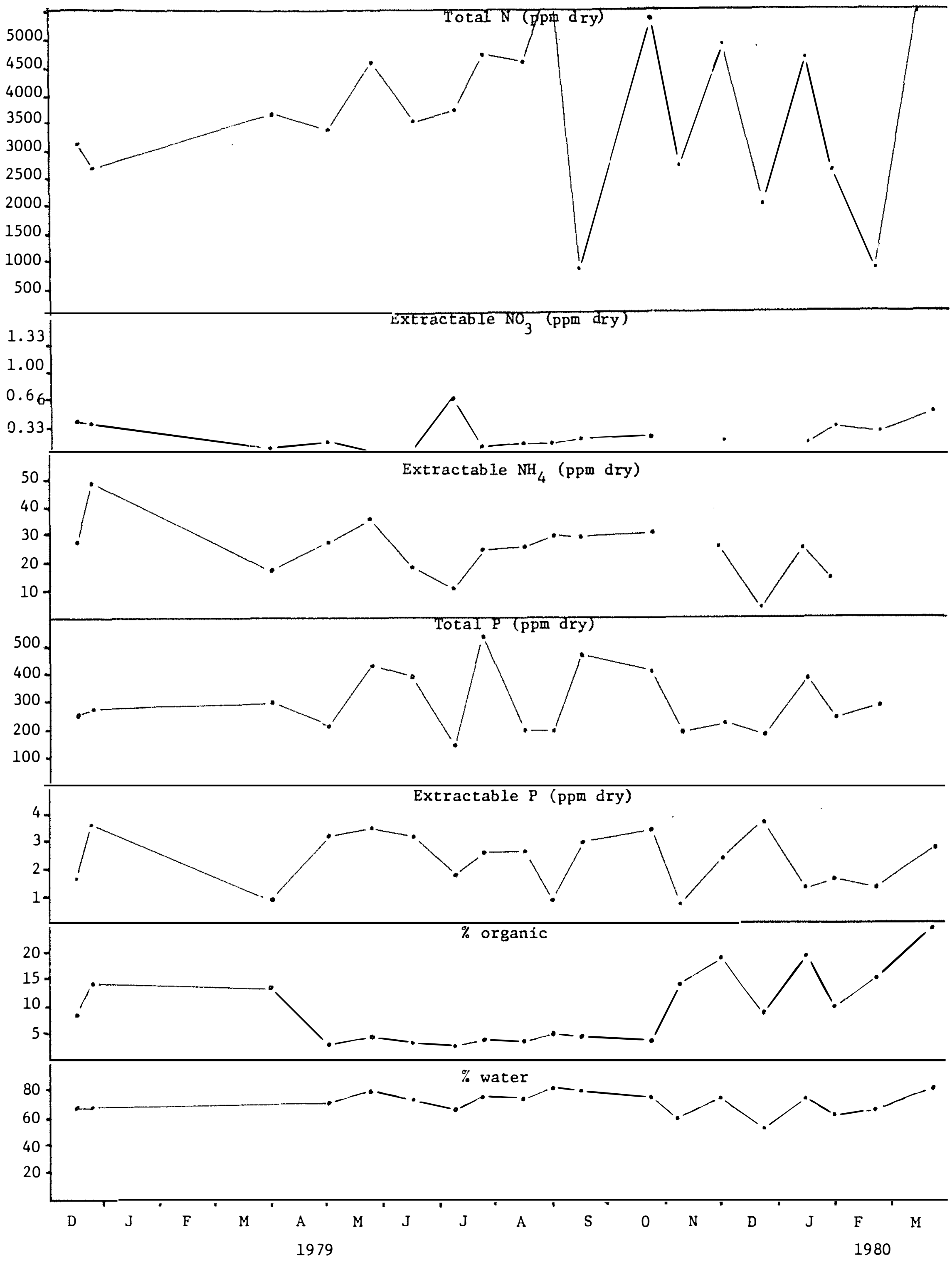


Figure 17. Sediment parameter time series, Station 8

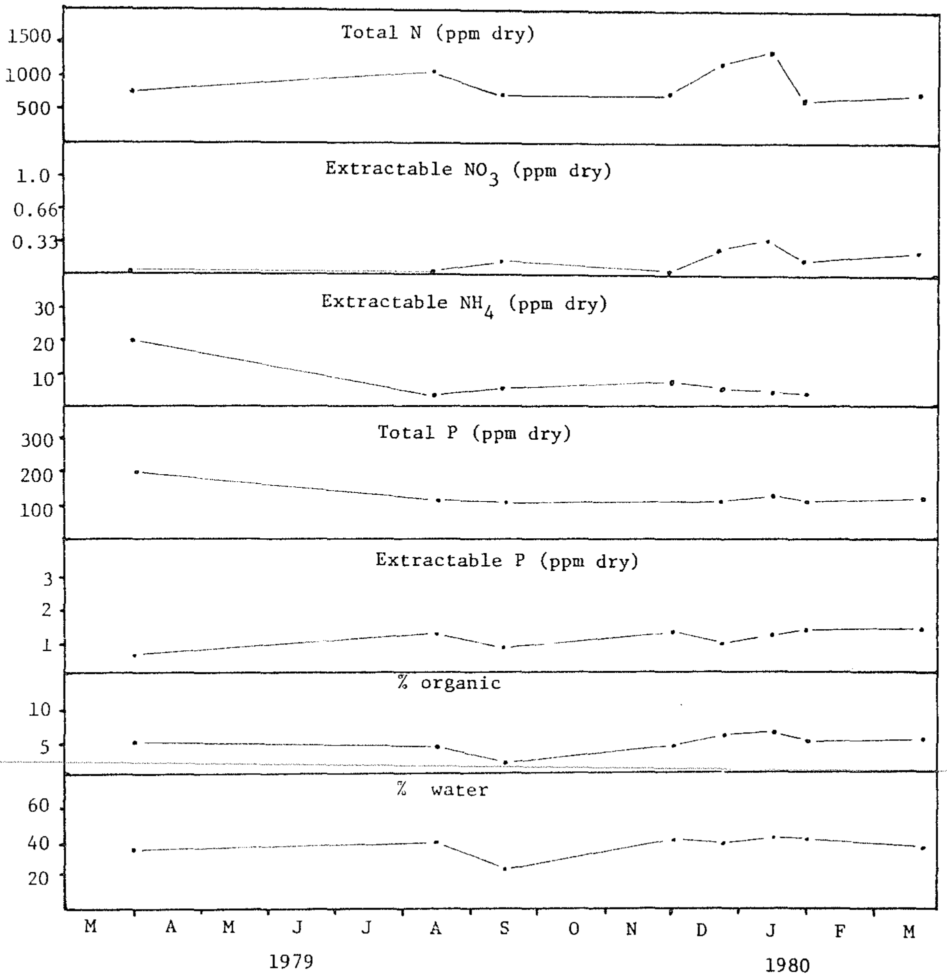


Figure 18. Sediment parameter time series, Station 31

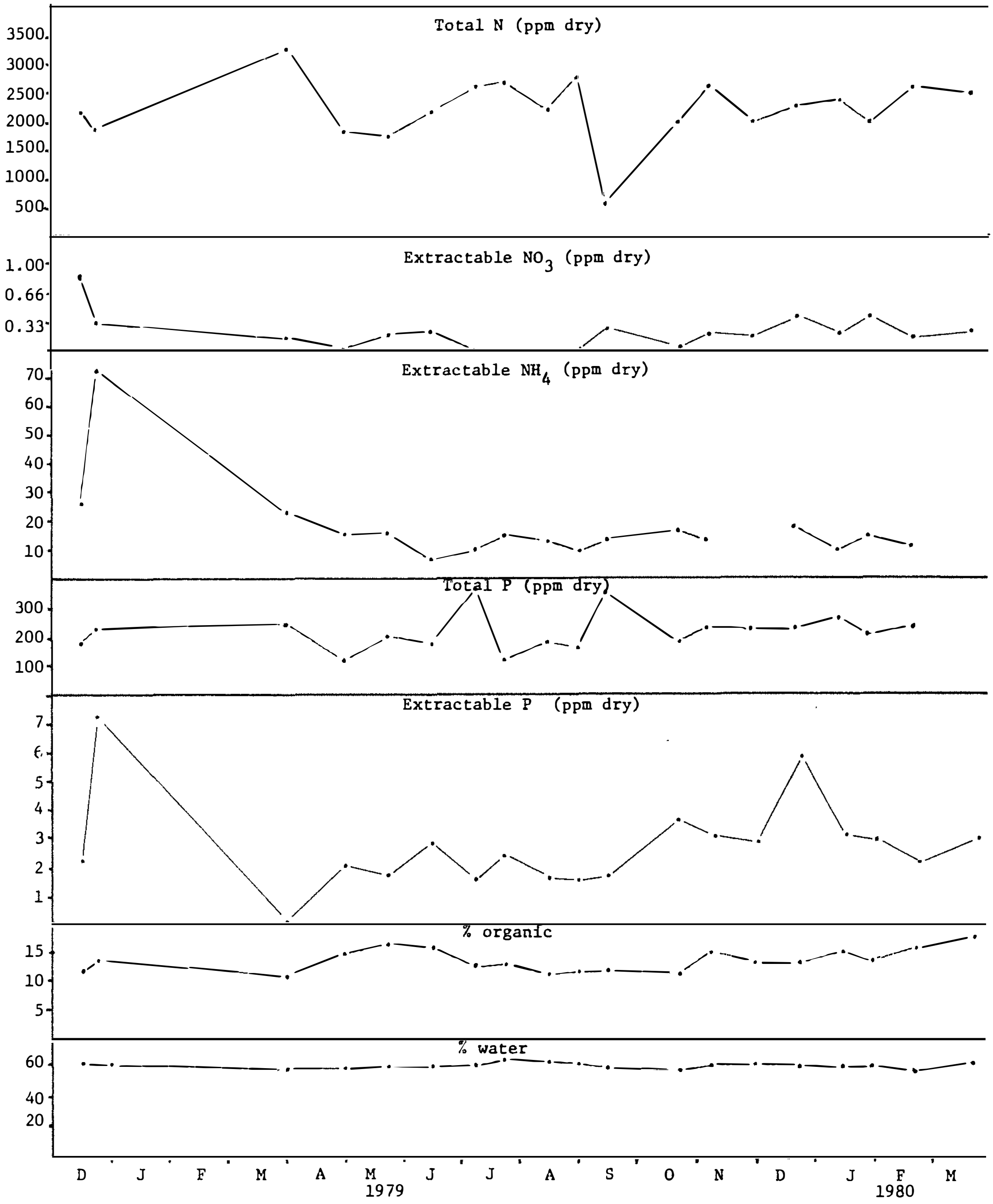


Figure 19. Sediment parameter time series, Station 1

VERTICAL DISTRIBUTION OF NUTRIENTS IN THE SURFACE SEDIMENTS

In order to determine the verticle distribution of nutrients in the surface sediments of the Peel and Harvey, short cores (approximately 20 cm) were taken at the eight weekly sampling sites plus four other sites. Sites 1, 4 and 6 were cored more than once. All cores were sectioned into one centimetre layers (0.5 cm layers for the top 2 cm) and analysed for water content, organic matter, total nitrogen and total phosphorus.

The results of the analyses of these cores are best conveyed in the form of graphs. Figures 20-23 show comparisons of profiles from each of the sites cored with each figure displaying one of the parameters measured. The depth scale is in centimeters. Graphs of all parameters (including a description) of each core individually and the actual data are presented in Appendix II.

In the Peel Inlet sites 2, 3, 4, 5, 6, 7, 8, and Post 46 were cored. All cores with the exception of Station 6 showed at least a thin layer of enriched sediment. Station 6 in Robert Bay has a sandy nutrient-poor sediment that varies little in content with depth. Station 2 sediment had a 1 cm enriched layer at the time of coring (4 July 1978) over a poorer layer between 1 and 12 cm below which the sediment rose somewhat in all parameters.

The profile at Station 3 (4 July 1978) shows nutient levels gradually increasing toward the surface but with sharp discontinuities above the 4 cm depth. This is probably due to the effects of the dredging of "Sticks" channel nearby.

Station 4 was cored four times between August 1977 and March 1979. All cores showed an enriched ooze layer varying in thickness from 1 to 4 cm overlying a fairly nutrient-poor sand (Table 2).

Station 5 profiles were similar to those of Station 4 except that these had a thinner enriched layer and were generally slightly poorer in nutrients.

Table 2 Contrast between ooze and sediment at Station 4.

	Ooze	Sediment
% H_2O	80	30
% Organic	25	3
Total P (ppm)	600-900	70-80
Total N (ppm)	7000-11000	400-600

Station 7 is located in the central basin of the Peel Inlet and is composed of a silty fine sand, with a thin enriched layer (approx. 1 cm). It has a higher base level of phosphorus (150-200 ppm dry wt.) than do the shelf sites (4, 5 and 6). As with Station 2 organic content increases in areas below 12 cm.

Station 8 (Cox Bay) had an enriched ooze layer of 5 cm in August 1978. Its profile is similar to that of Station 4 except that there is a much less sharp demarcation between the ooze layer and the fine sand below it. Below 13 cm the sediment reaches the very low levels of 1% organic content, 30 ppm phosphorus and 50-190 ppm nitrogen.

The sediment profile at Post 46 was also similar to that of Station 4. The ooze layer was not quite as rich, however, and the enriched nitrogen layer extended further down the core than did the enriched phosphorus layer (7 vs. 2 cm).

Four sites were cored in the Harvey Estuary: Stations 1, 24, 28, and 31. These sediments generally changed in composition gradually with depth as opposed to the sharp discontinuity of a rich ooze layer over a nutrient poor sand common in the Peel Inlet. With the exception of Station 31 the subsurface sediments of the Harvey were thus higher in water content, organic content, total N and total P. Station 24 has a surface ooze layer made up largely of fecal pellets as in the ooze layers of the Peel Inlet. This 3 cm layer is high in nitrogen and phosphorus (5000-7000 ppm N and 300-700 ppm P) but overlying a phosphorus-poor layer from 3-9 cm depth. Station 31 has the characteristic high water content of the Harvey sediments but was poorer in nitrogen and phosphorus than the sediments of the Harvey central basin and NW shelf areas.

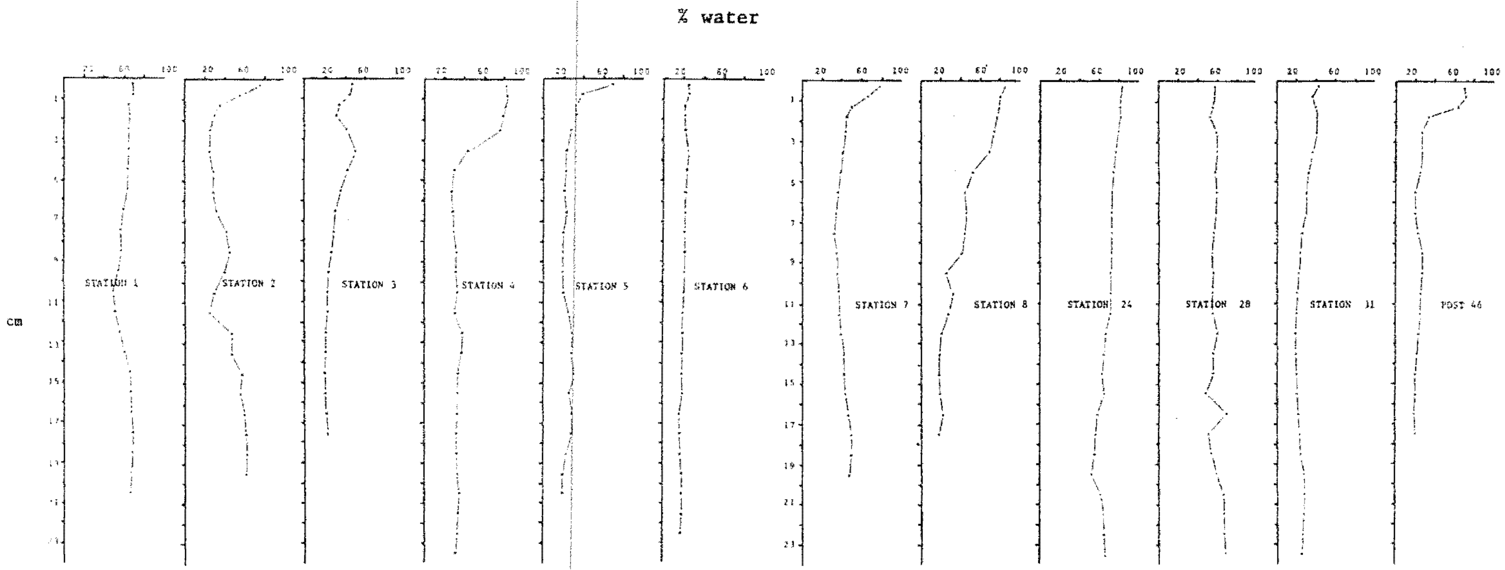


Figure 20. Sediment core profiles, % water

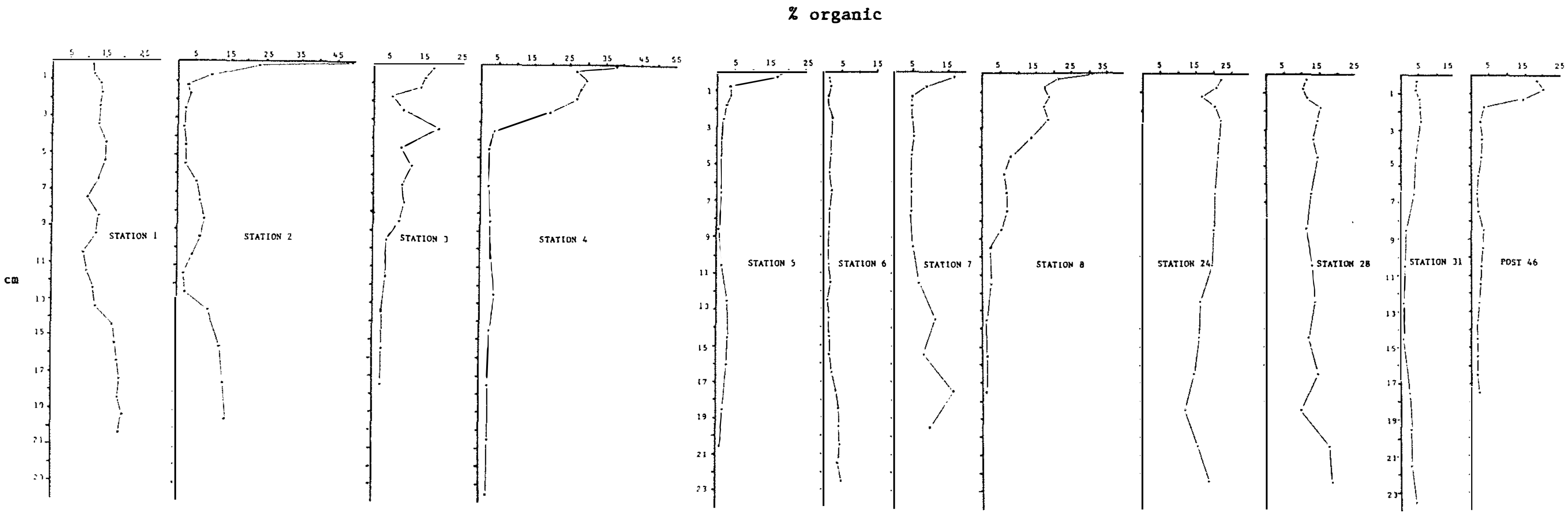


Figure 21. Sediment core profiles, % organic

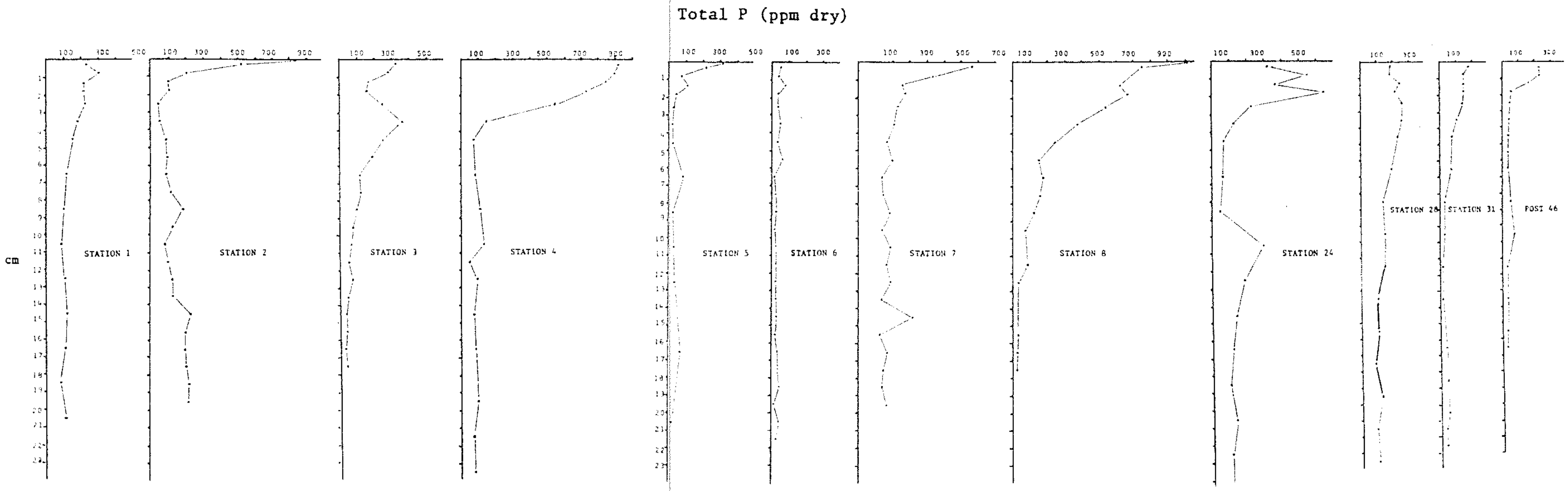


Figure 22. Sediment core profiles, total P

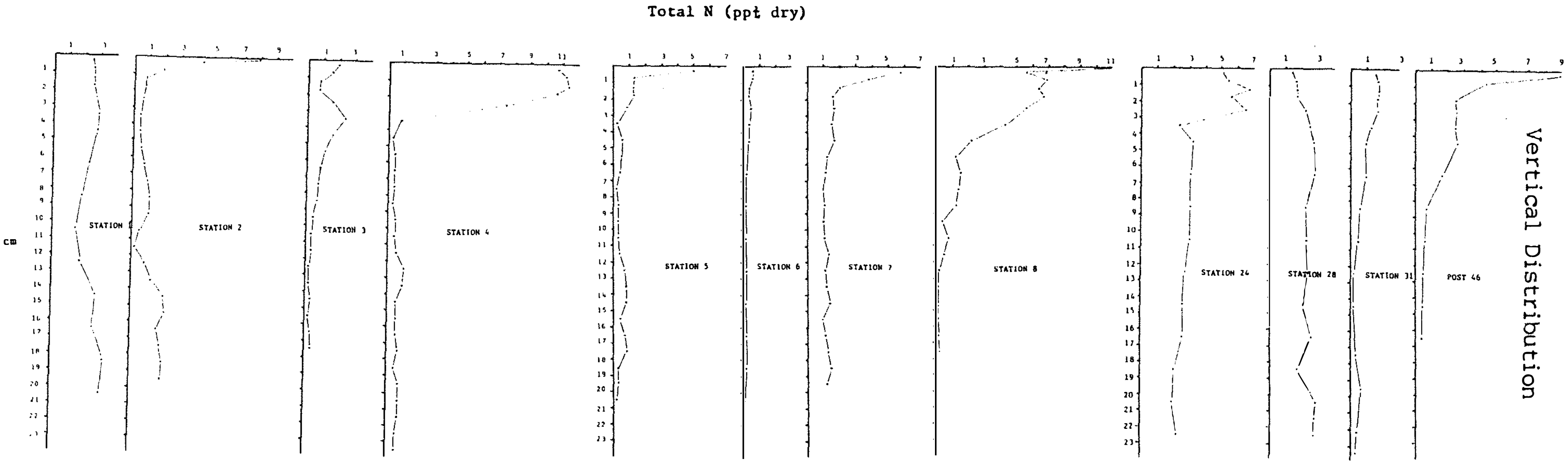


Figure 23. Sediment core profiles, total N

Conclusions

The core profiles confirm and amplify the conclusion from the grid studies that the sediments in the Harvey basin and NW shelf are generally richer in nutrients than the sediments of the Peel Inlet. The greater uniformity with depth of the Harvey sediments indicate that this has been true historically (20 cm depth is 300-600 years old assuming sedimentation rates of 0.3-0.6 mm per year). Thus, the net balance of sedimentation versus remineralization and release has been more on the side of sedimentation in the Harvey than in the Peel. Stations 1, 2 and 7 show some trend to increased organic content below 12 cm, indicating different condition at the time of deposition of these layers.

The major distinguishing feature of the Peel Inlet surface sediment is the existence of areas of "black ooze" which is a loose flocculant mud largely composed of detritus and fecal pellets (Fig. 24). This ooze is enriched in organic content and nitrogen and phosphorus with respect to the underlying sediment and is frequently associated with Cladophora beds. By assuming that this ooze is capable of degrading to the phosphorus levels of the underlying sediment, we can estimate how much phosphorus would be released from a layer of black ooze. If we use the values from table 2 of 600 ppm P degrading to 80 ppm P in a 1 cm thick layer of ooze wtih 80% water content and particulates of a specific gravity of 2.34 when dry, then 1.17 g P/m^2 could be released from a 1 cm layer of ooze. This is enough phosphorus to support the formation of 587 g/m^2 dry weight of Cladophora (0.2% P dry weight).

Obviously, these ooze layers have great potential for releasing nutrients for use by organisms in their proximity. Radioactive phosphorus experiments are planned to establish the availability of sediment phosphorus to Cladophora.

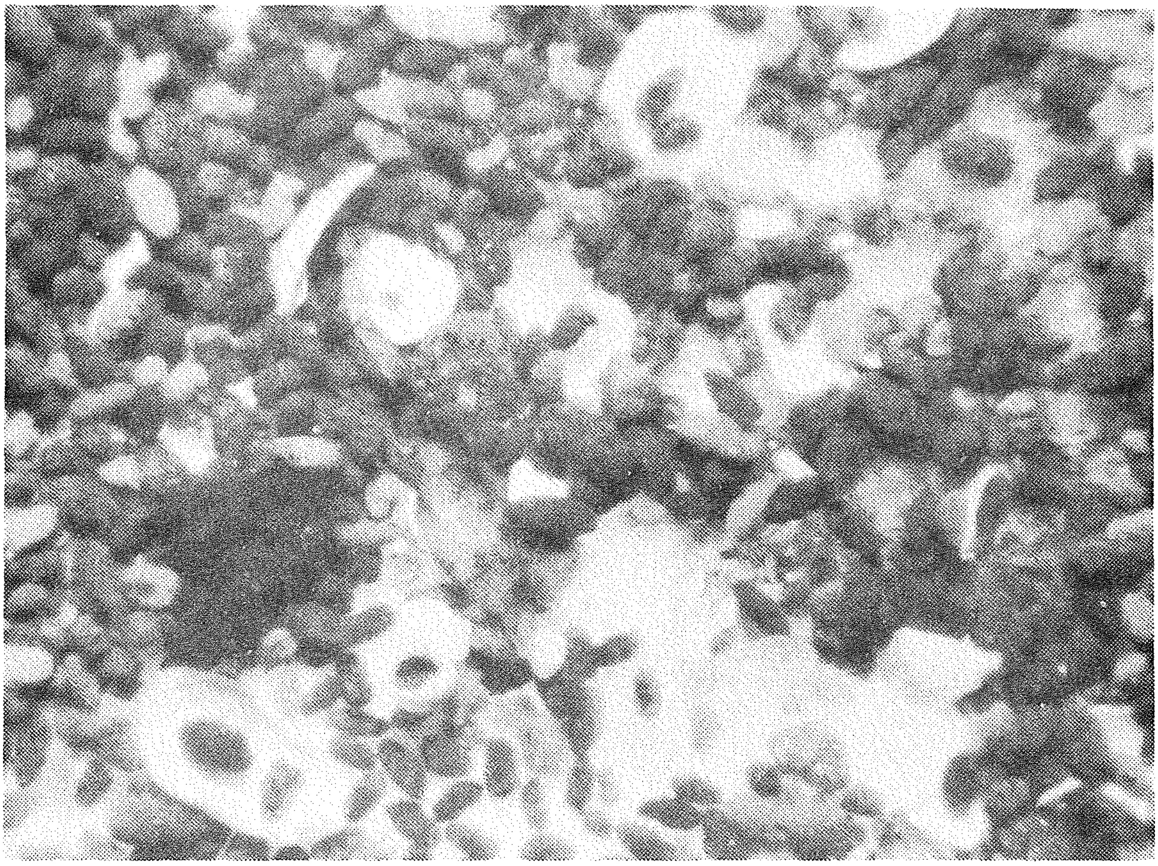


Figure 24. Station 4 "black ooze", 0.25 - 1 mm size fraction. (X16 magnification)

SEDIMENT BANK OF NUTRIENTS

The results of the grid studies were reported and discussed in Chapter 1 in terms of the distribution of nutrients on a dry weight concentration basis. In order to describe the bank of nutrients in the sediment which is in close contact with the water of the Peel-Harvey estuarine system, it would be more appropriate to estimate the nutrient content of a surface layer of sediment. Thus, the previous data must be converted to concentrations on a wet volume basis. This has been done for a 2 cm thick layer, using the wet/dry ratios measured for each sediment sample and an average specific gravity of 2.5 for the dry material (Appendix II).

Table 3 shows that the mean total nitrogen and total phosphorus content of the surface sediments did not vary significantly over the period of the grid studies. Only in the case of the Harvey Estuary did there appear to be a significant difference, that being a mean total N content of September 1979 significantly lower than that of August 1978. Total P averaged 2.2 g/m^2 for both the Peel and Harvey, whereas total N was about 21 g/m^2 for the Peel and 20 g/m^2 for the Harvey.

Table 3 Mean N and P content of the top 2 cm of sediment in the Peel and Harvey.[1]

	Total P (g/m^2)	Extract. P (mg/m^2)	Total N (g/m^2)	Extract. N (mg/m^2)
Peel Inlet				
March 1978	2.0±0.2	10.8± 3.7	22.6±1.7	144± 32
August 1978	2.2±0.3	88.6±32.9	21.7±2.1	1147±285
March 1979	2.3±0.2	6.6± 1.4	22.1±2.0	200± 25
Sept. 1979	2.4±0.2	11.9± 1.8	18.1±3.1	108± 12
Harvey Estuary				
March 1978	2.1±0.2	18.1± 5.3	21.9±1.0	170± 23
August 1978	2.5±0.2	100.2±20.2	23.6±2.5	1117±175
March 1979	2.3±0.2	6.3± 1.0	19.2±5.0	311± 29
Sept. 1979	2.1±0.2	15.8± 3.2	15.5±1.7	143± 16

[1] ± standard error of mean

The extractable N and P fractions, however, changed drastically, with the mean values for August 1978 being much higher than those of the previous summer. The winter of 1978 was the only winter during this phase of our study which had good (average) river flows with concurrent high dissolved nutrient loading. Extractable N and P fell significantly by the next summer, then at the time of the September 1979 grid study (a dry winter) the extractable P levels had risen slightly but the extractable N levels were even further reduced.

If the mean values given in table 3 are applied to the total areas of the Peel and the Harvey, an estimate of the N and P storage in the top 2 cm of sediment for these areas is obtained (Table 4).

Table 4 Sediment bank of N and P
(tonnes of N or P in 2 cm layer)

		March 1978	August 1978	March 1979	Sept. 1979	MEAN
Total N	Peel	1,470	1,410	1,439	1,178	1,374
	Harvey	1,100	1,180	959	774	1,003
	TOTAL	2,570	2,590	2,398	1,952	2,377
Extract. N	Peel	9.3	74.6	13.0	7.0	
	Harvey	8.5	55.8	15.6	7.1	
	TOTAL	17.8	130.4	28.6	14.1	
Total P	Peel	132	146	152	157	147
	Harvey	104	125	114	106	112
	TOTAL	136	271	266	263	259
Extract. P	Peel	0.7	5.8	0.4	0.8	
	Harvey	0.9	5.0	0.3	0.8	
	TOTAL	1.6	10.8	0.7	1.6	

The Botany Department (U. of W.A.) has estimated that in August 1978 the Peel and Harvey together contained 300 tonnes of nitrogen and 50 tonnes of phosphorus in the water mass and 903 tonnes of nitrogen and 103 tonnes of phosphorus in the benthic biomass (February 1979 workshop). Thus, there was approximately twice as much N and P in the top 2 cm layer of sediment as in the water and plants combined at the time of the August 1978 survey. Black and Rosher (1980) have estimated total river loading in 1977/78 to be 1586 tonnes N and 120 tonnes P and in 1978/79 510 tonnes N and 67 tonnes P. The amount of N and P in the top 2 cm layer of sediment is therefore also approximately double the total river loading in an average rainfall year. The significance of this large bank of N and P, of course, depends on how much it contributes to the productivity of the system as a whole and *Cladophora* in particular.

ADSORPTION/DESORPTION CHARACTERISTICS OF PEEL/HARVEY SEDIMENTS

Previous chapters have discussed the distribution of sediment nitrogen and phosphorus in space and time. Although this discussion included measurements of easily extractable N and P sediment fractions, the question of how the sediments interact with the overlying water and plants has not been addressed. This chapter will describe some of the adsorption/desorption characteristics of Peel/Harvey sediments.

The following series of experiments involved equilibrating sediment with water of different salinities and phosphate concentrations after which the water was sampled for final phosphate concentration (see Appendix I for methodology). By graphing the amount adsorbed versus the initial phosphate concentration, an equilibrium point concentration (EPC) at which there is neither adsorption nor desorption can be determined. Initial experiments with Station 4 surface sediments showed a very linear relationship between the amount of phosphate adsorbed and the initial amount of phosphate in the solution with the sediment.

Because the EPC's determined were affected by salinity, the following experiments used fewer initial phosphate concentrations (3) and more salt concentrations (5) covering the range from 6-40 ppt. In all cases pH was allowed to reach its own natural level. Seven different sediments were studied in this manner.

Results

Figure 25 shows the effect of salinity on the adsorption isotherms for Station 4. The EPC's vary from 14 ug PO_4-P/l at 6 ppt salt to 30 ug P/l at 40 ppt. The highest phosphate concentration used, 200 ug P/l in one experiment, did not approach the adsorption capacity of this sediment.

The surface sediment at Station 7 was less affected by salinity. Between 11 and 40 ppt salt concentrations the EPC's were 4-5 ug P/l.

The 6 ppt EPC was only slightly higher at 7 ug P/l. Thus, higher salinity seems to result in this sediment adsorbing slightly more strongly, in contrast to the situation with the Station 4 sediment.

Station 6 is very sandy and less strongly buffered than the other sediments tested, thus giving more variable results. EPC's as determined graphically (Fig. 26) varied between 7.5 ug P/l at 6 ppt and 15 ug P/l at 28 ppt. The 40 ppt line crosses the others to go against the general trend of higher EPC's for higher salinities. Note that these lines tend to decrease in slope at higher phosphate levels, thus indicating a lower adsorption capacity for this sediment.

The sediment at Station 8 (Cox Bay) is an organic black ooze which under the conditions of this experiment did not seem affected by the salinity of the water with which it was equilibrated. At pH 6.4 there were no significant differences between salinities and all data points could be combined into one line described by

$$\text{Adsorption} = 0.315\ (\text{initial concentration}) - 2.02$$

where initial concentration is in ug PO_4-P/l and
adsorption is in ug P/g dry weight and
$r^2 = 0.999$.

This gives an EPC of 6.4 ug P/l at pH 6.4 for Station 8 sediment.

Three sediment samples from the Harvey Estuary were tested. Station 1 (Fig. 27) was not significantly affected by salinity and gave quite low EPC's (2-5 ug P/l). Station 29 also seemed to be little affected by salinity with the possible exception of an anomalous point at low salinity and low initial phosphate concentration (Fig. 28). With this exception it is much like Station 7. Station 24, which has a surface sediment much like Station 8 (black ooze), adsorbed very strongly at all concentrations and had an effective EPC near zero.

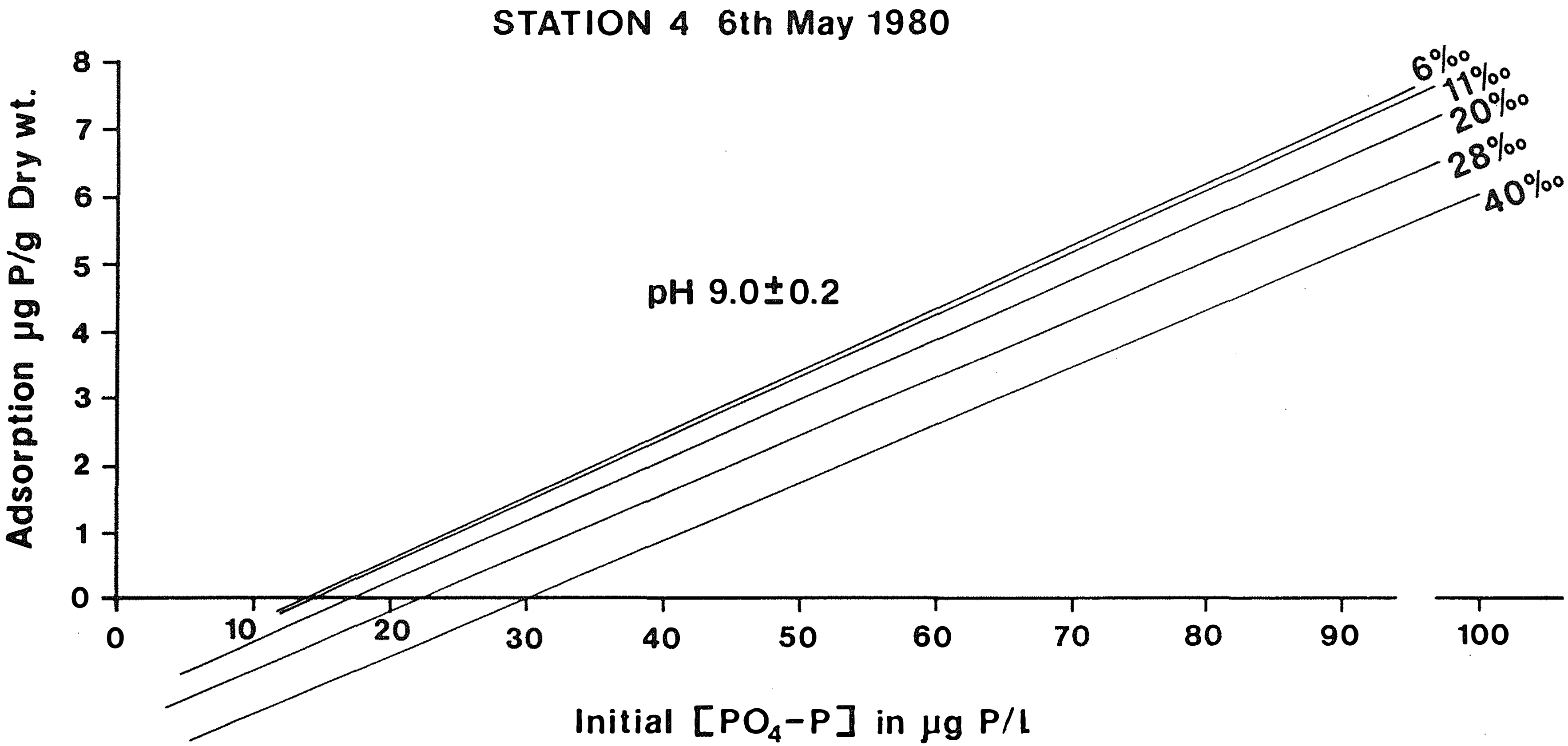


Figure 25. Adsorption isotherms, Station 4.

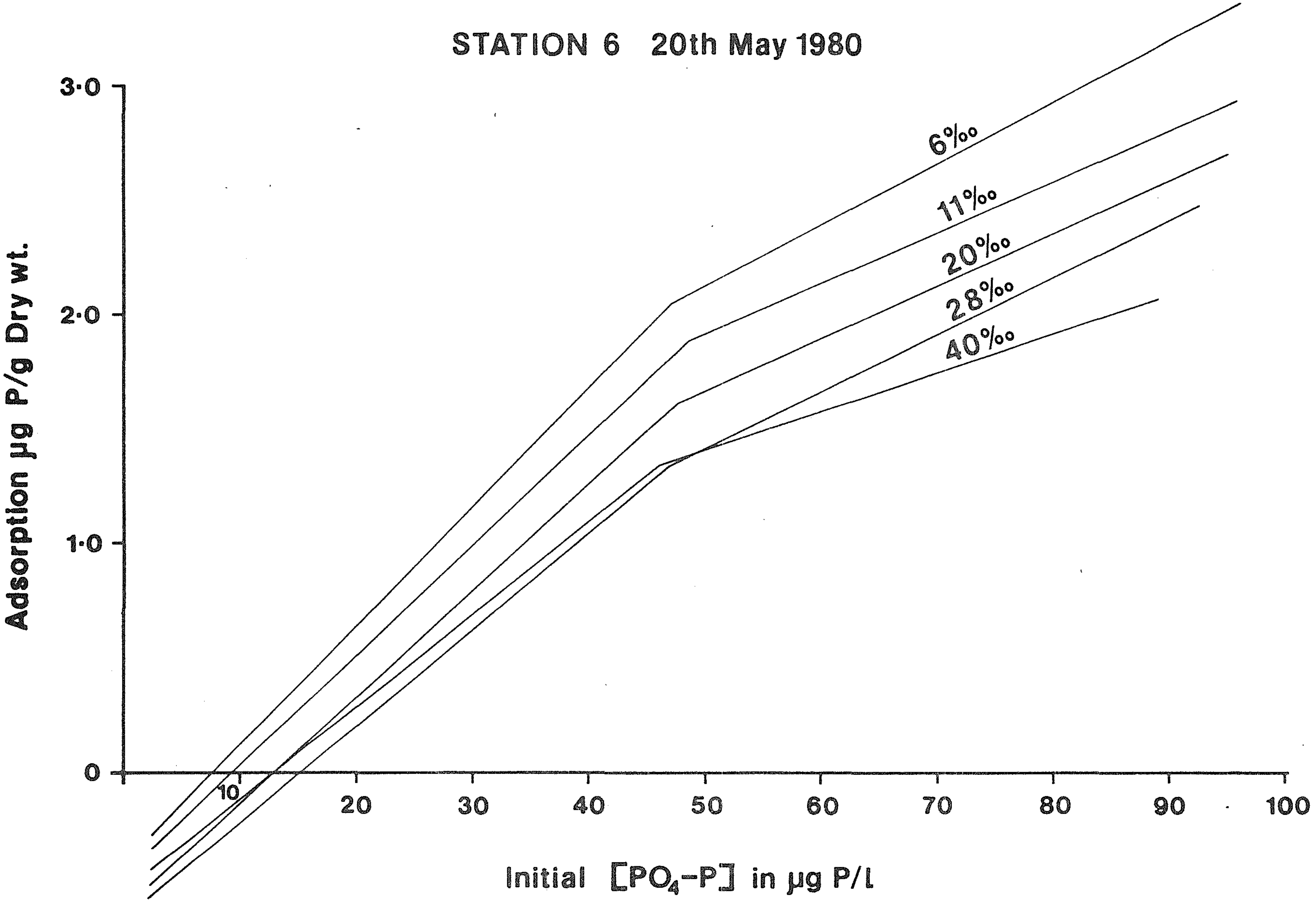


Figure 26. Adsorption isotherms, Station 6.

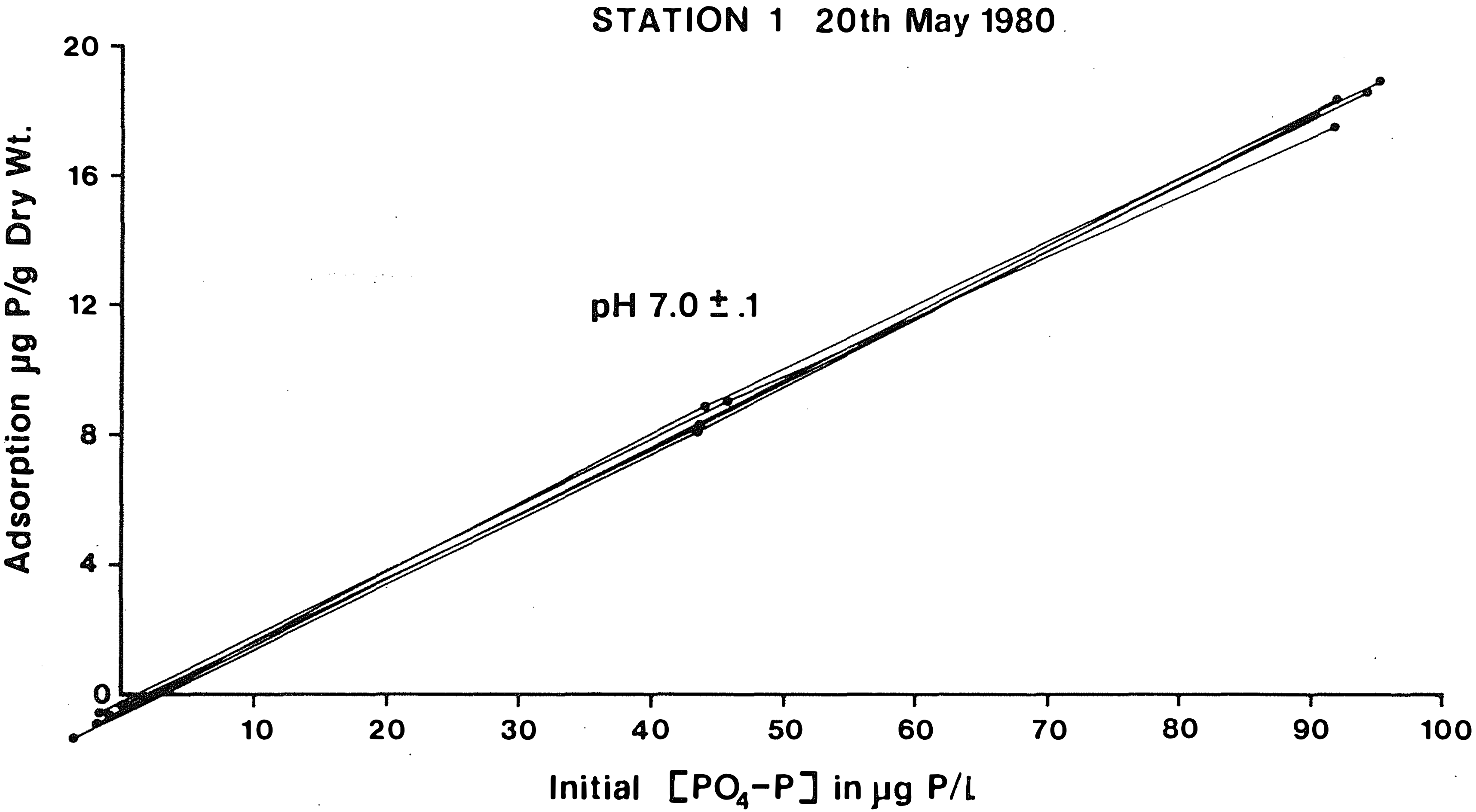


Figure 27. Adsorption isotherms, Station 1.

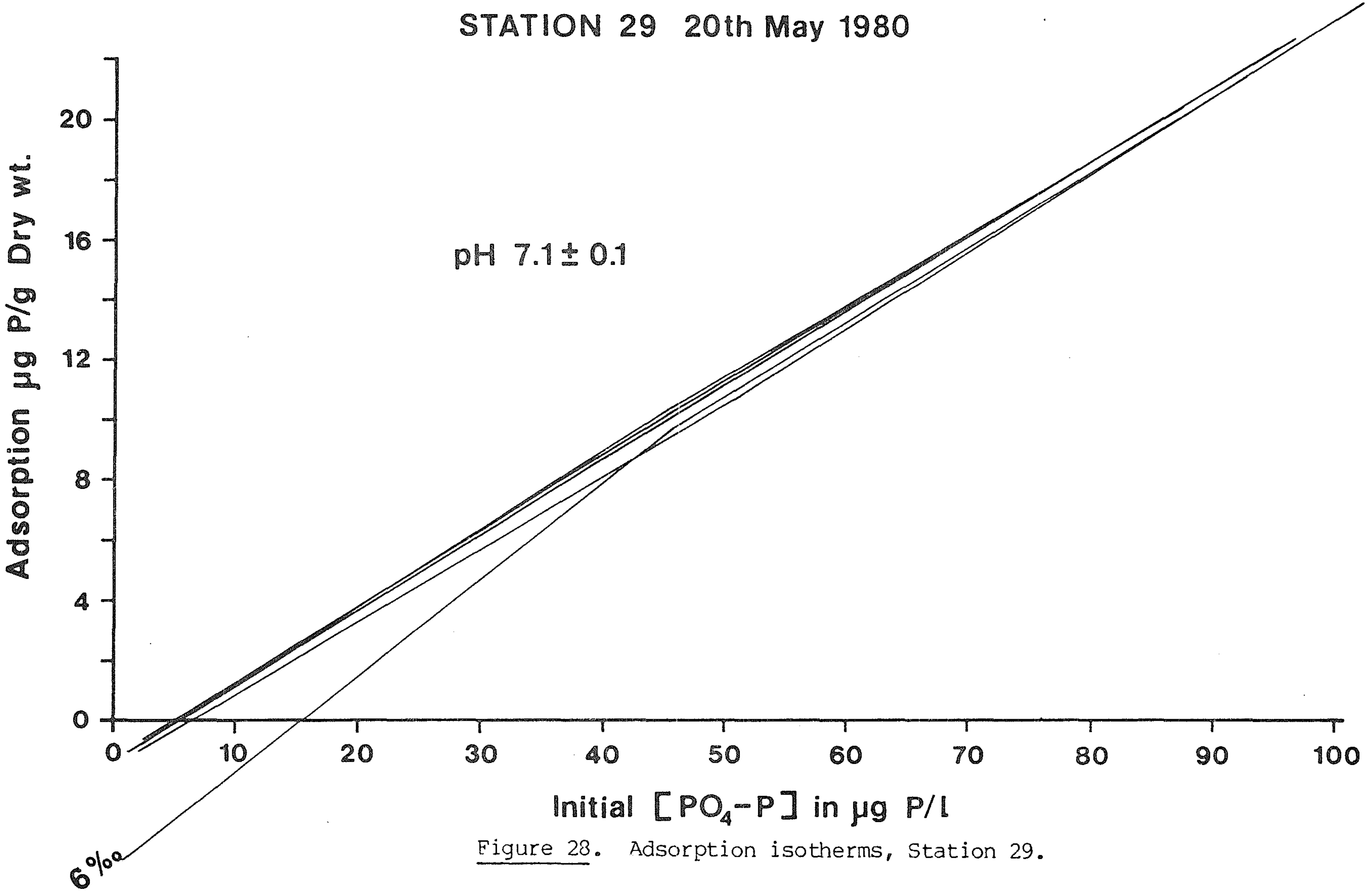


Figure 28. Adsorption isotherms, Station 29.

Discussion

The results of these experiments are summarized in table 5. Since changes in sediment solution ratios and pH could affect these equilibrium point concentrations to some degree, care is needed in their interpretation. However, these results do give some indication of the concentrations of phosphate with which these sediments would be in equilibrium under well oxygenated conditions. Thus, when sediment is resuspended into the water column it would tend to release phosphate if the water concentration was below the EPC and adsorb if the water concentration was above the EPC. Furthermore, in the case of Station 4 sediment salinity has a strong effect on the EPC. This sediment is strategically located to use this characteristic to increase its efficiency as a buffer for phosphate concentration in the water. When external inputs via the Murray and Serpentine rivers lead to high phosphate levels in the water (in the winter) the salinity is lowest and the sediment EPC is lowest. In the summer when water phosphate levels are at their lowest, salinities are high and Station 4 sediment's EPC is correspondingly high. Thus, the summer increase in salinity promotes phosphate release at this site.

Table 5 Equilibrium point concentrations of phosphate with Peel/Harvey sediments (ug P/l)[1]

	NaCl Concentration (ppt)				
Site	6	11	20	28	40
4	14.0	14.7	17.1	22.1	29.9
6	7.5	9.5	13.0	15.0	13.0
7	7.0	5.4	3.7	4.3	5.1
8	5.0	10.4	7.1	6.1	6.0
1	4.9	2.6	3.6	4.0	4.6
24	0.0	0.3	0.3	1.6	0.7
29	–	6.6	5.3	4.7	5.0

[1] All EPC values are the result of linear regressions with $r^2 > 0.99$ except station 6 which was determined graphically.

With the possible exception of the Station 6 sediment, there were no signs of reaching the maximum adsorption capacity for the sediments tested. The sediments will continue to take up phosphate when exposed to concentrations higher than their EPC. Thus, when bottom waters at Station 4 were above 20 ug PO_4-P/l for approximately 4 weeks in 1978 the surface sediments should have taken up significant amounts of phosphate by adsorption.

Repeated Washings

The adsorption/desorption and extractable phosphate data show that varying amounts of phosphate may be easily removed from Peel/Harvey sediments. In order to assess the effect that repeated resuspensions of sediment might have, serial washings of Station 4 and Station 8 surface sediments were carried out in the laboratory. These involved mixing the sediment with a salt solution, centrifuging and removing the supernatent for phosphate analysis. Another 40 ml of fresh solution was then added to the same sediment and the procedure repeated.

Figure 29 shows the results of three such serial extractions of Station 4 sediment under the following conditions: aerobic, aerobic with antibiotics, and low oxygen (2 mg O_2/l). All display the same pattern of reaching a peak phosphate release during the second extraction with subsequent washings yielding quantities that approach a fairly constant 0.25 ug P per extraction for all treatments. At the end of 15 extractions approximately 5 ug PO_4-P/g dry weight of sediment had been released, with no indication of diminishing rates. The 0.25 ug P per extraction represents a

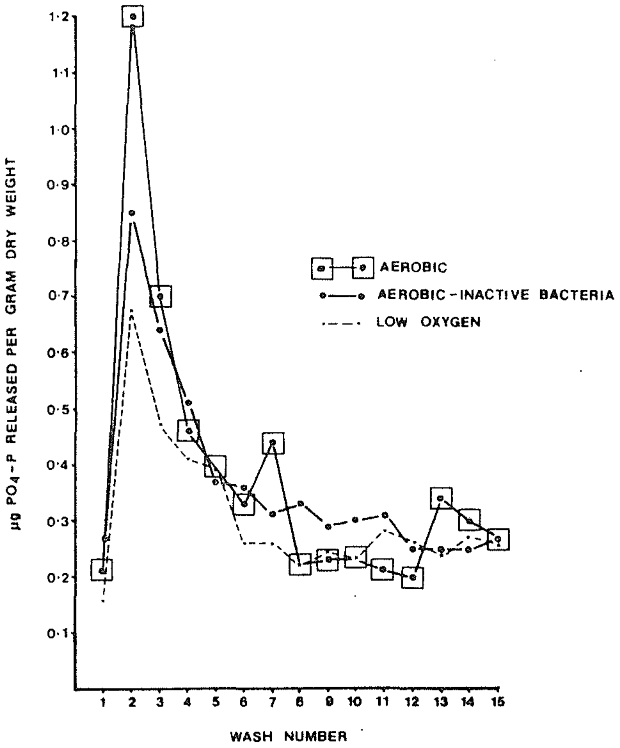


Figure 29 Repeated washings, Stn 4 sediment.

20 ug PO_4-P/l phosphate concentration in solution. This is in reasonable agreement with the results of the adsorption/desorption work described previously.

Surface sediment from Station 8 (Cox Bay) gave results similar to those obtained with Station 4 sediment (Fig. 30). A total of 6.2 ug PO_4-P/g dry weight of sediment was released during 15 successive washings. The later extractions tended toward a sustained level of 0.3 ug P/g dry weight.

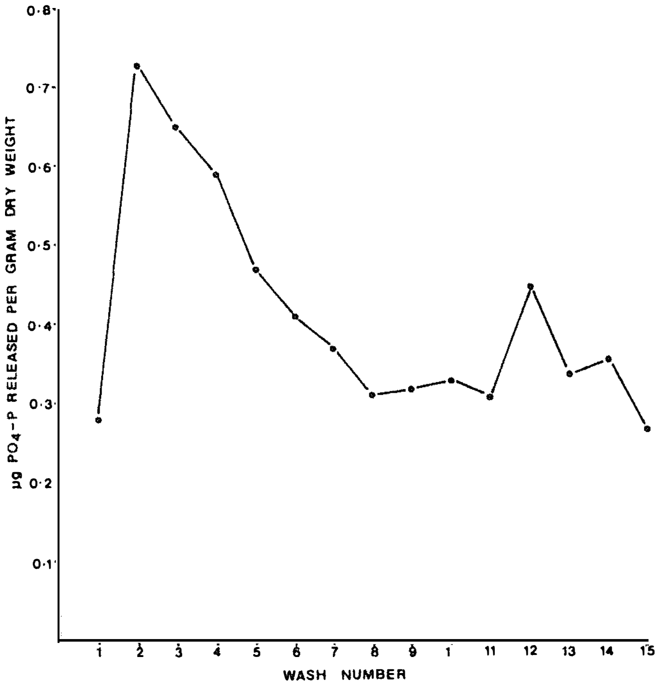


Figure 30 Repeated washings, Station 8 sediment.

The results of these repeated washing experiments indicate that these sediments release only a small fraction of their total phosphorus each time they are brought into solution. As these extractions were done in rapid succession (approximately every ten minutes) there was not time for any significant remineralisation of organic material. Thus, the phosphate released each time was probably from a larger inorganic pool with the amount extracted being controlled by physical adsorption/desorption mechanisms. The phosphate concentrations attained in these 10 minute extractions indicate a very quick approach to the equilibrium values measured after 24 hours in the earlier work.

SEDIMENT RELEASE OF PHOSPHORUS

Artificial cores

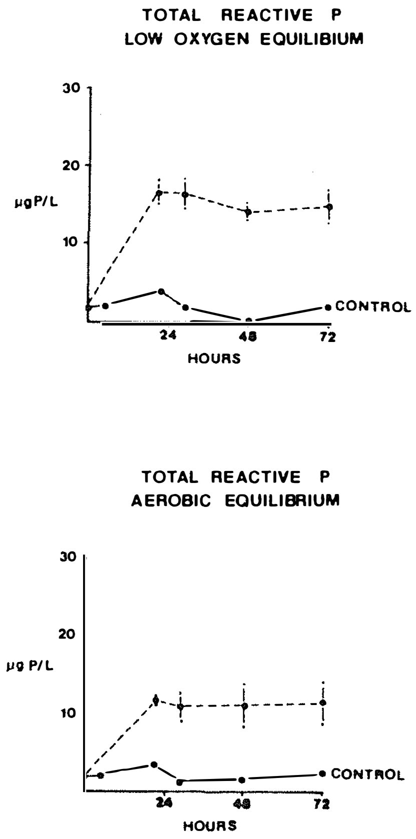
In order to measure phosphorus release from a sediment surface which is not kept in suspension, artificial cores were used. These consisted of perspex cylinders containing a 5 cm layer of homogenized sediment from Station 4 with 35 g/l NaCl solution carefully added over the sediment. Replicate cores (5 each) were placed in the dark at 25°C under both aerated and low oxygen (2 mg O_2/l) conditions. Total reactive phosphate (TRP) was measured to quantify phosphate release versus time. As shown in figure 31 both treatments yielded an increase in TRP within 24 hours followed by a stable period. As it was not possible to add the water to the cylinders without disturbing any sediment, the samples taken after 5 hours had too much turbidity to measure TRP. Therefore the initial rate of release is not known, but if we calculate release rates based on the 21 hour TRP value we obtain 2.5 mg P/m^2/day and 3.9 mg P/m^2/day released for the aerated and low oxygen treatments respectively.

Intact cores

Large cores of sediment taken intact with overlying water have been taken occasionally at Station 4. Figure 32 illustrates TRP release from two cores taken in June 1979. These intact cores contain natural populations of plankton and benthic organisms and would not be expected to be exact replicates. They were placed in the dark to inhibit photosynthesis and the water was allowed to decrease in dissolved oxygen through natural metabolic activities. By the ninth day the oxygen levels in the water were down to 4.2 and 5.3 mg O_2/l for cores A and B respectively and by the fifteenth day they had declined to 2.6 and 1.9 mg O_2/l respectively. The pH of the water varied from 8.3 initially to 7.5 at the end of 22 days.

Release rates were almost certainly affected by biological activities as well as chemical factors. If mean values of TRP at days 0, 9 and 22 are compared release rates of 0.6 mg P/m^2/day down to 5 mg

O_2/l and 2.7 mg P/m^2/day from 5 to 2 mg O_2/l can be calculated. These rates would include the influences of phosphate taken up or releaed by planktonic and benthic organisms as well as direct sediment release.



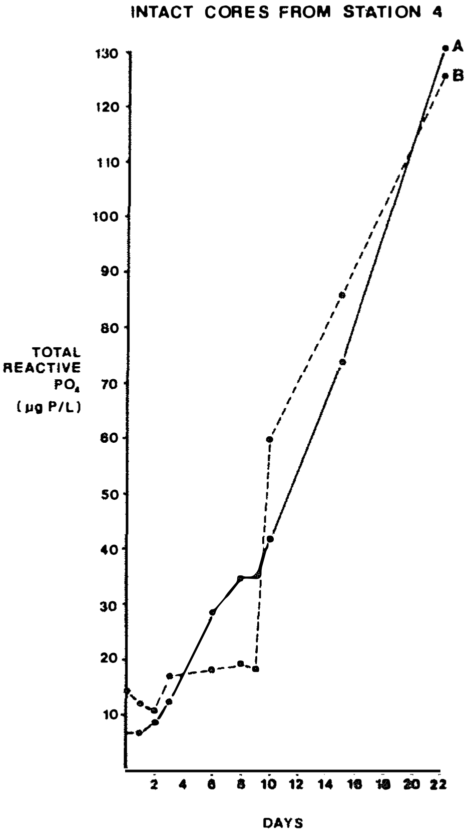


Figure 31 Phosphorus release from artificial cores.

Figure 32 Phosphorus release from intact cores.

Enclosure experiment

In March 1980 a flexible cylinder made of clear PVC film was used to enclose 1.3 m^2 of sediment in 1.2 m deep water near Station 4. A boat oar was used to stir up the sediment in the enclosure to mimic what might happen when various human activities stir up the sediment. Water samples were taken immediately before and periodically after the stirring. Measurements included turbidity, phosphate, total dissolved phosphate, ammonia and chlorophyll a. The results graphed in figures 33–35 show the expected increase in turbidity immediately after stirring with the bottom water measurement have the higher peak. The peak was followed by a gradual decrease until after 24 hours turbidity was close to the same as levels outside the enclosure.

The picture of what happened to the dissolved nutrient concentration is less clear. The resuspension of surface sediment materials caused quick changes with sharp increases in surface ammonia and TDP followed by similarly sharp declines. After one hour the dissolved nutrient concentrations continued to fluctuate but with no discernable pattern. At the end of 24 hours TDP and phosphate levels were approximately the same as for outside the enclosure but ammonia levels were lower.

While these results were not precise enough to estimate the amount of N and P which may have been released due to stirring, it is apparent that whatever was released was not available in the water column for long. The initial peaks returned to external levels within an hour of stirring although turbidity was still slightly above the external levels after 24 hours. It is possible that phytoplankton may have taken up nutrients released by the stirring but the data are insufficient to detect this. Chlorophyll measurements which are not yet available may help clarify the situation, but total N or P measurements would be confused by the resuspended particultes over the 24-hour time span of this experiment. Further experiments are planned to quantify the exchange of N and P sediment and water in this type of situation.

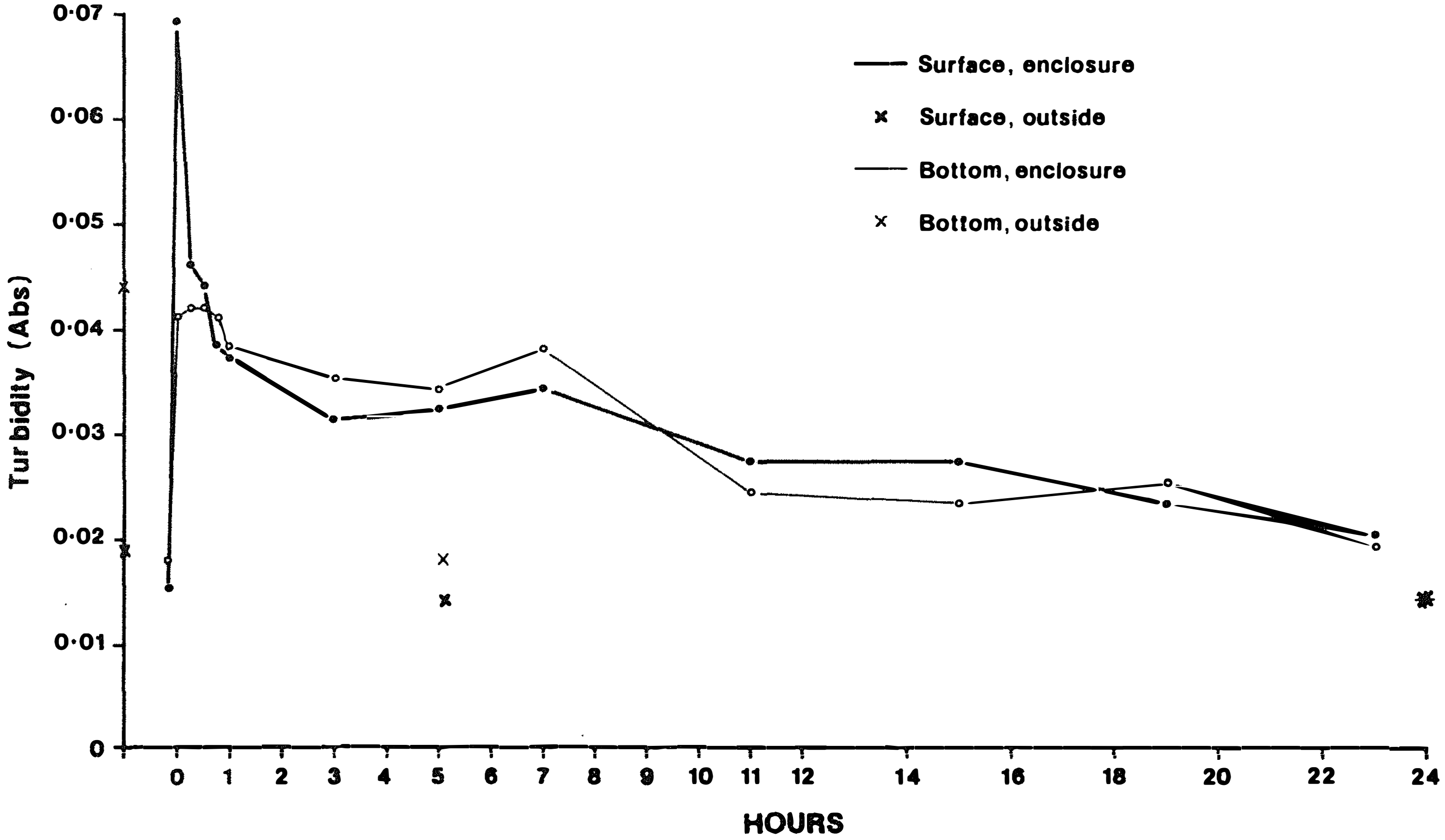


Figure 33. Enclosure experiment, turbidity.

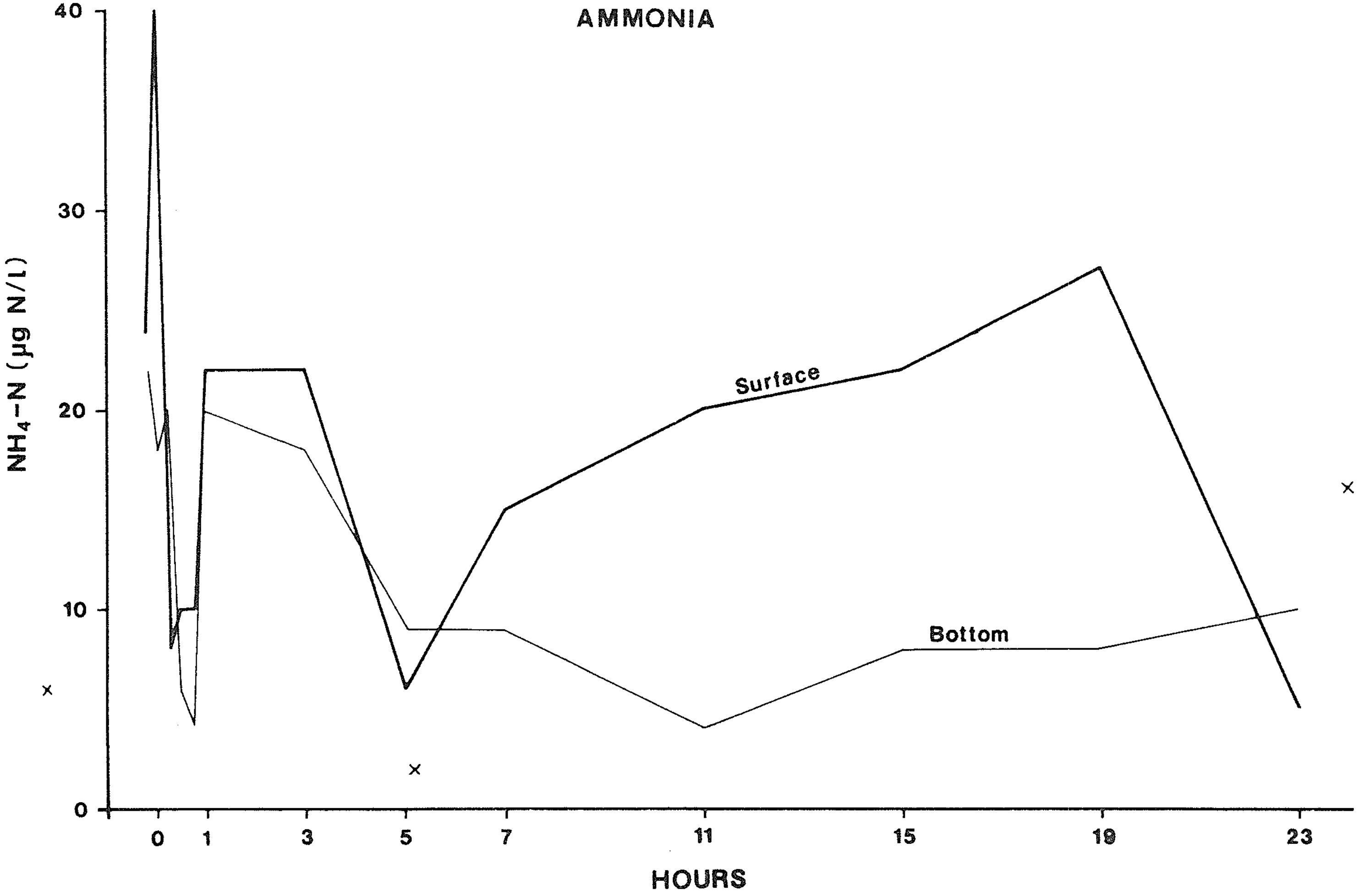


Figure 34. Enclosure experiment, ammonia.

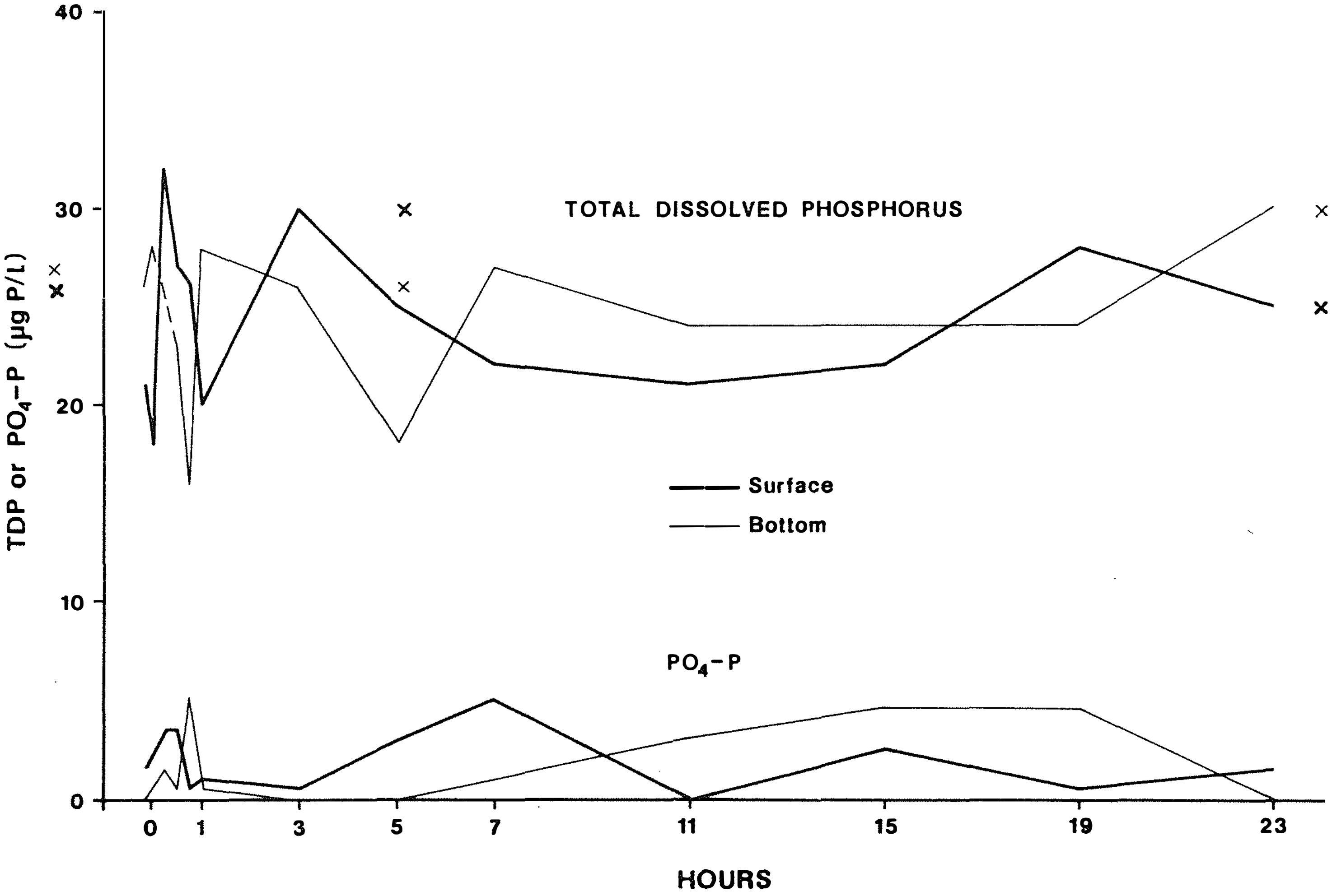


Figure 35. Enclosure experiment, TDP AND SRP.

Conclusion

Although stirring the sediment within an enclosure did not yield the anticipated large amounts of released dissolved nutrients, it is apparent from the above results that the sediments at Station 4 are capable of significant phosphate release. Even under well-oxygenated conditions release rates of 0.6 - 2.5 mg P/m^2/day were measured. Under low oxygen conditions 2.7 - 3.9 mg P/m^2/day were measured. These release rates are within the range reported by Holdren and Armstrong (1980) and represent a significant source of phosphorus to the Peel Inlet.

SEDIMENTATION AND RESUSPENSION

Measurement of sedimentation rates in a shallow estuary such as the Peel-Harvey estuarine system is fraught with problems. P.B. Birch (pers. com.) started sampling with sediment traps in 1978 and in 1979 sampling was continued and expanded by R.J. Luketelich and J.O. Gabrielson (unpublished). Although information necessary for a thorough analysis of the sediment trap data is not yet available, a brief discussion of sedimentation and resuspension is desirable at this time because of the significance of these processes in nutrient cycling in this system.

Nett sedimentation rate is a complex balance between allochthanous and autochthanous inputs, and decomposition, remineralization and release of nutrients from the sediment to the water. In a well-mixed shallow waterbody, sediment may be resuspended many times before being permanently buried. This resuspended sediment is caught in sediment traps together with newly-sedimenting material which, for most of the year in the Peel-Harvey system, is composed of microorganisms produced within the system.

Crude preliminary calculations indicate that an average of 80-85% of the dry weight caught in our traps was resuspended material. At times the trap collections were close to 100% resuspended material. Because of its expectably higher nitrogen and phosphorus content, newly-sedimenting material probably contributed a greater fraction of these elements than its dry weight contribution would indicate.

In the period from July 1978 to February 1980 measured sedimentation rates at Station 1 ranged from 0.62 - 124 g dry wt./m^2/day and 2 - 90 mg P/m^2/day. During the same period rates measured at Station 4 were 0.04 - 71.3 g dry wt/m^2/day and 1.3 - 66 mg P/m^2/day. These represent gross sedimentation and resuspension and should be contrasted to estimates of nett sedimentation. Treloar (1979) gave estimates of long-term nett sedimentation rates varying from 0.33 - 1.9 mm/year. If we assume that approximately 1 mm of average consolidated sediment is buried each year, that would be equivalent to 3 g dry wt./m^2/ day and 0.3 mg P/m^2/day.

The discrepancy between the sediment trap collection rates and the long-term nett sedimentation is probably accounted for by the large resuspension component of the measured sedimentation and by significant remineralization and recycling of phosphorus to the water mass. The release of soluble P from sediment has been discussed previously (Chpts. 6 & 7). Resuspension of sediments has a potentially important role in this ecosystem due to its role in the release of phosphate, its effects on the water column light regime, and as a supply of energy to filter-feeding organisms. Further analysis of sediment trap data in conjunction with wind data will hopefully clarify sedimentation and resuspension processes in the Peel-Harvey estuarine system.

SUMMARY

The distribution in time and space of several sediment parameters has been described. The most significant aspects were as follows:

1. Sediments of the Harvey are generally richer in organic matter, N, and P than sediments of the Peel Inlet.
2. Black ooze layers are highly enriched in N and P with a consequently high potential to supply nutrients to the Cladophora beds associated with these layers.
3. The highest levels of extractable N and P occurred during the wettest winter of the study (1978).
4. The amount of N and P in the surface sediment is large compared to the amounts in the water mass and benthic biomass and may rival river flows as a source of dissolved N and P.

Aspects of nutrient cycling between the sediments and water and biomass are the subject of further study. The following points can be made at present:

1. The adsorption/desorption characteristics of Peel Inlet sediments indicate that these sediments would tend to maintain phosphate concentrations in the water at 5 - 20 ug P/l.
2. Sediment core experiments have yielded release rates of 0 - 4 mg P/m^2/day with the higher rates occurring under low oxygen conditions (approx. 2 mg O_2/l).
3. Resuspension of sediments is very significant and accounts for 80 - 85% of the amounts collected by sediment traps.
4. Long-term nett sedimentation rates of phosphorus are estimated to be approximately 0.3 mg P/m^2/day. Much of short-term gross sedimentation is recycled.

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APPENDIX I

METHODOLOGY

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A. Analytical Methods

Ammonia:	Dal Pont *et al.* 1974
Nitrate:	Technicon method No 158-71W
Soluble reactive phosphate (SRP):	Acid molybdate-ascorbic acid method (Strickland & Parsons 1968)
Wet/dry ratio:	Wet weight of sediment divided by its weight after drying at 105°C for 24 hours
% water:	1 - 1/(W/D)
% organic matter:	Loss on ignition at 550°C for 1 hour
NaCl extractable PO_4:	20 g wet sediment was transferred into 250 ml graduated cylinders and brought to 220 ml with 2M NaCl, shaken end-over-end 10 times and allowed to settle for 1 hour, centrifuged, filtered through 0.45 um Millipore filter, and analyzed for SRP as above.
NaCl extractable N:	Aliquots of 2M NaCl extract (see NaCl ext. P) were analyzed for ammonia or nitrate as above.
Sediment digestion:	100 mg dry sediment per pyrex test tube. Add 5 ml conc. HNO_3, heat at approx. 200°C for several hours, add 5 ml of 70% perchloric acid, continue digestion to dryness. Add 1 ml of conc. HCl to redissolve precipitate, dilute with DI water, filter through Whatman 541 filter and make volume up to 100 ml with DI water.
Total P:	10 ml of sediment digest (see above) was neutralized with NaOH and HCl to phenolpthalein end point and analyzed for SRP as above.

Total N:	Samples digested in conc. H_2SO_4 in presence of mercury catalyst. Analysis by Autoanalyser Technicon methods No. 334-74W/B and No. 369-75A/B.
Organic P:	Ashed and non-ashed sediment samples were extracted with HCl, analyzed for SRP, and organic P calculated by difference (Olsen and Dean 1965).

Phosphatase activity:

20 g wet sediment diluted to 100 ml with water in erlenmeyer flask. Replicate samples of 2.5 ml of dilute sediment removed from continuously stirred solution. Each replicate sample added to a test tube with 0.125 ml 1:1 (V:V) toluene/ethanol and 0.5 ml of 50 mM p-nitrophenyl phosphate (pNPP). This mixture was swirled, then incubated at ambient temperature (17-25°C) in the dark. After 1 hour, 0.5ml of 0.125 M $CaCl_2$ and 2 ml of 0.25 N NaOH were added and the mixture was filtered through a 0.45 um Millipore filter and absorbance was measured at 410 nm. Parallel blanks run with pNPP added after the NaOH, just before filtering. Standard curve run with p-nitrophenol.

B. Grid studies and high frequency sampling.

Core samples were collected in 45 mm diameter perspex tubes for examination and then appropriate sections of 3 to 5 cores at each site were bulked, subsampled, stored in ice chests and returned to the laboratory where they were stored at 4°C until analyzed. Extractions and phosphatase activities (when done) were performed as soon as possible. Then the sediments were dried for 24 hours at 105°C and further analyses done as convenient.

C. Cores

Sediment cores were taken from a boat by pressing 45 mm inner diameter perspex coring tubes into the sediment through the use of a 3 m long handle with a one way valve in it. The cores were transported to the laboratory and stored at 4°C until processed. A superficial description of characteristics such as color and texture variations with depth was made before the sediment core was extruded and sectioned from the top. The first 2 cm from the sediment-water interface were sectioned at 5 mm intervals and below the 2 cm depth 1 cm sections were taken and further observations recorded.

D. Adsorption/desorption isotherms

Duplicate 5 g wet weight samples of sediment were equilibrated with 350 ml of water through gentle shaking at 25^{o}C in the dark for 24 hours. The water used consisted of all combinations of three concentrations of phosphate (0, 50 & 100 ug SRP/l) and five salt levels (6, 11, 20, 28, & 40 g NaCl/l), thus making 15 treatments. Controls (no sediment) were run for each treatment. pH was monitored but not controlled. After 24 hours of equilibrating the samples were centrifuged and filtered through 0.45 um Millipore filters before analysis for SRP.

E. Sediment traps

Two types of traps were used to collect sedimenting material. Both consisted of quadruplicate sample vessels suspended at approximately 40 cm above the sediment-water interface on a line between an anchor and subsurface float. The earlier traps used jars with a 68 mm diameter opening and 120 mm depth as collecting vessels. The newer traps used funnels (same collecting area as the older jars) with vials attached to the bottom. This second type of trap had significantly less problem with periphytic growth than did the jar type collectors which had greater surface area. Traps were left out for 1 to 2 weeks generally before collection and analysis back in the laboratory. Preservatives were not used.

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Table A1a. March 1978 Grid Study data, Peel Inlet surface sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3
2	1.33	1.8	57	.37	830	2.77	.44
3	1.46	3.8	153	.82	1070	4.69	.51
4	2.46	7.2	226	2.90	2280	8.56	.86
5	1.50	3.5	75	.26	950	2.99	.54
6	1.28	1.4	45	.58	410	4.34	.51
7	1.59	4.0	169	.27	1070	6.81	.57
8	1.35	2.2	53	.30	680	2.56	.50
9	1.51	3.1	102	.95	1010	9.33	.60
10	1.65	5.5	170	.50	1320	4.50	.23
11	1.25	1.3	20	.44	350	.90	.45
12	1.60	3.2	105	.14	950	3.57	.54
13	1.68	4.6	127	.08	1320	--	.60
14	1.97	7.1	169	.32	1800	7.37	.67
15	1.24	1.3	31	.11	470	2.46	.73
16	2.04	6.2	170	.20	1800	7.59	.35
17	1.49	3.0	86	.12	830	3.64	.27
18	1.26	1.2	34	.04	590	3.30	.24
19	2.15	8.7	178	1.68	1800	18.40	.39
20	2.08	9.5	177	.36	1920	18.82	.37
36	4.42	22.5	451	14.14	5130	135.47	1.64
MEAN	1.76	5.0	130	1.23	1329	13.06	.55
n	20	20	20	20	20	19	19
min	1.24	1.2	20	.04	350	0.90	.23
max	4.42	22.5	451	14.14	5130	135.47	1.64
Std Dev	.71	4.8	97	3.11	1049	30.05	.30
Xcorrelations with Extractable NO3							
n	20	20	20	20	20	19	
r	.798	.732	.710	.876	.772	.836	
Xcorrelations with Extractable NH4							
n	19	19	19	19	19		
r	.922	.915	.835	.978	.904		
Xcorrelations with Total Nitrogen							
n	20	20	20	20			
r	.993	.984	.967	.895			
Xcorrelations with Extractable PO4							
n	20	20	20				
r	.920	.883	.831				
Xcorrelations with Total Phosphorus							
n	20	20					
r	.951	.953					
Xcorrelations with Organic Matter							
n	20						
r	.980						

Table A1b. March 1978 Grid Study data, Peel Inlet non-ooze sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3
2	1.38	2.7	104	.41	590	---	.50
3	1.41	2.8	137	.49	830	3.99	.49
4	1.41	3.0	74	.96	590	5.84	.51
5	1.33	2.6	45	.12	2040	1.36	.49
6	1.28	1.8	42	.24	590	2.60	.46
7	1.56	4.2	158	.12	890	3.32	.53
8	1.35	2.2	53	.30	680	2.56	.50
9	1.48	2.4	65	.44	1190	6.91	.59
10	1.65	5.5	170	.50	1320	4.50	.23
11	1.25	1.3	42	.44	590	1.58	.45
12	1.63	4.5	134	.11	1320	2.61	.52
13	1.51	3.4	191	.00	1070	3.64	.53
14	1.57	4.6	131	.09	1320	---	.55
15	1.22	1.0	32	.01	590	1.33	.48
16	1.38	2.9	87	.04	830	---	.41
17	1.38	11.8	35	.01	830	3.44	.23
18	1.26	1.2	34	.04	590	3.30	.24
19	1.38	3.6	40	.08	830	6.10	.27
20	1.41	2.7	50	.28	950	5.25	.27
36	1.73	4.1	126	2.96	950	24.20	.67
MEAN	1.43	3.4	88	.38	930	4.85	.45
n	20	20	20	20	20	17	20
min	1.22	1.0	32	.00	590	1.33	.23
max	1.73	11.8	191	2.96	2040	24.20	.67
Std Dev	.14	2.3	52	.65	368	5.25	.13
Xcorrelations with Extractable NO3							
n	20	20	20	20	20	17	
r	.319	-.305	.341	.440	.131	.368	
Xcorrelations with Extractable NH4							
n	17	17	17	17	17		
r	.604	.111	.223	.935	-.004		
Xcorrelations with Total Nitrogen							
n	20	20	20	20			
r	.439	.203	.295	-.058			
Xcorrelations with Extractable PO4							
n	20	20	20				
r	.491	-.002	.182				
Xcorrelations with Total Phosphorus							
n	20	20					
r	.780	.184					
Xcorrelations with Organic Matter							
n	20						
r	.396						

Table A2a. August 1978 Grid Study data, Peel Inlet surface sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3
2	1.58	2.6	115	.39	760	3.13	.87
3	1.67	9.1	240	.70	1120	3.49	1.65
4	5.85	27.8	818	2.38	9160	94.21	3.22
5	2.54	7.9	279	.47	3630	---	2.88
6	1.35	1.8	34	.30	620	1.34	.59
7	1.94	4.6	241	.60	1620	27.49	1.71
8	3.26	14.7	484	36.04	5390	331.35	3.94
9	1.36	2.2	50	.91	690	14.00	1.05
10	1.66	4.3	206	4.95	1480	103.99	.55
11	1.24	1.0	44	1.96	330	36.01	.48
12	1.53	2.9	115	1.43	980	62.78	.50
13	1.62	3.4	118	2.87	1120	68.07	.53
14	3.2	12.5	395	36.68	3370	325.07	1.16
15	1.22	.7	16	1.13	250	27.31	.40
16	1.34	2.0	26	.37	620	41.68	.52
17	4.47	17.1	554	51.68	5670	619.79	2.36
18	1.28	1.0	25	.14	470	10.59	.49
19	1.36	1.3	33	.22	400	1.23	.45
20	1.35	1.9	21	.36	400	6.59	.67
36	4.44	21.5	598	109.21	5590	912.33	.98
MEAN	2.21	7.0	220	12.64	2183	141.60	1.25
n	20	20	20	20	20	19	20
min	1.22	.7	16	.14	250	1.23	.40
max	5.85	27.8	818	109.21	9160	912.33	3.94
Std Dev	1.34	7.8	233	27.24	2475	245.42	1.05
Xcorrelations with Extractable NO3							
n	20	20	20	20	20	19	
r	.690	.702	.745	.215	.786	.330	
Xcorrelations with Extractable NH4							
n	19	19	19	19	19		
r	.695	.688	.679	.984	.638		
Xcorrelations with Total Nitrogen							
n	20	20	20	20			
r	.983	.970	.976	.554			
Xcorrelations with Extractable PO4							
n	20	20	20				
r	.624	.639	.615				
Xcorrelations with Total Phosphorus							
n	20	20					
r	.978	.986					
Xcorrelations with Organic Matter							
n	20						
r	.980						

Table A2b. August 1978 Grid Study data, Peel Inlet non-ooze sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3
2	1.58	2.6	115	.39	760	3.13	.87
3	1.67	9.1	240	.70	1120	3.49	1.65
4	1.39	1.6	100	.26	470	3.09	.61
5	1.42	1.9	66	.62	970	6.25	.62
6	1.35	1.8	34	.30	620	1.34	.59
7	1.94	4.6	241	.60	1620	27.49	1.71
8	1.86	5.3	151	5.42	1550	74.58	2.21
9	1.36	2.2	50	.91	690	14.00	1.05
10	1.66	4.3	206	4.95	1480	103.99	.55
11	1.24	1.0	44	1.96	330	36.01	.48
12	1.53	2.9	115	1.43	980	62.78	.50
13	1.62	3.4	118	2.87	1120	68.07	.53
14	1.61	4.0	140	1.17	1050	67.17	.52
15	1.22	0.7	16	1.13	250	27.31	.40
16	1.34	2.0	26	.37	620	41.68	.52
17	1.44	2.4	76	4.15	690	61.22	.55
18	1.28	1.0	25	.14	470	10.59	.49
19	1.36	1.3	33	.22	400	1.23	.45
20	1.35	1.9	21	.36	400	6.59	.67
36	1.57	3.7	122	5.04	800	39.03	.35
MEAN	1.49	2.9	97	1.65	820	32.95	.77
n	20	20	20	20	20	20	20
min	1.22	.7	16	.14	250	1.23	.35
max	1.94	9.1	241	5.42	1620	103.99	2.21
Std Dev	.20	2.0	71	1.80	408	30.76	.50
Xcorrelations with Extractable NO3							
n	20	20	20	20	20	20	
r	.703	.676	.591	.145	.636	.013	
Xcorrelations with Extractable NH4							
n	20	20	20	20	20		
r	.431	.258	.377	.766	.556		
Xcorrelations with Total Nitrogen							
n	20	20	20	20			
r	.934	.733	.855	.464			
Xcorrelations with Extractable PO4							
n	20	20	20				
r	.425	.313	.348				
Xcorrelations with Total Phosphorus							
n	20	20					
r	.894	.864					
Xcorrelations with Organic Matter							
n	20						
r	.774						

Table A3a. March 1979 Grid Study data, Peel Inlet surface sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3	ORG. P	P'ASE
2	1.36	1.6	74	.78	860	9.57	.03	37.0	0.42
3	1.41	3.2	141	.68	860	8.07	.09	29.0	0.58
4	1.62	3.3	158	.64	1200	.89	.04	32.5	0.40
5	1.55	3.3	125	.07	860	1.53	.03	20.4	0.65
6	1.35	1.7	45	.04	590	3.12	.04	12.4	0.50
7	1.75	4.3	118	.19	1260	14.05	.04	20.4	0.68
8	3.56	18.3	436	1.49	4880	27.41	.08	134.0	1.80
9	1.26	1.9	49	.29	590	9.29	.04	25.6	0.27
10	1.31	1.7	60	.09	790	7.35	.04	13.2	0.35
11	1.27	1.3	104	.47	530	9.36	.04	17.0	0.40
12	1.98	6.8	246	.44	2540	23.30	.04	53.0	1.37
13	1.41	3.9	108	.22	720	13.03	.06	10.0	0.71
14	1.57	3.9	133	.10	860	19.52	.03	17.4	0.57
15	1.26	1.3	66	.01	460	5.82	.03	8.8	0.81
16	1.42	2.0	105	.20	660	4.06	.00	13.6	0.83
17	1.30	.9	47	.09	320	1.00	.01	3.4	0.33
18	1.31	1.3	36	.00	590	8.07	.06	7.2	0.56
19	3.76	19.0	484	.50	6020	45.50	.12	149.6	4.48
20	1.36	2.4	88	.09	790	2.24	.04	12.0	0.99
36	1.84	6.5	175	.91	2730	15.99	.06	---	0.51
MEAN	1.68	4.4	140	.37	1406	11.46	.05	32.4	0.86
n	20	20	20	20	20	20	20	19	20
min	1.26	.9	36	.00	320	.89	.00	3.4	0.27
max	3.76	19	484	1.49	6020	45.50	.12	149.6	4.48
Std Dev	.71	5.1	121	.38	1527	10.91	.03	40.5	0.93

Xcorrelations with Extractable NO3

n	20	20	20	20	20	20
r	.689	.723	.695	.469	.721	.705

Xcorrelations with Extractable NH4

n	20	20	20	20	20
r	.860	.874	.862	.440	.885

Xcorrelations with Total Nitrogen

n	20	20	20	20
r	.977	.979	.967	.626

Xcorrelations with Extractable PO4

n	20	20	20
r	.601	.624	.642

Xcorrelations with Total Phosphorus

n	20	20
r	.974	.977

Xcorrelations with Organic Matter

n	20
r	.993

Table A3b. March 1979 Grid Study data, Peel Inlet non-ooze sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3	ORG. P	P'ASE
2	1.36	1.6	74	.78	860	9.57	.03	37.0	0.42
3	1.41	3.2	141	.68	860	8.07	.09	29.0	0.58
4	1.57	2.9	87	.41	1130	.52	.09	31.8	0.20
5	1.55	3.3	125	.07	860	1.53	.03	20.4	0.65
6	1.35	1.7	45	.04	590	3.12	.04	12.4	0.50
7	1.75	4.3	118	.19	1260	14.05	.04	20.4	0.68
8	1.75	6.8	109	.12	1930	5.58	.06	---	0.36
9	1.26	1.9	49	.29	590	9.29	.04	25.6	0.27
10	1.31	1.7	60	.09	790	7.35	.04	13.2	0.35
11	1.27	1.3	104	.47	530	9.36	.04	17.0	0.40
12	1.73	5.9	200	.11	1400	12.75	.08	10.6	0.50
13	1.41	3.9	108	.22	720	13.03	.06	10.0	0.71
14	1.57	3.9	133	.10	860	19.52	.03	17.4	0.57
15	1.26	1.3	66	.01	460	5.82	.03	8.8	0.81
16	1.42	2.0	105	.20	660	4.06	.00	13.6	0.83
17	1.3	.9	47	.09	320	1.00	.01	3.4	0.33
18	1.31	1.3	36	.00	590	8.07	.06	7.2	0.56
19	1.64	5.5	126	.05	1260	13.17	.05	11.4	1.54
20	1.36	2.4	88	.09	790	2.24	.04	12.0	0.99
36	1.39	3.5	69	.28	400	1.38	.06	3.0	0.19
MEAN	1.45	3.0	94	.21	843	7.47	.05	16.0	0.59
n	20	20	20	20	20	20	20	19	20
min	1.26	.9	36	.00	320	.52	.00	3.0	0.19
max	1.75	6.8	200	.78	1930	19.52	.09	37.0	1.54
Std Dev	.17	1.7	41	.22	390	5.22	.02	9.6	0.30
Xcorrelations with Extractable NO3									
n	20	20	20	20	20	20			
r	.331	.456	.341	.266	.422	.077			
Xcorrelations with Extractable NH4									
n	20	20	20	20	20				
r	.328	.373	.469	.040	.284				
Xcorrelations with Total Nitrogen									
n	20	20	20	20					
r	.877	.849	.595	-.026					
Xcorrelations with Extractable PO4									
n	20	20	20						
r	-.146	-.144	.101						
Xcorrelations with Total Phosphorus									
n	20	20							
r	.716	.723							
Xcorrelations with Organic Matter									
n	20								
r	.893								

Table A4a. September 1979 Grid Study data, Peel Inlet surface sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3
2	1.34	2.4	112	.50	720	2.58	.13
3	1.46	5.2	146	.80	---	3.13	.24
4	4.45	24.6	434	.94	320	14.93	.24
5	2.40	9.1	224	.42	1530	11.09	.34
6	1.34	2.8	110	.54	2000	3.69	.16
7	1.52	3.5	181	.34	1460	4.85	.07
8	4.85	22.8	483	3.01	860	30.14	.21
9	1.28	1.9	79	.39	1260	3.24	.06
10	1.66	4.8	137	.75	1260	7.49	.04
11	1.22	2.1	55	.35	530	.54	.15
12	1.56	4.2	172	.65	390	4.63	.03
13	1.54	3.8	118	.53	720	5.67	.29
14	1.73	5.0	126	.45	1260	6.18	.95
15	1.28	1.6	63	.18	320	3.73	.14
16	1.56	4.0	102	1.05	860	9.44	.21
17	1.87	4.8	177	.22	1330	2.81	.20
18	2.82	10.5	430	3.93	4140	29.00	---
19	1.36	1.9	56	.13	588	1.50	.04
20	1.25	.7	19	.16	50	1.44	.06
36	3.46	18.3	439	2.75	4868	20.36	.42
MEAN	2.00	6.7	183	.90	1288	8.32	.21
n	20	20	20	20	19	20	19
min	1.22	.7	19	.13	50	.54	.03
max	4.85	24.6	483	3.93	4868	30.14	.95
Std Dev	1.07	7.0	144	1.05	1243	8.74	.21
Xcorrelations with Extractable NO3							
n	19	19	19	19	18	19	
r	.219	.244	.226	.189	.322	.245	
Xcorrelations with Extractable NH4							
n	20	20	20	20	19		
r	.851	.807	.913	.937	.586		
Xcorrelations with Total Nitrogen							
n	19	19	19	19			
r	.303	.323	.557	.704			
Xcorrelations with Extractable PO4							
n	20	20	20				
r	.688	.654	.829				
Xcorrelations with Total Phosphorus							
n	20	20					
r	.935	.930					
Xcorrelations with Organic Matter							
n	20						
r	.987						

Table A4b. September 1979 Grid Study data, Peel Inlet non-ooze sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3
2	1.34	2.4	112	.50	720	2.58	.13
3	1.46	5.2	146	.80	---	3.13	.24
4	1.49	3.2	73	.41	330	2.54	.20
5	1.57	4.9	82	.25	390	3.02	.17
6	1.34	2.8	110	.54	2000	3.69	.16
7	1.80	6.0	132	.92	1260	7.03	.18
8	1.53	3.8	105	.61	1200	3.87	.19
9	1.28	1.9	79	.39	1260	3.24	.06
10	1.66	4.8	137	.75	1260	7.49	.04
11	1.22	2.1	55	.35	530	.54	.15
12	1.56	4.2	172	.65	390	4.63	.03
13	1.54	3.8	118	.53	720	5.67	.29
14	1.47	3.4	64	.23	530	2.67	.15
15	1.28	1.6	63	.18	320	3.73	.14
16	1.30	1.5	42	.15	190	1.86	.24
17	1.42	2.5	46	.29	390	2.89	.08
18	1.36	1.7	37	.21	590	2.99	.04
19	1.36	1.9	56	.13	588	1.50	.04
20	1.25	.7	19	.16	50	1.44	.06
36	1.26	1.6	63	.04	491	2.08	.12
MEAN	1.42	3.0	86	.40	695	3.33	.14
n	20	20	20	20	19	20	20
min	1.22	.7	19	.04	50	.54	.03
max	1.80	6.0	172	.92	2000	7.49	.29
Std Dev	.15	1.5	41	.25	486	1.77	.08
Xcorrelations with Extractable NO3							
n	20	20	20	20	19	20	
r	.172	.318	.168	.220	.030	.059	
Xcorrelations with Extractable NH4							
n	20	20	20	20	19		
r	.808	.701	.700	.730	.514		
Xcorrelations with Total Nitrogen							
n	19	19	19	19			
r	.292	.387	.519	.626			
Xcorrelations with Extractable Phosphorus							
n	20	20	20				
r	.716	.809	.867				
Xcorrelations with Total Phosphorus							
n	20	20					
r	.656	.787					
Xcorrelations with Organic Matter							
n	20						
r	.906						

Table A5a. March 1978 Grid Study data, Harvey Estuary surface sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3
1	2.73	11.4	322	---	2400	12.67	---
21	1.57	4.5	110	.08	1070	---	.27
22	2.70	10.7	322	.78	2770	---	1.50
23	4.56	15.3	478	27.41	3740	95.08	1.50
24	3.04	14.5	309	1.95	2890	23.50	.46
25	1.34	2.3	65	.16	590	3.98	.23
26	3.23	16.5	290	3.97	2770	19.99	1.26
27	1.32	1.9	54	.01	530	4.71	.24
28	1.48	4.1	91	.24	1070	4.00	.27
29	2.37	11.7	263	1.54	2040	16.14	.36
30	1.23	1.3	53	.39	590	6.95	.22
31	2.71	13.7	323	.76	2160	6.23	.15
32	1.30	2.7	69	.69	1070	9.20	.23
33	3.97	14.5	534	15.56	2950	81.78	.75
34	1.32	7.3	49	.17	770	4.33	.24
35	1.68	4.8	119	.66	1320	11.27	.30
MEAN	2.28	8.6	216	3.62	1796	21.42	.53
n	16	16	16	15	16	14	15
min	1.23	1.3	49	.00	530	.00	.00
max	4.56	16.5	534	27.41	3740	95.08	1.50
Std Dev	1.05	5.5	159	7.66	1037	29.16	.48

Xcorrelations with Extractable NO3						
n	15	15	15	15	15	13
r	.748	.633	.676	.621	.786	.772
Xcorrelations with Extractable NH4						
n	14	14	14	13	14	
r	.853	.584	.814	.971	.758	
Xcorrelations with Total Nitrogen						
n	16	16	16	16		
r	.965	.925	.945	.662		
Xcorrelations with Extractable PO4						
n	15	15	15			
r	.817	.545	.742			
Xcorrelations with Total Phosphorus						
n	16	16				
r	.969	.889				
Xcorrelations with Organic Matter						
n	16					
r	.904					

Table A5b. March 1978 Grid Study data, Harvey Estuary non-ooze sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3
1	2.45	9.5	225	3.19	590	---	.69
21	1.27	1.4	38	.01	590	1.87	.24
22	1.31	2.3	32	.29	1070	4.40	.24
23	2.13	8.8	189	3.60	1800	24.52	.38
24	2.12	9.3	134	.72	1800	6.68	.36
25	1.34	2.3	65	.16	590	3.98	.23
26	3.20	13.8	222	1.18	2590	23.36	.54
27	1.32	1.9	54	.01	530	4.71	.24
28	1.39	2.5	53	.03	830	2.13	.25
29	2.27	11.6	182	2.66	1980	6.13	.50
30	1.23	1.3	53	.39	590	6.95	.22
31	2.10	8.2	169	.65	1740	8.00	.36
32	1.23	1.9	31	.18	590	5.15	.23
33	2.01	7.2	108	.28	1250	13.67	.34
34	1.32	7.3	49	.17	770	4.33	.24
35	1.39	3.1	114	.06	830	4.89	.26
MEAN	1.76	5.8	107	.85	1134	8.05	.33
n	16	16	16	16	16	15	16
min	1.23	1.3	31	.01	530	2.13	.22
max	3.20	13.8	225	3.60	2590	24.52	.69
Std Dev	.58	4.1	70	1.20	646	7.02	.14

Xcorrelations with Extractable NO3

n	16	16	16	16	16	15
r	.877	.819	.903	.777	.513	.672

Xcorrelations with Extractable NH4

n	15	15	15	15	15
r	.765	.662	.746	.666	.709

Xcorrelations with Total Nitrogen

n	16	16	16	16
r	.818	.830	.705	.433

Xcorrelations with Extractable PO4

n	16	16	16
r	.631	.651	.783

Xcorrelations with Total Phosphorus

n	16	16
r	.923	.877

Xcorrelations with Organic Matter

n	16
r	.929

Table A6a. August 1978 Grid Study data, Harvey Estuary surface sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3
1	2.77	11.5	267	2.41	3050	9.02	1.31
21	1.36	1.8	67	3.43	330	68.59	.49
22	1.39	1.7	63	1.94	330	57.41	.46
23	3.73	15.7	451	27.24	4520	313.06	1.44
24	3.35	17.2	544	23.33	5170	230.31	1.29
25	1.85	5.9	170	10.89	1840	81.05	.57
26	3.24	14.7	384	11.05	3720	177.13	.71
27	1.65	5.3	128	.62	1340	37.12	1.27
28	2.94	15.7	488	18.08	5310	157.17	.74
29	1.97	7.7	188	9.56	1700	94.11	.39
30	1.29	1.0	42	10.25	400	64.21	.43
31	2.99	12.1	364	1.05	2760	8.29	2.40
32	2.09	7.7	240	.64	1890	---	.99
33	1.84	5.2	119	1.58	1160	4.61	.57
34	1.83	5.5	172	10.07	1600	93.81	.60
35	1.30	.8	43	3.72	290	41.26	.29
MEAN	2.22	8.1	233	8.49	2213	95.81	.87
n	16	16	16	16	16	15	16
min	1.29	.8	42	.62	290	4.61	.29
max	3.73	17.2	544	27.24	5310	313.06	2.40
Std Dev	.82	5.7	166	8.32	1708	88.25	.55
Xcorrelations with Extractable NO3							
n	16	16	16	16	16	15	
r	.638	.582	.574	.060	.492	.097	
Xcorrelations with Extractable NH4							
n	15	15	15	15	15		
r	.673	.654	.697	.941	.702		
Xcorrelations with Total Nitrogen							
n	16	16	16	16			
r	.935	.978	.982	.721			
Xcorrelations with Extractable PO4							
n	16	16	16				
r	.633	.634	.683				
Xcorrelations with Total Phosphorus							
n	16	16					
r	.952	.983					
Xcorrelations with Organic Matter							
n	16						
r	.975						

Table A6b. August 1978 Grid Study data, Harvey Estuary non-ooze sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3
1	2.77	11.5	267	2.41	3050	9.02	1.31
21	1.48	2.6	55	1.58	620	115.75	.41
22	1.39	1.7	63	1.94	330	57.41	.46
23	2.23	8.2	184	9.35	1990	92.72	.81
24	2.49	11.7	317	11.07	3140	105.81	.68
25	1.85	5.9	170	10.89	1840	81.05	.57
26	3.24	14.7	384	11.05	3720	177.13	.71
27	1.65	5.3	128	.62	1340	37.12	1.27
28	2.94	15.7	488	18.08	5310	157.17	.74
29	1.97	7.7	188	9.56	1700	94.11	.39
30	1.29	1.0	42	10.25	400	64.21	.43
31	2.99	12.1	364	1.05	2760	8.29	2.40
32	1.54	3.6	72	.71	870	3.15	.64
33	1.84	5.2	119	1.58	1160	4.61	.57
34	1.83	5.5	172	10.07	1600	93.81	.60
35	1.30	.8	43	3.72	290	41.26	.29
MEAN	2.05	7.1	191	6.50	1882	71.41	.77
n	16	16	16	16	16	16	16
min	1.29	.8	42	.62	290	3.15	.29
max	3.24	15.7	488	18.08	5310	177.13	2.40
Std Dev	.65	4.8	137	5.36	1403	53.28	.52

Xcorrelations with Extractable NO3

n	16	16	16	16	16	16
r	.561	.480	.477	-.302	.372	-.365

Xcorrelations with Extractable NH4

n	16	16	16	16	16
r	.353	.425	.459	.773	.495

Xcorrelations with Total Nitrogen

n	16	16	16	16
r	.917	.969	.977	.599

Xcorrelations with Extractable PO4

n	16	16	16
r	.377	.479	.543

Xcorrelations with Total Phosphorus

n	16	16
r	.950	.978

Xcorrelations with Organic Matter

n	16
r	.977

Table A7a. March 1979 Grid Study data, Harvey Estuary surface sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3	ORG. P	P'ASE
1	2.44	10.9	246	.43	3270	23.35	.19	102.0	1.56
21	1.49	2.4	110	.15	790	16.72	.07	22.0	1.22
22	1.32	1.7	81	.01	390	4.94	.04	33.0	0.54
23	1.48	3.6	66	.24	530	14.98	.05	31.5	0.76
24	3.77	17.2	352	1.82	3680	28.20	.00	69.5	2.91
25	1.27	1.3	28	.11	190	6.85	.03	4.7	0.30
26	4.92	21.1	461	1.84	3470	71.44	.00	14.2	4.50
27	1.31	2.3	46	.17	390	13.98	.03	2.3	0.42
28	1.55	5.1	94	.10	860	16.20	.02	77.3	0.90
29	1.92	8.7	205	.55	2400	14.36	.04	66.0	1.36
30	1.29	1.6	38	.21	660	14.76	.01	28.5	0.46
31	1.60	4.8	203	.51	790	20.24	.04	43.5	0.96
32	1.33	2.2	130	.22	660	21.36	.04	36.7	1.21
33	2.59	11.0	298	.48	190	44.44	.06	98.0	1.16
34	1.62	7.1	191	.89	4680	21.74	.05	21.5	1.62
35	1.36	1.9	74	.22	2730	10.02	.06	88.5	0.45
MEAN	1.95	6.43	164	.50	1605	21.47	.05	46.2	1.21
n	16	16	16	16	16	16	16	16	16
min	1.27	1.3	28	.01	190	4.94	.00	2.3	0.30
max	4.92	21.1	461	1.84	4680	71.44	.19	102.0	4.50
Std Dev	1.03	6.0	125	.57	1499	16.20	.04	32.8	1.08

Xcorrelations with Organic Phosphorus							
n	16	16	16	16	16	16	16
r	.156	.269	.287	.026	.222	.068	.477
Xcorrelations with Extractable NO3							
n	16	16	16	16	16	16	
r	-.145	-.058	-.010	-.292	.154	-.135	
Xcorrelations with Extractable NH4							
n	16	16	16	16	16		
r	.878	.840	.869	.742	.363		
Xcorrelations with Total Nitrogen							
n	16	16	16	16			
r	.546	.631	.592	.710			
Xcorrelations with Extractable PO4							
n	16	16	16				
r	.908	.911	.876				
Xcorrelations with Total Phosphorus							
n	16	16					
r	.930	.960					
Xcorrelations with Organic Matter							
n	16						
r	.971						

Table A7b. March 1979 Grid Study data, Harvey Estuary non-ooze sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3	ORG. P	P'ASE
1	2.44	10.9	246	.43	3270	23.35	.19	102.00	1.56
21	1.32	1.5	67	.03	460	3.19	.04	15.80	0.50
22	1.32	1.7	81	.01	390	4.94	.04	33.00	0.54
23	1.60	4.9	68	.05	790	---	.05	26.50	0.39
24	2.69	13.8	100	.38	2130	16.27	.03	89.30	0.84
25	1.27	1.3	28	.11	190	6.85	.03	4.70	0.30
26	4.92	21.1	461	1.84	3470	71.44	.00	14.20	4.50
27	1.31	2.3	46	.17	390	13.98	.03	2.30	0.42
28	1.55	5.1	94	.10	860	16.20	.02	77.30	0.90
29	1.92	8.7	205	.55	2400	14.36	.04	66.00	1.36
30	1.29	1.6	38	.21	660	14.76	.01	28.50	0.46
31	1.60	4.8	203	.51	790	20.24	.04	43.50	0.96
32	1.33	2.2	130	.22	660	21.36	.04	36.70	1.21
33	2.00	8.9	163	.37	260	16.50	.09	58.80	0.78
34	1.47	6.6	104	.63	320	3.07	.06	21.00	0.29
35	1.36	1.9	74	.22	2730	10.02	.06	88.50	0.45
MEAN	1.84	6.1	132	.36	1235	17.10	.05	44.26	0.97
n	16	16	16	16	16	15	16	16	16
min	1.27	1.3	28	.01	190	3.07	.00	2.30	0.29
max	4.92	21.1	461	1.84	3470	71.44	.19	102.00	4.50
Std Dev	.93	5.5	109	.44	1144	16.34	.04	32.07	1.02
Xcorrelations with Organic Phosphorus									
n	16	16	16	16	16	15	16		
r	.100	.261	.131	-.077	.558	-.003	.529		
Xcorrelations with Extractable NO3									
n	16	16	16	16	16	15			
r	-.032	.095	.127	-.124	.281	-.142			
Xcorrelations with Extractable NH4									
n	15	15	15	15	15				
r	.906	.783	.886	.883	.613				
Xcorrelations with Total Nitrogen									
n	16	16	16	16					
r	.707	.692	.683	.602					
Xcorrelations with Extractable PO4									
n	16	16	16						
r	.897	.842	.903						
Xcorrelations with Total Phosphorus									
n	16	16							
r	.881	.838							
Xcorrelations with Organic Matter									
n	16								
r	.950								

Table A8a. September 1979 Grid Study data, Harvey Estuary surface sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3
1	2.62	12.0	352	1.75	590	13.98	.35
21	1.33	1.6	67	.22	320	3.95	.06
22	1.42	2.3	103	.12	781	4.30	.06
23	5.23	20.1	314	12.87	4080	73.64	2.01
24	5.38	20.3	244	2.42	4610	30.18	.53
25	1.37	1.4	108	.84	782	5.80	.21
26	3.48	16.3	202	.63	1660	16.46	.42
27	1.32	1.3	46	.27	120	3.70	.09
28	2.50	10.6	216	.48	2326	13.34	.17
29	3.77	16.8	304	2.79	3221	21.36	.33
30	1.35	1.7	34	.72	320	4.75	.16
31	1.32	1.7	109	.77	774	5.45	.16
32	1.97	6.4	242	1.18	1556	16.69	.22
33	1.69	3.9	143	1.27	886	4.46	.13
34	2.05	7.6	194	1.52	1469	8.01	.20
35	1.3	.7	61	.09	295	2.93	.06
MEAN	2.38	7.8	171	1.75	1487	14.31	.32
n	16	16	16	16	16	16	16
min	1.30	.7	34	.09	120	2.93	.06
max	5.38	20.3	352	12.87	4610	73.64	2.01
Std Dev	1.38	7.2	102	3.07	1388	17.63	.47
Xcorrelations with Extractable NO3							
n	16	16	16	16	16	16	
r	.746	.669	.553	.980	.666	.974	
Xcorrelations with Extractable NH4							
n	16	16	16	16	16		
r	.845	.775	.653	.954	.797		
Xcorrelations with Total Nitrogen							
n	16	16	16	16			
r	.937	.888	.685	.644			
Xcorrelations with Extractable PO4							
n	16	16	16				
r	.691	.608	.544				
Xcorrelations with Total Phosphorus							
n	16	16					
r	.746	.841					
Xcorrelations with Organic Matter							
n	16						
r	.968						

Table A8b. September 1979 Grid Study data, Harvey Estuary non-ooze sediments.

Station	W/D	% ORG	TOTAL P	EXT. PO4	TOTAL N	EXT. NH4	EXT. NO3
1	2.62	12	352	1.75	590	13.98	.35
21	1.33	1.6	67	.22	320	3.95	.06
22	1.42	2.3	103	.12	781	4.30	.06
23	1.99	7.2	136	3.30	1260	21.45	.24
24	5.38	20.3	244	2.42	4610	30.18	.53
25	1.37	1.4	108	.84	782	5.80	.21
26	3.48	16.3	202	.63	1660	16.46	.42
27	1.32	1.3	46	.27	120	3.70	.09
28	2.50	10.6	216	.48	2326	13.34	.17
29	3.77	16.8	304	2.79	3221	21.36	.33
30	1.35	1.7	34	.72	320	4.75	.16
31	1.32	1.7	109	.77	774	5.45	.16
32	1.97	6.4	242	1.18	1556	16.69	.22
33	1.69	3.9	143	1.27	886	4.46	.13
34	2.05	7.6	194	1.52	1469	8.01	.20
35	1.30	.7	61	.09	295	2.93	.06
MEAN	2.18	7.0	160	1.15	1311	11.05	.21
n	16	16	16	16	16	16	16
min	1.30	.7	34	.09	120	2.93	.06
max	5.38	20.3	352	3.30	4610	30.18	.53
Std Dev	1.15	6.4	95	.98	1204	8.26	.14
%correlations with Extractable NO3							
n	16	16	16	16	16	16	
r	.906	.907	.720	.629	.755	.863	
%correlations with Extractable NH4							
n	16	16	16	16	16		
r	.882	.882	.706	.777	.857		
%correlations with Total Nitrogen							
n	16	16	16	16			
r	.915	.856	.619	.583			
%correlations with Extractable PO4							
n	16	16	16				
r	.573	.599	.576				
%correlations with Total Phosphorus							
n	16	16					
r	.699	.809					
%correlations with Organic Matter							
n	16						
r	.964						

Table B1. Sediment parameter time series for STATION 1.

DATE	W/D	%Org.M.	Extract. P (ppm dry)	Total P (ppm dry)	Extract. NH4 (ppm dry)	Extract. NO3 (ppm dry)	Total N (ppm dry)	%H20
MAR78	2.59	10.4	3.19	274	12.7	0.69	1500	61.4
AUG78	2.77	11.5	2.41	267	9.0	1.31	3050	63.9
13DEC78	2.74	11.7	2.25	183	26.1	1.06	2190	63.5
20DEC78	2.65	13.6	7.26	231	72.6	0.41	1843	62.3
30MAR79	2.44	10.9	0.43	246	23.4	0.19	3270	59.0
1MAY79	2.45	15.0	2.05	119	15.6	0.05	1847	59.2
22MAY79	2.62	16.5	1.76	200	16.3	0.23	1762	61.8
13JUN79	2.57	16.0	2.88	180	7.1	0.31	2193	61.1
3JUL79	2.72	12.7	1.62	361	10.6	0.00	2610	63.2
24JUL79	3.00	13.2	2.42	121	15.7	0.03	2760	66.7
14AUG79	2.85	11.4	1.64	184	13.3	0.06	2490	64.9
4SEP79	2.77	11.8	1.57	166	9.9	0.03	2800	63.9
14SEP79	2.62	12.0	1.75	352	14.0	0.35	590	61.8
18OCT79	2.48	11.5	3.68	183	17.9	0.09	2000	59.7
7NOV79	2.75	14.9	3.12	236	13.7	0.26	2640	63.6
29NOV79	2.71	13.0	2.90	232	--	0.21	2014	63.1
20DEC79	2.63	13.1	5.90	238	18.2	0.48	2304	62.0
10JAN80	2.60	15.0	3.18	273	10.6	0.27	2390	61.5
30JAN80	2.63	13.6	3.01	212	14.8	0.49	2026	62.0
22FEB80	2.36	15.6	2.36	238	11.7	0.22	2639	59.6
26MAR80	2.73	17.6	3.05	172	--	0.31	2530	63.4

Table B2. Sediment parameter time series for STATION 5.

DATE	W/D	%Org.M.	Extract. P (ppm dry)	Total P (ppm dry)	Extract. NH4 (ppm dry)	Extract. NO3 (ppm dry)	Total N (ppm dry)	%H20
MAR78	1.34	2.7	0.13	47	1.5	0.49	1975	25.4
AUG78	1.87	4.3	0.56	151	6.2	1.52	2034	46.5
30MAR79	1.55	3.3	0.07	125	1.5	0.03	860	35.5
22MAY79	1.53	4.7	0.34	49	3.6	0.02	463	34.6
13JUN79	1.44	3.1	0.16	44	2.1	0.03	836	30.6
3JUL79	1.58	4.1	0.40	68	3.7	0.09	890	36.7
24JUL79	1.73	4.4	0.64	81	8.2	0.06	1210	42.2
14AUG79	1.50	3.0	0.44	60	1.1	0.03	780	33.3
4SEP79	1.69	3.9	0.39	80	3.4	0.02	1070	40.8
14SEP79	1.84	6.2	0.30	127	5.6	0.22	755	45.7

Table B3. Sediment parameter time series for STATION 4.

DATE	W/D	%Org.M.	Extract. P (ppm dry)	Total P (ppm dry)	Extract. NH4 (ppm dry)	Extract. NO3 (ppm dry)	Total N (ppm dry)	%H20
MAR78	1.62	3.8	1.35	104	6.4	0.58	928	38.3
AUG78	4.07	17.3	1.53	531	57.8	2.18	5684	75.4
13DEC78	1.88	5.5	0.50	100	7.2	0.33	1171	46.8
23JAN79	1.86	5.9	1.47	131	28.9	0.25	1428	46.2
14MAR79	1.50	3.1	0.45	73	1.7	0.08	900	33.3
30MAR79	1.58	3.0	0.47	105	0.6	0.08	1148	36.7
1MAY79	1.97	7.4	0.46	155	13.8	0.02	1709	49.2
22MAY79	1.60	3.9	1.37	72	7.3	0.02	404	37.5
13JUN79	1.62	4.4	0.71	97	3.0	0.12	970	38.3
3JUL79	1.78	5.0	0.66	105	3.7	0.00	1010	43.8
24JUL79	1.69	3.5	0.59	88	5.5	0.07	900	40.8
14AUG79	1.65	3.6	0.65	83	2.8	0.02	900	39.4
4SEP79	1.73	4.1	0.57	92	3.0	0.00	1210	42.2
14SEP79	3.86	20.3	0.83	362	12.4	0.23	322	74.1
18OCT79	1.65	4.0	0.77	101	3.1	0.13	890	39.4
7NOV79	1.84	5.1	1.40	165	--	--	1380	45.7
29NOV79	1.61	3.7	1.02	122	4.2	0.15	651	37.9
20DEC79	1.60	3.9	1.03	103	5.5	0.35	1024	37.5
10JAN80	1.68	4.8	0.42	99	4.8	0.24	1083	40.5
30JAN80	1.65	4.4	0.92	109	5.1	0.08	769	39.4
22FEB80	1.75	5.8	0.83	126	6.7	0.34	1664	42.9
26MAR80	1.69	5.2	0.91	100	--	0.29	982	40.9

Table B4. Sediment parameter time series for STATION 6.

DATE	W/D	%Org.M.	Extract. P (ppm dry)	Total P (ppm dry)	Extract. NH4 (ppm dry)	Extract. NO3 (ppm dry)	Total N (ppm dry)	%H20
MAR78	1.28	1.6	0.41	44	3.5	0.48	500	21.9
AUG78	1.35	1.8	0.30	34	1.3	0.59	620	25.9
30MAR79	1.35	1.7	0.04	44	3.1	0.04	590	25.9
1MAY79	1.49	4.4	0.54	69	10.0	0.39	905	32.9
22MAY79	1.40	4.4	0.45	54	3.6	0.01	767	28.6
13JUN79	1.47	3.8	0.39	75	2.1	0.03	893	32.0
3JUL79	1.38	2.4	0.28	32	1.5	0.00	530	27.5
24JUL79	1.40	2.7	0.60	64	5.2	0.06	400	28.6
14AUG79	1.42	3.0	0.30	58	1.6	0.03	520	29.6
4SEP79	1.42	2.7	0.50	65	2.5	0.00	770	29.6
14SEP79	1.34	2.8	0.54	110	3.7	0.16	2000	25.4

Table B5. Sediment parameter time series for STATION 7.

DATE	W/D	%Org.M.	Extract. P (ppm dry)	Total P (ppm dry)	Extract. NH4 (ppm dry)	Extract. NO3 (ppm dry)	Total N (ppm dry)	%H20
MAR78	1.58	4.1	0.20	164	5.1	0.55	980	36.7
AUG78	1.94	4.6	0.60	241	27.5	1.71	1620	48.5
13DEC78	1.95	5.5	0.82	157	--	0.56	1567	48.7
30MAR79	1.75	4.3	0.19	118	14.0	0.04	1260	42.9
1MAY79	1.62	5.5	0.98	122	17.0	0.09	1140	38.3
22MAY79	1.65	5.9	0.85	99	5.6	0.00	1179	39.4
13JUN79	1.67	6.5	0.68	140	3.5	0.02	1171	40.1
3JUL79	1.70	4.8	0.56	121	3.5	1.40	960	41.2
24JUL79	1.81	5.0	1.03	119	6.6	0.08	1270	44.8
14AUG79	1.84	6.4	0.72	89	3.3	0.00	1380	45.7
4SEP79	1.82	5.3	0.63	98	4.2	0.02	1510	45.1
14SEP79	1.78	5.9	0.89	135	6.9	0.17	1272	43.8
18OCT79	1.80	6.3	1.11	154	5.0	0.10	1270	44.4
7NOV79	1.65	5.7	0.91	137	--	--	1020	39.4
29NOV79	1.66	4.5	1.02	145	5.8	0.09	769	39.8
20DEC79	1.73	5.4	1.02	130	4.6	0.28	1143	42.2
10JAN80	1.64	5.8	0.38	138	4.2	0.24	1395	39.0
30JAN80	1.66	5.6	0.84	138	4.3	0.22	1020	39.8
22FEB80	1.70	6.2	0.52	166	5.1	0.16	1571	41.2
26MAR80	1.64	5.9	0.52	100	--	0.31	1073	39.1

Table B6. Sediment parameter time series for POST 46.

DATE	W/D	%Org.M.	Extract. P (ppm dry)	Total P (ppm dry)	Extract. NH4 (ppm dry)	Extract. NO3 (ppm dry)	Total N (ppm dry)	%H20
13DEC78	1.74	4.9	0.33	84	7.0	0.44	1175	42.5
14MAR79	1.55	4.9	0.53	64	3.6	0.14	538	35.5
13JUN79	1.58	4.6	0.89	67	3.2	0.05	486	36.7
3JUL79	1.68	4.8	0.98	59	4.0	0.27	710	40.5
24JUL79	1.67	3.9	1.34	73	6.9	0.11	770	40.1
14AUG79	1.66	4.0	1.29	64	4.5	0.04	770	39.8
4SEP79	1.62	4.5	0.61	62	2.8	0.07	890	38.3

Table B7. Sediment parameter time series for STATION 8.

DATE	W/D	%Org.M.	Extract. P (ppm dry)	Total P (ppm dry)	Extract. NH4 (ppm dry)	Extract. NO3 (ppm dry)	Total N (ppm dry)	%H20
MAR78	1.35	2.2	0.30	53	2.6	0.50	680	25.9
AUG78	2.70	10.9	23.79	351	228.6	3.25	3854	63.0
13DEC78	3.04	8.7	1.72	263	28.1	0.47	3184	67.1
20DEC78	3.08	14.0	3.69	280	49.2	0.41	2721	67.5
30MAR79	2.84	13.7	0.94	305	18.7	0.07	3700	64.8
1MAY79	3.37	18.2	3.23	226	28.1	0.15	3405	70.3
22MAY79	4.65	25.2	3.53	436	36.7	0.00	4617	78.5
13JUN79	3.68	17.2	3.20	394	19.5	0.00	3590	72.8
3JUL79	2.96	11.8	1.83	148	11.6	0.81	3770	66.2
24JUL79	4.14	16.7	2.64	541	25.0	0.09	4740	75.8
14AUG79	3.88	15.6	2.63	208	26.7	0.13	4630	74.2
4SEP79	5.48	19.1	0.86	202	30.1	0.18	6010	81.8
14SEP79	4.85	22.8	3.01	483	30.1	0.21	860	79.4
18OCT79	4.19	19.1	3.46	424	31.1	0.24	5400	76.1
7NOV79	2.41	10.8	0.75	207	--	--	2690	58.5
29NOV79	3.93	18.2	2.38	236	25.5	0.16	4900	74.6
20DEC79	2.12	8.5	3.70	195	3.8	--	2011	52.8
10JAN80	3.93	19.0	1.38	394	25.3	0.12	4683	74.6
30JAN80	2.67	10.6	1.69	258	14.4	0.35	2625	62.5
22FEB80	2.94	15.4	1.40	300	--	0.26	884	66.0
26MAR80	5.48	29.2	2.82	342	--	0.55	6795	81.7

Table B8. Sediment parameter time series for STATION 31.

DATE	W/D	%Org.M.	Extract. P (ppm dry)	Total P (ppm dry)	Extract. NH4 (ppm dry)	Extract. NO3 (ppm dry)	Total N (ppm dry)	%H20
MAR78	2.10	9.3	0.67	200	7.6	0.32	1824	52.4
AUG78	2.99	12.1	1.05	364	8.3	2.40	2760	66.6
30MAR79	1.60	4.8	0.51	203	20.2	0.04	790	37.5
14AUG79	1.69	4.3	1.15	118	3.5	0.02	1070	40.8
14SEP79	1.32	1.7	0.77	109	5.4	0.16	774	24.2
29NOV79	1.68	4.4	1.26	---	7.0	0.04	771	40.5
20DEC79	1.65	5.8	0.92	112	5.1	0.31	1208	39.4
10JAN80	1.73	6.2	1.13	131	4.2	0.41	1392	42.2
30JAN80	1.70	5.2	1.25	115	4.5	0.18	770	41.2
26MAR80	1.57	5.2	1.27	128	--	0.26	783	36.5

Table C1a. Core profile data for STATION 1, 28 August 1979.

Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H2O
0-0.5	4.91	18.4	716	4470	79.6
0.5-1.0	2.85	14.2	316	2650	64.9
1.0-1.5	3.31	13.7	344	2720	69.8
1.5-2.0	3.05	11.6	290	2260	67.2
2-3	2.28	9.5	176	2060	56.1
3-4	2.14	10.1	161	2080	53.3
4-5	2.24	11.1	170	1500	55.4
5-6	2.40	11.3	----	---	58.3
6-7	2.45	10.9	139	1090	59.2
7-8	2.36	10.2	----	---	57.6
8-9	2.48	10.1	132	840	59.7
9-10	2.62	13.3	----	---	61.8
10-11	2.59	10.4	125	2330	61.4
11-12	2.47	11.0	----	---	59.5
12-13	2.32	10.6	84	2180	56.9
13-14	2.35	11.2	----	---	57.4
14-15	2.65	13.0	128	1500	62.3
15-16	2.71	11.4	----	---	63.1
16-17	2.93	14.3	105	1080	65.9
17-18	3.15	15.3	----	---	68.3
18-19	3.13	14.2	106	1250	68.1
19-20	3.15	15.5	----	---	68.3
20-21	3.17	15.7	102	2840	68.5
21-22	3.01	---	----	---	66.8
22-23	2.98	16.6	----	---	66.4
23-24	3.06	---	----	---	67.3
24-25	3.04	15.4	127	2730	67.1
25-26	3.07	---	----	---	67.4
26-27	3.05	16.3	----	---	67.2
27-28	3.03	---	----	---	67.0
28-29	3.07	16.7	115	1720	67.4
29-30	3.05	---	----	---	67.2
30-31	3.00	16.7	----	---	66.7
31-32	3.03	---	----	---	67.0
32-33	3.04	15.6	96	---	67.1
33-34	3.01	---	----	---	66.8
34-35	3.00	15.4	----	1260	66.7
35-36	2.95	---	----	---	66.1
36-37	2.80	---	----	---	64.3
37-38	3.05	16.3	----	---	67.2
38-40	3.08	---	105	1510	67.5
40-42	2.95	14.7	----	---	66.1

Table C1b. Core profile data for STATION 1, 6 September 1977.

Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)
0-1	---	16.7	507	---
1-2	---	16.4	420	3088
2-3	---	16.0	362	---
3-4	---	16.2	306	2831
4-5	---	15.5	252	2501
5-6	---	---	239	2418
6-7	---	14.4	206	---
7-8	---	---	189	2200
8-9	---	16.2	174	---
9-10	---	---	152	2083
10-11	---	14.5	143	---
11-12	---	---	143	1986
12-13	---	16.2	146	---
13-14	---	---	137	1889
14-15	---	15.5	126	---
15-16	---	---	123	1674
16-17	---	14.7	119	---
17-18	---	---	105	1459
18-19	---	10.2	99	---

Table C1c. Core profile data for STATION 1, 17 October 1979.

		Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H_2O
tan		0-0.5	3.28	11.6	235	2454	69.5
ooze		0.5-1.0	3.30	11.8	307	2522	69.7
black		1.0-1.5	2.87	13.5	218	2519	65.2
		1.5-2.0	2.96	14.0	215	2531	66.2
		2-3	2.87	13.4	226	2687	65.2
		3-4	2.85	13.0	183	2869	64.9
		4-5	2.80	15.2	153	2813	64.3
		5-6	2.79	14.8	----	---	64.2
		6-7	2.52	13.1	118	2300	60.3
		7-8	2.31	10.1	----	---	56.7
		8-9	2.34	13.0	99	1879	57.3
		9-10	2.20	12.6	----	---	54.5
		10-11	1.99	8.8	86	1514	49.7
		11-12	2.04	9.6	----	---	51.0
		12-13	2.22	11.5	109	1764	55.0
	green tinge	13-14	2.44	12.3	----	---	59.0
		14-15	2.90	17.0	120	2809	65.5
		15-16	2.96	17.8	----	---	66.2
		16-17	3.02	18.2	110	2632	66.9
grey		17-18	3.16	19.0	----	---	68.4
		18-19	3.14	18.5	83	3300	68.2
brown		19-20	3.09	19.9	----	---	67.6
grey		20-21	2.95	19.3	110	3100	66.1

Table C2. Core profile data for STATION 2, 4 July 1978.

	Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H20
brown/	plant	7.29	49.0	832	7900	8613
black	0-0.5	4.19	22.8	517	4410	76.0
ooze	0.5-1.0	2.23	9.4	204	1870	55.2
↑	1.0-1.5	1.54	3.0	107	730	35.1
black	1.5-2.0	1.43	3.4	101	720	30.1
ooze	2-3	1.36	2.3	47	590	26.5
+	3-4	1.33	1.8	53	460	24.8
sand	4-5	1.42	2.4	86	460	29.6
	5-6	1.41	2.4	96	530	29.1
↓	6-7	1.48	5.1	87	720	32.4
↑	7-8	1.73	6.1	115	990	42.2
clay	8-9	1.83	7.4	185	1130	45.4
+	9-10	1.67	6.4	125	1060	40.1
sand	10-11	1.43	4.4	83	530	30.1
	11-12	1.34	1.8	97	250	25.4
↓	12-13	1.88	2.2	122	860	46.8
↑	13-14	1.92	8.5	132	1260	47.9
	14-15	2.38	---	228	2060	58.0
grey	15-16	2.29	11.8	205	2130	56.3
clay	16-17	2.50	---	201	1730	60.0
	17-18	2.60	12.9	209	1930	61.5
	18-19	2.69	---	222	2070	62.8
↓	19-20	2.57	13.1	220	2000	61.1

Table C3. Core profile data for STATION 3, 4 July 1978.

	Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H20
dark brown	0-0.5	1.94	7.8	325	1930	48.5
	0.5-1.0	1.82	5.3	281	1530	45.1
	1.0-1.5	1.54	4.4	168	790	35.1
	1.5-2.0	1.48	4.5	155	720	32.4
tan	2-3	1.74	7.2	245	1530	42.5
black	3-4	2.04	10.1	362	2400	51.0
	4-5	1.75	6.9	247	1600	42.9
	5-6	1.59	8.0	186	1130	37.1
	6-7	1.45	6.3	116	860	31.0
	7-8	1.41	6.5	121	720	29.1
	8-9	1.38	6.0	94	660	27.5
	9-10	1.33	3.4	76	460	24.8
	10-11	1.30	3.6	66	330	23.1
	11-12	1.30	3.6	49	320	23.1
	12-13	1.28	2.7	69	190	21.9
	13-14	1.26	2.4	48	190	21.9
	14-15	1.26	---	32	320	20.6
	15-16	1.26	2.8	34	190	20.6
dark grey	16-17	1.29	---	30	320	22.5
	17-18	1.31	2.3	37	390	23.7

Table C4a. Core profile data for STATION 4, 25 August 1977.

Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)
Clad.	---	79.5	1940	---
0-1	---	26.6	615	6859
1-2	---	5.3	165	1140
2-3	---	2.5	116	587
3-4	---	3.0	117	648
4-5	---	3.4	105	770
5-6	---	3.7	118	836
6-7	---	2.7	109	---
7-8	---	2.6	93	650
8-9	---	2.7	95	---
9-10	---	2.6	101	761
10-11	---	3.3	92	---
11-12	---	---	155	773
12-13	---	5.1	104	---
13-14	---	---	87	772
14-15	---	3.4	81	---
15-16	---	---	77	777
16-17	---	4.3	97	---

Table C4b. Core profile data for STATION 4, 5 December 1978.

Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H2O
0-0.5	4.69	23.6	1097	6650	78.7
0.5-1.0	4.63	23.6	835	953	78.4
1.0-1.5	4.56	23.6	744	278	78.1
1.5-2.0	4.54	23.6	721	218	78.0
2-3	4.78	22.9	550	156	79.1
3-4	2.40	7.9	104	340	58.3
4-5	1.50	3.4	92	402	33.3
5-6	1.40	3.2	---	---	28.6
6-7	1.37	3.2	77	216	27.0
7-8	1.36	3.0	---	---	26.5
8-9	1.40	3.1	77	270	28.6
9-10	1.46	3.8	---	---	31.5
10-11	1.43	3.5	86	401	30.1
11-12	1.48	3.8	---	---	32.4

Table C4c. Core profile data for STATION 4, 13 June 1978.

	Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H2O
	Cl ad.	--	37.7	1447	--	--
black	0-0.5	5.82	26.7	912	10640	82.8
ooze	0.5-1.0	6.02	29.5	896	11170	83.4
	1.0-1.5	5.52	28.0	841	11310	81.9
B.O.	1.5-2.0	5.05	26.7	723	10640	80.2
+	2-3	4.24	19.4	541	7420	76.4
sand	3-4	1.78	3.7	141	860	43.8
	4-5	1.43	2.0	72	390	30.1
	5-6	1.36	--	---	460	26.5
	6-7	1.39	2.2	79	460	28.1
	7-8	1.41	--	---	460	29.1
	8-9	1.47	2.7	110	320	32.0
	9-10	1.48	--	---	530	32.4
	10-11	1.50	3.0	128	460	33.3
	11-12	1.44	--	49	590	30.6
	12-13	1.61	3.8	91	1060	37.9
	13-14	1.59	--	---	990	37.1
	14-15	1.52	2.7	72	590	34.2
dark	15-16	1.51	--	---	590	33.8
grey	16-17	1.49	--	81	590	32.9
sand	17-18	1.48	2.2	---	720	32.4
	18-19	1.48	--	---	460	32.4
	19-20	1.51	--	97	790	33.8
	20-21	1.54	2.8	---	790	35.1
	21-22	1.52	--	75	790	34.2
	22-23	1.49	--	---	590	32.9
	23-24	1.47	2.0	85	590	32.0

Table C4d. Core profile data for STATION 4, 14 March 1979.

	Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H2O
	plant	8.84	---	----	6844	----
black	0-0.5	5.24	26.8	645	7164	80.9
ooze	0.5-1.0	2.03	7.4	221	6438	50.7
	1.0-1.5	1.42	2.4	111	7529	29.6
	1.5-2.0	1.37	2.0	75	7506	27.0
	2-3	1.39	2.2	73	6687	28.1
	3-4	1.44	2.9	81	2195	30.6
	4-5	1.43	2.6	84	460	30.1
	5-6	1.39	2.2	----	---	28.1
	6-7	1.36	1.8	70	402	26.5
	7-8	1.38	2.0	----	---	27.5
	8-9	1.40	2.7	71	338	28.6
	9-10	1.44	3.5	----	---	30.6
	10-11	1.41	3.4	78	456	29.1
	11-12	1.41	3.4	----	---	29.1
	12-13	1.46	3.6	67	661	31.5
sandy	13-14	1.52	3.7	----	---	34.2
clay	14-15	1.50	3.5	65	626	33.3
	15-16	1.44	3.0	----	---	30.6
	16-17	1.46	3.1	52	340	31.5
	17-18	1.46	3.0	----	---	31.5
	18-19	1.45	3.0	54	400	31.0
	19-20	1.41	2.5	----	---	29.1
	20-21	1.42	2.6	49	280	29.6
	21-22	1.44	3.0	----	---	30.6
	22-23	1.44	3.0	52	400	30.6
	23-24	1.44	2.9	51	---	30.6

Table C5. Core profile data for STATION 5, 13 June 1978.

	Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H2O
	Clad.	3.86	19.1	313	6670	74.1
50% Clad	0-0.5	3.21	16.8	216	4950	68.8
	0.5-1.0	1.62	3.8	72	1330	38.3
B.O.	1.0-1.5	1.51	3.7	104	1200	33.8
	1.5-2.0	1.51	2.7	42	1260	33.8
	2-3	1.38	1.8	27	860	27.5
	3-4	1.30	1.4	20	260	23.1
	4-5	1.29	1.3	22	530	22.5
black	5-6	1.27	---	----	530	21.3
sand	6-7	1.30	1.1	84	390	23.1
	7-8	1.26	---	----	190	20.6
	8-9	1.24	0.7	22	320	19.4
	9-10	1.25	---	----	320	20.0
	10-11	1.26	1.4	30	320	20.6
	11-12	1.34	---	----	390	25.4
	12-13	1.41	2.9	37	660	29.1
clay	13-14	1.40	---	----	790	28.6
	14-15	1.46	3.2	49	790	31.5
grey	15-16	1.36	---	----	390	26.5
sand	16-17	1.41	2.8	63	720	29.1
	17-18	1.41	---	----	860	29.1
	18-19	1.30	1.6	36	320	23.1
	19-20	1.25	---	----	320	20.0
	20-21	1.24	1.0	20	190	19.4

Table C6a. Core profile data for STATION 6, 1 August 1978.

	Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H2O
↑	0-0.5	1.35	1.6	56	600	25.9
oxid.	0.5-1.0	1.35	1.9	48	570	25.9
brown	1.0-1.5	1.28	1.4	88	370	21.9
sand	1.5-2.0	1.26	1.5	37	320	20.6
↓	2-3	1.27	1.9	37	450	21.3
↑	3-4	1.32	2.1	50	340	24.2
	4-5	1.30	2.0	36	340	23.1
	5-6	1.28	1.7	61	---	21.9
	6-7	1.27	1.3	17	160	21.3
black	7-8	1.27	1.4	21	---	21.3
sand	8-9	1.27	1.1	36	155	21.3
	9-10	1.27	1.6	26	---	21.3
	10-11	1.26	1.6	26	154	20.6
	11-12	1.25	1.9	23	---	20.0
	12-13	1.24	0.8	21	155	19.4
	13-14	1.24	1.4	20	---	19.4
↓	14-15	1.23	0.9	24	155	18.7
↑	15-16	1.23	1.7	17	---	18.7
grey	16-17	1.21	1.9	29	156	17.4
sand	17-18	1.21	3.6	32	---	17.4
with	18-19	1.22	3.2	40	154	18.0
greenish	19-20	1.24	14.5	11	---	19.4
streaks	20-21	1.24	3.2	39	32	19.4
↓	21-22	1.24	4.2	24	---	19.4
green	22-23	1.24	3.2	---	32	19.4

Table C6b. Core profile data for STATION 6, 20 June 1978.

	Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)
ox.brn.	0-0.5	--	0.8	40	190
sand	0.5-1.0	--	0.4	27	460
↑	1.0-1.5	--	0.8	43	190
black	1.5-2.0	--	1.6	50	390
sand	2-3	--	1.1	43	260
↓	3-4	--	1.5	36	530
↑	4-5	--	1.4	30	190
dark	5-6	--	0.9	20	50
grey	6-7	--	0.8	18	30
sand	7-8	--	0.7	26	50
	8-9	--	0.8	16	320
↓	9-10	--	0.7	14	320

Table C7. Core profile data for STATION 7, 25 July 1978.

	Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H2O
some plant Clad.	0-0.5	4.68	16.4	666	5750	78.6
	0.5-1.0	2.98	8.8	434	3810	66.4
	1.0-1.5	2.02	5.0	259	2000	50.5
grey/	1.5-2.0	1.81	4.8	272	1600	44.8
brown	2-3	1.77	4.7	230	1660	43.5
	3-4	1.70	5.4	208	1530	41.2
	4-5	1.64	4.9	168	1660	39.0
black	5-6	1.57	4.5	200	1260	36.3
	6-7	1.52	4.8	139	1130	34.2
	7-8	1.48	4.7	145	990	32.4
	8-9	1.53	--	184	1060	34.6
	9-10	1.55	5.2	137	1000	35.5
	10-11	1.58	--	184	1060	36.7
	11-12	1.61	6.6	163	1330	37.9
grey	12-13	1.65	--	185	1130	39.4
mud	13-14	1.75	11.5	135	1170	42.9
+	14-15	1.72	--	313	1460	41.9
shells	15-16	1.77	8.5	123	990	43.5
	16-17	1.86	--	166	1130	48.5
	17-18	1.94	16.5	143	1330	48.5
	18-19	1.97	--	136	1490	49.2
	19-20	1.93	10.3	165	1260	48.2

Table C8. Core profile data for STATION 8, 29 August 1978.

	Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H2O
	plant	---	32.3	1031	10860	---
	0-0.5	6.42	21.4	746	5680	84.4
	0.5-1.0	5.02	17.4	687	6960	80.1
black	1.0-1.5	4.66	18.6	626	6420	78.5
ooze	1.5-2.0	4.44	17.1	670	6750	77.5
	2-3	3.76	18.2	541	5620	73.4
	3-4	3.18	13.9	374	4350	68.6
	4-5	2.12	7.8	241	2200	52.8
	5-6	1.80	6.0	151	1260	44.4
clay	6-7	1.85	6.7	175	1530	45.9
	7-8	1.80	6.8	158	1460	44.4
	8-9	1.67	5.4	121	1260	40.1
	9-10	1.35	2.4	75	460	25.9
	10-11	1.47	---	80	790	32.0
	11-12	1.38	2.4	85	530	27.5
	12-13	1.26	---	31	190	20.6
sand	13-14	1.22	1.0	72	50	18.0
	14-15	1.22	---	----	50	18.0
	15-16	1.23	1.1	29	50	18.7
	16-17	1.27	---	24	190	21.3
	17-18	1.22	0.9	21	190	18.0

Table C9. Core profile data for STATION 24, 29 November 1979.

	Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H2O
2mm oxid.	0-0.5	6.14	22.3	334	5170	83.7
	0.5-1.0	5.61	20.9	558	5450	82.2
	1.0-1.5	5.34	16.7	363	6730	81.3
	1.5-2.0	5.26	20.5	642	5610	81.0
	2-3	5.03	21.9	225	6530	80.1
	3-4	4.44	21.7	132	2442	77.5
	4-5	3.94	21.4	69	3255	74.6
	5-6	3.76	---	----	---	73.4
	6-7	3.70	20.4	65	3117	73.0
	7-8	3.65	---	----	---	72.6
black	8-9	3.65	20.2	44	3110	72.6
	9-10	3.60	---	----	---	72.2
	10-11	3.56	19.6	298	3045	71.9
	11-12	3.48	---	----	---	71.3
	12-13	3.08	16.2	176	2784	67.5
	13-14	2.88	---	----	---	65.3
	14-15	2.74	15.9	136	2631	63.5
	15-16	2.88	---	----	---	65.3
	16-17	2.45	14.6	110	2664	59.2
	17-18	2.36	---	----	---	57.6
	18-19	2.28	11.8	99	2131	56.1
	19-20	2.17	---	----	---	53.9
	20-21	2.65	15.6	128	2012	62.3
	21-22	2.87	---	----	---	65.2
grey	22-23	2.97	18.6	105	2314	66.3
	23-24	3.05	---	----	---	67.2
	24-25	3.05	19.6	110	2298	67.2
	25-26	3.00	---	----	---	66.7

Table C10. Core profile data for STATION 28, 5 March 1980.

	Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H2O
black	0-0.5	2.40	11.4	193	1461	58.3
	0.5-1.0	2.37	10.4	190	1679	57.8
	1.0-1.5	2.25	11.6	245	1676	55.6
	1.5-2.0	2.14	15.3	219	1680	53.2
	2-3	2.42	14.4	263	2205	58.8
	3-4	2.51	13.4	258	2515	60.2
	4-5	2.39	14.7	238	2750	58.1
	5-6	2.67	---	----	---	59.5
	6-7	2.42	12.7	195	2756	58.7
	7-8	2.30	---	----	---	56.6
	8-9	2.21	11.5	141	2249	54.8
	9-10	2.23	---	----	---	55.2
	10-11	2.20	13.0	155	2253	54.6
	11-12	2.20	---	----	---	54.7
	12-13	2.49	13.7	152	2352	59.8
dark grey	13-14	2.24	---	----	---	55.4
	14-15	2.26	11.9	110	2039	55.8
	15-16	1.93	---	----	---	48.2
	16-17	3.19	14.6	112	2558	68.6
	17-18	2.02	---	----	---	50.6
	18-19	2.12	9.7	92	1707	52.9
	19-20	2.38	---	----	---	58.0
	20-21	2.84	17.7	129	2834	64.8
	21-22	2.96	---	----	---	66.2
grey	22-23	2.96	18.5	95	2772	66.2
	23-24	2.94	---	----	---	66.0
	24-25	2.90	18.6	108	2857	65.6

Table C11. Core profile data for STATION 31, 20 December 1979.

	Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H2O
oxid.	0-0.5	1.74	4.4	177	1580	42.5
↓	0.5-1.0	1.59	4.2	156	1690	37.1
↑	1.0-1.5	1.66	5.1	150	1750	39.8
black	1.5-2.0	1.71	5.3	149	1670	41.5
muddy	2-3	1.69	5.4	142	1680	40.8
clay	3-4	1.58	4.9	110	1330	36.7
↓	4-5	1.47	3.7	72	1000	32.0
↑	5-6	1.44	--	---	--	30.6
black	6-7	1.43	3.6	70	990	30.1
sandy	7-8	1.35	--	---	--	25.9
clay	8-9	1.32	1.9	32	590	24.2
↓	9-10	1.28	--	---	--	21.9
↑	10-11	1.26	1.3	23	500	20.6
	11-12	1.25	--	---	--	20.0
	12-13	1.23	0.8	12	170	18.7
grey	13-14	1.23	--	---	--	18.7
clay	14-15	1.25	0.9	13	170	20.0
	15-16	1.27	--	---	--	21.3
	16-17	1.28	--	---	--	21.9
	17-18	1.30	2.6	43	340	23.1
↓	18-19	1.32	--	---	--	24.2
*	19-20	1.38	3.2	46	680	27.5
↓	20-21	1.39	--	---	--	28.1
↑	21-22	1.37	3.5	46	510	27.0
	22-23	1.35	--	35	--	25.9
green	23-24	1.33	4.3	31	340	24.8
clay	24-25	1.32	--	22	--	24.2
↓	25-26	1.34	4.3	21	170	25.4

* black sandy clay

Table C12. Core profile data for POST 46, 14 March 1979.

	Depth (cm)	Wet/dry	%Org. M.	Total P (ppm)	Total N (ppm)	% H20
B.O.	0-0.5	3.34	18.4	232	8993	70.1
	0.5-1.0	3.43	20.3	234	4350	70.8
	1.0-1.5	2.71	14.9	167	3470	63.1
	1.5-2.0	1.51	3.5	59	2510	33.8
	2-3	1.37	2.5	48	2570	27.0
	3-4	1.37	2.9	48	2440	27.0
	4-5	1.33	2.7	37	2540	24.8
	5-6	1.26	1.8	---	---	20.6
	6-7	1.25	1.6	33	1630	20.0
grey sandy clay	7-8	1.29	2.1	---	---	22.5
	8-9	1.38	3.2	51	650	27.5
	9-10	1.37	3.2	---	---	27.0
	10-11	1.34	2.8	74	590	25.4
	11-12	1.33	2.5	---	---	24.8
	12-13	1.30	2.0	26	470	23.1
	13-14	1.28	1.7	---	---	21.9
	14-15	1.26	2.0	28	400	20.6
	15-16	1.26	1.8	---	---	20.6
	16-17	1.24	1.7	22	400	19.4
	17-18	1.26	2.0	22	---	20.6

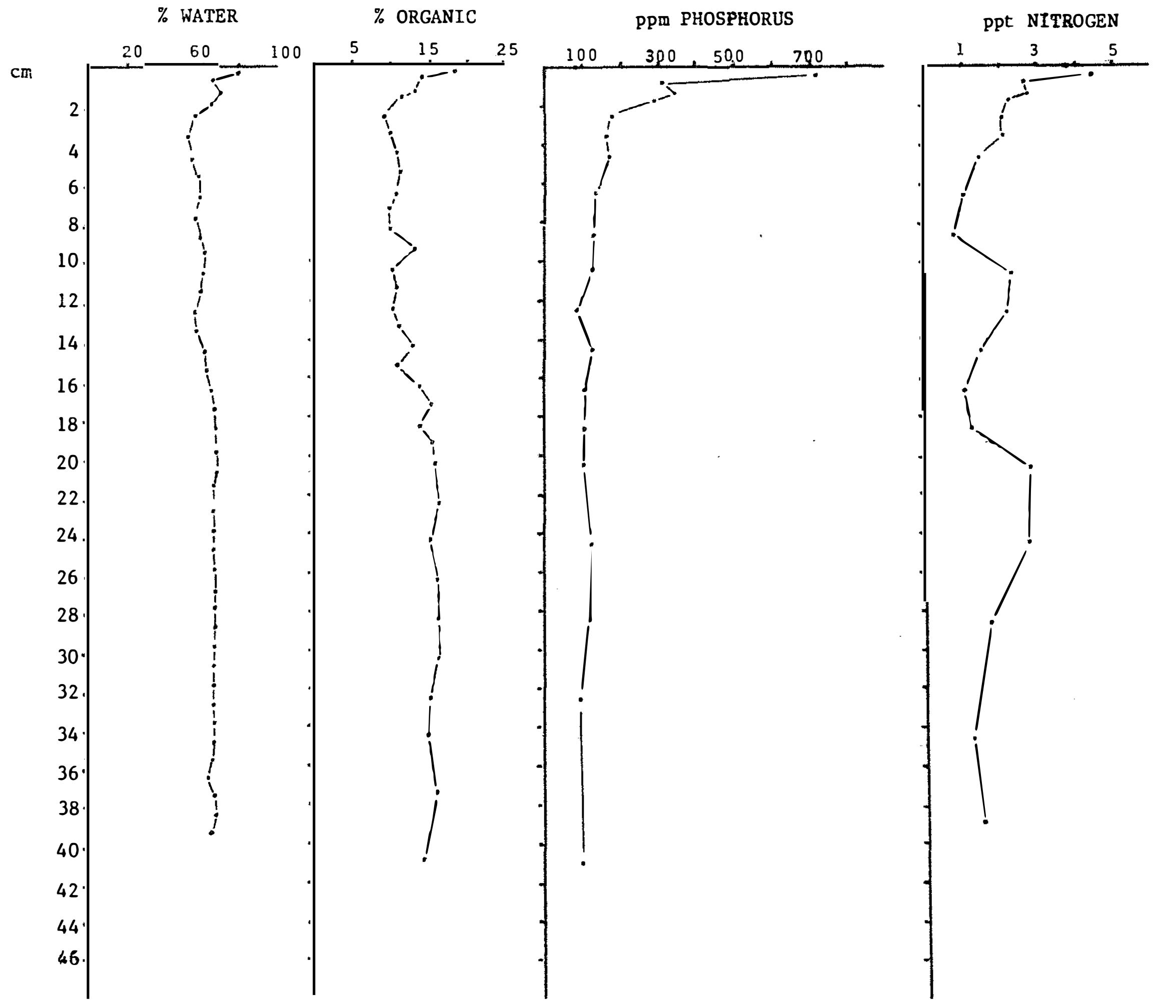

Figure C1a. Core profiles for Station 1, 28 August 1979

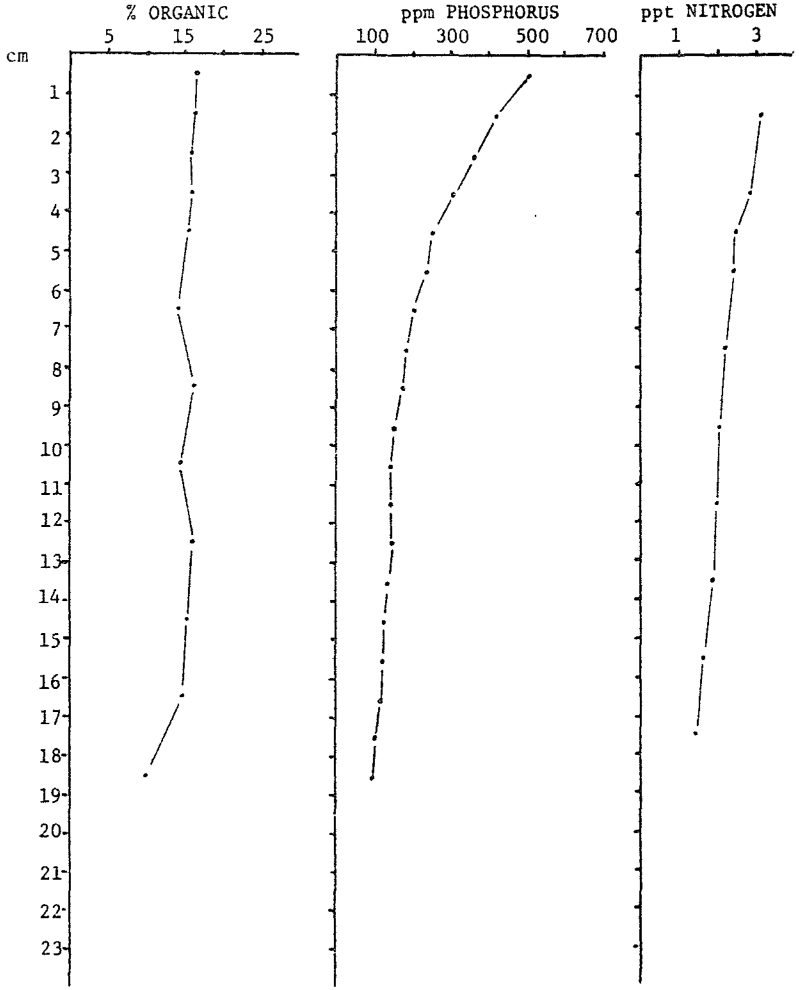

Figure C1b. Core profiles for Station 1, 6 September 1977

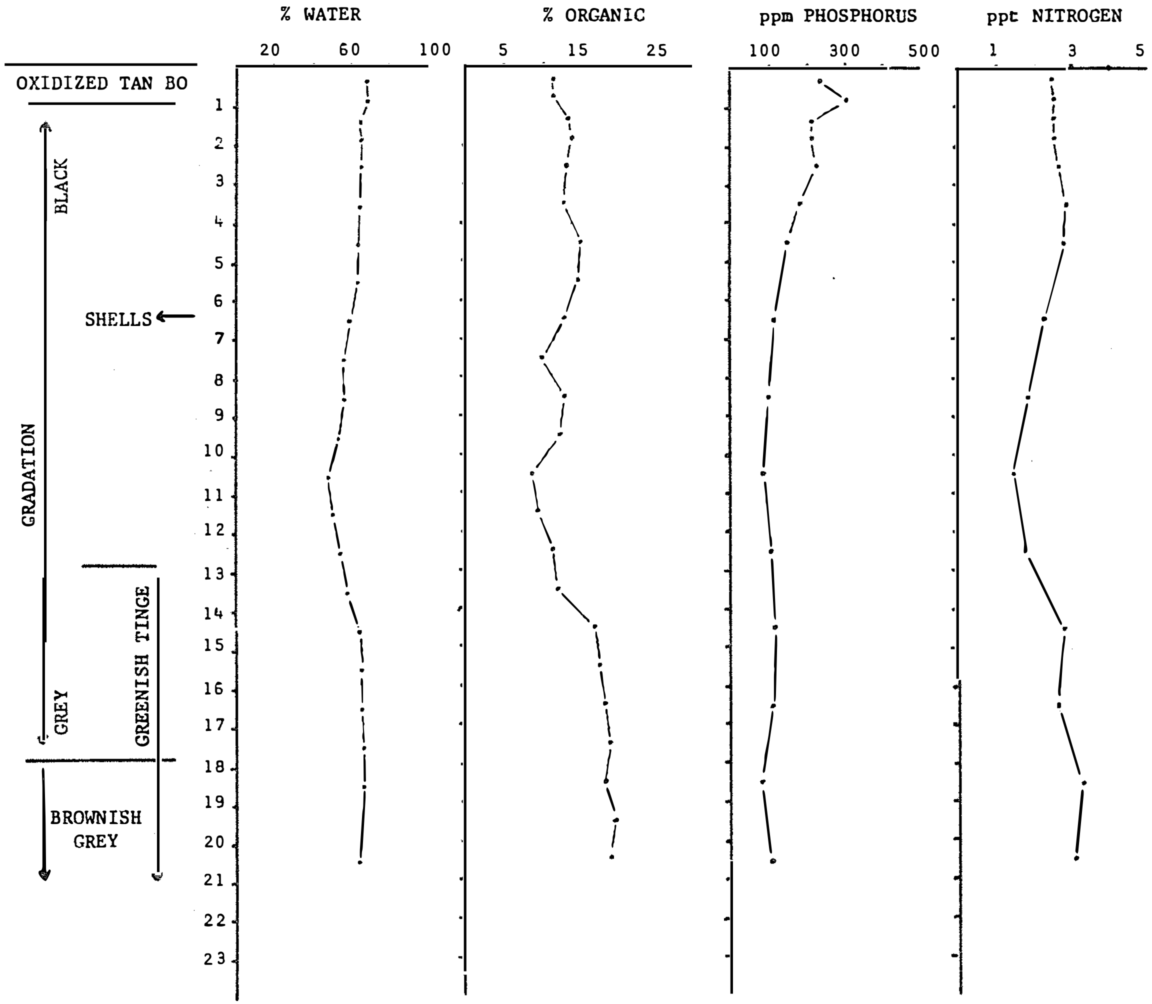

Figure Clc. Core profiles for Station 1, 17 October 1979

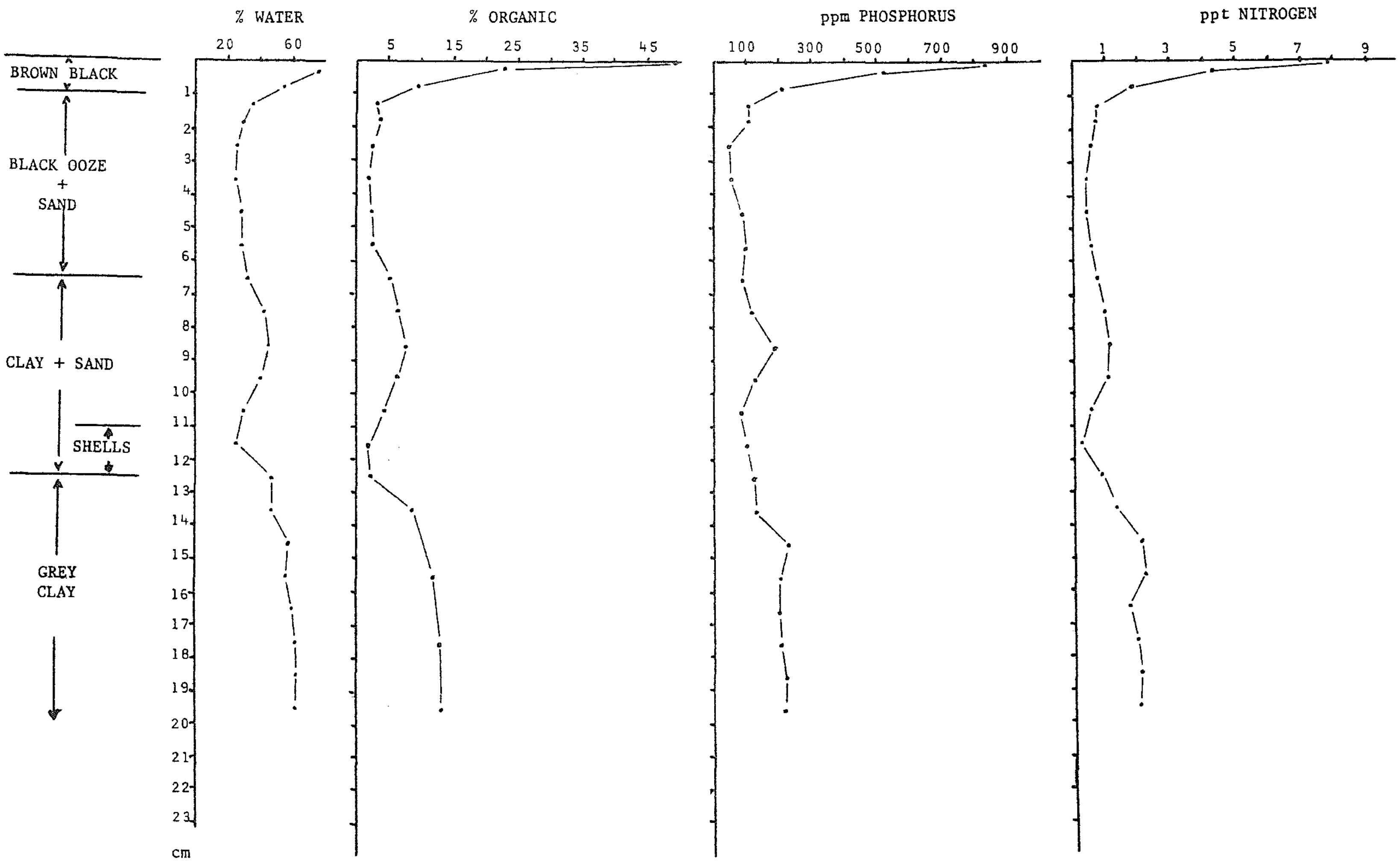

Figure C2. Core profiles for Station 2, 4 July 1978

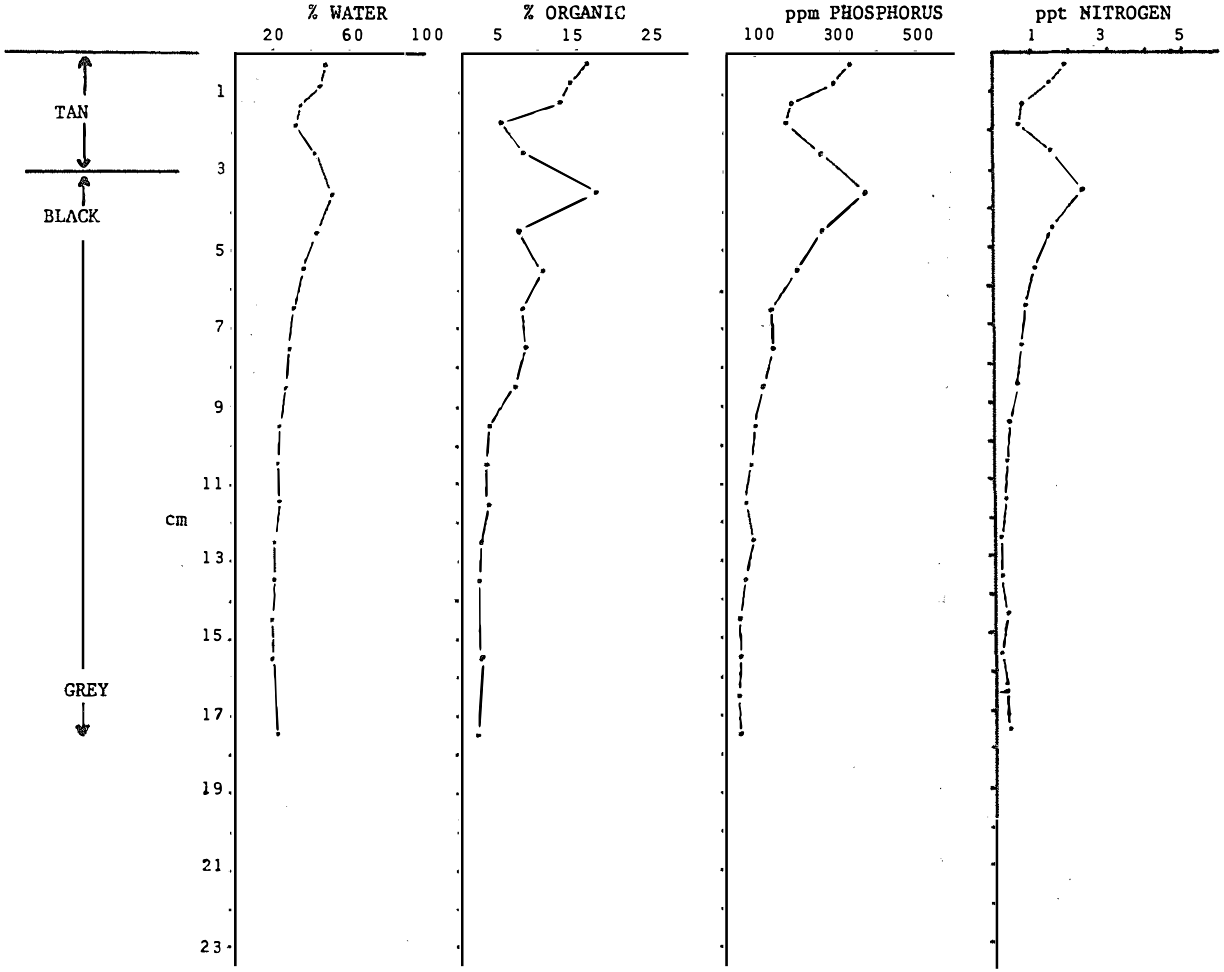

Figure C3. Core profiles for Station 3, 4 July 1978

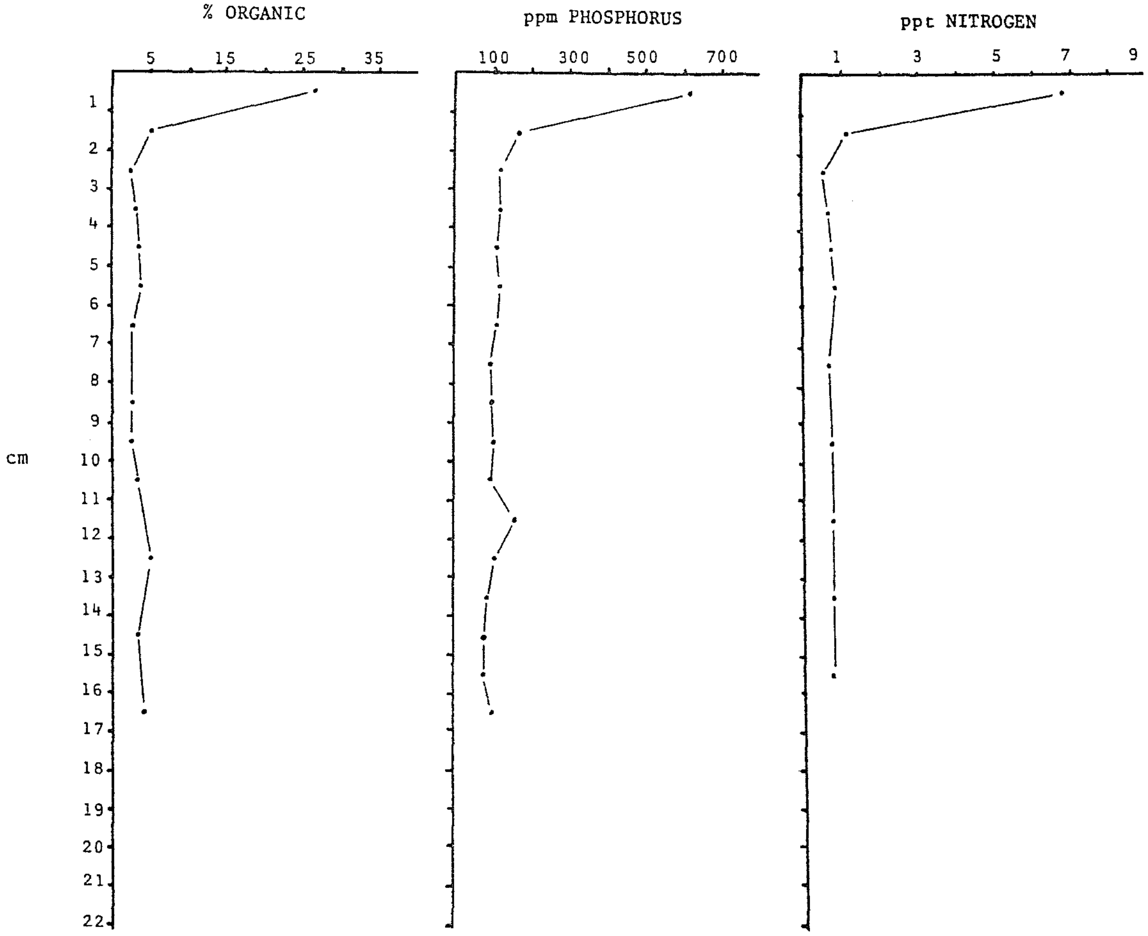

Figure C4a. Core profiles for Station 4, 25 August 1977

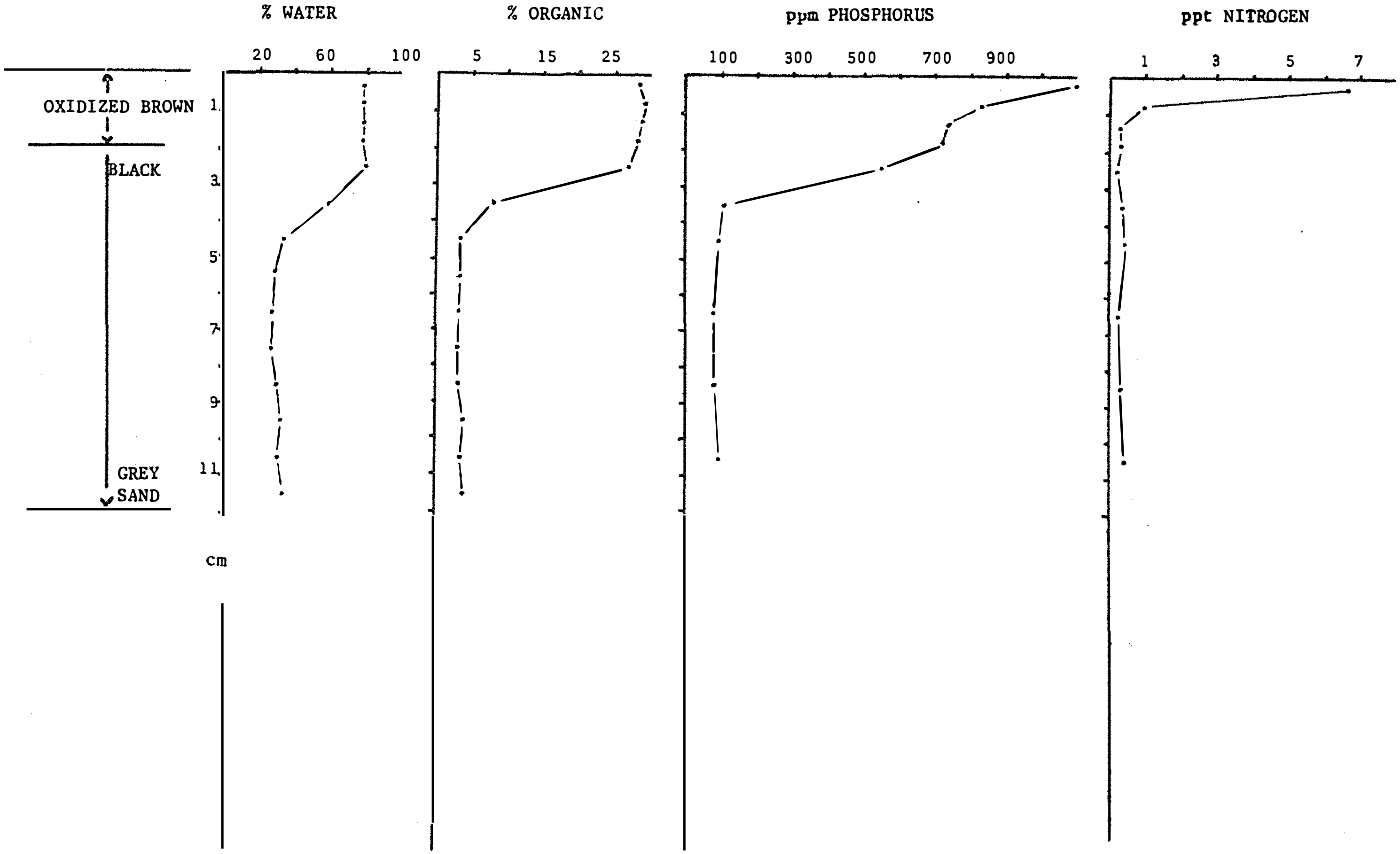

Figure C4b. Core profiles for Station 4, 5 December 1978

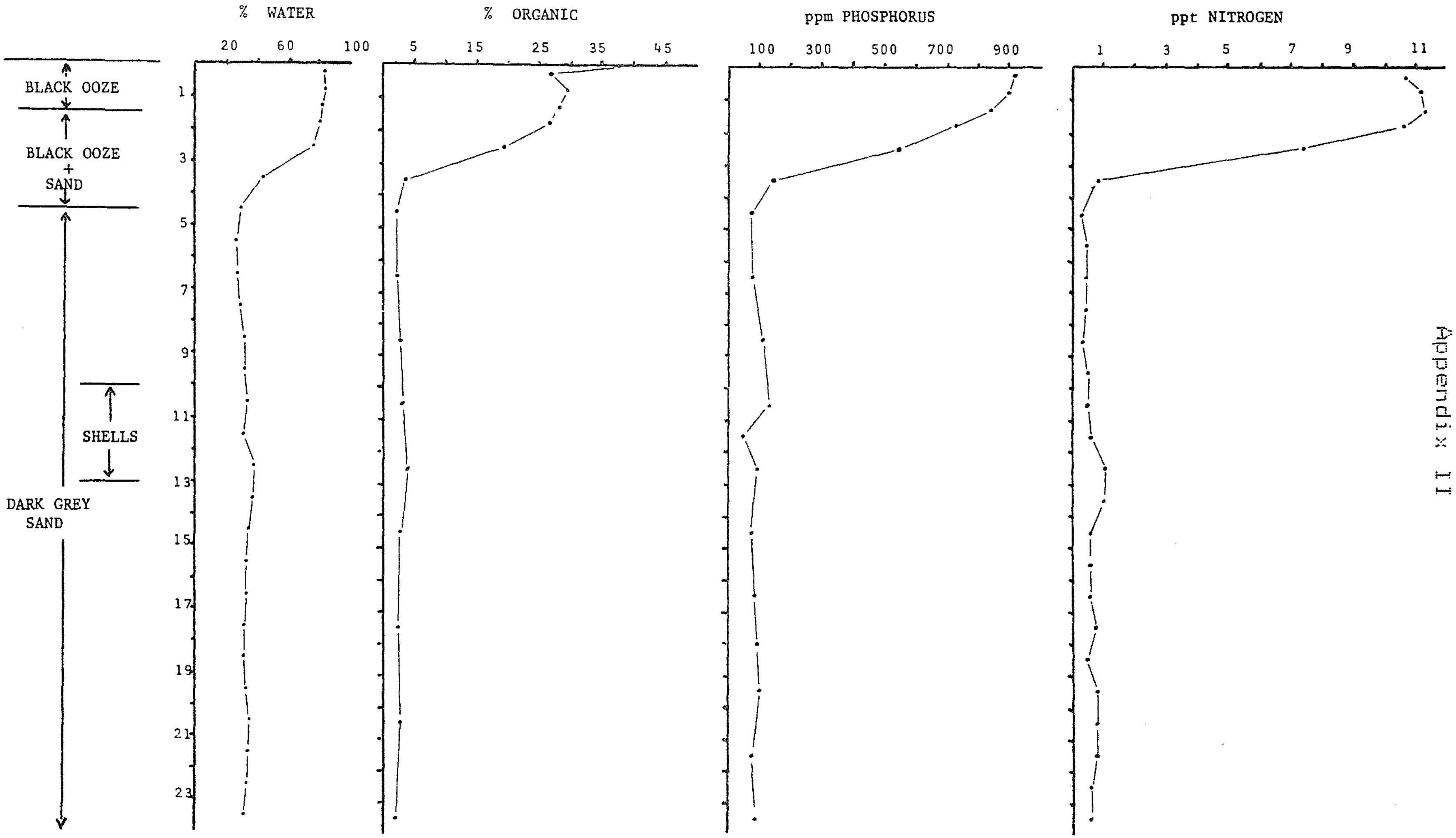

Figure C4c. Core profiles for Station 4, 13 June 1978

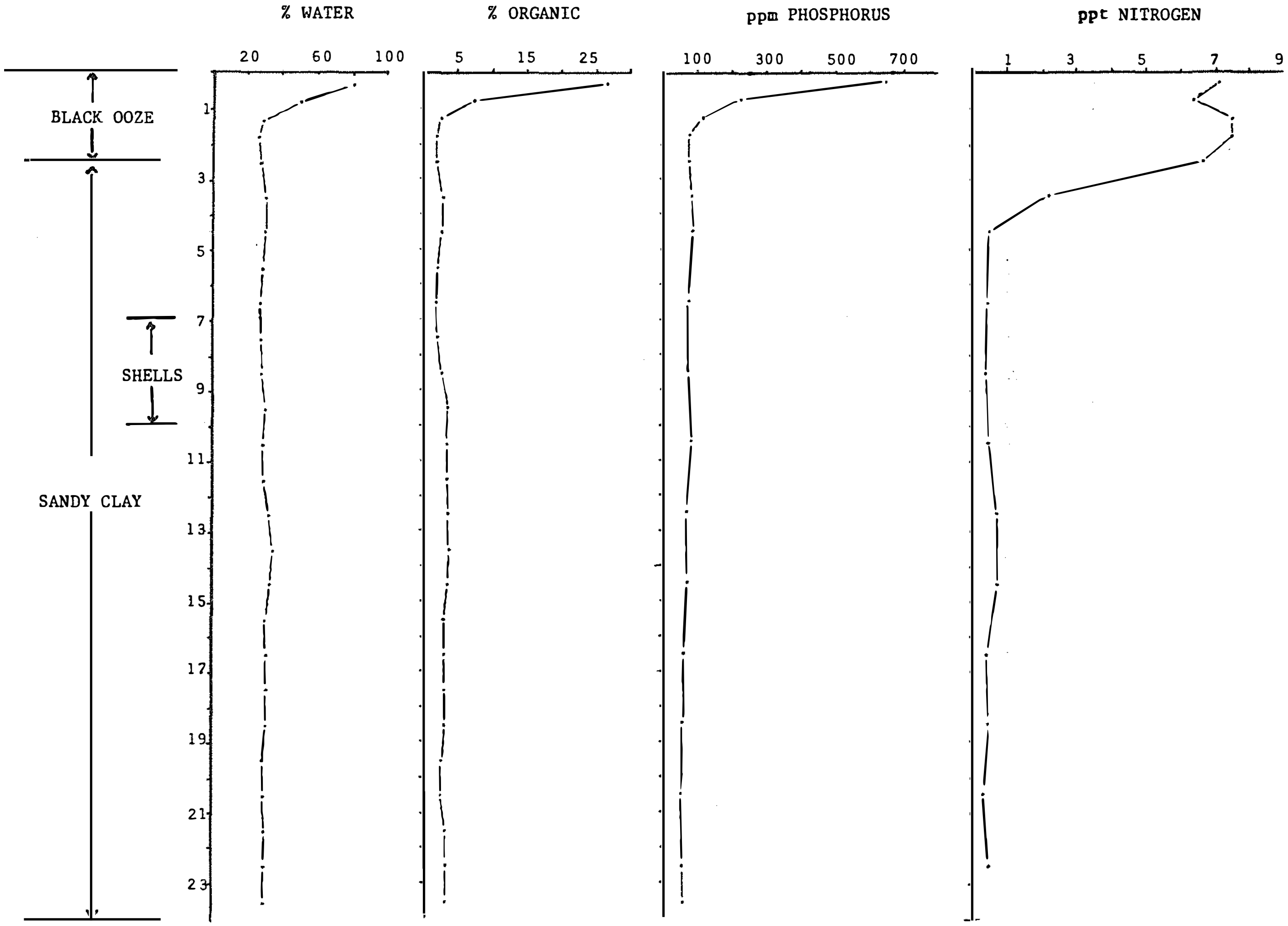

Figure C4d. Core profiles for Station 4, 14 March 1979

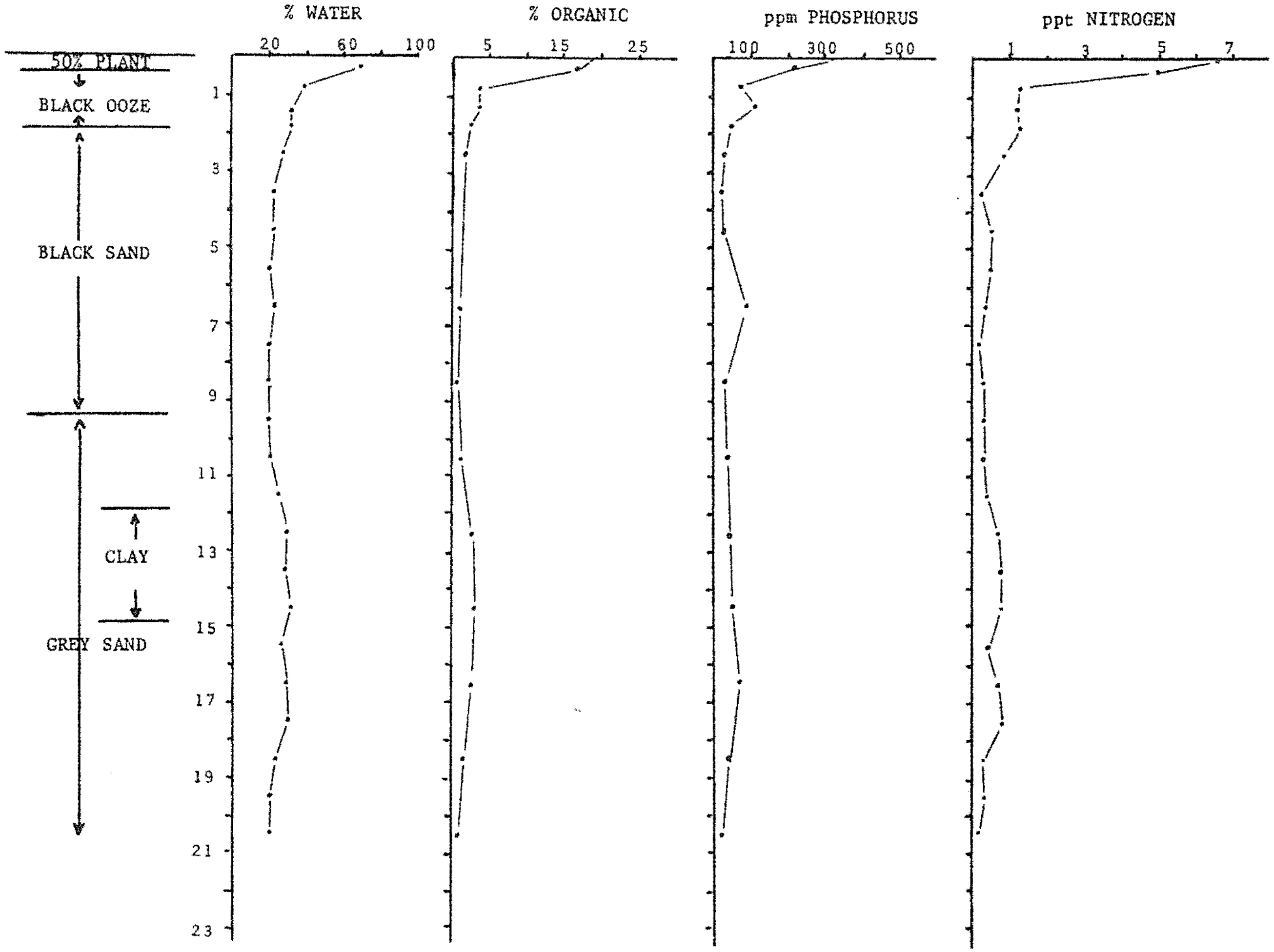

Figure C5. Core profiles for Station 5, 13 June 1978

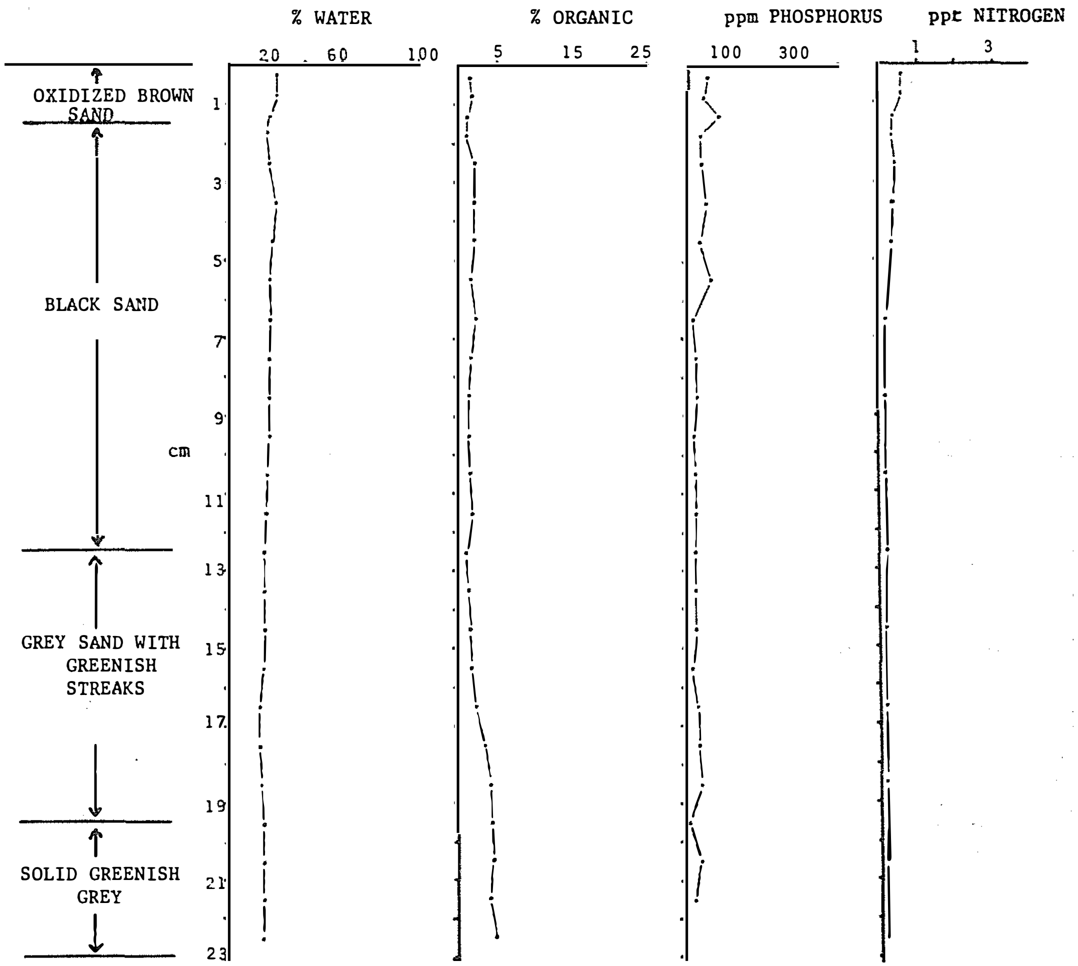

Figure C6a. Core profiles for Station 6, 1 August 1978

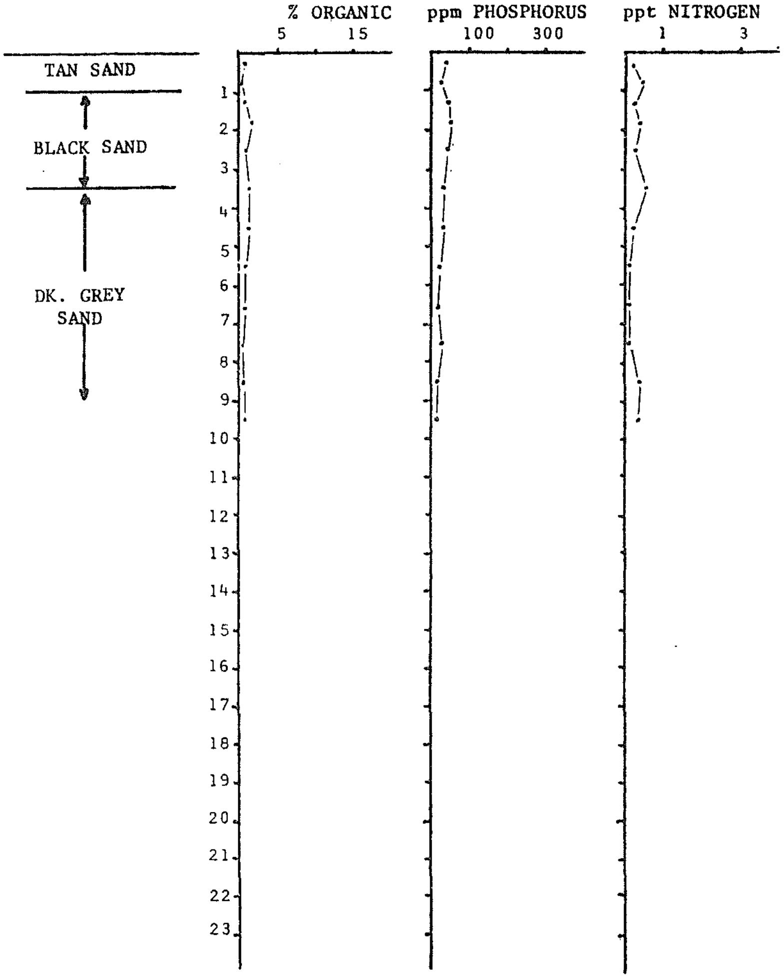

Figure C6b. Core profiles for Station 6, 20 June 1978

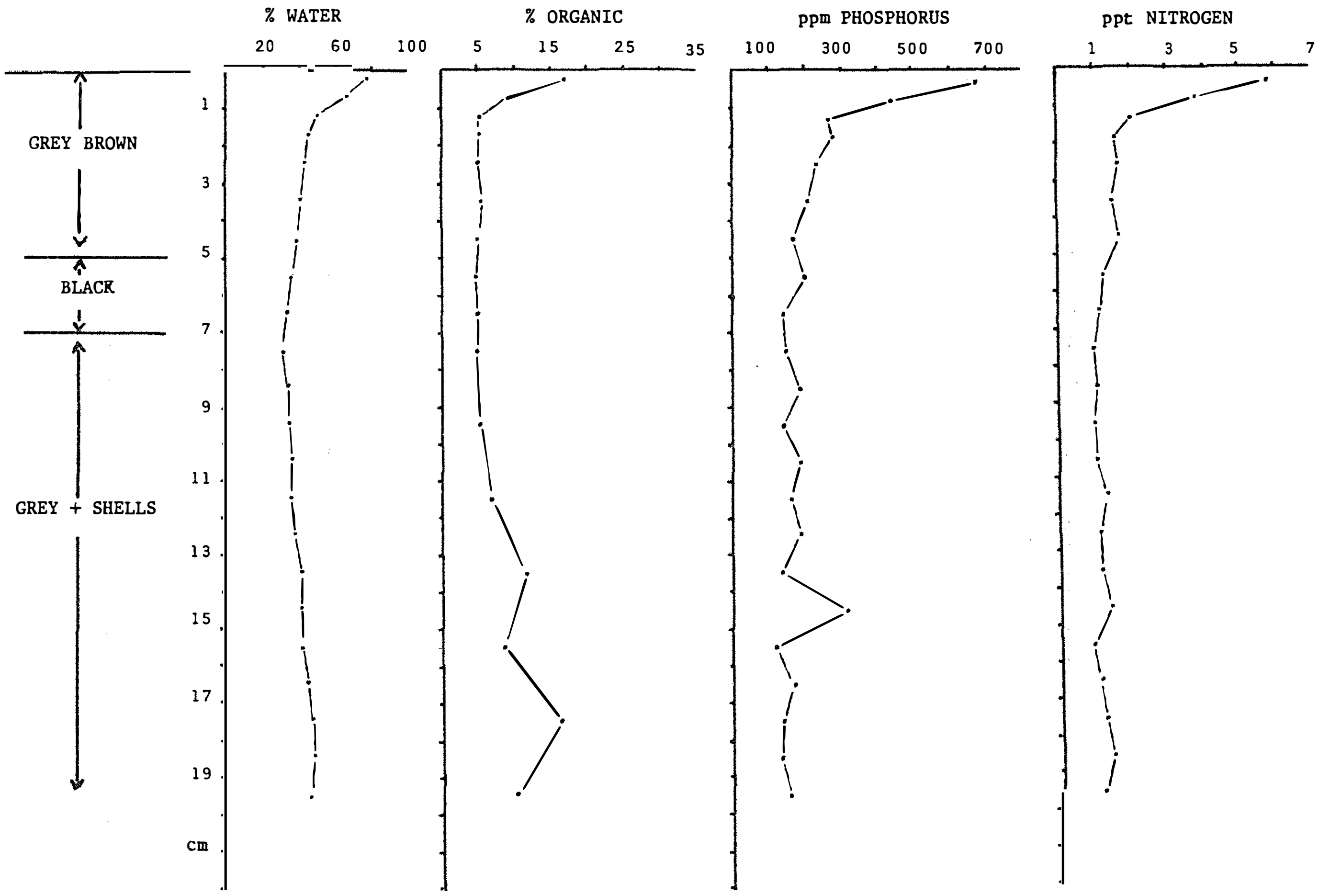

Figure C7. Core profiles for Station 7, 25 July 1978

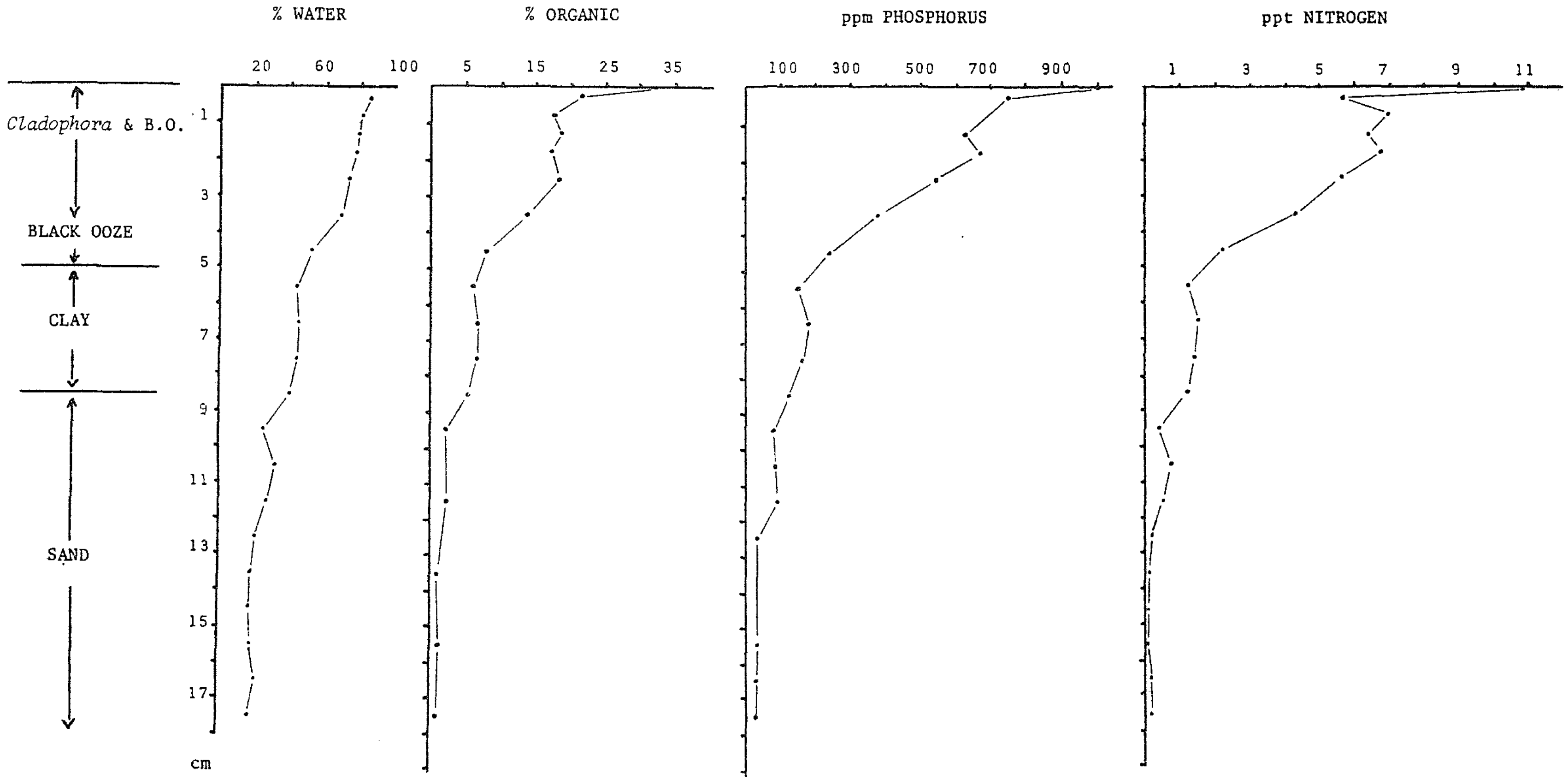

Figure C8. Core profiles for Station 8, 29 August 1978

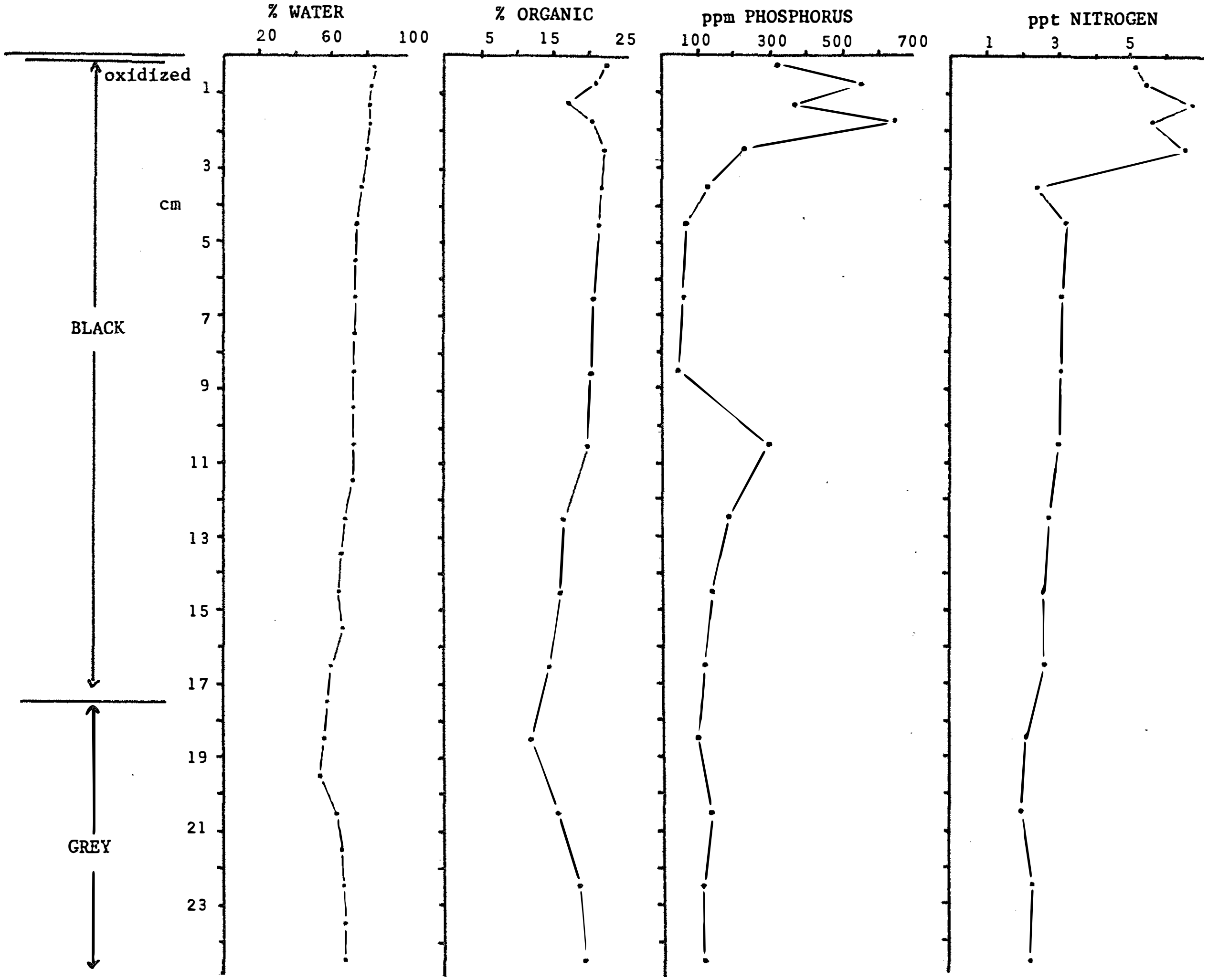

Figure C9. Core profiles for Station 24, 29 November 1979

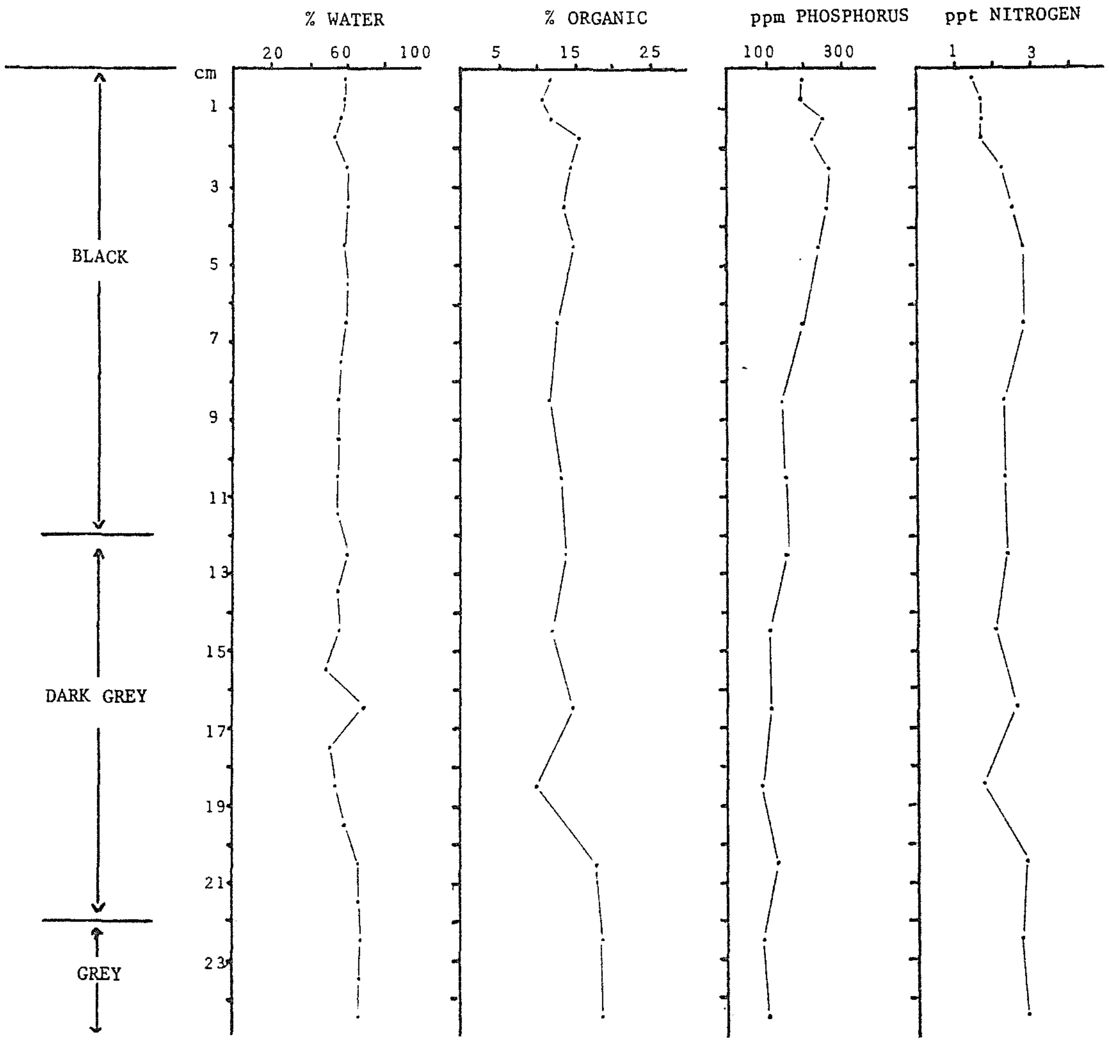

Figure C10. Core profiles for Station 28, 5 March 1980

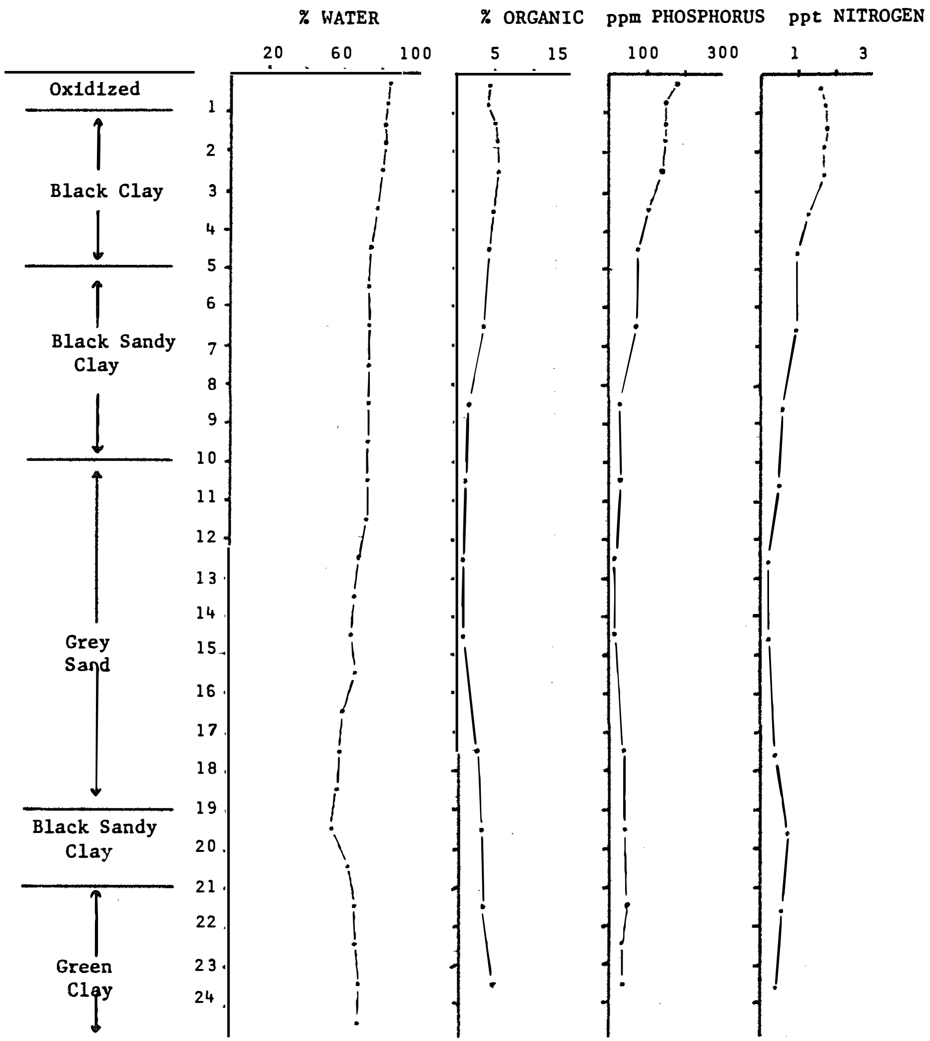

Figure C11. Core profiles for Station 31, 20 December 1979

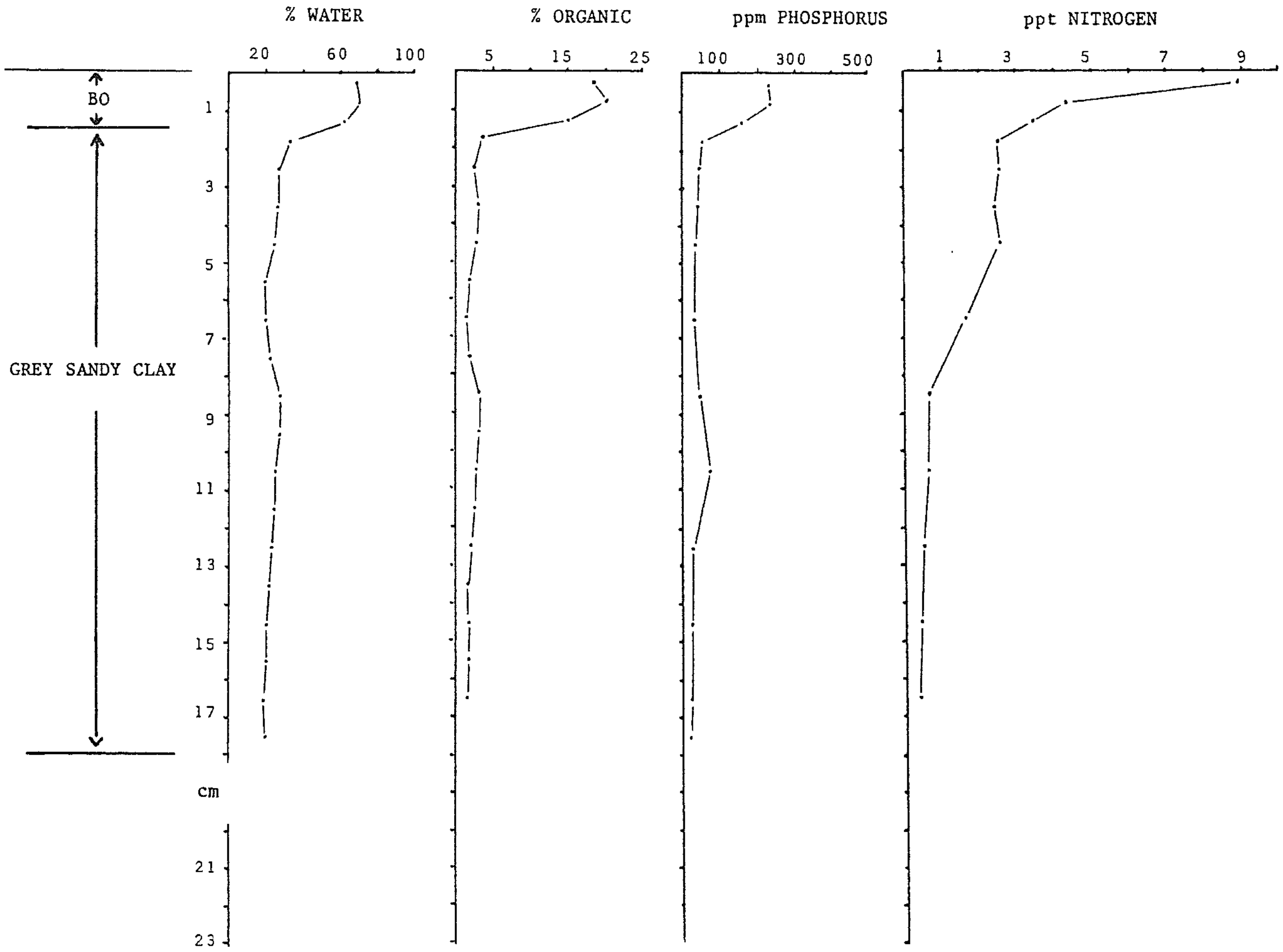

Figure C12. Core profiles for Post 46, 14 March 1979

Table D1. N and P in the top 2 cm of sediment.

	MARCH 1978				AUGUST 1978			
STATION	Extract. P (mg P/m2)	Total P (g P/m2)	Extract. N (mg N/m2)	Total N (g N/m2)	Extract. P (mg P/m2)	Total P (g P/m2)	Extract. N (mg N/m2)	Total N (g N/m2)
1	30.0	3.0	125	22.5	22.2	2.5	95	28.1
2	10.3	2.1	85	18.7	6.3	2.3	82	15.5
3	15.5	3.5	115	22.6	13.1	4.5	96	20.9
4	27.0	2.1	132	19.0	9.1	3.1	371	34.9
5	3.7	1.3	55	50.7	4.8	2.9	94	37.4
6	12.1	1.3	116	14.7	8.0	0.9	52	16.5
7	4.1	3.3	115	20.0	9.0	3.6	436	24.2
8	8.0	1.4	83	18.1	271.0	3.6	2521	40.5
9	15.6	1.9	194	24.4	23.9	1.3	396	18.2
10	9.5	3.2	90	25.1	93.4	3.9	1972	27.9
11	13.8	1.2	60	17.4	61.3	1.4	1140	10.3
12	2.8	2.1	82	19.0	30.8	2.5	1361	21.1
13	0.4	3.6	88	23.8	56.3	2.3	1345	22.0
14	4.2	2.5	124	26.4	282.2	3.0	2510	25.9
15	1.9	1.0	76	16.8	36.5	0.5	894	8.1
16	1.9	2.3	158	23.1	10.0	0.7	1140	16.8
17	1.0	1.2	92	20.5	267.1	2.9	3215	29.3
18	1.2	1.0	107	17.9	4.1	0.7	326	13.8
19	4.0	1.2	171	21.5	5.8	0.9	44	10.5
20	5.7	1.9	210	24.9	9.6	0.6	194	10.7
21	0.5	1.3	60	18.3	63.1	1.5	2229	11.4
22	8.0	1.3	116	29.4	49.1	1.6	1465	8.4
23	83.6	2.4	390	21.7	165.2	2.8	1880	28.2
24	12.7	2.1	144	23.7	130.3	3.5	1266	34.3
25	4.3	1.8	114	15.9	174.2	2.7	1306	29.4
26	19.7	2.0	172	20.5	83.7	2.9	1347	28.2
27	0.3	1.5	138	14.7	11.8	2.4	731	25.5
28	5.5	2.1	97	24.3	154.5	4.2	1350	45.4
29	24.4	2.6	134	23.4	139.6	2.7	1380	24.8
30	12.4	1.7	228	18.7	297.1	1.2	1874	11.6
31	10.1	4.3	85	28.8	8.8	3.0	89	23.1
32	13.3	1.5	225	25.2	8.6	3.2	56	25.4
33	48.2	2.3	344	17.6	25.5	1.9	84	18.7
34	4.7	1.4	127	21.4	163.7	2.8	1535	26.0
35	12.2	2.2	214	24.4	106.3	1.2	1187	8.3
36	74.0	2.4	718	26.9	568.8	3.1	4757	29.1

Table D2. N and P in the top 2 cm of sediment.

	MARCH 1979				SEPTEMBER 1979			
STATION	Extract. P (mg P/m2)	Total P (g P/m2)	Extract. N (mg N/m2)	Total N (g N/m2)	Extract. P (mg P/m2)	Total P (g P/m2)	Extract. N (mg N/m2)	Total N (g N/m2)
1	4.6	2.6	256	35.6	17.4	3.4	142	5.8
2	20.6	2.0	253	22.6	13.6	3.0	73	19.4
3	16.8	3.4	201	21.2	18.6	3.4	78	--
4	11.1	2.7	16	23.5	4.8	2.2	79	1.6
5	1.4	2.6	33	18.0	4.7	2.3	121	16.1
6	1.0	1.2	84	15.8	14.6	3.0	104	54.0
7	3.2	2.0	245	21.8	14.2	2.5	118	22.6
8	10.0	2.8	186	33.0	14.2	2.2	143	4.0
9	8.8	1.4	283	17.8	11.4	2.4	97	37.0
10	2.6	1.6	208	22.2	14.2	2.6	141	23.8
11	14.0	3.0	281	15.8	11.2	1.8	22	17.0
12	6.4	3.6	338	36.8	13.6	3.6	97	8.2
13	5.4	2.6	323	17.8	11.2	2.6	127	15.2
14	2.0	2.8	403	17.8	7.0	1.9	105	18.7
15	0.2	2.0	177	14.0	5.2	1.8	114	9.4
16	4.8	2.6	99	16.0	20.9	2.1	194	17.2
17	2.6	1.4	29	9.2	5.0	2.1	59	10.0
18	--	1.0	229	16.6	35.4	3.8	261	37.2
19	3.2	3.0	289	38.0	3.4	1.4	41	15.4
20	2.4	2.2	60	20.8	5.0	0.6	46	1.6
21	1.8	2.0	205	14.8	6.0	1.8	110	8.9
22	0.2	2.2	138	10.8	3.0	2.4	106	19.0
23	5.0	1.4	342	12.4	55.6	1.4	327	17.6
24	11.4	2.2	178	23.2	10.2	1.0	128	19.2
25	3.2	0.8	205	5.6	21.8	2.8	156	20.2
26	8.6	2.2	331	16.0	4.4	1.4	117	11.6
27	4.8	1.2	395	11.0	7.4	1.2	105	3.4
28	2.0	2.0	341	18.0	5.0	2.2	142	24.4
29	8.4	3.0	218	3.6	17.6	2.0	137	20.4
30	6.0	1.0	428	19.2	19.2	0.8	131	8.6
31	10.2	4.0	406	15.8	21.4	3.0	156	21.4
32	6.0	3.6	586	18.0	17.2	3.6	247	22.6
33	5.1	2.5	279	3.3	23.2	2.6	84	16.2
34	17.2	3.7	409	87.6	21.0	2.6	113	20.2
35	5.8	2.0	265	12.0	2.6	1.8	85	8.4
36	14.6	2.8	257	44.0	19.2	3.0	145	34.0

Table E1. Results of adsoption/desorption series for Station 4 sediments.

	Station 4 6 May 1980				Station 4 Dec 1979			
	5g wet wt.=3.148±.009g dry (mean±SE)				5g wet wt.=2.698±.009g dry (mean±SE)			
	Initial [PO4]	Final [PO4]	Adsorption (ug P/g dry wt.)	pH	Initial [PO4]	Final [PO4]	Adsorption (ug P/g dry wt.)	pH
	3.8	13.5	-1.08		0.5	6.8	-0.82	7.9
		12.8	-1.01			7.5	-0.91	8.0
0.1M	46.3	18.3	3.13		42.0	14.8	3.55	7.6
NaCl		16.5	3.33			12.2	3.89	7.8
	94.8	25.4	7.76		98.4	27.6	9.24	7.6
		31.0	7.13			--	---	7.7
	4.5	13.5	-1.01		1.2	8.2	-0.91	7.2
		15.0	-1.17			8.6	-0.97	7.9
0.2M	48.6	17.6	3.47		46.4	14.4	4.17	7.4
NaCl		17.2	3.51			17.0	3.84	7.4
	94.4	28.4	7.38		99.5	21.8	10.14	7.6
		29.5	7.26			25.1	9.71	7.6
	4.9	14.6	-1.08		* 0.9	8.6	-1.00	7.9
		15.4	-1.17		*	9.3	-1.10	7.9
0.35M	48.2	22.8	2.84		* 44.5	15.2	3.82	7.4
NaCl		22.5	2.87		*	21.4	3.01	7.4
	93.7	31.8	6.92		* 93.6	22.2	9.32	7.6
		33.3	6.75		*	23.2	9.18	7.6
	3.8	20.6	-1.88		3.1	15.9	-1.67	7.9
		16.5	-1.42			15.6	-1.63	8.3
0.5M	48.2	26.9	2.38		45.3	26.9	2.40	8.1
NaCl		26.6	2.42			24.7	2.69	8.1
	95.6	38.9	6.34		97.7	39.4	7.61	8.1
		39.6	6.26			39.7	7.57	8.1
	5.7	25.1	-2.17		4.2	19.2	-1.96	8.4
		26.2	-2.29			18.6	-1.88	8.5
0.7M	46.3	29.5	1.88		48.6	29.5	2.49	8.2
NaCl		31.8	1.62			28.4	2.64	8.3
	94.1	44.1	5.59		100.2	42.7	7.50	8.3
		48.9	5.05			41.2	7.70	8.3

[NaCl]	0.1M	0.2M	0.35	0.5M	0.7M	0.1M	0.2M	*0.02M	0.5M	0.7M
EPC (ugP/l)	14.0	14.7	17.1	22.1	29.9	7.9	9.9	11.7	19.7	23.3
r2	.995	.996	.999	.997	.991	.998	.999	.995	.999	1.000

Table E2. Results of adsoption/desorption series for Station 6 and Station 8 sediments.

	Station 6 20 May 1980				Station 8 6 May 1980			
	5g wet wt.=3.816±.019g dry (mean±SE)				5g wet wt.=1.107±.005g dry (mean±SE)			
	Initial [PO4]	Final [PO4]	Adsorption (ug P/g dry wt.)	pH	Initial [PO4]	Final [PO4]	Adsorption (ug P/g dry wt.)	pH
	2.6	--	--	7.8	3.1	5.4	-0.73	---
		5.5	-0.27	7.6		5.8	-0.86	---
0.1M	47.0	27.0	1.84	7.9	50.2	4.3	14.60	---
NaCl		22.3	2.28	7.5		--	---	6.5
	96.1	63.1	3.04	8.4	279.7	12.5	85.0	6.5
		56.0	3.70	7.5		8.8	86.1	---
	2.6	5.5	-0.27	7.5	3.5	4.6	-0.35	---
		6.9	-0.40	8.0		--	---	---
0.2M	48.4	27.7	1.91	7.9	51.0	6.5	14.15	6.2
NaCl		28.4	1.84	7.8		20.5	9.70	---
	95.7	72.8	2.11	9.0	286.5	11.4	87.5	6.5
		54.9	3.76	7.7		8.4	88.4	---
	2.6	8.3	-0.53	8.3	3.5	5.0	-0.48	---
		7.6	-0.46	8.5		4.6	-0.35	---
0.35M	47.7	33.0	1.36	8.4	52.9	4.3	15.45	---
NaCl		27.3	1.88	7.9		15.6	11.86	6.5
	95.0	67.8	2.51	8.5	282.7	8.8	87.15	6.4
		63.5	2.91	8.2		7.3	87.6	---
	2.6	11.2	-0.79	8.7	3.5	3.1	0.13	---
		5.8	-0.30	8.1		4.3	-0.25	---
0.5M	47.0	33.0	1.29	8.7	51.7	5.0	14.85	---
NaCl		32.0	1.38	8.5		13.3	12.21	6.3
	92.9	66.0	2.48	8.7	283.1	9.9	86.87	6.4
		54.5	3.54	7.6		6.1	88.08	---
	2.6	7.3	-0.43	8.4	3.5	5.8	-0.73	---
		6.9	-0.40	8.3		5.0	-0.48	---
0.7M	46.3	27.3	1.75	7.9	48.3	3.1	14.37	---
NaCl		36.3	0.92	8.8		10.7	11.96	6.4
	88.9	67.8	1.95	8.2	292.5	9.5	90.0	6.4
		64.9	2.21	8.2		6.9	90.8	---

[NaCl]	0.1M	0.2M	0.35	0.5M	0.7M	0.1M	0.2M	0.35	0.5M	0.7M
EPC (ugP/l)	4.8	12.7	13.6	17.0	14.9	5.0	10.4	7.1	6.1	6.0
r2	.921	.852	.943	.947	.900	1.000	.998	.999	.999	1.000

Table E3. Results of adsoption/desorption series for Station 1 and Station 29 sediments.

	Station 1 20 May 1980				Station 29 20 May 1980			
	5g wet wt.=1.708±.005g dry (mean±SE)				5g wet wt.=1.473±.007g dry (mean±SE)			
	Initial [PO4]	Final [PO4]	Adsorption (ug P/g dry wt.)	pH	Initial [PO4]	Final [PO4]	Adsorption (ug P/g dry wt.)	pH
	-1.8	3.3	-1.06	7.2	0.8	--		7.1
		5.5	-1.51	7.2		--		7.1
0.1M	44.1	7.4	7.59	7.1	45.7	7.2	9.23	7.2
NaCl		4.4	8.21	7.1		3.1	10.21	7.2
	89.7	5.5	17.42	7.2	92.9	3.1	21.52	7.2
		5.2	17.48	7.1		3.1	21.52	7.2
	0.1	3.3	-0.66	7.0	1.9	6.5	-1.10	7.0
		2.3	-0.46	7.0		6.1	-1.01	7.0
0.2M	46.3	4.1	8.73	7.1	51.4	5.0	11.12	7.1
NaCl		3.7	8.81	7.0		6.8	10.69	7.1
	91.1	12.8	16.20	7.0	102.3	2.7	23.87	7.1
		4.1	18.00	7.0		2.3	23.96	7.0
	0.8	5.5	-0.97	7.0	1.2	5.3	-0.98	7.0
		2.6	-0.37	7.0		6.1	-1.17	7.0
0.35M	44.9	3.3	8.60	6.8	48.7	3.1	10.93	7.1
NaCl		3.0	8.67	7.0		3.1	10.93	7.1
	94.4	6.6	18.16	6.9	95.2	1.6	22.43	7.0
		4.4	18.62	7.0		2.3	22.26	7.0
	1.9	3.0	-0.23	6.9	2.3	4.2	-0.46	7.0
		4.4	-0.52	6.9		6.1	-0.91	7.0
0.5M	44.1	5.9	7.90	7.0	45.7	3.4	10.14	7.1
NaCl		--	--	7.1		1.9	10.50	7.1
	93.3	5.9	18.08	7.0	96.7	2.7	22.53	7.2
		5.5	18.16	7.1		1.6	22.79	7.1
	0.1	4.4	-0.89	7.0	2.3	6.1	-0.91	7.2
		4.4	-0.89	7.2		5.3	-0.72	7.2
0.7M	43.4	5.2	7.90	7.0	45.7	1.9	10.50	7.1
NaCl		4.8	7.98	7.0		2.3	10.40	7.2
	91.1	5.2	17.77	7.0	87.6	1.9	20.54	7.2
		4.4	17.93	7.1		3.4	20.18	7.1

[NaCl]	0.1M	0.2M	0.35	0.5M	0.7M	0.1M	0.2M	0.35	0.5M	0.7M
EPC (ugP/l)	4.9	2.6	3.6	4.0	4.6	--	6.6	5.3	4.7	5.0
r2	.999	.994	.999	1.000	1.000	--	1.000	1.000	.999	.999

Table E4. Results of adsoption/desorption series for Station 24 and Station 7 sediments.

	Station 24 20 May 1980				Station 7 20 May 1980			
	5g wet wt.=1.399±.004g dry (mean±SE)				5g wet wt.=2.787±.012g dry (mean±SE)			
	Initial [PO4]	Final [PO4]	Adsorption (ug P/g dry wt.)	pH	Initial [PO4]	Final [PO4]	Adsorption (ug P/g dry wt.)	pH
	1.1	-2.8	0.98	6.9	2.2	6.6	-0.56	8.1
		2.2	-0.28	6.9		6.6	-0.56	8.2
0.1M	42.4	--	---	6.7	48.3	9.6	4.89	8.1
NaCl		2.5	10.09	6.7		10.7	4.75	8.4
	89.7	5.7	21.24	6.8	90.7	15.8	9.46	8.0
		3.2	21.87	6.8		11.4	10.02	7.8
	-0.6	0.1	-0.18	6.7	2.2	4.8	-0.33	7.7
		-0.3	-0.07	6.7		5.9	-0.47	7.9
0.2M	44.9	2.9	10.62	6.7	50.2	7.0	5.46	7.7
NaCl		2.5	10.72	6.6		6.3	5.54	7.8
	90.8	3.2	22.15	6.6	94.0	8.5	10.80	7.8
		3.6	22.04	6.6		7.7	10.90	7.7
	1.5	1.5	0.00	6.7	2.2	3.7	-0.19	7.6
		2.5	-0.25	6.7		2.6	-0.05	7.9
0.35M	43.5	2.2	10.44	6.6	49.0	7.4	5.25	7.7
NaCl		1.8	10.54	6.6		6.6	5.36	8.0
	91.8	12.1	20.15	6.6	94.4	7.7	10.95	7.7
		13.8	19.72	6.6		--	---	8.0
	2.5	2.9	-0.10	6.6	3.3	2.2	0.14	7.6
		1.8	0.18	6.6		4.2	-0.11	7.8
0.5M	44.5	2.2	10.70	6.6	48.7	11.4	4.71	7.7
NaCl		2.9	10.52	6.8		5.5	5.46	7.6
	91.8	6.1	21.67	6.6	94.4	6.3	11.13	7.9
		8.2	21.14	6.6		11.8	10.43	7.8
	3.6	1.5	0.53	6.9	3.0	5.9	-0.37	7.8
		1.8	0.46	7.4		3.7	-0.09	7.8
0.7M	42.4	2.2	10.17	6.8	50.2	7.4	5.41	7.8
NaCl		2.2	10.17	6.8		7.7	5.37	8.1
	91.1	10.3	20.43	6.8	95.5	8.1	11.04	7.8
		6.1	21.49	6.8		10.0	10.80	7.9

[NaCl]	0.1M	0.2M	0.35	0.5M	0.7M	0.1M	0.2M	0.35	0.5M	0.7M
EPC (ugP/l)	-0.1	0.3	0.3	1.6	0.7	7.0	5.4	3.7	4.3	5.1
r2	.998	1.000	.994	.999	.998	.998	1.000	.999	.994	.999

Table F1. Sediment trap data, Station 1.

TRAP TYPE	DATE IN	DATE COLLECTED	TIME OUT (days)	DRY WEIGHT (g)	SEDIMENTATION RATE (g/m2/day)	LOSS ON IGNITION (%)	TOTAL PHOSPHORUS		TOTAL NITROGEN	
							(ppm dry wt)	(mg/m2/day)	(ppm dry wt)	(mg/m2/day)
jar	11-07-78	25-07-78	14	0.903	12.84		478	6.14	4030	51.7
jar	25-07-78	08-08-78	14	0.318	1.46					
jar	08-08-78	23-08-78	15	0.137	0.63					
jar	23-08-78	20-09-78	28	0.252	0.62					
jar	03-04-79	01-05-79	28	4.09	10.07	24.3	306	3.08	3630	36.5
jar	01-05-79	15-05-79	14	5.53	27.24	27.1	676	18.41	4800	130.7
jar	15-05-79	29-05-79	14	19.40	95.57	21.6	770	73.59	3640	347.9
jar	29-05-79	05-06-79	7	4.50	44.33	23.7	700	31.03	6180	274.0
jar	05-06-79	26-06-79	21	1.04	3.42	21.8	588	2.01	4920	16.8
funnel	21-06-79	10-07-79	19	34.08	124.56± 2.57	19.8	618	76.98	4840	602.9
funnel	10-07-79	24-07-79	14	4.32	21.43±14.24	--	1150	24.64	2570	55.1
funnel	24-07-79	08-08-79	15	4.60	21.31±15.22	20.2	1065	22.70	1830	39.0
funnel	08-08-79	22-08-79	14	6.81	45.06±24.74	23.0	1081	48.71	1770	79.8
funnel	22-08-79	04-09-79	13	1.96	13.95± 0.20	25.9	1108	15.46	3790	52.9
funnel	11-10-79	01-11-79	21	3.63	11.99± 2.85	24.3	1227	14.71	2220	26.6
jar	18-10-79	01-11-79	14	22.87	113.44±38.64	--	329	37.32	4240	481.0
funnel	01-11-79	21-11-79	20	1.74	8.06± 0.97	17.8	1151	9.28	3210	25.9
jar	01-11-79	21-11-79	20	9.93	34.24	--	767	26.26	3150	107.9
funnel	21-11-79	06-12-79	15	0.28	1.29	23.5				
jar	21-11-79	06-12-79	15	2.85	13.10	--	969	12.69	5720	74.9
funnel	06-12-79	20-12-79	14	1.46	9.65± 2.56	23.1	972	9.38	5370	51.8
jar	06-12-79	20-12-79	14	16.42	81.45±37.14	--	1114	90.74	2760	224.8
jar	16-01-80	06-02-80	21	13.32	44.05±17.17	20.0	759	33.43	5320	234.3
funnel	02-07-80	16-07-80	14	6.91	45.70± 4.71	24	790	36.10	7300	333.6
funnel	30-07-80	28-08-80	31	38.17	85.50±56.67	19	930	79.52	4800	410.4
funnel	28-08-80	09-09-80	12	31.96	185.19	24	940	174.08	6500	1203.7
funnel	09-09-80	23-09-80	14	4.95	32.74±10.22	25	970	31.76	6700	219.4
funnel	23-09-80	07-10-80	14	8.56	42.46±10.07	24	860	36.52	6500	275.9
funnel	07-10-80	22-10-80	15	3.64	16.85± 3.01	20	950	16.01	6700	112.9
funnel	22-10-80	05-11-80	14	2.21	14.62± 3.48	25	460	6.73	8200	120.3
funnel	05-11-80	18-11-80	13	1.58	11.25± 0.69	25	970	10.91	7300	82.1
funnel	18-11-80	02-12-80	14	4.92	24.41±10.64	25	1080	26.36	7800	190.4
funnel	02-12-80	16-12-80	14	3.44	17.06± 6.53	23	1090	18.60	6700	114.3
funnel	16-12-80	13-01-81	28	14.54	36.06±10.06	26	830	29.93	5400	194.7
funnel	13-01-81	10-02-81	28	15.66	38.84± 7.64	24	940	36.51	6700	260.2

Table F2. Sediment trap data, Station 4.

TRAP TYPE	DATE IN	DATE COLLECTED	TIME OUT (days)	DRY WEIGHT (g)	SEDIMENTATION RATE (g/m2/day)	LOSS ON IGNITION (%)	TOTAL PHOSPHORUS		TOTAL NITROGEN	
							(ppm dry wt)	(mg/m2/day)	(ppm dry wt)	(mg/m2/day)
jar	16-05-78	30-05-78	14	7.98	39.23	29.7	741	29.07	9170	359.7
jar	30-05-78	13-06-78	14	0.008	0.04					
jar	13-06-78	27-06-78	14	0.037	0.18					
jar	11-07-78	25-07-78	14	0.37	2.42		1530	3.70	5670	13.7
jar	25-07-78	08-08-78	14	0.028	0.14					
jar	08-08-78	14-08-78	6	0.018	0.14					
jar	14-08-78	18-08-78	4	0.051	0.94					
jar	18-08-78	05-09-78	17	0.052	0.03					
jar	05-09-78	03-10-78	28	0.39	0.96		1355	1.30	11510	11.0
jar	03-10-78	10-10-78	7	0.02	0.20					
jar	10-10-78	24-10-78	14	0.09	0.44					
jar	07-11-78	22-11-78	15	3.68	16.9		1065	18.00	9510	160.7
jar	22-11-78	05-12-78	13	2.63	13.9		1102	15.32	8960	124.5
jar	05-12-78	19-12-78	14	4.29	21.1	28.5	1112	23.46	9330	196.9
jar	19-12-78	09-01-79	21	9.93	43.4		1138	49.39	9100	394.9
jar	06-02-79	20-02-79	14	0.303	1.49		1148	1.71	6110	9.1
jar	20-02-79	20-03-79	28	0.583	1.91		866	1.65	9230	17.6
jar	01-05-79	22-05-79	21	2.08	6.82	30.3	840	5.73	11580	79.0
funnel	21-06-79	10-07-79	19	2.07	7.55± 1.39		924	6.98	11950	90.2
funnel	10-07-79	24-07-79	14	2.82	11.49± 1.64	31.2	1130	12.98	13080	150.3
funnel	24-07-79	22-08-79	29	2.87	6.88± 2.71	29.9	982	6.76	10400	71.5
funnel	22-08-79	19-09-79	28	2.20	5.44± 0.22	30.2	1102	6.00	11160	60.7
funnel	19-09-79	11-10-79	22	3.44	10.86± 0.22	29.4	1022	11.10	9000	97.7
funnel	11-10-79	01-11-79	21	2.07	6.84± 0.87	26.9	1246	8.52	9000	61.6
jar	18-10-79	01-11-79	14	8.20	40.67±27.1	--	994	40.43	7440	302.6
funnel	01-11-79	15-11-79	14	4.76	23.45	32.5	1072	25.14	10930	256.3
jar	01-11-79	15-11-79	14	14.48	71.33	--	930	66.34	10040	716.1
funnel	15-11-79	29-11-79	14	4.37	21.68± 4.33	31.7	972	21.07	9130	197.9
funnel	29-11-79	20-12-79	21	5.06	16.73± 1.92	33.6	1040	17.40	9430	157.8
funnel	20-12-79	03-01-80	14	1.83	9.08± 1.40	32.8	1009	9.16	11160	101.3
jar	20-12-79	03-01-80	14	0.49	2.41					
funnel	03-01-80	16-01-80	13	1.88	10.02± 2.60		1194	11.96	10000	100.2
jar	03-01-80	16-01-80	13	0.96	5.09		1248	6.35	8600	43.8
funnel	16-01-80	06-02-80	21	2.28	7.54± 1.38	29.3	882	6.65	9150	69.0
jar	16-01-80	06-02-80	21	1.31	17.33	--	1236	21.42	8130	140.9
funnel	06-02-80	27-02-80	21	3.08	10.18± 1.68	31	760	7.74	9600	97.7
funnel	27-02-80	12-03-80	14	2.65	13.15± 3.70	34	1660	21.83	9300	122.3
funnel	12-03-80	26-03-80	14	5.86	29.07±10.57	31	1600	46.51	10000	290.7
funnel	26-03-80	09-04-80	14	4.61	22.87± 7.17	34	1150	26.30	11700	267.6
funnel	09-04-80	23-04-80	14	2.55	12.65		1000	12.65	14300	180.9
funnel	23-04-80	06-05-80	13	0.74	3.95± 1.52	29	1060	4.19	12300	48.6

STATION 4
Sediment Trap Data
(continued)

TRAP TYPE	DATE IN	DATE COLLECTED	TIME OUT (days)	DRY WEIGHT (g)	SEDIMENTATION RATE (g/m2/day)	LOSS ON IGNITION (%)	TOTAL PHOSPHORUS (ppm dry wt)	TOTAL PHOSPHORUS (mg/m2/day)	TOTAL NITROGEN (ppm dry wt)	TOTAL NITROGEN (mg/m2/day)
funnel	06-05-80	04-06-80	29	10.18	24.38±18.05	28	710	17.31	9500	231.6
funnel	18-06-80	02-07-80	14	1.34	8.86± 1.26	23	670	5.94	9100	80.6
funnel	02-07-80	16-07-80	14	1.80	8.93± 0.58	34	820	7.32	13700	122.3
funnel	16-07-80	30-07-80	14	0.24	1.09± 0.38	34	1360	1.48	14900	16.2
funnel	30-07-80	28-08-80	31	6.53	14.63± 5.05	30	1040	15.22	10100	147.8
funnel	28-08-80	09-09-80	12	1.92	11.06± 5.02	31	650	7.19	11400	126.1
funnel	09-09-80	23-09-80	14	1.38	9.13± 1.11	30	590	5.39	10300	94.1
funnel	23-09-80	07-10-80	14	1.70	8.43± 0.38	28	680	5.73	10700	89.8
funnel	07-10-80	22-10-80	15	1.93	8.94± 1.37	29	530	4.74	9500	84.9
funnel	22-10-80	05-11-80	14	0.53	3.51± 1.35	30	800	2.81	14200	49.8
funnel	05-11-80	18-11-80	13	0.36	2.56± 0.86	29	1150	2.94	14900	38.1
funnel	18-11-80	02-12-80	14	3.42	16.96± 2.36	29	800	13.57	7800	132.3
funnel	02-12-80	16-12-80	14	1.42	7.04± 1.03	30	840	5.91	13600	95.7
funnel	16-12-80	13-01-81	28	5.00	16.53± 6.16	29	2330	38.52	8170	135.1
funnel	13-01-81	10-02-81	28	11.59	38.29±13.93	27	1830	70.07	9500	363.7

Table F3. Sediment trap data, Station 7.

TRAP TYPE	DATE IN	DATE COLLECTED	TIME OUT (days)	DRY WEIGHT (g)	SEDIMENTATION RATE (g/m2/day)	LOSS ON IGNITION (%)	TOTAL PHOSPHORUS (ppm dry wt)	TOTAL PHOSPHORUS (mg/m2/day)	TOTAL NITROGEN (ppm dry wt)	TOTAL NITROGEN (mg/m2/day)
funnel	21-06-79	10-07-80	19	10.23	37.37± 2.57	21.4	650	24.40	7400	274.7
funnel	10-07-79	24-07-79	14	3.50	17.34± 1.48	22.6	830	14.38	7700	133.9
funnel	24-07-79	14-08-79	21	0.12	0.39± 0.24	--	1290	0.50	10200	3.9
funnel	14-08-79	22-08-79	8	10.77	93.44±28.14	23.9	620	58.12	7600	713.9
funnel	22-08-79	04-09-79	13	1.79	9.55± 2.02	25.2	900	8.55	9400	89.6
funnel	18-09-80	25-09-80	7	1.96	19.44± 2.71	20.4	490	9.51	6200	121.1
funnel	25-09-80	11-10-80	16	4.88	21.19± 3.22	26.4	910	19.24	1400	29.9
funnel	11-10-79	01-11-79	21	3.85	12.72± 1.47	27.7	1090	13.83	1300	17.0
funnel	01-11-79	15-11-79	14	5.51	27.14±	28.5	940	25.54	7900	216.3
funnel	16-07-80	30-07-80	14	0.27	1.34± 0.91	32	910	1.22	13400	17.9
funnel	30-07-80	20-08-80	21	1.17	7.74± 1.96	33	540	4.18	10300	79.7
funnel	23-09-80	07-10-80	14	3.48	17.26± 7.14	23	1060	18.30	8400	144.9

Table F4. Sediment trap data, Station 28.

TRAP TYPE	DATE IN	DATE COLLECTED	TIME OUT (days)	DRY WEIGHT (g)	SEDIMENTATION RATE (g/m2/day)	LOSS ON IGNITION (%)	TOTAL PHOSPHORUS		TOTAL NITROGEN	
							(ppm dry wt)	(mg/m2/day)	(ppm dry wt)	(mg/m2/day)
funnel	21-06-79	10-07-79	19	35.98	131.36±13.51	22.0	760	99.79	6130	804.9
funnel	10-07-79	24-07-79	14	8.32	41.27± 5.71	23.0	594	24.51	5400	222.9
funnel	24-07-79	08-08-79	15	4.78	22.13±10.6	23.7	609	13.48	5550	122.8
funnel	08-08-79	22-08-79	14	13.98	69.31±13.18	20.7	638	44.22	4670	323.7
funnel	22-08-79	04-09-79	13	10.41	55.58± 2.82	21.8	842	46.80	5860	325.7
funnel	04-09-79	19-09-80	15	0.76	16.30	23.4	668	10.89	6100	99.4
funnel	19-09-79	25-09-79	6	20.26	234.49±13.36	23.7	701	164.38	4780	1120.
funnel	25-09-79	11-10-79	16	12.10	52.50± 4.82	23.4	813	42.68	3630	190.6
funnel	11-10-79	25-10-79	14	7.65	37.95± 2.32	24.2	1032	39.16	3630	137.8
funnel	25-10-79	01-11-79	7	22.58	224.0 ±12.23	22.2	621	139.12	5350	1198.4
funnel	01-11-79	07-11-79	6	8.44	97.01±	21.4	782	75.86	3770	365.7
funnel	07-11-79	21-11-79	14	4.70	23.29± 1.40	21.4	812	18.91	5320	123.9
funnel	21-11-79	06-12-79	15	10.79	49.61	20.1	714	35.42	4490	222.7
funnel	06-12-79	20-12-79	14	11.79	58.47± 3.86	20.9	703	41.10	1880	109.9
funnel	10-01-80	16-01-80	6	8.68	100.46± 8.64	21.0	712	71.53	4660	468.1
funnel	26-02-80	12-03-80	14	16.93	83.97± 5.74	21	550	46.18	3800	319.1
funnel	12-03-80	26-03-80	14	14.59	72.36± 1.24	20	570	41.24	3200	231.6
funnel	26-03-80	09-04-80	14	5.79	28.72± 2.88	--	590	16.94	20200	580.1
funnel	09-04-80	23-04-80	14	4.41	21.88± 2.37	--	670	14.66	9000	196.9
funnel	23-04-80	06-05-80	13	1.60	8.55± 1.14	23	780	6.67	7900	67.5
funnel	06-05-80	20-05-80	14	2.31	11.46± 2.90	24	--	---	6800	77.9
funnel	20-05-80	04-06-80	15	15.37	71.16± 1.88	22	510	36.29	4800	341.3
funnel	04-06-80	18-06-80	14	2.00	9.92± 0.63	22	610	6.05	5600	55.6
funnel	18-06-80	02-07-80	14	28.83	143.01±10.57	22	510	72.94	4300	614.9
funnel	02-07-80	30-07-80	28	36.70	91.02± 6.63	21	600	54.61	5200	473.3
funnel	28-08-80	09-09-80	12	10.10	58.45± 5.14	23	730	42.67	5200	303.9
funnel	09-09-80	23-09-80	14	11.60	57.54±13.71	23	880	50.64	5600	322.2

Table F5. Sediment trap data, Station 31.

TRAP TYPE	DATE IN	DATE COLLECTED	TIME OUT (days)	DRY WEIGHT (g)	SEDIMENTATION RATE (g/m2/day)	LOSS ON IGNITION (%)	TOTAL PHOSPHORUS (ppm dry wt)	(mg/m2/day)	TOTAL NITROGEN (ppm dry wt)	(mg/m2/day)
funnel	21-06-79	10-07-79	19	12.76	46.62±15.2	21.3	651	30.35	5540	258.3
funnel	10-07-79	24-07-79	14	5.74	28.44± 3.57	24.4	1106	31.45	4100	116.6
funnel	24-07-79	08-08-79	15	0.80	3.67± 0.61	--	1361	4.99	4160	15.3
funnel	08-08-79	22-08-79	14	5.42	26.85± 5.53	23.5	1256	33.72	1840	49.4
funnel	22-08-79	04-09-79	13	2.92	15.63±11.17	24.3	1280	20.01	2670	41.7
funnel	04-09-79	25-09-79	21	8.07	26.50	22.5	1362	36.09	4660	123.5
funnel	25-09-79	11-10-79	16	4.93	21.41± 6.61	24.7	1590	34.04	3250	69.6
funnel	11-10-79	01-11-79	21	4.50	14.89± 1.39	23.6	1226	18.26	4340	64.6
funnel	16-07-80	30-07-80	14	1.88	9.33± 5.30	30	640	5.97	7800	72.8
funnel	30-07-80	28-08-80	31	11.95	26.77± 2.08	24	1780	47.65	7500	200.8
funnel	28-08-80	09-09-80	12	7.02	40.63±14.33	24	1310	53.23	6000	243.8
funnel	09-09-80	23-09-80	14	3.62	23.94± 1.59	25	1390	33.28	8200	196.3
funnel	23-09-80	07-10-80	14	1.71	11.31± 0.91	22	1210	13.69	6900	78.1
funnel	07-10-80	22-10-80	15	0.78	14.44	26	1540	22.23	9400	135.4
funnel	22-10-80	18-11-80	28	4.35	10.79± 0.83	27	1980	21.36	6500	70.1
funnel	18-11-80	02-12-80	14	2.84	18.78± 2.69	--	1720	32.30	8600	161.5
funnel	02-12-80	16-12-80	14	3.75	24.80± 2.19	26	930	23.06	7900	195.9
funnel	16-12-80	13-01-81	28	12.99	32.22± 4.29	28	1320	42.53	5200	167.5
funnel	13-01-81	10-02-81	28	18.04	59.66±12.83	26	970	57.87	6100	363.9

Table F6. Sediment trap data, Station 38.

TRAP TYPE	DATE IN	DATE COLLECTED	TIME OUT (days)	DRY WEIGHT (g)	SEDIMENTATION RATE (g/m2/day)	LOSS ON IGNITION (%)	TOTAL PHOSPHORUS (ppm dry wt)	(mg/m2/day)	TOTAL NITROGEN (ppm dry wt)	(mg/m2/day)
funnel	21-06-79	10-07-79	19	9.70	35.45± 4.83	17.5	563	19.96	2250	79.8
funnel	10-07-79	31-07-79	21	4.12	13.61± 2.14	--	1068	14.54	2660	36.2
funnel	31-07-79	22-08-79	23	11.69	35.60± 5.05	23.3	851	30.30	2890	102.9
funnel	22-08-79	04-09-79	13	3.02	16.12± 1.55	14.7	588	9.48	3180	51.3
funnel	04-09-79	25-09-79	21	5.05	16.70± 2.52	16.4	463	7.73	5260	87.8
funnel	25-09-79	11-10-79	16	16.74	72.65± 5.57	15.8	520	37.78	4000	290.6
funnel	11-10-79	01-11-79	21	7.60	25.13± 0.78	13.2	464	11.66	2230	56.0
funnel	01-11-79	21-11-79	20	6.13	21.29± 4.66	15.3	561	11.94	1400	29.8
funnel	21-11-79	06-12-79	15	9.20	42.30	16.3	572	24.20	5850	247.5