108734

Scientific Excellence • Resource Protection & Conservation • Benefits for Canadians
Excellence scientifique • Protection et conservation des ressources • Bénéfices aux Canadiens

Environmental Monitoring of the Bay of Fundy Salmonid Mariculture Industry During 1986 and 1987

D.J. Wildish, J.L. Martin, A.J. Wilson and A.M. DeCoste

Biological Station
St. Andrews, N.B. E0G 2X0

November 1988

Canadian Technical Report of Fisheries and Aquatic Sciences No. 1648

Fisheries and Oceans Pêches et Océans

Canada

Canadian Technical Report of Fisheries and Aquatic Sciences

Technical reports contain scientific and technical information that contributes to existing knowledge but which is not normally appropriate for primary literature. Technical reports are directed primarily toward a worldwide audience and have an international distribution. No restriction is placed on subject matter and the series reflects the broad interests and policies of the Department of Fisheries and Oceans, namely, fisheries and aquatic sciences.

Technical reports may be cited as full publications. The correct citation appears above the abstract of each report. Each report is abstracted in *Aquatic Sciences and Fisheries Abstracts* and indexed in the Department's annual index to scientific and technical publications.

Numbers 1–456 in this series were issued as Technical Reports of the Fisheries Research Board of Canada. Numbers 457–714 were issued as Department of the Environment, Fisheries and Marine Service, Research and Development Directorate Technical Reports. Numbers 715–924 were issued as Department of Fisheries and the Environment, Fisheries and Marine Service Technical Reports. The current series name was changed with report number 925.

Technical reports are produced regionally but are numbered nationally. Requests for individual reports will be filled by the issuing establishment listed on the front cover and title page. Out-of-stock reports will be supplied for a fee by commercial agents.

Rapport technique canadien des sciences halieutiques et aquatiques

Les rapports techniques contiennent des renseignements scientifiques et techniques qui constituent une contribution aux connaissances actuelles, mais qui ne sont pas normalement appropriés pour la publication dans un journal scientifique. Les rapports techniques sont destinés essentiellement à un public international et ils sont distribués à cet échelon. Il n'y a aucune restriction quant au sujet; de fait, la série reflète la vaste gamme des intérêts et des politiques du ministère des Pêches et des Océans, c'est-à-dire les sciences halieutiques et aquatiques.

Les rapports techniques peuvent être cités comme des publications complètes. Le titre exact paraît au-dessus du résumé de chaque rapport. Les rapports techniques sont résumés dans la revue *Résumés des sciences aquatiques et halieutiques*, et ils sont classés dans l'index annual des publications scientifiques et techniques du Ministère.

Les numéros 1 à 456 de cette série ont été publiés à titre de rapports techniques de l'Office des recherches sur les pêcheries du Canada. Les numéros 457 à 714 sont parus à titre de rapports techniques de la Direction générale de la recherche et du développement, Service des pêches et de la mer, ministère de l'Environnement. Les numéros 715 à 924 ont été publiés à titre de rapports techniques du Service des pêches et de la mer, ministère des Pêches et de l'Environnement. Le nom actuel de la série a été établi lors de la parution du numéro 925.

Les rapports techniques sont produits à l'échelon régional, mais numérotés à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement auteur dont le nom figure sur la couverture et la page du titre. Les rapports épuisés seront fournis contre rétribution par des agents commerciaux.

Canadian Technical Report of
Fisheries and Aquatic Sciences 1648

November 1988

ENVIRONMENTAL MONITORING OF THE BAY OF FUNDY SALMONID MARICULTURE INDUSTRY DURING 1986 AND 1987

by

D. J. Wildish, J. L. Martin, A. J. Wilson and A. M. DeCoste
Department of Fisheries and Oceans
Biological Station
St. Andrews, New Brunswick E0G 2X0
Canada

This is the one hundred and ninety-ninth Technical Report of
the Biological Station, St. Andrews, N. B.

© Minister of Supply and Services Canada 1988
Cat. No. Fs 97-6/1648E ISSN 0706-6475

Correct citation for this publication:

Wildish, D. J., J. L. Martin, A. J. Wilson, and A. M. DeCoste. 1988. Environmental monitoring of the Bay of Fundy salmonid mariculture industry during 1986 and 1987. Can. Tech. Rep. Fish. Aquat. Sci. 1648: iii + 44 p.

ABSTRACT

Wildish, D. J., J. L. Martin, A. J. Wilson, and A. M. DeCoste. 1988. Environmental monitoring of the Bay of Fundy salmonid mariculture industry during 1986 and 1987. Can. Tech. Rep. Fish. Aquat. Sci. 1648: iii + 44 p.

Negative redox values, indicating microbial denitrification respiration, were present at three of nine salmonid farm sites investigated. Uneven distribution of redox values within sediment cores can be explained by periods of net depositional and erosional activity. A temporal study of phytoplankton species number and density at 12 sampling stations within the Western Isles region was initiated beginning in May 1987. It is hoped that the phytoplankton data can be used as a benchmark against which to measure possible future changes of species spectra and density.

Results of dissolved oxygen profiling in lower L'Etang during 1986 and 1987 confirm that the receiving water effects from a pulp mill discharge in upper L'Etang had stabilized prior to 1985. A 4-km long upper pond and a 5-km section of the lower L'Etang is impacted by the pulp mill effluent.

RÉSUMÉ

Wildish, D. J., J. L. Martin, A. J. Wilson, and A. M. DeCoste. 1988. Environmental monitoring of the Bay of Fundy salmonid mariculture industry during 1986 and 1987. Can. Tech. Rep. Fish. Aquat. Sci. 1648: iii + 44 p.

Faisant suite à des études menées dans neuf établissements de salmoniculture, on a remarqué à trois d'entre eux, la présence de valeurs négatives d'oxydoréduction, ce qui indique la dénitrification bactérienne en anaérobiose. La distribution inégale des valeurs redox dans les noyaux sédimentaires peut s'expliquer par des périodes d'activité de sédimentation et d'érosion nette. On a entrepris une étude temporelle de la quantité et de la densité des espèces de phytoplanctons à douze postes d'échantillonnage situés dans la région de Western Isles, au mois de mai 1987. On espère que les données recueillies sur les phytoplanctons pourront servir de repère à l'aide duquel on pourra désormais mesurer les changements futurs possibles au niveau de la gamme et de la densité des espèces.

Suite à l'établissement du profil de l'oxygène dissous dans le cours inférieur de L'Étang au cours de 1986 et 1987, il a été confirmé que l'action sur les eaux réceptrices des décharges d'une usine de pâte et papier située le long de cours supérieur de L'Étang s'était stabilisée avant 1985. Une section de 4 km du cours supérieur et une section de 5 km du cours inférieur de L'Étang sont touchées par les effluents de l'usine de pâte et papier.

INTRODUCTION

The Bay of Fundy salmonid mariculture industry during 1986-87 was concentrated in the Western Isles region (Fig. 1). Further expansion of this industry into Passamaquoddy Bay is constrained by cold, winter seawater, down to -1.2°C, which is lower than the lethal limit of -0.7°C for Atlantic salmon (Saunders et al. 1975).

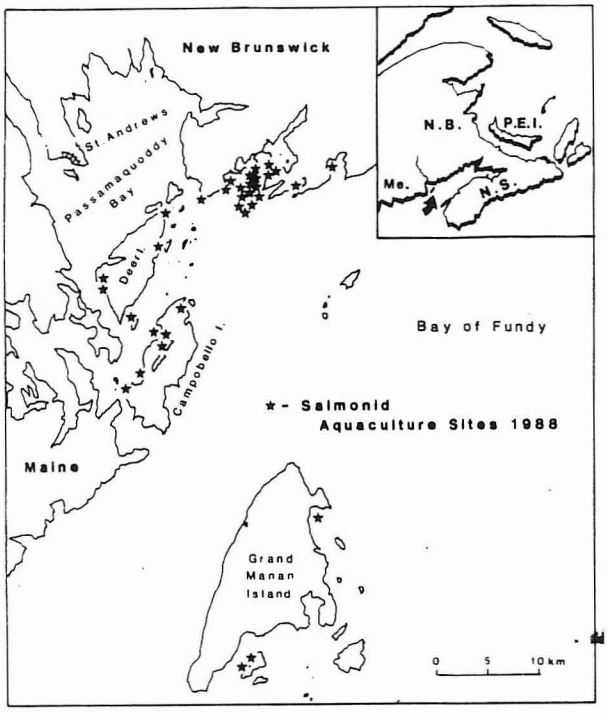

Fig. 1. Location of 34 salmonid mariculture farms in the Western Isles region of the Bay of Fundy.

Expansion into the open Bay of Fundy is limited by risks from high wave exposure which could result in damage to the currently used cages. The focus of the industry during 1986-87 was in the lower L'Etang Inlet (inclusive of Bliss Harbour and Back Bay) where 19 of the 34 cage sites were situated.

In a previous environmental study of L'Etang Inlet (Wildish et al. 1986), it was shown that there had been little change due to pulp mill pollution since 1975 and also that the buildup of particulate organic wastes under most cage sites was not a serious problem. The reason for the latter observation is probably that the strong tidal currents within the Bay of Fundy ensure wide dispersal and mixing of particulate and dissolved organic wastes. Mariculture wastes, particularly faeces, urine and waste food, either in the water column or following settlement on net depositional sediments, supply an aerobic microbial community whose products include nitrate, nitrite, ammonium and phosphate. In sufficient quantities, these nutrients result in hypernitrification and stimulation of plant growth. Because this process of eutrophication might cause potentially serious problems for the salmonid industry, e.g. by direct lethal effects of microalgae on caged salmon as has occurred in British Columbia where salmon deaths have been attributed to blooms of Chaetoceros convolutus and Heterosigma akashiwo (Anon. 1988a), and in Norway due to blooms of Gyrodinium aureolum (Tangen 1977) and Chrysochromulina polylepsis (R.L. Saunders, pers. comm.). Gonyaulax excavata may also cause fish kills of wild herring (White 1980) or at high cell densities directly kill caged salmon (Mortensen 1985) due to paralytic shellfish poisoning. Fish deaths have also been recorded after a nontoxic bloom has died off caused by the rapid utilization of dissolved oxygen by aerobic microorganisms involved in decay. Typically these effects result in localized areas of oxygen depletion (Ketchum 1969). Consequently, in May 1987, we also commenced monitoring phytoplankton to provide a temporal basis for comparison in future years to determine if changes were occurring. The 1986-87 study was also expanded geographically to include more of the Western Isles region utilized by the salmon mariculture industry.

The aims of this study were, therefore, to monitor:

- particulate pollution in sediments beneath selected farm sites;
- seasonal phytoplankton abundance in the Western Isles region in the period May to November 1987; and
- to reassess the effect of pulpmill effluent discharges in the L'Etang to determine if any changes had occurred.

MATERIALS AND METHODS

Hydrographic field sampling was carried out from the PANDALUS III for a HW and LW transect in L'Etang Inlet from the causeway to Indian Point at 10 stations during August of each year. Hourly hydrographic observations were made at one of these stations also during August when temperatures were high and dissolved oxygen levels expected to be at their lowest. By way of comparison, similar observations were made at the Salmon Demonstration Farm site in August 1986. Phytoplankton collections at 12 sampling stations and at three depths for each station involved subsampling from the Nansen bottle and were begun in May 1987.

Sediments were sampled during a 1-wk period of August of each year with a hand-held corer operated from an Eastporter. In many cases the corer was deployed directly from a salmonid cage walkway to ensure closeness to the site. The sampling station numbers refer to Fig. 5.

HYDROGRAPHY

Surface samples were taken in a clean bucket and seawater temperature determined with a mercury thermometer read to 0.1°C. All other samples were taken in 1.2-L capacity Nansen reversing water bottles equipped with a thermometer. Seawater subsamples were taken in 300-mL bottles for determination of dissolved oxygen (DO) by the azide modification of the Winkler method, salinity in 150-mL bottles by conductrimetric method, absorbance at 250 nm (100 mL plastic containers) and for determination of adenosine triphosphate (ATP) in 15-mL aliquots. The analytical methods used are as described in Wildish et al. (1986).

SEDIMENT SAMPLING AND ANALYSIS

Sediment was sampled with a 20-kg Kajak corer and the cores subsampled with a cut-off 1-cc syringe through holes drilled in the plexiglass coring tube as described previously (Wildish et al. 1986). The sediment redox potential was determined, after extruding the sediment sample into a Petri dish, with a combined redox electrode (Orion 96-78) and Orion ionanalyzer (Model 399A). Eh results are expressed relative to the normal hydrogen electrode. Precautions during sampling and analysis were as described previously (Wildish et al. 1986).

PHYTOPLANKTON SAMPLING AND ANALYSIS

A 200-mL subsample from the Nansen bottle was preserved in a 2.5% formalin:acetic acid mixture (1:1). On return to the laboratory, a 50-mL subsample was settled in a counting chamber and species identified and cell densities determined with a Zeiss inverted microscope. With the magnifications routinely used (objective 10x-40x, eyepiece 12.5x), it was possible to identify cells in the size range 5->100 µ. Sampling at three depths - surface, 10 m and 1 m above bottom - was started in May 1987, with weekly sampling. In September-October, samples were taken every other week, and a single sample was taken in November.

A list showing the references used in identifying phytoplankton samples in this work is added separately to the regular reference list. They are not quoted in the text of this publication.

RESULTS

PULP MILL EFFLUENT DISCHARGE EFFECTS IN LOWER L'ETANG

The sampling transect used during this study is shown in Fig. 2. Pulp mill effluent enters lower L'Etang during ebb tide across the causeway carrying route 1 highway, in four 6-ft diameter pipes. The most landward stations near the causeway were low in dissolved oxygen with values less than full saturation and, in the case of station 1 at HW, devoid of dissolved oxygen completely (Fig. 3). Dissolved oxygen values and

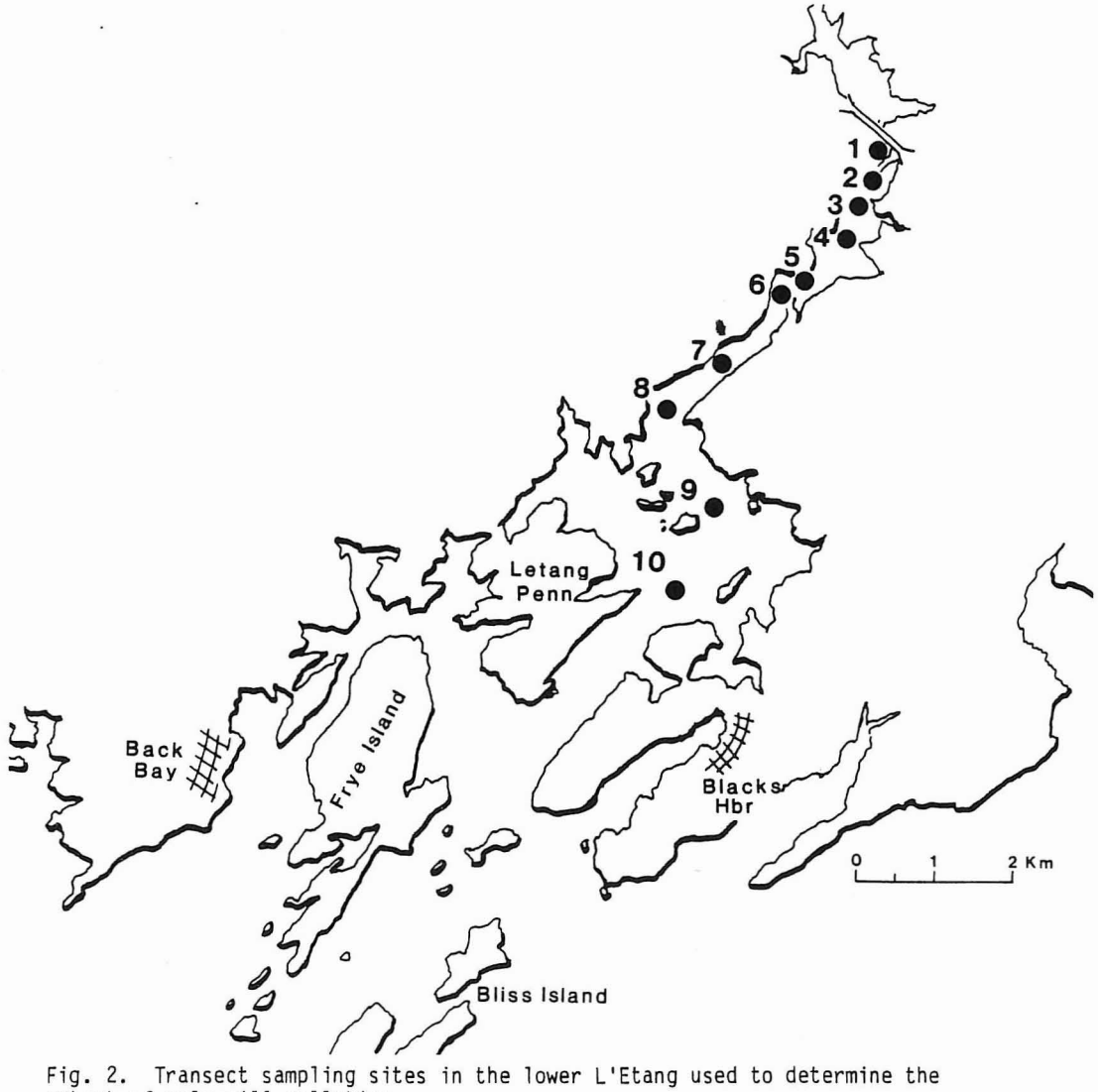

Fig. 2. Transect sampling sites in the lower L'Etang used to determine the extent of pulp mill pollution.

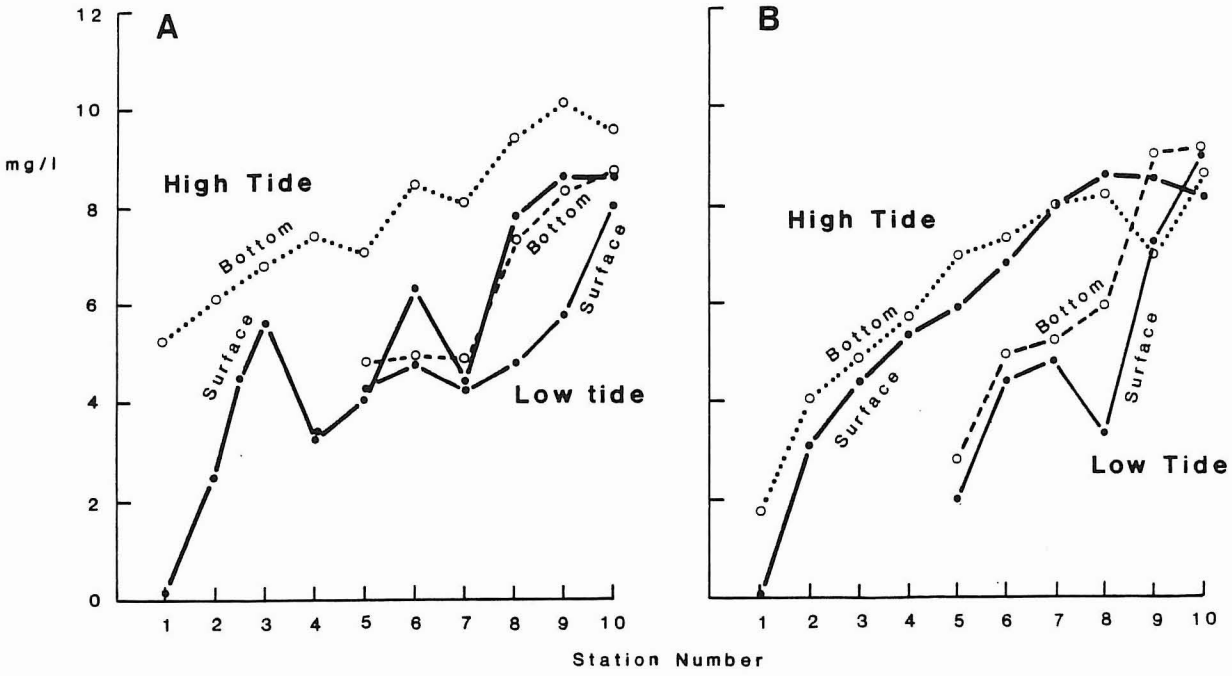

Fig. 3. Dissolved oxygen concentrations along the L'Etang transect shown in Fig. 2 are shown for A - 15 August 1986, B - 25 August 1987.

other hydrographic parameters measured at each of the 10 stations are shown in Appendix 1.

Seawater samples were collected hourly for one complete tide from station 7 (Fig. 2) and hydrographic measurements made on them as in the transect study. Dissolved oxygen levels were generally higher near HW than near LW (Fig. 4), both in bottom and surface waters. This is inversely related to absorbance at 250 nm (an indicator of dissolved organic carbon), which is high at LW and low at HW. High levels of dissolved organic carbon were always associated with a greater microbial biomass of degrading microorganisms, as indicated by the higher ATP levels at high A250-nm values. Towards high tide, the seawater is more saline in the Inlet at station 7, reflecting the cleaner seawater entering the system (see Appendix 2). Data from a "control" station, nearer the seaward end of L'Etang at the Salmon Demonstration Farm site (station 5, Fig. 5), is included in Appendix 3. Low A250-nm values are present at this station and the presence of fully oxygen saturated seawater in both surface and bottom samples indicates the presence of good quality seawater during 1986.

SEDIMENTARY CONDITIONS NEAR SALMONID FARM CAGE SITES

Sedimentary conditions were investigated at nine mariculture sites within the L'Etang (see Fig. 5). To aid interpretation of the data (Table 1), see Fig. 6. Using Lynch and Poole's (1979) criteria, the negative values of Table 1 indicate that anaerobic microorganisms utilizing denitrification respiration are active. In this type of respiration, nitrate is the major electron acceptor and the products may include nitrite, ammonium, ammonia and nitrogen. Negative redox

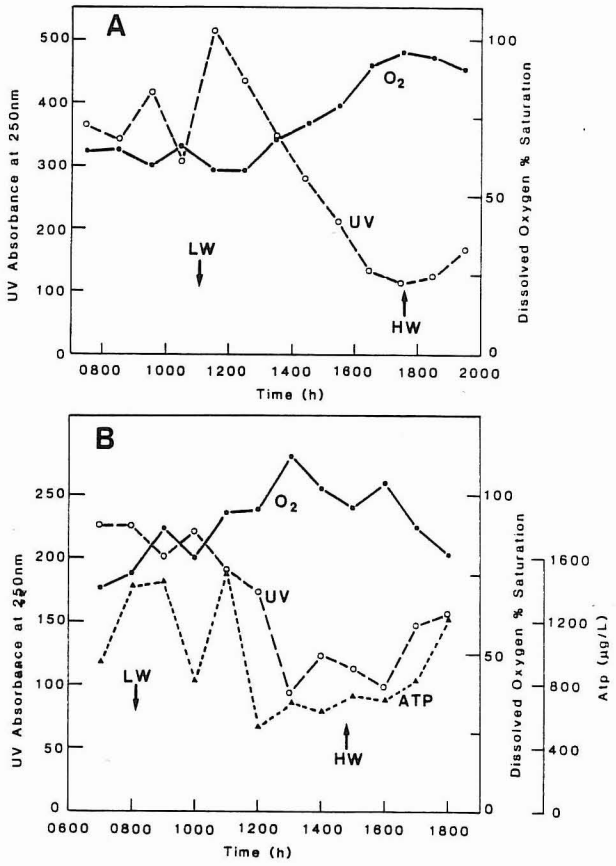

Fig. 4. Temporal changes of surface dissolved oxygen (●), UV absorbance (O) and ATP (Δ) at station 7 (see Fig. 2) in A - 1986 and B - 1987.

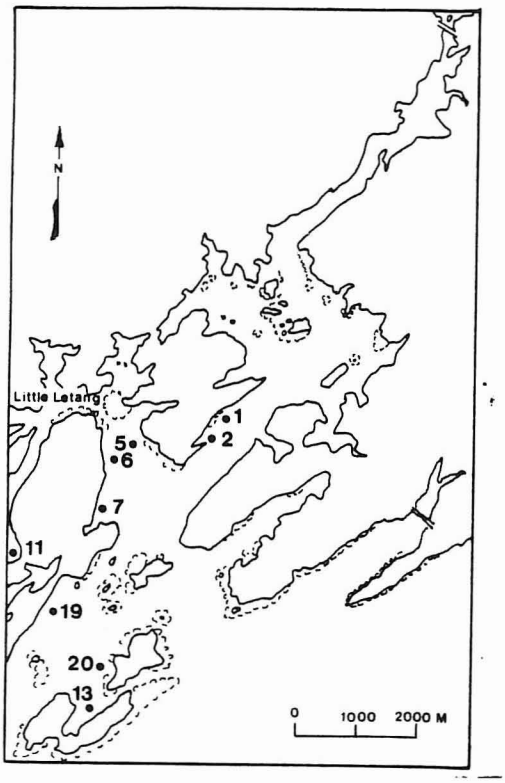

Fig. 5. Location of nine sampling locations where sediment cores and Eh measurements were made.

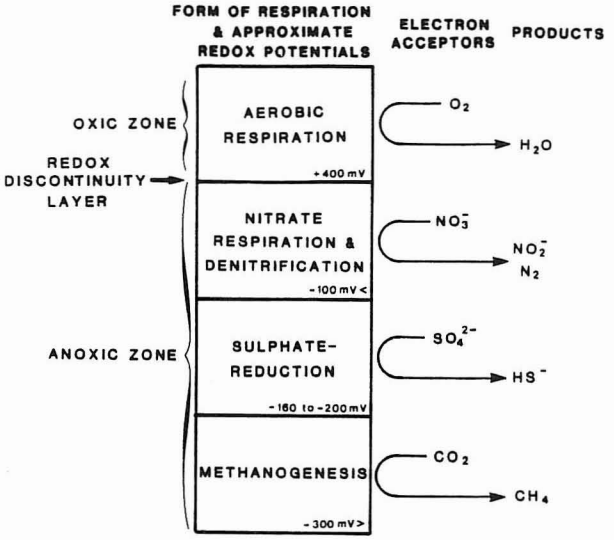

Fig. 6. Form of microbial respiration, redox potentials, electron acceptors and typical products within marine sediments (from Lynch and Poole 1979).

Table 1. Values of the oxidation-reduction potential normal to the hydrogen electrode (E_{NHE}) at various depths within the sediment core. Location of station number shown in Fig. 5.

Sediment depth cm	Station 1		2	5		6	7		11	13		19		20
	1986	1987	1986	1986	1987	1986	1986	1987	1987	1986	1987	1986	1987	1986
0	+344	+134	+334	+179	+204	+89	-1	-26	+159	+44	+124	-96	+184	-16
5	+104	+149	+144	+119	+ 89	+84	+84	-66	+94	+174	+104	+44		+44
8													+179	
10	+209	+179	+104	+69	+124	+74	-41	+179	+94	+114	+119	-1		-81
13													+149	
15	+174			+109	+182	+69	-46	+89	+34	+124	+169	+129		+49
18													+154	
20	+154			+119	+199	+99	+114	+184	+4	+94	+149	-76	+179	-26
25				+164	+244	+109	-16	+44	+24	+144	+124	-101	+164	
30				+174	+244	+104	+4	+144	+274	+109	+164	-21	+204	
35				+146	+244	+109	+69	+44	+359		+249	+59	+204	
40					+199			+159	+220		+224	+144	+99	

Table 2. Oxidation-reduction potentials normal to the hydrogen electrode (E_{NHE}) in sediment cores from control stations in the L'Etang observed during August 1986.

Sediment depth (cm)	Haddock Ledge	L'Etang Harbour	Bliss Harbour
0		+104	+144
5	+274	+144	+109
10	+174	+159	+179
15	+164		+214
20			+239
25			+189
30			+184
35			+209
40			+169
45			+224

values appear at some sediment levels at stations 7, 19 and 20 in Table 1 and indicate that anaerobic denitrification processes dominate at these stations. At control stations (Table 2), where salmonid net-pens are absent, the sedimentary cores all have positive Eh values.

It is of interest that one of the Lime Kiln Bay sites (#7 in Table 1) had redox potential values lower in 1985 (Wildish et al. 1986) than in 1986 and 1987. Two possible explanations to account for this are that:

- spatial differences or "patchiness" of anaerobic conditions were present,
- during winter storms the sediment surface layer is removed by wave action.

Scuba diving observations in the spring of 1986 suggest that the latter is at least part of the explanation for the improvement in redox values at site #7. The observations suggest that this site is a net depositional one in summer, whereas in winter it is a net erosional one. This may help explain uneven distribution of redoxes at various depths within some of the cores shown in Table 1.

SEASONAL PHYTOPLANKTON ANALYSIS

From the 12 stations sampled for phytoplankton during 1987 (Table 3) in the Western Isles area (Fig. 7), a species list (Table 4) containing 120 distinct taxa was generated. Individual densities for each of the taxa identified in Table 4 were calculated and are shown in Appendix 4. Of interest is the temporal distribution of densities of Gonyaulax excavata, the microalga responsible for paralytic shellfish poisoning. Motile cells were observed mostly in surface waters at all 12 sampling sites between mid June and mid October. Highest inshore concentrations (6.6×10^3 cells/L) were found at station 3 (Fig. 7) on June 30. At an offshore station north of Grand Manan, Prince 5 (44°57'N, 66°51'W), also studied but unreported here, the highest numbers of G. excavata cells found was 1.2×10^4 cells/L. This concurs with a previous study (Martin and White 1988) which showed that the highest concentrations of G. excavata were located offshore in the south-central and southwestern portions of the Bay of Fundy where the major cyst seed beds are located. The circulation and tidal fronts of the Bay of Fundy tend to retain the greater majority of the cells in the offshore region (Martin and White 1988). The maximum concentration of 6.6×10^3 cells/L of G. excavata found in this study is not considered to be a potential threat to the salmonid culture industry because the observed concentration causing direct mortalities in the Faroe Islands was $>1 \times 10^7$ cells/L (Mortensen 1985).

DISCUSSION

We have followed two of the recommendations for further environmental monitoring proposed earlier (Wildish et al. 1986). That is:

- further DO profiling be carried out in the landward section of lower L'Etang. The results for 1986 and 1987 confirm that the pulp mill effluent effects have stabilized within a 5-km section and does not deleteriously affect L'Etang seaward of station 10 (Fig. 2). These results suggest that Scotch Bay, enclosed by L'Etang Penninsula and opposite station 10 (Fig. 2) escape the direct impact of the pulpmill effluent;
- a temporal study of phytoplankton within the Western Isles area. The 1987 phytoplankton data presented here should act as a benchmark against which possible future changes of species diversity and density can be measured. This study was completed in a period when salmonid production from the Western Isles region had already begun, although was still relatively modest. Salmonid production was 796 t in 1986 and 1266 t in 1987 (Wildish 1988).

Lack of time has prevented us from undertaking a geographic survey of sediments in L'Etang to determine areas of net depositional and erosional sediments. This information would be useful in

Table 3. Dates during 1987 for phytoplankton sampling at 12 stations within the Western Isles region of the bay.

Date	Date
May 26	Aug. 4
June 1	Aug. 11
June 9	Aug. 18
June 17	Aug. 25
June 23	Sept. 1
June 30	Sept. 8
July 7	Sept. 29
July 14	Oct. 6
July 21	Oct. 20
July 28	Nov. 19

Station descriptions

1 NE of Cross Point-near Haddock Ledge
2 Jail Island Salmon in Granger Cove
3 Salmon Demonstration Farm
4 Site in Lime Kiln Bay
5 L'Etang Head
6 Jail Island Salmon in Lime Kiln Bay
7 Site at Back Bay
8 Sea Farms site in Bliss Harbour
9 Fisherman's Cove site
10 Bliss Harbour
11 Mouth of Harbour de Loutre
12 Harbour de Loutre-off Bunker Hill

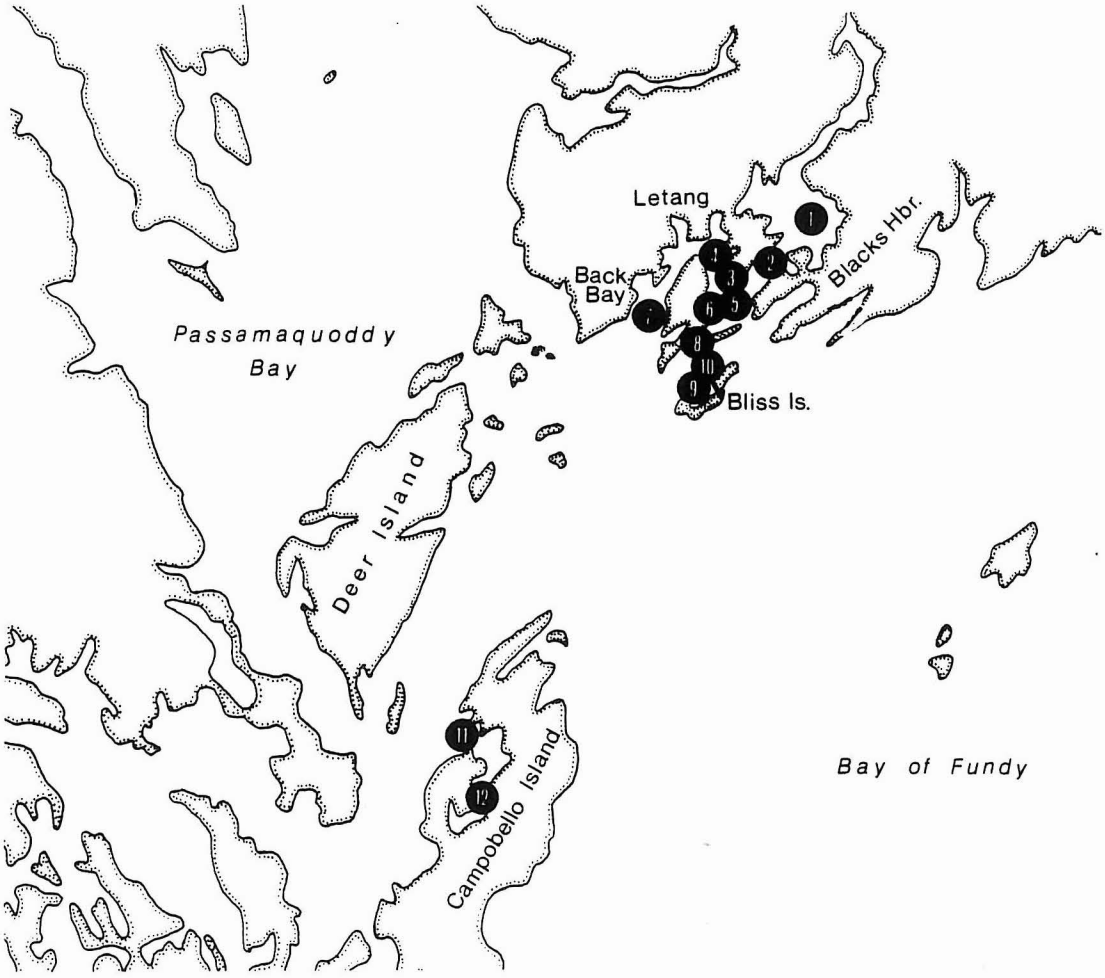

Fig. 7. Phytoplankton sampling stations occupied during 1987.

Table 4. Phytoplankton observed in the Western Isles region during the period 26 May-19 November 1987.

Gonyaulax excavata	*Grammatophora marina*
Gonyaulax (duplet)	*Gyrosigma* sp.
Gonyaulax (triplet)	*Gyrosigma fasciola*
Gonyaulax (quadruplet)	*Gyrosigma baltica*
Gonyaulax (fusing)	*Gyrosigma prolongatum*
Gonyaulax (planozygote)	*Gyrosigma tennuissimum*
Gonyaulax (cyst)	*Guinardia flaccida*
Gonyaulax spinifera	*Leptocylindrus danicus*
Gonyaulax triacantha	*Leptocylindrus minimus*
Ceratium furca	*Lycmophora lyngbyei*
Ceratium fusus	*Melosira nummuloides*
Ceratium longipes	*Melosira moniliformis*
Ceratium minutum	*Navicula* sp.
Dinophysis sp.	*Nitzschia* sp.
Dinophysis acuta	*Nitzschia closterium*
Dinophysis acuminata	*Nitzschia delicatissima*
Dinophysis norvegica	*Nitzschia pungens*
Dinophysis rotundata	*Pleurosigma angulatum*
Peridinium sp.	*Pleurosigma strigosum*
Peridinium conicum	*Paralia sulcata*
Peridinium depressum	*Porosira glacialis*
Peridinium limbatum	*Pinnularia* sp.
Peridinium triqueta	*Rhabdonema adriaticum*
Peridinium ovatum	*Rhizosolenia* sp.
Scrippsiella trochoidea	*Rhizosolenia delicatula*
Gyrodinium sp.	*Rhizosolenia fragillima*
Asterionella japonica	*Rhizosolenia hebetata*
Bacteriosira fragilis	*Rhizosolenia setigera*
Biddulphia aurita	*Skeletonema costatum*
Cerataulina bergoni	*Stephanopyxis turris*
Chaetoceros sp.	*Striatella unipunctata*
Chaetoceros affinis	*Synedra* sp.
Chaetoceros atlanticus	*Thalassiosira* sp.
Chaetoceros borealis	*Thalassiosira condensata*
Chaetoceros compressus	*Thalassiosira decipiens*
Chaetoceros constrictus	*Thalassiosira gravida*
Chaetoceros convolutus	*Thalassiosira nordenskioeldii*
Chaetoceros danicus	*Thalassiosira rotula*
Chaetoceros debilis	*Thalassiosira subtilis*
Chaetoceros decipiens	*Thalassiothrix nitzschiodes*
Chaetoceros diadema	*Distephanus speculum*
Chaetoceros didymus	*Mesodinium rubrum*
Chaetoceros furcellatus	*Polyasterias* sp.
Chaetoceros karianus	*Euglena* sp.
Chaetoceros laciniosus	*Eutreptia* sp.
Chaetoceros lorenzianus	*Favella* sp.
Chaetoceros mitra	*Helicostomella* sp.
Chaetoceros perpusillus	*Ptychocylis* sp.
Chaetoceros socialis	Tintinnids
Chaetoceros teres	*Tintinnopsis* sp.
Chaetoceros willei	*Tintinnopsis beroidea*
Cocconeis sp.	*Tintinnopsis cincta*
Corethron criophilum	*Tintinnopsis karajacensis*
Coscinodiscus sp.	*Tintinnopsis patula*
Coscinosira polychorda	*Codonella* sp.
Detonula cystifera	*Acartia* sp.
Ditylum brightwelli	*Brachionus* sp.
Diploneis sp.	Unidentified *Gymnodinium*
Eucampia sp.	Unidentified *Dinophysis*
Fragilaria sp.	Unidentified dinoflagellate

predicting where a buildup of organic wastes might occur under salmonid cages.

Our redox measurements show that of nine sites, three have marked accumulation of wastes sufficient to result in anoxia and with anaerobic denitrification decay processes dominating. Such sediments exert a chemical oxygen demand on the water column above them. Whether the oxygen demand results in a depression of dissolved oxygen will depend on the volume, flow and mixing characteristics concerned. Other sites which show little change in Eh value may either have a net erosional sediment (on which organic wastes do not accumulate) or a low level input of organic wastes because production levels were also low. We hope that in future years we can obtain annual salmonid production data for each site to correlate with the sedimentary conditions existing there.

If the optimum holding capacity for salmonid culture in the Western Isles region is exceeded, it can be expected that environmental limiting factors will begin to affect salmonid production. The environmental limits might include:

- excessive biological oxygen demands by aerobic, heterotrophic microorganisms utilizing salmon excreta or chemical oxygen demand, particularly from anoxic sediments or water which limited growth of, or caused direct mortality to, salmon;

- an eutrophication process resulting in microalgal blooms which could contain species directly toxic to salmon, or if non-toxic, cause problems following die-off and decay which produce localized areas low in dissolved oxygen;

- susceptibility to disease is increased as soon as environmental conditions become suboptimal.

Unfortunately, the prediction of optimum holding capacity for an area like the Western Isles region is a complex, unsolved, multidisciplinary problem, involving physical modelling of the system as well as attempting mass balances of poorly known biological cycles involving carbon, oxygen, nitrogen and phosphorous (Parsons et al. 1977). We consider that this is the priority research area for the salmonid mariculture industry in respect of environmental problems and hope that attempts to increase the level of multidisciplinary research directed at it are soon successful. Until a reliable holding capacity model can be produced, it is prudent to use environmental monitoring, as we have attempted here, as an early warning of changes in the system which could indicate that the salmonid holding capacity has been exceeded. As the industry expands, increased levels of environmental monitoring should be undertaken. This would include monitoring of the kind described herein, as well as in other areas, such as the fate and effects of chemicals used in mariculture (see Anon. 1988b).

ACKNOWLEDGMENTS

We thank Captain Don Hurley of the PANDALUS III for his cheerful assistance in all aspects of field sampling and Ms. M. LeGresley for assistance in phytoplankton analysis. Drs. R. L. Saunders and R. L. Stephenson critically reviewed the manuscript. Mr. W. McMullon prepared the figures and Ms. B. Best typed the manuscript.

REFERENCES

Anon. 1988a. Experience in 1987 with blooms of toxic plankton at the Pacific Biological Station Experimental Fish Farm. Aquaculture Up-Date No. 29: 3 p.

Anon. 1988b. The reduction of the impact of fish farming on the natural marine environment. A report prepared for the Nature Conservancy Council by Institute of Aquaculture, University of Stirling. 167 p.

Ketchum, B. H. 1969. Eutrophication of estuaries, p. 197-209. In Eutrophication: causes, consequences, correctives. Natl. Acad. Sci., Wash.

Lynch, J. M., and N. J. Poole. 1979. Microbial ecology: a conceptual approach. Blackwell Scientific Publications, Oxford. 266 p.

Martin, J. L., and A. White. 1988. Distribution and abundance of the toxic dinoflagellage Gonyaulax excavata in the Bay of Fundy. Can. J. Fish. Aquat. Sci. 45: 1968-1975.

Mortensen, A. I. 1985. Massive fish mortalities in the Faroe Islands caused by a Gonyaulax excavata red tide, p. 165-170. In D. M. Anderson, A. W. White and D. G. Baden (ed.) Toxic Dinoflagellates. Elsevier.

Parsons, T. R., M. Takahashi, and B. Hargrave. 1977. Biological oceanographic processes. 2nd Edition, Pergamon Press, Oxford. 332 p.

Saunders, R. L., B. C. Muise, and E. B. Henderson. 1975. Mortality of salmonids cultured at low temperature in seawater. Aquaculture 5: 243-252.

Tangen, K. 1977. Blooms of Gyrodinium aureolum (Dinophyceae) in north European waters, accompanied by mortality in marine organisms. Sarsia 63: 123-133.

White, A. W. 1980. Marine zooplankton can accumulate and retain dinoflagellate toxins and cause fish kills. Limnol. Oceanogr. 26: 103-109.

Wildish, D. J. 1988. Mariculture and potential multiple-use resource conflicts in Atlantic Canada. Presented at Habitat Awareness Seminar at Acadia University, Wolfville, N.S.

Wildish, D. J., J. D. Martin, A. J. Wilson, and A. M. DeCoste. 1986. Hydrographic and sedimentary conditions in the L'Etang Inlet during 1985. Can. Tech. Rep. Fish. Aquat. Sci. 1473: 14 p.

TAXONOMIC REFERENCE SOURCES USED IN IDENTIFICATION

Anon. 1979-84. Working Party on Taxonomy in the Akashiwo Kenkyukai, Japanese Government (ed.) 1979, 1980, 1981, 1982, 1983, 1984. Synopsis of Red-Tide Organisms. Sheet Nos. 1-180.

Brunel, J. 1970. Le phytoplancton de la Baie des Chaleurs. Les Presses du l'Université de Montréal. 365 p.

Davis, C. C. 1955. The marine and fresh-water plankton. Michigan State University Press. 562 p.

Fraser, J. H., and V. Kr. Hansen (ed.). 1969. Fiches d'identification du zooplankton. Int. Counc. Explor Sea 117-127.

Gran, H. H., and T. Braarud. 1934. A quantitative study of the phytoplankton in the Bay of Fundy and Gulf of Maine (including observations on hydrography, chemistry and turbidity). J. Biol. Board Can. 1: 279-467.

LeBour, M. V. 1925. The dinoflagellates of northern seas. The Mayflower Press, Plymouth. 250 p.

LeBour, M. V. 1930. The planktonic diatoms of northern seas. The Ray Society, London. 244 p.

Patrick, R., and C. W. Reimer. 1966. The diatoms of the United States, exclusive of Alaska and Hawaii. Vol. 1. Monographs of the Academy of Natural Sciences of Philadelphia. No. 13: 688 p.

Yamaji, I. 1968. The plankton of Japanese coastal waters. 1-chome Uchikyuhoji-Machi, Higashiku, Osaka, Japan. 238 p.

Appendix 1. Lower L'Etang transect hydrographic data sampled on 15 August 1986 and 25 August 1987.

Station	Depth (m)	Temp (°C)	DO mg/L	DO % sat.	A250	ATP µg/L	Salinity (o/oo)
HW 0755 15.8.86							
1	0	16.5	0	0	2828	12.1	-
	4.6	15.5	5.22	63.5	339	30.1	30.46
2	0	15.2	2.53	30.2	1019	8.3	-
	4.6	15.0	6.05	72.1	231	64.2	30.81
3	0	15.1	5.61	66.9	306	37.2	30.56
	6.4	14.8	6.74	80.4	199	32.5	30.98
4	0	15.0	3.23	39.1	833	6.5	-
	4.6	14.5	7.31	88.4	169	28.3	31.20
5	0	15.1	3.98	47.5	501	20.0	29.83
	4.6	14.5	6.99	84.5	172	62.1	31.10
6	0	14.9	6.32	75.4	279	23.0	30.74
	6.4	14.1	8.26	97.8	124	27.7	31.34
7	0	14.8	4.36	52.0	430	18.7	30.16
	8.3	14.0	7.95	94.2	101	41.8	31.45
8	0	14.8	7.73	93.5	145	50.1	31.24
	8.3	13.9	9.34	110.6	67	26.4	31.62
9	0	14.5	8.48	102.5	117	48.1	31.42
	17.4	12.9	9.97	115.5	45	20.0	31.82
10	0	13.9	8.52	101.0	105	38.8	31.44
	15.6	12.8	9.46	109.6	55	29.1	31.75
LW 1300 14.8.86							
5	0	14.8	4.34	51.8	357	17.8	30.24
	3.7	14.8	4.84	57.7	250	15.3	30.62
6	0	15.0	4.80	57.2	283	8.5	30.52
	4.6	14.8	4.88	58.2	263	45.0	30.61
7	0	15.7	4.30	52.4	343	18.4	30.58
	4.6	15.0	4.89	58.3	270	66.4	30.28
8	0	15.5	4.81	56.2	328	15.8	30.38
	4.6	13.7	7.30	82.9	93	5.2	31.42
9	0	14.7	5.77	68.8	258	19.7	30.64
	13.8	13.0	8.32	96.4	49	8.3	31.69
10	0	15.0	8.01	96.8	85	13.9	31.47
	17.4	12.8	8.64	100.1	41	10.9	31.77

Appendix 1. (cont'd)

Station	Depth (m)	Temp (°C)	DO mg/L	DO % sat.	Chl a µg/L	A250	ATP µg/L	Salinity (o/oo)
HW 1310 25.8.87								
1	0	17.2	0	0	8.41	1.616	761	
	5	14.7	1.80		2.74	0.495	1403	
2	0	15.8	3.12	28.5	2.13	0.317	1420	31.12
	5	14.6	4.06	49.1	1.33	0.252	1326	31.34
3	0	15.0	4.44	53.7	2.01	0.211	993	31.44
	5	14.3	4.87	57.7	0.72	0.195	1149	31.46
4	0	14.6	5.34	64.5	1.62	0.158	1021	31.55
	5	14.2	5.72	67.8	1.55	0.149	705	31.54
5	0	14.8	5.91	71.5	2.04	0.114	674	31.67
	6	13.7	6.99	32.8	1.32	0.094	356	31.78
6	0	14.0	6.80	80.5	1.78	0.101	353	31.76
	7	13.4	7.35	87.1	1.43	0.081	417	31.80
7	0	13.5	8.04	95.3	1.47	0.067	346	31.85
	20	13.1	8.02	93.0	1.01	0.051	215	31.92
8	0	13.4	8.64	100.1	1.70	0.050	371	31.89
	22	12.9	8.26	95.7	1.39	0.048	274	31.89
9	0	12.9	8.60	99.6	1.22	0.035	231	31.97
	21	12.4	6.97	79.1	1.62	0.027	229	31.99
10	0	12.9	8.32	96.5	2.04	0.023	228	31.95
	20	12.5	8.62	99.9	2.01	0.030	309	31.97
LW 0850 28.8.87								
5	0	14.0	1.92	22.7	1.03	0.496	2905	
	1.5	13.8	2.73	32.3	0.46	0.467	2106	
6	0	13.6	4.39	52.0	0.92	0.262	2248	
	3	13.4	4.93	57.1	1.28	0.254	1443	
7	0	13.5	4.84	57.3	1.39	0.228	-	
	5	13.6	5.21	61.7	1.01	0.221	-	
8	0	13.8	3.33	39.4	1.35	0.191	-	31.52
	6	13.6	5.90	69.9	0.97	0.191	-	
9	0	13.2	7.26	84.2	1.08	0.114	-	31.73
	15	12.4	9.05	102.7	0.66	0.034	-	32.01
10	0	12.0	8.99	101.9	1.16	0.038	-	31.99
	13	12.2	9.18	104.2	1.01	0.033	-	

Appendix 2. Hourly hydrographic observations at station 7, lower L'Etang.

Time AST	Depth (m)	Temp (°C)	DO mg/L	DO % sat.	A250	ATP µg/L	Salinity (o/oo)
LW 1105 12.8.86							
0730	0	13.8	5.49	64.2	364	26.4	29.92
		13.5	7.95	94.2	106	6.3	31.16
0830	0	14.0	5.53	64.6	340	38.6	29.98
	8.3	13.8	6.78	79.2	213	18.6	30.61
0930	0	14.5	5.00	59.6	416	23.1	29.75
	8.3	14.1	6.08	71.1	247	36.0	30.42
1030	0	14.5	5.68	66.4	305	75.9	30.21
	6.4	14.1	6.00	70.1	254	30.4	30.40
1130	0	14.5	4.87	58.1	513	20.1	29.41
	6.4	13.5	7.50	87.7	142	30.3	30.99
1230	0	14.3	5.02	58.7	435	5.2	29.71
	7.5	11.8	6.25	70.9	131	25.5	31.06
1330	0	14.8	5.80	69.2	341	56.8	30.05
	8.3	12.8	8.13	94.2	73	25.0	31.41
1430	0	15.5	6.03	73.4	279	99.6	30.27
	10.1	13.0	8.94	103.6	67	27.3	31.46
1530	0	14.5	6.60	78.7	210	72.1	30.69
	10.1	12.8	8.58	99.4	63	24.0	31.50
1630	0	14.5	7.63	92.3	132	32.2	31.10
	11.9	13.0	8.93	103.5	57	26.0	31.51
1730	0	14.3	8.12	96.2	114	61.9	31.19
	11.9	13.0	9.44	109.4	62	17.9	31.50
1830	0	14.7	7.75	93.7	125	38.9	31.10
	10.1	13.0	8.38	97.1	60	38.6	31.49
1930	0	14.6	7.55	91.3	166	49.5	31.28
	10.1	13.0	8.41	97.5	65	21.3	31.45

Appendix 2. (cont'd)

Time AST	Depth (m)	Temp (°C)	DO mg/L	DO % sat.	Chl a µg/L	A250	ATP µg/L	Salinity (o/oo)
LW 0810 27.8.87								
0700	0	13.4	6.07	70.3	1.01	0.225	944	31.42
	4	13.8	6.92	82.0	0.89	0.223	930	31.40
0800	0	13.5	6.38	75.5	1.08	0.226	1411	31.48
	3	13.3	4.46	51.7	0.50	0.393	553	31.39
0900	0	13.8	7.55	89.4	0.43	0.201	1454	31.44
	4	13.6	7.18	85.0	0.35	0.219	513	31.41
1000	0	14.2	6.76	80.0	0.73	0.220	821	31.43
	6.5	13.7	4.74	56.2*	0.77	0.180	841	31.52
1100	0	14.5	7.78	94.1	0.93	0.188	1510	31.50
	8	13.2	6.39	74.0	0.68	0.090	410	31.79
1200	0	15.2	7.83	94.6	0.85	0.173	533	31.64
	10	14.6	10.82	130.8	0.23	0.061	327	31.88
1300	0	14.5	9.18	111.0	0.93	0.087	696	31.75
	11	12.3	9.83	111.6	0.54	0.049	128	31.93
1400	0	14.8	8.40	101.6	0.31	0.124	638	31.74
	12	12.0	6.04	68.5*	0.54	0.039	167	31.95
1500	0	14.6	7.93	95.9	1.12	0.113	754	31.74
	11	12.3	9.98	113.2	0.73	0.049	255	31.99
1600	0	14.2	8.75	103.7	0.97	0.098	705	31.84
	8.5	12.7	9.43	109.3	0.71	0.070	374	31.89
1700	0	14.2	7.59	89.9	0.78	0.145	815	31.64
	9.5	13.0	7.97	92.4	0.62	0.088	418	31.81
1800	0	14.5	6.67	80.6	0.35	0.157	1275	31.59
	6	14.0	7.78	92.1	0.77	0.158	1554	31.61

*Very dirty sample, may have caused low reading - bottom sediment was stirred up during the week (windy).

Appendix 3. Hourly hydrographic observations at the Salmon Demonstration Farm cage site.

Time AST	Depth (m)	Temp (°C)	DO mg/L	DO % sat.	A250	ATP µg/L	Salinity (o/oo)
LW 1200 13.8.86							
0730	0	12.8	10.32	119.6	29	4.9	31.87
	22.9	12.3	9.96	113.0	23	4.2	31.92
0830	0	12.0	10.76	122.1	29	18.1	31.86
	22.9	11.8	10.73	121.7	26	11.8	31.89
0930	0	12.5	10.75	124.6	36	19.7	-
	21.1	12.0	-	-	27	4.3	31.88
1030	0	12.8	9.37	108.6	47	26.7	31.70
		12.0	10.50	119.1	32	24.1	31.85
1130	0	12.8	9.02	104.5	53	25.2	31.59
		12.1	11.13	126.3	34	12.7	31.83
1230	0	12.9	9..6	115.4	61	16.3	31.56
	17.4	12.1	10.99	124.7	35	9.5	31.88
1330	0	13.7	10.37	122.8	56	70.0	31.62
	17.4	12.7	10.77	124.8	41	4.5	31.74
1430	0	13.0	10.69	123.9	54	10.3	31.64
	19.3	12.5	10.19	118.1	42	14.3	31.74
1530	0	13.1	9.25	107.2	56	22.4	31.69
	22.9	11.5	9.72	110.3	39	4.8	31.93
1630	0	12.9	10.28	119.1	39	12.8	31.85
	24.8	12.0	10.76	122.1	39	9.8	31.80
1730	0	12.8	10.45	121.1	39	27.0	31.86
	24.8	11.8	10.58	120.0	32	9.8	31.89
1830	0	12.8	9.50	110.1	34	0	31.85
	24.8	11.5	10.43	118.3	32	9.4	31.91
1930	0	12.1	10.09	114.5	38	28.4	31.85
		11.5	10.13	114.9	30	21.2	31.91

Appendix 4. Phytoplankton densities as number of cells per L at 12 sampling stations in the Western Isles area and at three depths.

MAY 26 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	0	0	0	0		20	0	60		
SCRIPPSIELLA TROCHOIDEA	0	0	0	0	40	0		40	0	20		
GYRODINIUM SP.	0	0	0	0	0	0		20	0	0		
CHAETOCEROS DEBILIS	0	0	140	20	60	40		0	100	20		
CHAETOCEROS DECIPIENS	0	0	0	0	40	0		20	40	0		
CHAETOCEROS FURCELLATUS	0	0	0	0	0	0		20	60	0		
CHAETOCEROS PERPUSILLUS	0	0	140	0	0	0		0	0	0		
CHAETOCEROS SOCIALIS	0	20	0	0	20	20		0	160	0		
COSCINOSIRA POLYCHORDA	0	20	0	0	0	0		0	0	0		
MELOSIRA NUMMULOIDES	0	0	0	20	0	0		0	0	0		
NAVICULA SP.	0	0	0	0	0	0		0	0	20		
NITZSCHIA DELICATISSIMA	0	0	40	20	0	20		20	40	20		
PLEUROSIGMA ANGULATUM	0	0	20	0	0	0		0	0	0		
PLEUROSIGMA STRIGOSUM	0	0	0	0	20	0		0	0	0		
RHIZOSOLENIA HEBETATA	20	0	0	0	0	0		0	0	0		
MESODINIUM RUBRUM	0	0	60	240	100	100		20	20	60		
EUGLENA SP.	40	20	0	20	40	0		80	20	20		
TINTINNOPSIS SP.	0	20	0	80	40	20		40	20	0		

MAY 26 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	40	0	0	0	0		0	0	0		
SCRIPPSIELLA TROCHOIDEA	0	20	0	20	20	0		0	0	0		
BACTERIOSIRA FRAGILIS	0	0	0	0	20	0		0	0	0		
BIDDULPHIA AURITA	0	0	0	20	0	0		0	0	0		
CHAETOCEROS CONSTRICTUS	20	0	0	0	0	0		0	0	0		
CHAETOCEROS CONVOLUTUS	20	0	0	0	0	0		0	0	0		
CHAETOCEROS DEBILIS	40	40	20	80	20	20		20	60	120		
CHAETOCEROS DIADEMA	0	20	0	0	0	0		0	0	0		
CHAETOCEROS FURCELLATUS	0	0	0	0	0	0		40	80	0		
CHAETOCEROS LACINIOSUS	0	20	60	0	0	0		0	0	0		
CHAETOCEROS SOCIALIS	0	40	20	20	0	0		80	140	100		
DITYLUM BRIGHTWELLI	0	0	0	0	0	0		20	0	0		
LEPTOCYLINDRUS MINIMUS	0	40	0	0	0	0		40	0	20		
MELOSIRA NUMMULOIDES	0	20	0	0	0	0		0	0	0		
NAVICULA SP.	40	0	0	0	0	0		0	0	0		
NITZSCHIA DELICATISSIMA	0	20	60	0	40	0		0	0	40		
PLEUROSIGMA ANGULATUM	20	20	0	20	0	0		0	20	60		
PLEUROSIGMA STRIGOSUM	0	0	0	0	20	40		0	0	0		
THALASSIOSIRA NORDENSKIOELDII	0	0	20	0	0	0		20	0	0		
MESODINIUM RUBRUM	20	40	0	0	0	0		20	20	20		
EUGLENA SP.	0	80	0	40	0	0		20	20	0		
TINTINNOPSIS SP.	0	0	0	0	0	0		0	20	0		
TINTINNOPSIS PATULA	0	0	0	0	20	0		0	0	0		

MAY 26 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GYRODINIUM SP.	0	0	0		0	20		0	0	0		
BIDDULPHIA AURITA	0	0	0		0	0		20	0	0		
CHAETOCEROS COMPRESSUS	0	20	0		0	0		0	20	0		
CHAETOCEROS CONVOLUTUS	0	0	0		0	0		0	20	0		
CHAETOCEROS DEBILIS	0	20	0		0	20		100	80	220		
CHAETOCEROS DECIPIENS	0	20	0		0	0		0	0	0		
CHAETOCEROS LACINIOSUS	0	40	0		0	0		0	0	20		
CHAETOCEROS SOCIALIS	0	0	0		40	40		100	0	80		
GYROSIGMA BALTICA	0	0	0		0	20		0	0	0		
NITZSCHIA DELICATISSIMA	0	20	0		0	20		0	0	0		
PLEUROSIGMA ANGULATUM	0	20	0		0	0		20	0	0		
PLEUROSIGMA STRIGOSUM	0	0	0		40	0		0	0	0		
RHABDONEMA ADRIATICUM	0	0	0		0	0		20	0	0		
THALASSIOSIRA NORDENSKIOELDII	0	0	0		0	0		0	40	0		
MESODINIUM RUBRUM	40	0	0		0	0		40	0	20		
EUGLENA SP.	0	20	0		0	0		40	0	20		

Appendix 4. (cont'd)

JUNE 2 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	20	0	40	340	40	140	0	120	1080	140		
GONYAULAX (DUPLET)	0	0	0	40	0	0	0	20	80	40		
GONYAULAX (TRIPLET)	0	0	0	0	0	0	0	0	20	0		
GONYAULAX (QUADRUPLET)	0	0	0	40	0	0	0	0	20	0		
SCRIPPSIELLA TROCHOIDEA	0	0	40	40	20	40	0	0	60	40		
GYRODINIUM SP.	40	20	0	0	0	0	0	0	0	0		
CHAETOCEROS CONSTRICTUS	0	0	0	0	0	0	20	0	0	0		
CHAETOCEROS DEBILIS	0	0	0	20	60	0	60	120	20	60		
MELOSIRA NUMMULOIDES	0	0	0	0	0	0	0	0	0	20		
MELOSIRA MONILIFORMIS	0	0	0	0	0	0	0	40	0	0		
NITZSCHIA CLOSTERIUM	0	0	0	0	0	0	20	0	0	0		
NITZSCHIA DELICATISSIMA	0	0	20	0	0	0	20	0	0	0		
PLEUROSIGMA ANGULATUM	0	0	0	0	0	0	0	20	20	0		
THALASSIOSIRA NORDENSKIOELDII	0	0	0	0	20	0	0	0	0	0		
THALASSIOSIRA ROTULA	0	0	0	0	0	0	0	20	0	0		
MESODINIUM RUBRUM	200	0	160	40	60	200	40	40	80	220		
EUGLENA SP.	20	20	20	0	100	20	0	0	180	140		
EUTREPTIA SP.	0	0	0	380	0	0	0	0	0	0		
FAVELLA SP.	0	0	0	0	0	20	0	0	0	0		
TINTINNOPSIS SP.	60	40	0	0	20	40	0	0	0	20		
TINTINNOPSIS CINCTA	20	0	0	0	0	0	0	0	0	0		

JUNE 2 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	40	0	0	0	0	20	0	60		
DINOPHYSIS SP.	20	0	0	0	0	0	0	0	0	0		
SCRIPPSIELLA TROCHOIDEA	0	20	40	0	0	20	0	60	0	0		
CHAETOCEROS SP.	20	0	0	0	0	0	0	0	0	0		
CHAETOCEROS DEBILIS	0	20	0	0	60	40	40	0	100	20		
CHAETOCEROS DECIPIENS	0	20	0	0	0	0	0	0	0	0		
CHAETOCEROS SOCIALIS	0	0	0	0	20	0	0	0	0	20		
EUCAMPIA SP.	0	0	0	0	0	0	0	20	0	40		
GYROSIGMA SP.	0	20	0	0	0	0	0	0	0	0		
MELOSIRA NUMMULOIDES	0	0	0	0	40	0	0	0	0	20		
MELOSIRA MONILIFORMIS	0	0	0	0	0	0	0	20	0	0		
NITZSCHIA DELICATISSIMA	0	0	0	20	0	0	0	0	0	0		
PLEUROSIGMA ANGULATUM	0	0	0	0	0	0	20	0	0	20		
THALASSIOSIRA NORDENSKIOELDII	0	20	0	0	0	0	100	0	0	0		
THALASSIOSIRA ROTULA	0	0	0	0	0	0	0	0	0	20		
DISTEPHANUS SPECULUM	20	0	0	0	0	0	0	0	0	0		
MESODINIUM RUBRUM	60	20	0	0	20	20	0	20	40	20		
EUGLENA SP.	0	0	20	0	20	0	0	20	60	100		
TINTINNOPSIS SP.	0	40	20	0	0	20	0	20	0	80		
TINTINNOPSIS PATULA	0	0	0	0	0	20	0	0	0	0		

JUNE 2 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	0		20					20		
CHAETOCEROS COMPRESSUS	0	20	0		0					0		
CHAETOCEROS DEBILIS	20	0	20		20					20		
NITZSCHIA DELICATISSIMA	0	0	20		0					0		
PLEUROSIGMA ANGULATUM	60	0	20		20					40		
THALASSIOSIRA NORDENSKIOELDII	0	0	0		0					40		
MESODINIUM RUBRUM	0	0	40		40					40		
TINTINNOPSIS SP.	20	0	0		0					0		

Appendix 4. (cont'd)

JUNE 9 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	180	760	560	340	380	480	160	280	200	360		
GONYAULAX (DUPLET)	20	80	20	40	0	0	0	0	0	40		
GONYAULAX (TRIPLET)	0	0	0	0	0	20	0	0	0	0		
GONYAULAX (QUADRUPLET)	0	0	0	0	0	20	0	0	0	0		
GONYAULAX (CYST)	0	0	0	0	20	0	0	0	0	0		
CERATIUM LONGIPES	0	0	0	0	0	20	0	0	0	0		
DINOPHYSIS SP.	0	20	0	0	0	0	0	0	0	0		
SCRIPPSIELLA TROCHOIDEA	140	160	60	20	20	0	40	40	0	20		
CHAETOCEROS COMPRESSUS	0	0	20	0	20	0	0	0	0	0		
CHAETOCEROS DEBILIS	0	60	40	100	100	0	220	0	40	20		
CHAETOCEROS SOCIALIS	20	0	0	0	0	0	60	0	0	0		
COSCINODISCUS SP.	0	0	0	0	0	0	20	0	0	0		
EUCAMPIA SP.	0	0	20	0	0	0	0	0	0	0		
LEPTOCYLINDRUS MINIMUS	0	0	0	0	0	0	20	0	0	0		
NITZSCHIA DELICATISSIMA	0	0	0	0	20	0	0	0	0	0		
PLEUROSIGMA ANGULATUM	0	0	0	0	20	0	0	0	0	0		
RHIZOSOLENIA HEBETATA	0	0	0	0	0	0	0	20	0	0		
THALASSIOSIRA NORDENSKIOELDII	0	60	60	20	20	0	0	0	0	0		
THALASSIOTHRIX NITZSCHIODES	0	0	20	0	0	0	0	0	0	0		
MESODINIUM RUBRUM	260	160	480	60	140	80	80	0	0	40		
EUGLENA SP.	80	40	180	40	80	60	20	60	20	0		
EUTREPTIA SP.	10000	100	1480	4640	700	0	2800	580	2200	2740		
FAVELLA SP.	0	60	40	40	40	40	0	0	20	20		
PTYCHOCYLIS SP.	0	0	60	40	20	40	20	0	0	0		
TINTINNOPSIS SP.	120	20	40	20	40	0	0	60	60	0		
TINTINNOPSIS BEROIDEA	0	0	40	0	0	0	0	0	0	0		
TINTINNOPSIS CINCTA	0	0	0	0	0	0	0	0	0	20		

JUNE 9 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	60	380	180	40	200	20	60	0	0	460		
GONYAULAX (DUPLET)	0	20	20	0	20	0	0	0	0	0		
GONYAULAX (FUSING)	0	0	0	0	0	0	0	0	0	40		
CERATIUM LONGIPES	0	40	0	0	20	0	0	0	0	0		
DINOPHYSIS SP.	0	0	0	0	0	0	0	0	0	40		
PERIDINIUM CONICUM	0	20	0	0	0	0	0	0	0	0		
SCRIPPSIELLA TROCHOIDEA	0	40	20	0	20	40	0	20	0	20		
CERATAULINA BERGONI	0	0	0	0	0	40	20	0	0	20		
CHAETOCEROS COMPRESSUS	0	20	20	0	0	0	20	0	0	20		
CHAETOCEROS DEBILIS	40	20	60	0	0	60	200	40	120	80		
CHAETOCEROS LACINIOSUS	0	0	0	0	0	0	60	20	0	0		
COSCINODISCUS SP.	0	0	0	0	0	0	0	20	0	0		
EUCAMPIA SP.	0	40	0	0	20	0	0	0	20	0		
LEPTOCYLINDRUS MINIMUS	0	0	0	0	0	0	20	0	0	0		
PLEUROSIGMA ANGULATUM	0	0	40	0	0	0	0	0	20	0		
PLEUROSIGMA STRIGOSUM	20	0	0	0	0	0	0	0	0	0		
RHABDONEMA ADRIATICUM	20	0	0	0	0	0	0	0	0	0		
THALASSIOSIRA NORDENSKIOELDII	20	60	100	0	100	40	60	140	20	0		
MESODINIUM RUBRUM	100	120	20	40	20	40	60	20	0	0		
EUGLENA SP.	100	140	80	60	20	20	0	0	0	0		
EUTREPTIA SP.	1240	620	860	180	360	140	60	20	180	400		
FAVELLA SP.	60	20	20	20	80	20	0	0	0	20		
PTYCHOCYLIS SP.	20	20	0	0	0	0	0	0	0	0		
TINTINNOPSIS SP.	80	20	0	0	60	0	0	0	20	0		
TINTINNOPSIS PATULA	0	0	0	0	0	0	20	0	0	0		

Appendix 4. (cont'd)

JUNE 9 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	100	80	0		100	20				0		
CERATIUM LONGIPES	0	0	0		0	20				0		
GYRODINIUM SP.	0	0	0		20	0				0		
CHAETOCEROS COMPRESSUS	20	0	20		20	0				20		
CHAETOCEROS CONVOLUTUS	0	20	0		0	0				0		
CHAETOCEROS DEBILIS	60	20	40		60	40				120		
CHAETOCEROS LACINIOSUS	0	20	0		0	0				0		
CHAETOCEROS TERES	0	20	0		0	0				0		
COSCINODISCUS SP.	0	0	0		20	0				0		
EUCAMPIA SP.	20	0	40		40	0				0		
MELOSIRA NUMMULOIDES	0	20	0		0	0				0		
NITZSCHIA DELICATISSIMA	0	20	0		0	0				0		
PLEUROSIGMA ANGULATUM	0	0	0		0	0				20		
RHIZOSOLENIA HEBETATA	0	60	20		0	0				0		
THALASSIOSIRA NORDENSKIOELDII	20	20	20		40	60				80		
THALASSIOSIRA ROTULA	0	20	0		0	0				0		
DISTEPHANUS SPECULUM	20	0	0		0	0				0		
MESODINIUM RUBRUM	20	40	20		40	0				0		
EUGLENA SP.	100	100	0		40	0				20		
EUTREPTIA SP.	1340	0	260		360	140				40		
FAVELLA SP.	20	20	40		20	0				0		
PTYCHOCYLIS SP.	0	20	0		0	0				20		
TINTINNOPSIS SP.	20	40	0		0	0				20		

JUNE 17 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	60	80	180	60	40	40	0	80	60	140	80	
GONYAULAX (DUPLET)	0	0	0	0	0	0	0	0	0	40	0	
CERATIUM LONGIPES	20	0	0	0	0	0	0	0	0	0	0	
DINOPHYSIS SP.	0	0	20	20	0	0	0	20	0	0	0	
SCRIPPSIELLA TROCHOIDEA	40	0	40	0	0	0	0	0	0	0	0	
GYRODINIUM SP.	0	0	0	0	0	20	0	0	0	0	0	
CERATAULINA BERGONI	0	0	20	20	0	0	0	0	0	0	0	
CHAETOCEROS COMPRESSUS	0	0	0	0	60	0	20	0	20	0	0	
CHAETOCEROS CONVOLUTUS	0	0	0	0	0	0	0	0	0	20	0	
CHAETOCEROS DEBILIS	100	100	100	120	180	100	340	360	200	700	180	
CHAETOCEROS LACINIOSUS	0	0	0	20	0	0	0	0	40	80	0	
CHAETOCEROS SOCIALIS	0	0	20	80	60	40	20	60	120	200	80	
CHAETOCEROS TERES	0	0	0	0	0	0	0	0	0	40	0	
COSCINOSIRA POLYCHORDA	100	0	100	0	60	0	0	40	80	40	20	
EUCAMPIA SP.	20	0	0	0	60	0	0	60	20	0	20	
LEPTOCYLINDRUS DANICUS	0	0	0	0	0	0	0	0	120	0	0	
LEPTOCYLINDRUS MINIMUS	0	0	20	0	0	0	20	0	0	0	40	
MELOSIRA NUMMULOIDES	0	0	0	20	0	0	20	40	40	60	0	
NITZSCHIA DELICATISSIMA	40	20	40	0	0	20	0	0	200	100	140	
PLEUROSIGMA ANGULATUM	0	0	40	20	60	20	40	40	20	100	0	
POROSIRA GLACIALIS	0	0	0	0	0	0	0	20	0	0	0	
RHABDONEMA ADRIATICUM	0	0	0	0	0	0	0	0	0	0	40	
RHIZOSOLENIA HEBETATA	0	0	120	0	20	0	0	0	0	0	0	
THALASSIOSIRA GRAVIDA	0	20	0	120	0	180	0	140	260	300	80	
THALASSIOSIRA NORDENSKIOELDII	80	0	80	0	120	0	280	120	20	80	20	
MESODINIUM RUBRUM	100	180	100	0	60	80	0	60	80	80	0	
EUGLENA SP.	0	20	20	0	40	60	20	0	40	0	60	
EUTREPTIA SP.	20	0	80	60	0	0	60	0	0	0	0	
FAVELLA SP.	20	0	60	40	0	20	20	0	20	20	0	
PTYCHOCYLIS SP.	0	0	20	0	20	0	0	0	0	0	0	
TINTINNOPSIS SP.	0	0	20	0	20	0	0	20	0	0	0	
TINTINNOPSIS CINCTA	0	0	0	0	40	0	0	0	0	0	0	

Appendix 4. (cont'd)

JUNE 17 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	100	0	0	40	20	0	20	160	120	20	0	
GONYAULAX (DUPLET)	0	0	0	20	0	0	0	0	40	0	0	
GONYAULAX (FUSING)	0	0	0	0	0	0	0	20	0	0	0	
DINOPHYSIS SP.	20	0	0	0	0	0	0	0	0	0	0	
SCRIPPSIELLA TROCHOIDEA	40	0	0	0	20	0	20	0	20	0	0	
GYRODINIUM SP.	0	0	0	0	0	0	0	0	0	0	20	
CERATAULINA BERGONI	0	0	40	0	0	0	0	0	0	20	0	
CHAETOCEROS SP.	0	0	0	0	0	20	0	0	0	0	0	
CHAETOCEROS COMPRESSUS	0	0	0	20	20	0	0	0	0	0	0	
CHAETOCEROS DEBILIS	100	120	180	400	240	40	340	180	600	420	300	
CHAETOCEROS DIDYMUS	0	0	0	0	0	0	0	140	0	60	0	
CHAETOCEROS LACINIOSUS	0	0	0	20	20	20	220	0	20	60	20	
CHAETOCEROS SOCIALIS	0	0	0	120	100	20	0	40	220	0	100	
COSCINOSIRA POLYCHORDA	0	20	40	0	0	20	40	0	0	20	80	
DETONULA CYSTIFERA	0	0	0	0	0	0	0	0	20	0	0	
DITYLUM BRIGHTWELLI	0	0	0	20	0	0	0	0	0	0	0	
EUCAMPIA SP.	20	0	20	100	20	0	40	60	0	80	80	
LEPTOCYLINDRUS MINIMUS	20	0	0	0	0	0	0	0	0	20	220	
MELOSIRA NUMMULOIDES	80	0	20	20	0	0	100	0	0	0	20	
NAVICULA SP.	0	0	0	0	0	0	0	0	0	0	20	
NITZSCHIA DELICATISSIMA	20	40	20	0	0	0	100	0	40	80	0	
PLEUROSIGMA ANGULATUM	60	0	0	120	60	0	40	0	140	40	40	
POROSIRA GLACIALIS	0	0	0	0	0	0	40	0	0	0	0	
RHABDONEMA ADRIATICUM	0	0	0	0	0	0	0	0	0	20	0	
RHIZOSOLENIA HEBETATA	0	0	0	0	0	0	0	20	20	0	20	
THALASSIOSIRA GRAVIDA	0	0	100	80	40	0	0	180	540	160	280	
THALASSIOSIRA NORDENSKIOELDII	0	100	20	60	40	0	240	0	60	40	40	
MESODINIUM RUBRUM	20	20	0	20	0	20	40	60	40	0	0	
EUGLENA SP.	0	20	0	60	20	0	0	40	40	0	0	
EUTREPTIA SP.	0	0	20	80	0	0	0	0	0	0	0	
FAVELLA SP.	20	0	40	80	20	0	20	20	40	20	0	
PTYCHOCYLIS SP.	20	0	20	0	0	40	0	0	0	0	0	
TINTINNOPSIS SP.	0	0	0	40	0	20	0	0	0	0	0	
TINTINNOPSIS CINCTA	0	0	0	0	20	0	0	0	0	0	0	
TINTINNOPSIS KARAJACENSIS	0	0	20	0	0	0	0	0	0	0	0	

JUNE 17 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA		0	80		80		40			20	0	
GONYAULAX (DUPLET)		0	20		0		0			0	0	
SCRIPPSIELLA TROCHOIDEA		0	0		0		0			0	20	
CERATAULINA BERGONI		0	0		0		0			20	0	
CHAETOCEROS DEBILIS		20	140		200		100			220	100	
CHAETOCEROS LACINIOSUS		20	0		60		60			60	20	
CHAETOCEROS SOCIALIS		0	140		180		140			20	0	
COSCINOSIRA POLYCHORDA		40	0		60		0			0	0	
DETONULA CYSTIFERA		0	0		0		40			0	0	
DITYLUM BRIGHTWELLI		0	80		0		0			0	0	
EUCAMPIA SP.		0	0		0		20			60	40	
LEPTOCYLINDRUS MINIMUS		0	0		0		40			20	0	
MELOSIRA NUMMULOIDES		0	0		0		80			20	0	
NITZSCHIA DELICATISSIMA		20	20		40		20			60	40	
PLEUROSIGMA ANGULATUM		20	100		160		40			40	40	
POROSIRA GLACIALIS		0	40		0		0			0	60	
RHIZOSOLENIA HEBETATA		0	0		40		0			0	20	
SYNEDRA SP.		0	0		0		0			40	80	
THALASSIOSIRA GRAVIDA		0	240		340		0			460	140	
THALASSIOSIRA NORDENSKIOELDII		40	40		0		0			60	0	
MESODINIUM RUBRUM		0	20		60		20			80	100	
EUGLENA SP.		0	20		20		0			0	20	
EUTREPTIA SP.		0	20		20		0			0	0	
FAVELLA SP.		0	20		60		0			60	0	

Appendix 4. (cont'd)

JUNE 23 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	280	140	2560	480	480	560	100	500	520	400	0	
GONYAULAX (DUPLET)	40	20	0	40	60	60	0	0	0	0	0	
GONYAULAX (QUADRUPLET)	0	0	0	0	0	0	20	0	0	0	0	
GONYAULAX (FUSING)	0	0	0	0	0	0	20	0	0	0	0	
GONYAULAX (PLANOZYGOTE)	0	0	0	0	0	40	0	0	0	0	0	
CERATIUM LONGIPES	0	0	0	0	40	0	0	20	20	0	0	
PERIDINIUM SP.	0	0	0	0	0	0	20	0	0	0	0	
PERIDINIUM CONICUM	0	0	0	140	0	0	0	0	0	0	0	
SCRIPPSIELLA TROCHOIDEA	0	0	0	80	60	60	0	0	100	40	20	
BACTERIOSIRA FRAGILIS	0	0	0	0	60	20	60	120	20	0	0	
CERATAULINA BERGONI	60	20	0	0	0	0	0	0	0	0	0	
CHAETOCEROS COMPRESSUS	60	0	2560	40	100	40	40	20	20	120	0	
CHAETOCEROS CONVOLUTUS	0	120	0	40	80	0	0	40	120	20	0	
CHAETOCEROS DEBILIS	240	500	3400	460	700	60	880	380	360	520	0	
CHAETOCEROS DIADEMA	0	0	0	20	0	0	0	0	0	0	0	
CHAETOCEROS LACINIOSUS	0	20	2560	180	240	20	280	100	120	60	40	
CHAETOCEROS LORENZIANUS	0	0	0	0	40	0	0	60	0	80	0	
CHAETOCEROS SOCIALIS	140	180	4260	60	120	0	80	20	100	40	0	
COSCINOSIRA POLYCHORDA	20	20	2560	20	60	0	0	20	60	40	0	
EUCAMPIA SP.	40	200	1700	80	280	60	40	60	40	100	0	
LEPTOCYLINDRUS MINIMUS	0	20	860	100	0	0	40	0	20	60	0	
MELOSIRA NUMMULOIDES	0	100	860	20	0	0	60	100	20	40	0	
NITZSCHIA DELICATISSIMA	60	60	860	240	20	20	320	60	20	80	0	
PLEUROSIGMA ANGULATUM	20	0	0	0	0	40	0	20	0	20	20	
POROSIRA GLACIALIS	0	100	0	40	0	0	60	0	0	0	0	
RHABDONEMA ADRIATICUM	20	20	0	0	0	0	0	0	0	0	0	
RHIZOSOLENIA DELICATULA	0	0	0	20	20	0	0	0	0	0	0	
RHIZOSOLENIA HEBETATA	60	60	860	40	40	0	80	60	20	40	0	
SKELETONEMA COSTATUM	0	0	0	0	0	0	40	0	0	0	0	
THALASSIOSIRA DECIPIENS	0	0	0	0	40	0	0	0	0	0	0	
THALASSIOSIRA GRAVIDA	820	1240	0	120	860	380	2360	800	2400	800	0	
THALASSIOSIRA NORDENSKIOELDII	120	260	860	360	240	0	220	760	380	220	0	
MESODINIUM RUBRUM	120	40	0	120	60	100	0	20	40	100	20	
EUGLENA SP.	0	0	0	80	0	0	0	0	0	0	0	
EUTREPTIA SP.	40	60	0	20	0	0	0	0	0	0	0	
FAVELLA SP.	60	40	860	0	140	100	0	40	60	60	0	
PTYCHOCYLIS SP.	0	0	0	0	60	0	0	20	0	0	0	
TINTINNIDS	0	0	0	0	0	0	0	0	0	20	0	
TINTINNOPSIS SP.	20	40	0	0	0	0	0	0	0	0	0	
BRACHIONUS SP.	0	0	0	0	0	40	20	0	80	20	0	

Appendix 4 (cont'd)

JUNE 23 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	80	40	80	140	260	160	40	120	160	360		
GONYAULAX (DUPLET)	0	0	0	0	0	20	0	0	0	0		
PERIDINIUM CONICUM	0	0	0	20	0	0	0	0	0	0		
SCRIPPSIELLA TROCHOIDEA	0	0	40	0	0	0	0	0	0	0		
GYRODINIUM SP.	0	0	0	0	0	0	0	20	0	0		
BACTERIOSIRA FRAGILIS	0	0	0	0	20	0	100	40	80	100		
CERATAULINA BERGONI	0	80	20	0	0	0	0	0	0	0		
CHAETOCEROS COMPRESSUS	180	0	60	140	180	100	120	0	200	40		
CHAETOCEROS CONVOLUTUS	0	80	80	140	0	0	0	0	0	480		
CHAETOCEROS DEBILIS	500	320	540	800	740	360	780	460	980	1100		
CHAETOCEROS DIADEMA	0	0	0	0	0	0	0	0	0	100		
CHAETOCEROS LACINIOSUS	0	0	360	0	240	120	140	100	320	180		
CHAETOCEROS LORENZIANUS	0	0	0	0	20	0	0	0	0	200		
CHAETOCEROS SOCIALIS	240	160	20	700	60	0	0	60	0	40		
COSCINOSIRA POLYCHORDA	300	20	220	60	40	60	80	20	460	40		
DETONULA CYSTIFERA	0	100	0	0	0	0	0	0	0	0		
DITYLUM BRIGHTWELLI	20	0	0	0	20	0	0	0	0	0		
EUCAMPIA SP.	140	40	140	140	320	140	320	160	160	380		
LEPTOCYLINDRUS MINIMUS	20	0	0	80	20	20	0	20	0	60		
MELOSIRA NUMMULOIDES	20	80	40	140	40	20	180	140	100	140		
NITZSCHIA DELICATISSIMA	0	120	180	240	20	180	0	80	180	0		
PLEUROSIGMA ANGULATUM	0	0	80	40	60	20	20	20	0	20		
POROSIRA GLACIALIS	0	20	0	60	0	20	20	100	20	20		
RHABDONEMA ADRIATICUM	0	0	0	0	0	0	0	20	0	40		
RHIZOSOLENIA DELICATULA	0	0	100	0	0	0	20	0	0	0		
RHIZOSOLENIA HEBETATA	80	40	60	240	80	20	160	60	160	120		
SKELETONEMA COSTATUM	0	0	0	0	20	0	0	0	0	0		
THALASSIOSIRA GRAVIDA	1120	1060	1000	100	1900	940	2360	800	1400	3500		
THALASSIOSIRA NORDENSKIOELDII	140	180	120	740	220	120	60	420	380	240		
THALASSIOTHRIX NITZSCHIODES	0	0	0	20	0	0	0	0	0	0		
MESODINIUM RUBRUM	20	0	0	0	40	0	0	0	20	80		
EUGLENA SP.	20	0	0	0	0	0	0	0	0	0		
EUTREPTIA SP.	20	0	0	0	0	0	0	0	0	0		
FAVELLA SP.	0	40	0	40	60	20	100	20	60	120		
PTYCHOCYLIS SP.	20	0	0	0	20	20	0	20	0	0		
TINTINNOPSIS SP.	0	0	0	0	0	0	0	20	0	0		
BRACHIONUS SP.	0	0	0	20	0	0	0	0	0	0		

JUNE 23 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	80	40	20		0	40	0	0	40	0		
GONYAULAX (DUPLET)	20	20	0		0	0	0	0	0	0		
CERATIUM LONGIPES	0	0	0		0	20	0	0	0	0		
PERIDINIUM CONICUM	0	0	0		20	0	0	0	0	0		
BACTERIOSIRA FRAGILIS	0	0	60		160	60	20	40	20	0		
CERATAULINA BERGONI	0	40	0		0	0	0	0	0	0		
CHAETOCEROS COMPRESSUS	0	60	120		260	120	80	120	260	860		
CHAETOCEROS CONVOLUTUS	40	0	80		20	40	20	0	160	0		
CHAETOCEROS DEBILIS	420	480	480		860	520	280	760	1260	5120		
CHAETOCEROS LACINIOSUS	60	140	300		520	220	140	140	140	860		
CHAETOCEROS SOCIALIS	200	280	80		40	140	20	100	20	3400		
COSCINOSIRA POLYCHORDA	120	60	240		360	0	80	260	0	0		
DETONULA CYSTIFERA	0	20	0		0	0	0	0	0	0		
EUCAMPIA SP.	40	100	140		360	180	20	100	260	2560		
LEPTOCYLINDRUS MINIMUS	40	20	20		0	20	0	0	0	0		
MELOSIRA NUMMULOIDES	40	120	0		80	0	20	60	180	0		
NITZSCHIA DELICATISSIMA	180	40	40		40	20	20	180	20	1700		
PLEUROSIGMA ANGULATUM	20	0	20		0	20	20	40	40	0		
POROSIRA GLACIALIS	40	0	0		20	40	0	80	120	860		
RHIZOSOLENIA DELICATULA	0	0	0		40	0	0	0	0	0		
RHIZOSOLENIA HEBETATA	180	80	60		220	100	80	200	140	0		
THALASSIOSIRA GRAVIDA	600	460	1420		1340	1540	1460	2080	4760	11080		
THALASSIOSIRA NORDENSKIOELDII	200	220	200		80	60	140	260	140	1700		
MESODINIUM RUBRUM	20	0	0		0	20	60	0	0	860		
EUGLENA SP.	40	0	0		0	0	0	0	0	0		
FAVELLA SP.	0	0	20		0	0	0	0	20	0		
BRACHIONUS SP.	0	0	0		0	0	0	0	20	0		

Appendix 4. (cont'd)

JUNE 30 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	1280	3720	6660	3120	660	1700	480	700	1140	660	440	
GONYAULAX (DUPLET)	140	280	260	240	80	120	60	80	100	80	20	
GONYAULAX (TRIPLET)	0	20	0	0	0	0	0	0	20	0	0	
GONYAULAX (QUADRUPLET)	40	60	0	0	0	0	0	0	0	0	0	
CERATIUM LONGIPES	60	0	20	100	20	60	0	20	80	40	0	
CERATIUM MINUTUM	0	0	0	0	0	0	0	0	20	0	0	
DINOPHYSIS ACUTA	0	0	60	0	0	0	0	0	0	20	0	
DINOPHYSIS ACUMINATA	40	0	20	40	80	60	40	20	60	40	20	
DINOPHYSIS NORVEGICA	40	60	0	0	0	60	20	100	0	0	0	
PERIDINIUM SP.	680	1300	1760	2820	760	740	460	1200	1440	1240	420	
PERIDINIUM CONICUM	0	0	20	20	0	0	20	20	0	0	20	
PERIDINIUM DEPRESSUM	0	0	20	20	20	0	20	0	0	0	0	
PERIDINIUM TRIQUETA	60	200	180	320	20	40	0	100	60	40	20	
PERIDINIUM OVATUM	0	0	40	0	0	0	0	0	0	0	0	
SCRIPPSIELLA TROCHOIDEA	320	440	280	400	120	200	60	20	0	140	40	
BIDDULPHIA AURITA	0	0	0	0	0	0	0	20	0	0	0	
CHAETOCEROS SP.	2560	3340	2540	3560	3000	3140	7360	5080	1940	3660	440	
CHAETOCEROS ALTANTICUS	0	0	0	0	0	0	0	20	0	40	20	
CHAETOCEROS CONSTRICTUS	0	0	0	0	0	0	0	0	0	0	640	
CHAETOCEROS CONVOLUTUS	280	200	180	160	100	220	140	420	360	340	40	
CHAETOCEROS DEBILIS	380	340	280	240	60	40	500	340	380	160	1040	
CHAETOCEROS DECIPIENS	0	0	0	140	80	40	40	60	20	120	80	
CHAETOCEROS LACINIOSUS	40	120	0	60	20	80	40	20	20	40	40	
CHAETOCEROS SOCIALIS	0	40	0	0	0	0	0	0	60	0	340	
CHAETOCEROS TERES	0	0	0	0	0	0	0	0	40	0	360	
COSCINOSIRA POLYCHORDA	80	0	0	20	0	0	0	0	40	0	0	
DITYLUM BRIGHTWELLI	0	60	0	0	60	40	20	20	0	0	20	
EUCAMPIA SP.	0	0	0	0	0	0	20	0	0	0	0	
FRAGILARIA SP.	0	0	0	0	0	0	0	0	0	0	40	
LEPTOCYLINDRUS MINIMUS	20	0	40	240	60	20	220	60	20	100	260	
LYCMOPHORA LYNGBYEI	0	0	0	0	0	0	0	0	0	0	20	
NAVICULA SP.	20	20	0	0	40	0	40	20	60	0	40	
NITZSCHIA CLOSTERIUM	0	0	0	0	0	0	20	0	20	0	20	
NITZSCHIA DELICATISSIMA	20	40	0	0	0	0	0	20	0	0	0	
NITZSCHIA PUNGENS	280	260	360	240	1080	640	840	660	600	400	80	
PLEUROSIGMA ANGULATUM	0	0	20	40	80	40	120	100	100	60	60	
RHIZOSOLENIA DELICATULA	100	40	20	0	80	80	60	140	100	100	0	
RHIZOSOLENIA HEBETATA	280	80	60	160	120	220	200	240	160	140	40	
RHIZOSOLENIA SETIGERA	0	0	0	0	0	0	0	0	40	0	0	
SKELETONEMA COSTATUM	60	0	20	0	40	0	0	0	0	0	20	
STEPHANOPYXIS TURRIS	60	0	60	80	20	40	40	100	140	40	100	
THALASSIOSIRA CONDENSATA	0	0	0	0	0	20	0	0	0	0	0	
THALASSIOSIRA GRAVIDA	3380	1200	2040	2060	2960	2700	780	2640	1720	2120	4800	
THALASSIOSIRA NORDENSKIOELDII	120	60	0	0	0	0	0	20	0	0	0	
THALASSIOSIRA ROTULA	280	140	80	260	320	460	320	320	440	400	180	
THALASSIOTHRIX NITZSCHIODES	0	0	0	0	20	0	0	0	60	20	20	
DISTEPHANUS SPECULUM	0	40	0	20	0	20	0	0	0	0	0	
MESODINIUM RUBRUM	1440	5280	1720	1180	940	1620	880	1000	940	680	700	
EUGLENA SP.	100	20	20	0	80	0	20	20	20	0	40	
FAVELLA SP.	20	0	0	60	20	40	1280	60	80	0	40	
HELICOSTOMELLA SP.	0	0	0	0	20	0	20	0	60	0	0	
PTYCHOCYLIS SP.	60	0	60	40	40	120	0	120	120	140	0	
TINTINNIDS	620	380	280	460	420	640	200	560	680	400	200	
ACARTIA SP.	0	0	0	20	0	0	0	0	0	0	0	
BRACHIONUS SP.	80	80	60	160	20	160	20	60	80	60	0	
UNIDENTIFIED GYMNODINIUM	20	0	0	20	0	0	0	0	40	40	20	
UNIDENTIFIED DINOPHYSIS	0	40	20	60	0	40	0	0	0	60	0	

Appendix 4. (cont'd)

JUNE 30 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	140	280	420	360	400	280	660	340	300	700	140	
GONYAULAX (DUPLET)	20	20	20	20	60	20	40	20	20	40	20	
CERATIUM LONGIPES	0	20	0	0	20	20	20	0	0	20	0	
CERATIUM MINUTUM	0	0	0	0	0	0	20	0	0	0	0	
DINOPHYSIS ACUTA	0	0	40	0	0	0	0	0	0	0	0	
DINOPHYSIS ACUMINATA	0	40	0	40	40	20	60	20	20	40	0	
DINOPHYSIS NORVEGICA	20	0	0	0	60	0	20	0	40	40	0	
PERIDINIUM SP.	60	680	1140	460	920	300	500	500	520	1200	360	
PERIDINIUM CONICUM	0	20	20	0	0	20	0	0	0	0	20	
PERIDINIUM DEPRESSUM	0	0	0	20	0	0	0	0	0	0	0	
PERIDINIUM TRIQUETA	0	0	60	0	20	0	0	40	0	60	0	
PERIDINIUM OVATUM	0	0	0	0	0	0	0	0	20	0	0	
SCRIPPSIELLA TROCHOIDEA	20	40	0	0	100	0	0	0	0	100	0	
BIDDULPHIA AURITA	0	0	0	0	0	20	0	0	0	0	0	
CHAETOCEROS SP.	1820	3100	2820	4480	4140	2440	5460	4540	2760	4620	340	
CHAETOCEROS ALTANTICUS	20	20	0	0	0	0	40	0	40	0	0	
CHAETOCEROS CONSTRICTUS	0	0	0	0	0	0	0	0	620	0	200	
CHAETOCEROS CONVOLUTUS	300	240	260	440	220	360	480	480	440	580	60	
CHAETOCEROS DEBILIS	80	660	200	260	160	220	440	400	580	260	1060	
CHAETOCEROS DECIPIENS	60	60	40	40	80	80	60	120	180	60	40	
CHAETOCEROS LACINIOSUS	120	40	80	40	100	0	80	20	220	40	80	
CHAETOCEROS MITRA	0	0	0	0	0	0	0	0	0	0	60	
CHAETOCEROS SOCIALIS	0	0	0	0	0	0	0	0	80	0	40	
CHAETOCEROS TERES	0	0	0	0	0	0	0	0	160	0	300	
COSCINOSIRA POLYCHORDA	0	0	20	60	0	0	0	0	0	0	0	
DITYLUM BRIGHTWELLI	0	40	0	60	0	0	40	20	20	0	20	
EUCAMPIA SP.	60	0	0	0	0	0	0	0	0	0	20	
GYROSIGMA SP.	0	40	0	0	0	0	0	0	0	0	20	
GYROSIGMA FASCIOLA	0	0	0	0	0	0	0	0	40	0	0	
GYROSIGMA PROLONGATUM	0	0	0	20	0	0	0	0	0	0	0	
GYROSIGMA TENNUISSIMUM	0	0	0	0	0	0	0	0	20	0	0	
LEPTOCYLINDRUS MINIMUS	20	20	40	180	220	20	440	260	60	80	180	
LYCMOPHORA LYNGBYEI	0	0	0	0	20	0	0	0	0	20	0	
NAVICULA SP.	0	60	20	20	0	60	60	20	40	20	20	
NITZSCHIA CLOSTERIUM	0	0	0	40	20	0	100	20	0	0	0	
NITZSCHIA DELICATISSIMA	40	0	0	100	120	60	0	60	0	0	60	
NITZSCHIA PUNGENS	380	320	700	640	760	560	620	600	820	420	140	
PLEUROSIGMA ANGULATUM	60	40	60	80	60	100	260	300	220	80	60	
RHIZOSOLENIA DELICATULA	80	160	60	320	260	140	280	460	220	240	80	
RHIZOSOLENIA FRAGILLIMA	20	0	0	0	0	0	0	0	0	0	20	
RHIZOSOLENIA HEBETATA	180	300	220	240	380	300	200	360	140	100	0	
SKELETONEMA COSTATUM	20	120	40	0	0	40	60	40	80	0	100	
STEPHANOPYXIS TURRIS	0	80	0	40	140	40	140	60	160	120	140	
THALASSIOSIRA CONDENSATA	0	0	0	0	0	0	0	0	100	0	0	
THALASSIOSIRA GRAVIDA	2700	3580	4400	3160	3200	2960	4800	2980	3960	2080	3500	
THALASSIOSIRA NORDENSKIOELDII	20	0	0	0	0	20	0	0	0	0	0	
THALASSIOSIRA ROTULA	200	220	200	220	20	120	180	620	320	580	180	
THALASSIOTHRIX NITZSCHIODES	0	0	40	0	80	20	60	40	40	40	20	
DISTEPHANUS SPECULUM	0	20	20	0	20	0	20	20	0	20	20	
MESODINIUM RUBRUM	120	280	20	140	20	40	680	300	100	380	100	
POLYASTERIAS SP.	0	0	0	0	0	0	0	0	20	0	0	
EUGLENA SP.	180	40	100	0	0	0	140	0	100	80	20	
FAVELLA SP.	100	0	0	60	40	40	40	40	120	80	20	
HELICOSTOMELLA SP.	20	20	20	0	0	0	0	0	0	0	0	
PTYCHOCYLIS SP.	0	20	60	60	40	0	40	60	20	100	0	
TINTINNIDS	560	1240	820	540	340	300	640	780	380	380	60	
ACARTIA SP.	0	20	0	0	0	20	20	0	0	0	0	
BRACHIONUS SP.	20	0	20	20	0	0	60	60	60	20	0	
UNIDENTIFIED GYMNODINIUM	0	0	40	20	20	0	0	0	0	0	0	
UNIDENTIFIED DINOPHYSIS	0	0	40	0	0	0	0	0	0	20	0	

Appendix 4. (cont'd)

JUNE 30 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA		180	260		220					340	200	
GONYAULAX (DUPLET)		0	20		40					20	40	
CERATIUM LONGIPES		20	20		0					0	0	
DINOPHYSIS ACUMINATA		20	60		0					40	0	
DINOPHYSIS NORVEGICA		0	0		40					20	0	
PERIDINIUM SP.		240	680		300					440	220	
PERIDINIUM DEPRESSUM		0	0		20					20	0	
PERIDINIUM OVATUM		20	0		0					0	0	
BIDDULPHIA AURITA		0	20		0					0	0	
CHAETOCEROS SP.		3120	4920		2960					2320	300	
CHAETOCEROS ALTANTICUS		0	0		0					20	0	
CHAETOCEROS BOREALIS		0	0		0					40	0	
CHAETOCEROS CONSTRICTUS		0	0		0					400	320	
CHAETOCEROS CONVOLUTUS		260	360		440					420	80	
CHAETOCEROS DEBILIS		220	240		260					400	1040	
CHAETOCEROS DECIPIENS		0	20		140					60	100	
CHAETOCEROS LACINIOSUS		20	80		80					60	100	
CHAETOCEROS MITRA		0	0		0					20	0	
CHAETOCEROS TERES		0	0		0					160	340	
COSCINODISCUS SP.		0	0		0					40	0	
COSCINOSIRA POLYCHORDA		0	0		0					20	0	
DITYLUM BRIGHTWELLI		200	40		40					20	20	
EUCAMPIA SP.		0	0		0					0	60	
LEPTOCYLINDRUS DANICUS		0	20		0					0	0	
LEPTOCYLINDRUS MINIMUS		60	80		180					180	40	
LYCMOPHORA LYNGBYEI		0	0		0					0	20	
NAVICULA SP.		40	40		100					160	0	
NITZSCHIA CLOSTERIUM		20	20		0					0	0	
NITZSCHIA DELICATISSIMA		60	0		20					0	20	
NITZSCHIA PUNGENS		560	920		380					700	140	
PLEUROSIGMA ANGULATUM		40	160		60					180	80	
RHIZOSOLENIA DELICATULA		40	200		220					300	40	
RHIZOSOLENIA HEBETATA		120	520		340					480	0	
SKELETONEMA COSTATUM		60	0		0					80	60	
STEPHANOPYXIS TURRIS		100	140		20					20	0	
THALASSIOSIRA GRAVIDA		3620	4520		4000					5060	3140	
THALASSIOSIRA NORDENSKIOELDII		20	0		0					0	0	
THALASSIOSIRA ROTULA		80	100		320					420	60	
THALASSIOTHRIX NITZSCHIODES		0	80		40					160	20	
DISTEPHANUS SPECULUM		20	20		0					40	40	
MESODINIUM RUBRUM		240	140		40					60	40	
EUGLENA SP.		160	60		0					40	100	
FAVELLA SP.		20	0		40					40	60	
PTYCHOCYLIS SP.		0	20		0					0	0	
TINTINNIDS		440	240		100					160	60	
ACARTIA SP.		20	0		0					0	0	
BRACHIONUS SP.		0	0		0					0	20	
UNIDENTIFIED GYMNODINIUM		0	0		20					0	0	
UNIDENTIFIED DINOPHYSIS		40	0		0					40	40	

Appendix 4. (cont'd)

JULY 7 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	1800	340	1520	3540	2200	1880	120	3820	3000	2540		
GONYAULAX (DUPLET)	100	20	20	100	0	60	0	40	20	40		
CERATIUM LONGIPES	0	60	80	60	80	40	80	20	20	20		
DINOPHYSIS ACUMINATA	20	20	20	60	40	20	20	120	60	0		
DINOPHYSIS NORVEGICA	0	0	100	60	0	60	40	80	20	0		
PERIDINIUM SP.	400	180	240	1860	1280	440	180	520	1040	840		
PERIDINIUM CONICUM	0	0	20	60	0	80	0	0	60	20		
PERIDINIUM DEPRESSUM	0	0	0	0	60	0	0	20	0	0		
PERIDINIUM TRIQUETA	0	20	0	0	200	140	20	0	160	0		
PERIDINIUM OVATUM	0	0	0	0	20	0	20	0	60	0		
SCRIPPSIELLA TROCHOIDEA	20	60	60	260	200	180	40	400	200	260		
BIDDULPHIA AURITA	0	0	0	0	20	0	0	0	0	0		
CHAETOCEROS SP.	520	680	1100	740	640	780	1900	2000	800	1040		
CHAETOCEROS ALTANTICUS	0	0	0	0	0	0	20	40	0	0		
CHAETOCEROS CONVOLUTUS	60	60	60	80	40	120	100	260	140	120		
CHAETOCEROS DEBILIS	0	20	0	0	0	0	40	60	100	80		
CHAETOCEROS DECIPIENS	0	0	0	20	0	0	20	0	0	20		
CHAETOCEROS LACINIOSUS	0	0	0	40	0	20	60	20	0	0		
DITYLUM BRIGHTWELLI	0	0	0	20	0	0	40	0	0	40		
FRAGILARIA SP.	0	0	0	0	0	0	20	0	0	0		
GYROSIGMA SP.	0	0	0	0	0	0	0	0	0	20		
GYROSIGMA PROLONGATUM	0	0	20	0	0	0	60	0	0	0		
LEPTOCYLINDRUS DANICUS	0	0	0	0	20	0	0	20	0	0		
LEPTOCYLINDRUS MINIMUS	60	20	40	160	40	160	720	120	160	120		
NAVICULA SP.	0	0	0	0	0	0	0	0	0	40		
NITZSCHIA CLOSTERIUM	0	0	40	80	80	20	0	20	60	20		
NITZSCHIA DELICATISSIMA	40	40	20	0	0	0	40	80	100	0		
NITZSCHIA PUNGENS	80	100	360	180	120	220	320	240	320	300		
PLEUROSIGMA ANGULATUM	0	40	20	0	0	20	20	0	20	0		
RHIZOSOLENIA DELICATULA	20	20	1080	480	340	360	380	1420	880	760		
RHIZOSOLENIA HEBETATA	60	60	100	120	200	200	160	120	120	40		
SKELETONEMA COSTATUM	0	40	20	0	0	0	40	0	0	0		
STEPHANOPYXIS TURRIS	40	20	60	20	40	20	120	120	100	60		
THALASSIOSIRA GRAVIDA	340	540	620	520	680	760	740	1620	820	480		
THALASSIOSIRA ROTULA	40	40	160	40	40	280	140	300	120	140		
THALASSIOTHRIX NITZSCHIODES	0	20	60	0	0	40	100	60	80	0		
DISTEPHANUS SPECULUM	0	0	0	40	0	0	20	60	0	0		
MESODINIUM RUBRUM	1020	340	1260	300	940	580	160	740	180	260		
EUGLENA SP.	20	20	100	60	140	40	0	20	20	40		
FAVELLA SP.	0	40	60	0	40	80	20	20	0	60		
HELICOSTOMELLA SP.	0	0	60	220	160	40	0	300	180	40		
PTYCHOCYLIS SP.	80	60	260	140	80	260	0	380	140	20		
TINTINNIDS	1000	700	1080	780	1500	960	200	480	0	280		
TINTINNOPSIS SP.	0	0	0	0	0	0	0	0	780	0		
ACARTIA SP.	0	0	20	0	20	0	20	20	0	0		
BRACHIONUS SP.	0	20	40	20	20	20	0	20	0	0		
UNIDENTIFIED GYMNODINIUM	0	20	0	0	40	0	20	0	0	0		

Appendix 4. (cont'd)

JULY 7 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	1720	260	960	1040	1380	960	940	80	360	2800		
GONYAULAX (DUPLET)	40	0	100	20	0	0	0	0	0	40		
CERATIUM LONGIPES	60	80	120	60	40	40	20	0	60	80		
CERATIUM MINUTUM	0	0	0	20	0	0	0	0	0	0		
DINOPHYSIS SP.	0	0	0	0	0	0	0	0	20	0		
DINOPHYSIS ACUMINATA	0	40	20	80	0	0	20	0	60	40		
DINOPHYSIS NORVEGICA	0	0	80	60	120	0	20	0	40	40		
PERIDINIUM SP.	520	160	140	720	680	320	520	20	140	840		
PERIDINIUM CONICUM	20	20	20	40	0	40	20	0	0	0		
PERIDINIUM DEPRESSUM	40	0	20	0	20	40	0	0	20	0		
PERIDINIUM TRIQUETA	0	0	0	0	0	0	40	0	0	140		
PERIDINIUM OVATUM	20	20	0	0	20	0	20	0	20	40		
SCRIPPSIELLA TROCHOIDEA	120	60	80	40	40	20	60	0	20	360		
CHAETOCEROS SP.	920	860	1480	1120	880	1600	1520	2540	2060	1100		
CHAETOCEROS ALTANTICUS	20	0	0	0	0	20	0	0	0	0		
CHAETOCEROS CONVOLUTUS	0	140	40	60	40	180	80	360	140	60		
CHAETOCEROS DEBILIS	0	0	20	0	0	0	0	0	300	80		
CHAETOCEROS DECIPIENS	0	20	20	20	0	0	0	0	0	0		
CHAETOCEROS LACINIOSUS	20	0	0	20	0	0	20	100	20	20		
COSCINODISCUS SP.	0	0	0	0	0	0	0	0	20	0		
COSCINOSIRA POLYCHORDA	0	20	0	0	0	40	0	0	0	40		
DITYLUM BRIGHTWELLI	20	0	0	0	0	0	0	40	0	0		
GYROSIGMA FASCIOLA	0	0	0	40	0	0	0	0	0	0		
GYROSIGMA PROLONGATUM	0	0	20	0	0	0	0	0	0	0		
LEPTOCYLINDRUS DANICUS	0	0	0	0	0	0	0	0	20	40		
LEPTOCYLINDRUS MINIMUS	160	60	260	240	60	140	520	360	380	200		
NAVICULA SP.	0	20	0	40	0	0	40	0	0	20		
NITZSCHIA CLOSTERIUM	60	20	80	40	0	60	0	160	140	40		
NITZSCHIA DELICATISSIMA	0	0	0	80	0	20	0	140	20	0		
NITZSCHIA PUNGENS	80	120	440	120	120	380	460	700	360	380		
PLEUROSIGMA ANGULATUM	0	20	20	0	20	20	60	140	20	0		
RHIZOSOLENIA DELICATULA	400	380	540	780	220	1380	1100	2240	100	860		
RHIZOSOLENIA HEBETATA	220	140	220	360	180	80	240	1300	260	160		
RHIZOSOLENIA SETIGERA	0	0	0	40	20	0	0	20	0	0		
SKELETONEMA COSTATUM	40	40	40	40	0	40	0	60	20	40		
STEPHANOPYXIS TURRIS	0	40	40	0	80	100	20	80	200	0		
THALASSIOSIRA GRAVIDA	300	460	680	920	1260	1080	960	4300	4000	820		
THALASSIOSIRA ROTULA	220	100	120	420	60	120	100	300	80	320		
THALASSIOTHRIX NITZSCHIODES	0	0	0	100	0	20	40	180	20	20		
DISTEPHANUS SPECULUM	0	0	20	0	20	20	0	0	0	60		
MESODINIUM RUBRUM	500	60	120	40	180	120	20	80	60	160		
EUGLENA SP.	160	100	40	120	60	80	120	60	80	200		
FAVELLA SP.	20	40	40	0	0	40	20	120	40	20		
HELICOSTOMELLA SP.	60	20	40	0	60	20	40	0	0	20		
PTYCHOCYLIS SP.	340	100	360	160	140	100	140	40	160	280		
TINTINNIDS	980	500	980	740	640	640	340	760	0	400		
TINTINNOPSIS SP.	0	0	0	0	0	0	0	0	760	0		
ACARTIA SP.	0	0	0	0	0	20	0	0	20	0		
BRACHIONUS SP.	0	0	0	0	0	0	0	0	60	0		

Appendix 4. (cont'd)

JULY 7 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	460	480	780		1260					60		
GONYAULAX (DUPLET)	0	0	20		140					0		
CERATIUM LONGIPES	60	60	80		40					0		
DINOPHYSIS ACUMINATA	0	20	80		40					0		
DINOPHYSIS NORVEGICA	0	20	20		60					20		
PERIDINIUM SP.	80	100	460		380					80		
PERIDINIUM DEPRESSUM	0	0	0		20					20		
PERIDINIUM TRIQUETA	0	20	0		0					0		
PERIDINIUM OVATUM	0	40	0		40					0		
SCRIPPSIELLA TROCHOIDEA	0	0	20		60					0		
BIDDULPHIA AURITA	0	0	0		0					20		
CHAETOCEROS SP.	840	840	2420		1860					1780		
CHAETOCEROS ALTANTICUS	20	20	20		20					0		
CHAETOCEROS CONVOLUTUS	0	140	200		100					100		
CHAETOCEROS DEBILIS	20	0	0		80					20		
CHAETOCEROS DECIPIENS	60	0	0		20					20		
CHAETOCEROS LACINIOSUS	20	20	20		40					0		
COSCINOSIRA POLYCHORDA	20	0	0		0					40		
DITYLUM BRIGHTWELLI	0	60	20		0					0		
LEPTOCYLINDRUS MINIMUS	140	180	380		260					120		
LYCMOPHORA LYNGBYEI	0	60	0		0					0		
NAVICULA SP.	0	20	20		0					20		
NITZSCHIA CLOSTERIUM	40	100	80		0					100		
NITZSCHIA DELICATISSIMA	0	0	140		40					0		
NITZSCHIA PUNGENS	220	300	380		240					560		
PLEUROSIGMA ANGULATUM	0	40	20		60					20		
RHIZOSOLENIA DELICATULA	800	600	2060		1360					1280		
RHIZOSOLENIA HEBETATA	180	120	500		160					280		
RHIZOSOLENIA SETIGERA	0	0	40		20					0		
SKELETONEMA COSTATUM	0	80	0		20					0		
STEPHANOPYXIS TURRIS	40	140	0		100					200		
THALASSIOSIRA GRAVIDA	380	1000	1200		660					1460		
THALASSIOSIRA ROTULA	160	100	200		80					20		
THALASSIOTHRIX NITZSCHIODES	20	20	40		0					0		
DISTEPHANUS SPECULUM	20	20	20		40					0		
MESODINIUM RUBRUM	20	20	40		160					20		
EUGLENA SP.	20	60	60		100					40		
FAVELLA SP.	0	20	40		20					60		
HELICOSTOMELLA SP.	0	40	40		0					0		
PTYCHOCYLIS SP.	40	20	40		60					20		
TINTINNIDS	320	280	400		1020					60		
ACARTIA SP.	40	0	0		0					20		
UNIDENTIFIED GYMNODINIUM	0	20	0		0					0		

Appendix 4. (cont'd)

JULY 14 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	1080	200	500	420	2740	340		2100	260	340	100	80
GONYAULAX (DUPLET)	0	0	0	0	40	0		0	0	0	0	0
GONYAULAX (FUSING)	0	0	0	0	20	0		0	0	0	0	0
GONYAULAX (PLANOZYGOTE)	60	0	0	0	0	0		0	0	0	0	0
GONYAULAX (CYST)	0	0	0	0	0	0		0	20	0	0	0
GONYAULAX TRIACANTHA	0	0	0	0	0	0		0	0	40	0	0
CERATIUM LONGIPES	0	0	40	0	0	0		40	0	40	0	0
CERATIUM MINUTUM	0	0	0	0	0	0		0	0	20	0	0
DINOPHYSIS SP.	0	20	0	0	0	0		20	0	0	0	0
DINOPHYSIS ACUTA	0	0	0	0	60	0		0	0	0	0	0
DINOPHYSIS ACUMINATA	0	0	0	0	120	0		0	0	0	0	0
DINOPHYSIS NORVEGICA	0	0	0	0	40	0		0	0	0	0	0
PERIDINIUM SP.	0	0	0	0	1380	0		0	0	0	0	0
PERIDINIUM CONICUM	0	0	0	0	40	0		0	0	0	0	0
PERIDINIUM DEPRESSUM	0	0	0	0	40	0		0	0	0	0	0
PERIDINIUM LIMBATUM	0	0	0	0	0	0		0	0	20	0	0
PERIDINIUM TRIQUETA	0	0	0	0	160	0		0	0	0	0	0
PERIDINIUM OVATUM	0	0	0	20	0	0		0	0	0	0	0
SCRIPPSIELLA TROCHOIDEA	60	20	60	40	480	20		320	40	280	0	0
GYRODINIUM SP.	0	0	0	0	0	0		20	0	0	0	0
CHAETOCEROS CONSTRICTUS	0	0	0	0	20	0		0	0	0	0	0
CHAETOCEROS CONVOLUTUS	0	20	0	20	0	0		0	0	0	0	0
CHAETOCEROS DEBILIS	0	40	20	0	0	0		0	20	20	20	0
CHAETOCEROS LACINIOSUS	0	0	0	20	0	0		0	0	0	0	0
CHAETOCEROS MITRA	0	0	0	0	40	0		0	0	0	0	0
CHAETOCEROS SOCIALIS	0	0	0	0	0	0		0	20	0	0	40
COSCINOSIRA POLYCHORDA	0	0	0	0	0	0		20	20	0	0	0
GYROSIGMA SP.	0	0	0	0	0	40		0	0	0	0	0
LEPTOCYLINDRUS MINIMUS	0	0	120	260	740	120		60	0	0	0	20
MELOSIRA NUMMULOIDES	0	0	220	0	0	0		0	0	0	0	0
NAVICULA SP.	0	0	0	0	20	0		0	0	0	0	0
NITZSCHIA CLOSTERIUM	0	0	0	0	120	0		0	20	0	0	0
NITZSCHIA DELICATISSIMA	0	0	20	0	0	0		0	0	0	40	0
NITZSCHIA PUNGENS	0	0	0	20	0	60		40	80	180	0	0
PLEUROSIGMA ANGULATUM	20	0	0	0	120	100		0	20	0	20	0
RHIZOSOLENIA DELICATULA	20	20	60	120	160	40		40	40	120	0	60
RHIZOSOLENIA HEBETATA	20	0	20	40	20	80		100	100	80	0	0
SKELETONEMA COSTATUM	0	0	0	0	0	0		0	360	0	0	0
STEPHANOPYXIS TURRIS	0	0	0	0	40	0		0	0	0	0	0
THALASSIOSIRA GRAVIDA	0	0	20	20	0	40		0	0	0	0	0
THALASSIOSIRA NORDENSKIOELDII	0	0	0	0	0	0		0	40	0	0	0
THALASSIOTHRIX NITZSCHIODES	0	0	0	0	20	0		0	0	0	0	0
DISTEPHANUS SPECULUM	0	0	0	0	60	0		0	0	0	0	0
MESODINIUM RUBRUM	60	20	0	0	540	100		380	0	80	40	20
EUGLENA SP.	0	0	0	0	100	0		0	0	0	0	0
FAVELLA SP.	40	0	20	0	0	20		40	0	0	0	0
HELICOSTOMELLA SP.	40	20	40	20	100	0		80	0	0	0	0
PTYCHOCYLIS SP.	0	0	0	0	40	0		0	0	0	0	0
TINTINNIDS	0	0	0	0	220	40		0	0	0	0	0
TINTINNOPSIS SP.	0	0	40	0	0	0		0	0	0	0	0
BRACHIONUS SP.	20	0	0	20	40	0		0	20	0	0	0
UNIDENTIFIED GYMNODINIUM	0	0	0	0	60	20		0	20	0	0	0
UNIDENTIFIED DINOPHYSIS	0	0	0	0	100	0		0	0	0	0	0

Appendix 4. (cont'd)

JULY 14 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	260		0		40	600		120		40	20	
GONYAULAX (DUPLET)	20		0		0	0		0		0	0	
CERATIUM LONGIPES	0		0		0	0		40		40	0	
DINOPHYSIS SP.	0		0		0	60		0		20	0	
SCRIPPSIELLA TROCHOIDEA	0		80		40	60		0		20	0	
GYRODINIUM SP.	0		0		20	0		0		60	0	
ASTERIONELLA JAPONICA	0		0		0	0		0		20	0	
CHAETOCEROS SP.	0		0		0	20		0		220	0	
CHAETOCEROS CONVOLUTUS	20		0		0	0		0		0	0	
DITYLUM BRIGHTWELLI	0		0		0	0		0		20	0	
LEPTOCYLINDRUS MINIMUS	0		100		20	380		40		0	0	
MELOSIRA NUMMULOIDES	0		0		0	20		0		0	0	
NITZSCHIA CLOSTERIUM	0		0		0	0		20		0	0	
NITZSCHIA DELICATISSIMA	20		0		0	0		0		0	0	
NITZSCHIA PUNGENS	0		0		40	80		40		320	0	
PLEUROSIGMA ANGULATUM	20		60		60	40		20		0	20	
RHIZOSOLENIA DELICATULA	100		20		0	0		20		200	0	
RHIZOSOLENIA HEBETATA	0		0		20	20		60		0	60	
THALASSIOSIRA GRAVIDA	0		40		0	0		20		0	0	
MESODINIUM RUBRUM	40		0		0	60		0		140	0	
EUGLENA SP.	0		0		20	0		0		0	0	
FAVELLA SP.	0		0		80	40		0		0	0	
HELICOSTOMELLA SP.	0		20		0	0		0		0	0	
TINTINNIDS	0		0		20	0		0		0	0	
UNIDENTIFIED GYMNODINIUM	0		40		0	0		20		0	0	

JULY 14 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	160	100	40		580			0		0		
CERATIUM LONGIPES	0	20	0		0			0		0		
DINOPHYSIS SP.	0	20	0		0			0		0		
DINOPHYSIS ACUMINATA	0	0	0		20			0		0		
PERIDINIUM SP.	0	0	0		600			0		0		
PERIDINIUM CONICUM	0	0	0		20			0		0		
PERIDINIUM TRIQUETA	0	0	0		80			0		0		
SCRIPPSIELLA TROCHOIDEA	0	20	40		0			0		0		
BIDDULPHIA AURITA	0	0	0		20			0		0		
CHAETOCEROS SP.	0	0	0		0			0		320		
CHAETOCEROS CONSTRICTUS	0	0	0		20			0		0		
CHAETOCEROS MITRA	0	0	0		220			0		0		
CHAETOCEROS SOCIALIS	0	0	0		60			0		0		
LEPTOCYLINDRUS MINIMUS	0	0	60		740			0		20		
MELOSIRA NUMMULOIDES	0	0	40		0			0		0		
NAVICULA SP.	0	0	0		20			0		0		
NITZSCHIA CLOSTERIUM	0	0	0		100			0		0		
NITZSCHIA DELICATISSIMA	0	20	40		0			0		0		
NITZSCHIA PUNGENS	0	0	0		40			0		100		
PLEUROSIGMA ANGULATUM	0	40	40		180			20		0		
RHIZOSOLENIA DELICATULA	40	20	0		220			20		180		
RHIZOSOLENIA HEBETATA	0	0	60		40			0		0		
THALASSIOSIRA GRAVIDA	0	0	20		60			0		0		
MESODINIUM RUBRUM	0	40	0		60			60		0		
EUGLENA SP.	0	0	0		40			0		0		
FAVELLA SP.	0	0	0		20			0		0		
HELICOSTOMELLA SP.	0	0	20		80			0		0		
PTYCHOCYLIS SP.	0	0	0		20			0		0		
TINTINNIDS	0	0	0		140			0		0		

Appendix 4. (cont'd)

JULY 21 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	160	20	460	2900	740	980	480	5500	340	500		
GONYAULAX (DUPLET)	20	0	20	240	20	120	0	320	0	100		
GONYAULAX (TRIPLET)	0	0	0	0	0	20	0	140	0	0		
GONYAULAX (QUADRUPLET)	0	0	0	100	0	0	0	0	0	0		
GONYAULAX (FUSING)	0	0	0	0	0	0	20	60	20	20		
GONYAULAX (PLANOZYGOTE)	0	0	0	20	0	0	0	60	0	0		
CERATIUM LONGIPES	0	0	0	0	0	0	0	20	0	40		
DINOPHYSIS SP.	20	0	0	0	20	0	0	20	40	20		
SCRIPPSIELLA TROCHOIDEA	0	0	0	200	100	100	140	0	40	0		
CHAETOCEROS CONVOLUTUS	0	20	0	0	0	0	0	0	0	0		
FRAGILARIA SP.	0	0	0	0	0	0	20	0	0	0		
NITZSCHIA DELICATISSIMA	60	0	0	0	0	0	0	0	0	0		
PLEUROSIGMA ANGULATUM	0	20	0	0	0	0	0	0	0	0		
MESODINIUM RUBRUM	1160	100	120	540	380	860	340	1940	420	80		
FAVELLA SP.	0	0	20	60	0	0	0	40	20	0		
HELICOSTOMELLA SP.	60	0	20	40	0	60	0	20	0	0		
TINTINNOPSIS SP.	20	20	0	0	0	0	0	0	0	0		
BRACHIONUS SP.	0	0	0	0	0	0	20	0	0	0		

JULY 21 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	60	60	220	160	180		120	0	160	0		
GONYAULAX (TRIPLET)	0	0	20	0	0		0	0	0	0		
GONYAULAX (PLANOZYGOTE)	0	0	0	20	0		0	0	0	0		
GONYAULAX (CYST)	0	0	0	20	0		0	0	0	0		
GONYAULAX TRIACANTHA	0	0	0	20	0		0	0	0	0		
DINOPHYSIS SP.	0	0	20	0	0		0	0	20	0		
PERIDINIUM LIMBATUM	0	0	0	0	0		20	0	40	0		
SCRIPPSIELLA TROCHOIDEA	0	20	20	0	20		0	20	0	0		
EUCAMPIA SP.	0	0	0	0	0		20	0	0	0		
NITZSCHIA DELICATISSIMA	0	0	40	0	80		0	0	0	0		
PLEUROSIGMA ANGULATUM	0	0	0	20	0		0	0	0	0		
RHIZOSOLENIA DELICATULA	0	20	0	0	0		0	0	0	0		
RHIZOSOLENIA HEBETATA	0	0	20	0	0		20	20	0	20		
MESODINIUM RUBRUM	40	40	20	80	20		20	0	20	0		
FAVELLA SP.	0	20	20	0	0		40	20	20	0		
HELICOSTOMELLA SP.	0	0	0	20	0		40	0	0	0		

JULY 21 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	0		160	0				0		
SCRIPPSIELLA TROCHOIDEA	0	40	0		20	20				0		
CHAETOCEROS CONVOLUTUS	0	0	20		0	0				0		
CHAETOCEROS DEBILIS	0	20	0		0	0				0		
NITZSCHIA DELICATISSIMA	0	0	0		0	40				0		
RHIZOSOLENIA DELICATULA	0	20	0		0	0				0		
RHIZOSOLENIA HEBETATA	0	0	0		0	20				100		
THALASSIOSIRA NORDENSKIOELDII	0	0	0		20	0				0		

Appendix 4. (cont'd)

JULY 28 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	2520	1000	720	200	500	960	1720	2000	220	360	20	140
GONYAULAX (DUPLET)	40	60	40	0	40	80	120	80	20	0	0	0
GONYAULAX (TRIPLET)	0	0	20	0	20	0	0	60	0	0	0	0
GONYAULAX (QUADRUPLET)	0	0	0	20	0	40	0	40	0	0	0	0
GONYAULAX (PLANOZYGOTE)	60	100	120	40	0	40	120	220	0	60	0	0
CERATIUM LONGIPES	20	0	0	0	0	0	20	0	0	20	0	0
DINOPHYSIS SP.	40	20	0	0	0	0	20	0	20	0	0	20
PERIDINIUM SP.	280	0	100	0	0	0	240	0	0	0	0	0
SCRIPPSIELLA TROCHOIDEA	0	100	100	40	0	140	0	220	0	60	20	0
CHAETOCEROS DEBILIS	0	0	40	0	0	0	0	0	0	0	0	0
CHAETOCEROS LACINIOSUS	0	0	0	0	0	0	0	0	0	0	80	0
COSCINOSIRA POLYCHORDA	0	0	0	0	0	0	0	0	20	0	0	0
DITYLUM BRIGHTWELLI	0	0	0	0	0	0	0	0	0	0	20	0
LEPTOCYLINDRUS MINIMUS	0	0	0	0	0	0	0	0	0	0	20	0
PLEUROSIGMA ANGULATUM	40	0	80	0	80	0	60	20	0	40	0	60
RHIZOSOLENIA HEBETATA	20	20	0	0	0	0	0	0	0	0	0	0
THALASSIOSIRA GRAVIDA	0	0	0	0	0	0	0	0	0	0	20	0
MESODINIUM RUBRUM	1180	600	260	100	260	180	3380	340	40	120	20	160
FAVELLA SP.	100	20	60	0	40	40	140	20	0	60	0	0
HELICOSTOMELLA SP.	100	40	20	0	60	80	160	0	0	60	0	20
PTYCHOCYLIS SP.	0	0	20	0	0	0	0	0	0	0	0	0
TINTINNIDS	0	0	0	0	0	0	20	0	0	0	0	0
TINTINNOPSIS SP.	100	40	60	0	40	0	0	0	60	0	0	20
BRACHIONUS SP.	0	0	20	0	20	20	20	0	0	20	0	0

JULY 28 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	80	300	320	40	420	240	80	80	300	700	0	
GONYAULAX (DUPLET)	0	40	20	0	0	0	0	0	40	40	0	
GONYAULAX (PLANOZYGOTE)	0	60	60	0	20	80	20	0	60	60	0	
CERATIUM LONGIPES	0	0	0	0	20	20	0	0	20	20	0	
DINOPHYSIS SP.	0	0	0	0	20	0	0	0	0	20	0	
SCRIPPSIELLA TROCHOIDEA	20	20	20	0	80	0	40	0	0	20	0	
GYRODINIUM SP.	0	0	20	0	0	0	0	0	0	0	0	
CHAETOCEROS DEBILIS	0	20	0	0	0	0	0	0	0	0	0	
NITZSCHIA DELICATISSIMA	0	0	0	0	60	0	40	0	20	0	0	
PLEUROSIGMA ANGULATUM	40	80	0	20	60	60	60	100	60	100	60	
RHIZOSOLENIA HEBETATA	0	0	0	0	0	0	0	20	20	20	0	
THALASSIOSIRA GRAVIDA	0	0	0	0	0	0	0	0	0	0	20	
THALASSIOTHRIX NITZSCHIODES	0	20	0	0	0	0	0	0	0	0	0	
MESODINIUM RUBRUM	60	100	120	20	60	20	0	60	180	20	0	
FAVELLA SP.	0	0	0	0	0	20	0	20	20	20	0	
HELICOSTOMELLA SP.	20	0	0	0	60	0	0	0	0	20	0	
TINTINNOPSIS SP.	120	20	20	0	0	0	0	40	20	0	0	
BRACHIONUS SP.	0	0	0	0	0	0	0	40	20	0	20	

JULY 28 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA		60	520		540	60			0	20		
GONYAULAX (DUPLET)		0	60		0	0			0	0		
GONYAULAX (TRIPLET)		0	20		0	0			0	0		
GONYAULAX (QUADRUPLET)		0	20		0	0			0	0		
GONYAULAX (PLANOZYGOTE)		0	20		0	0			0	20		
CERATIUM LONGIPES		0	0		0	0			0	20		
DINOPHYSIS SP.		0	20		0	20			0	0		
SCRIPPSIELLA TROCHOIDEA		0	20		20	40			0	0		
NITZSCHIA DELICATISSIMA		0	0		0	20			0	0		
PLEUROSIGMA ANGULATUM		80	40		120	20			0	180		
RHIZOSOLENIA HEBETATA		0	0		40	0			0	0		
MESODINIUM RUBRUM		20	120		280	20			0	0		
FAVELLA SP.		0	20		60	0			0	0		
HELICOSTOMELLA SP.		0	40		60	0			0	0		

Appendix 4. (cont'd)

AUGUST 4 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	100	80	0	20	20	40	40	100	940	100		
GONYAULAX (DUPLET)	0	0	0	0	0	0	0	0	40	0		
GONYAULAX (FUSING)	0	0	0	0	0	0	0	0	0	20		
GONYAULAX (PLANOZYGOTE)	0	0	0	0	0	0	20	0	20	0		
CERATIUM LONGIPES	40	0	40	0	0	0	20	40	0	40		
DINOPHYSIS SP.	0	0	0	0	0	0	20	0	0	0		
DINOPHYSIS ACUMINATA	40	0	0	0	0	0	0	0	0	0		
DINOPHYSIS NORVEGICA	20	0	0	0	0	0	0	0	0	0		
PERIDINIUM SP.	60	0	0	0	0	0	0	0	0	0		
PERIDINIUM TRIQUETA	40	0	0	0	0	0	0	0	0	0		
SCRIPPSIELLA TROCHOIDEA	0	0	0	20	0	40	0	60	240	60		
BACTERIOSIRA FRAGILIS	0	0	0	0	0	0	20	0	0	0		
CHAETOCEROS DEBILIS	0	0	20	0	0	0	60	20	20	0		
CHAETOCEROS LACINIOSUS	0	0	0	0	0	0	60	20	0	40		
CHAETOCEROS LORENZIANUS	0	0	0	0	0	0	20	0	0	20		
GYROSIGMA PROLONGATUM	20	0	0	0	0	0	0	0	0	0		
GYROSIGMA TENNUISSIMUM	20	0	0	0	0	0	0	0	0	0		
MELOSIRA NUMMULOIDES	0	0	0	0	0	0	20	0	0	0		
NAVICULA SP.	20	0	0	40	0	0	0	0	0	0		
NITZSCHIA DELICATISSIMA	0	0	80	0	140	0	180	40	60	80		
PLEUROSIGMA ANGULATUM	0	20	0	0	0	0	20	0	0	0		
RHABDONEMA ADRIATICUM	0	0	0	0	0	0	0	20	0	0		
RHIZOSOLENIA HEBETATA	0	40	0	0	0	0	0	0	0	0		
DISTEPHANUS SPECULUM	0	0	0	0	0	0	0	20	0	20		
MESODINIUM RUBRUM	8260	140	0	20	20	180	280	400	80	60		
FAVELLA SP.	0	20	0	20	0	0	20	0	40	20		
HELICOSTOMELLA SP.	0	0	0	20	0	0	40	0	20	20		
TINTINNIDS	340	0	0	0	0	0	0	0	0	0		
TINTINNOPSIS SP.	0	20	0	0	0	0	60	0	20	0		
UNIDENTIFIED DINOPHYSIS	20	0	0	0	0	0	0	0	0	0		

AUGUST 4 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	0	0	0	20	20	0	0	20		
CERATIUM LONGIPES	0	0	80	0	0	0	0	0	0	0		
DINOPHYSIS SP.	0	0	20	0	0	0	0	0	0	0		
PERIDINIUM CONICUM	0	0	0	0	0	40	0	0	0	0		
SCRIPPSIELLA TROCHOIDEA	0	0	20	0	0	0	0	0	0	0		
CHAETOCEROS DEBILIS	0	0	0	0	0	0	60	0	0	0		
CHAETOCEROS LACINIOSUS	0	0	40	0	0	0	160	20	0	80		
CHAETOCEROS MITRA	0	0	0	0	0	0	0	0	0	20		
LEPTOCYLINDRUS MINIMUS	0	0	0	0	0	0	20	0	0	0		
NITZSCHIA DELICATISSIMA	20	20	80	80	120	180	140	100	80	160		
PLEUROSIGMA ANGULATUM	0	0	20	20	0	0	20	0	0	0		
RHIZOSOLENIA HEBETATA	0	0	0	0	0	0	60	0	0	0		
MESODINIUM RUBRUM	0	20	0	20	80	140	0	0	0	40		
TINTINNOPSIS SP.	0	20	0	0	0	0	20	0	0	0		

AUGUST 4 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
CERATIUM LONGIPES			0		0					20		
CHAETOCEROS DEBILIS			0		20					40		
CHAETOCEROS LACINIOSUS			20		0					20		
DITYLUM BRIGHTWELLI			0		20					0		
NITZSCHIA DELICATISSIMA			120		0					0		
SKELETONEMA COSTATUM			20		0					0		
MESODINIUM RUBRUM			20		0					0		
FAVELLA SP.			20		0					0		

Appendix 4. (cont'd)

AUGUST 11 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	20	80	0	100	60	180		60	760	400	60	0
GONYAULAX (CYST)	0	0	0	0	0	0		0	0	0	20	0
CERATIUM LONGIPES	20	40	120	100	0	120		100	100	100	80	0
DINOPHYSIS SP.	0	20	120	200	140	360		200	160	180	20	0
PERIDINIUM SP.	0	140	340	700	700	1120		560	860	1520	340	0
SCRIPPSIELLA TROCHOIDEA	100	20	20	20	120	380		240	360	480	0	0
BACTERIOSIRA FRAGILIS	0	240	720	440	120	140		400	640	700	300	420
CHAETOCEROS SP.	0	2200	3560	4180	3560	2720		4180	6160	4580	2500	2640
CHAETOCEROS DEBILIS	80	0	0	0	0	0		0	0	0	0	0
CHAETOCEROS LACINIOSUS	180	0	0	0	0	0		0	0	0	0	0
CHAETOCEROS SOCIALIS	60	0	0	0	0	0		0	0	0	0	0
DITYLUM BRIGHTWELLI	0	0	0	0	20	0		0	0	40	0	0
LEPTOCYLINDRUS MINIMUS	0	220	260	260	260	240		560	160	400	100	60
LYCMOPHORA LYNGBYEI	0	0	0	0	0	0		20	0	0	0	0
NAVICULA SP.	20	0	20	60	20	20		20	40	40	60	20
NITZSCHIA CLOSTERIUM	0	0	0	0	0	0		0	0	0	20	60
NITZSCHIA DELICATISSIMA	0	0	0	0	40	40		280	0	200	0	0
NITZSCHIA PUNGENS	180	0	0	0	0	0		0	220	0	460	340
PLEUROSIGMA ANGULATUM	40	0	60	220	100	0		40	80	0	20	40
RHIZOSOLENIA DELICATULA	20	0	0	0	0	0		0	0	0	0	0
RHIZOSOLENIA HEBETATA	40	20	200	80	40	140		20	100	160	20	60
SKELETONEMA COSTATUM	20	160	100	100	80	20		120	120	60	2000	1600
THALASSIOSIRA GRAVIDA	0	0	0	20	0	20		0	40	20	760	760
DISTEPHANUS SPECULUM	0	0	0	0	0	20		0	100	20	0	0
MESODINIUM RUBRUM	40	260	360	300	900	1120		880	3060	4500	240	460
FAVELLA SP.	0	20	20	0	0	0		0	0	20	0	20
HELICOSTOMELLA SP.	40	0	0	20	40	0		40	100	60	0	40
TINTINNIDS	0	60	100	60	100	0		100	440	320	180	60
ACARTIA SP.	0	100	20	120	0	80		0	80	20	0	0

AUGUST 11 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	100	60	20	80	160	20		240	280	80	0	
GONYAULAX (DUPLET)	20	0	0	0	0	0		0	0	0	0	
CERATIUM LONGIPES	40	120	40	20	120	40		180	220	60	20	
DINOPHYSIS SP.	0	100	40	160	140	100		320	320	180	0	
PERIDINIUM SP.	0	120	280	380	680	280		500	680	500	0	
PERIDINIUM LIMBATUM	20	0	0	0	0	0		0	0	0	20	
SCRIPPSIELLA TROCHOIDEA	0	0	0	120	80	0		100	260	100	0	
BACTERIOSIRA FRAGILIS	20	560	500	300	300	200		760	1000	1300	80	
CHAETOCEROS SP.	0	4080	4200	4760	4720	3040		4840	4760	6040	0	
CHAETOCEROS DEBILIS	60	0	0	0	0	0		0	0	0	80	
CHAETOCEROS LACINIOSUS	120	0	0	0	0	0		0	0	0	120	
CHAETOCEROS SOCIALIS	180	0	0	0	0	0		0	0	0	0	
CORETHRON CRIOPHILUM	0	0	20	0	0	0		0	0	0	0	
DITYLUM BRIGHTWELLI	0	0	0	0	0	0		0	20	0	0	
LEPTOCYLINDRUS MINIMUS	20	360	500	540	260	400		440	500	380	160	
NAVICULA SP.	0	0	0	20	20	80		20	0	0	0	
NITZSCHIA CLOSTERIUM	0	0	0	0	0	0		0	40	0	0	
NITZSCHIA DELICATISSIMA	0	100	120	20	20	140		100	0	140	0	
NITZSCHIA PUNGENS	420	0	0	0	0	0		0	360	0	60	
PLEUROSIGMA ANGULATUM	80	180	20	80	40	80		100	240	300	0	
RHABDONEMA ADRIATICUM	0	0	0	0	0	0		0	0	20	0	
RHIZOSOLENIA DELICATULA	20	0	0	0	0	0		0	0	0	0	
RHIZOSOLENIA HEBETATA	0	120	80	400	120	60		80	220	240	0	
SKELETONEMA COSTATUM	20	100	160	80	240	60		100	140	200	0	
THALASSIOSIRA GRAVIDA	0	20	0	0	0	0		0	20	0	0	
THALASSIOSIRA NORDENSKIOELDII	0	0	0	0	0	0		0	0	0	20	
DISTEPHANUS SPECULUM	0	0	0	60	0	20		40	0	40	0	
MESODINIUM RUBRUM	0	120	80	360	340	140		280	620	200	0	
FAVELLA SP.	0	20	0	60	0	20		40	20	20	0	
HELICOSTOMELLA SP.	0	40	60	40	20	20		100	60	120	0	
TINTINNIDS	0	140	40	80	120	60		100	220	260	0	
ACARTIA SP.	0	40	120	20	60	0		0	0	40	0	

Appendix 4. (cont'd)

AUGUST 11 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	0		100	0		20	220	120	0	
GONYAULAX (CYST)	0	0	0		20	0		0	0	0	0	
CERATIUM LONGIPES	0	40	100		180	80		80	40	120	20	
DINOPHYSIS SP.	0	40	120		80	80		80	160	220	0	
PERIDINIUM SP.	0	140	640		620	120		80	380	260	0	
SCRIPPSIELLA TROCHOIDEA	0	0	120		120	0		0	40	40	0	
BACTERIOSIRA FRAGILIS	0	220	240		280	480		600	1200	1140	80	
CHAETOCEROS SP.	0	3040	2960		4040	3080		3860	5500	5260	0	
CHAETOCEROS DEBILIS	0	0	0		0	0		0	0	0	40	
CHAETOCEROS LACINIOSUS	0	0	0		0	0		0	0	0	60	
CHAETOCEROS SOCIALIS	220	0	0		0	0		0	0	0	0	
CORETHRON CRIOPHILUM	0	0	0		0	0		0	0	20	0	
COSCINODISCUS SP.	0	20	0		0	0		0	0	0	0	
DITYLUM BRIGHTWELLI	0	20	0		20	0		0	0	40	0	
LEPTOCYLINDRUS MINIMUS	20	320	160		220	260		100	360	260	100	
NAVICULA SP.	0	40	20		0	20		0	40	80	0	
NITZSCHIA DELICATISSIMA	240	60	0		20	0		300	0	240	0	
NITZSCHIA PUNGENS	0	0	0		0	0		0	200	0	80	
PLEUROSIGMA ANGULATUM	20	120	60		80	100		100	380	260	20	
RHIZOSOLENIA HEBETATA	0	140	160		160	280		240	100	300	20	
SKELETONEMA COSTATUM	0	80	60		80	140		100	100	220	40	
THALASSIOSIRA GRAVIDA	0	0	20		0	0		40	40	40	0	
THALASSIOTHRIX NITZSCHIODES	0	0	0		20	20		0	0	0	0	
DISTEPHANUS SPECULUM	0	0	0		0	0		0	80	40	0	
MESODINIUM RUBRUM	0	100	300		180	80		60	280	100	0	
FAVELLA SP.	0	0	40		0	20		0	20	0	0	
HELICOSTOMELLA SP.	0	0	60		40	0		20	20	40	0	
TINTINNIDS	0	40	500		100	60		100	500	320	0	
ACARTIA SP.	0	20	60		20	20		0	0	0	0	

AUGUST 18 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	40	160	20	40	160	200	160	40	40	640		
GONYAULAX SPINIFERA	0	0	0	0	0	0	0	0	0	140		
GONYAULAX TRIACANTHA	0	0	0	20	0	0	0	0	20	0		
CERATIUM LONGIPES	20	0	0	20	0	0	20	0	20	60		
DINOPHYSIS SP.	0	40	0	0	40	0	20	40	0	0		
DINOPHYSIS ACUMINATA	0	0	0	0	0	0	0	0	0	180		
DINOPHYSIS NORVEGICA	0	0	0	0	0	0	0	0	0	200		
PERIDINIUM SP.	0	0	0	0	0	0	0	0	0	1160		
PERIDINIUM CONICUM	0	0	0	0	0	0	0	0	0	60		
PERIDINIUM LIMBATUM	0	20	0	0	0	0	0	0	0	0		
PERIDINIUM TRIQUETA	0	0	0	0	0	0	0	0	0	460		
SCRIPPSIELLA TROCHOIDEA	0	180	0	20	100	120	160	120	60	280		
GYRODINIUM SP.	0	0	0	0	0	20	0	0	0	0		
BACTERIOSIRA FRAGILIS	0	0	0	0	0	0	0	20	0	0		
CHAETOCEROS SP.	0	0	0	0	20	80	0	80	0	340		
CHAETOCEROS CONSTRICTUS	0	0	0	0	0	0	0	0	0	500		
CHAETOCEROS DEBILIS	20	0	20	0	0	60	80	40	0	40		
CHAETOCEROS DECIPIENS	0	0	0	0	0	0	0	0	0	160		
CHAETOCEROS LACINIOSUS	0	0	0	0	0	0	0	20	0	60		
CHAETOCEROS MITRA	0	0	0	0	0	0	0	0	100	20		
CHAETOCEROS TERES	0	0	0	0	0	0	0	0	0	20		
CHAETOCEROS WILLEI	0	0	0	0	0	0	0	0	0	20		
DITYLUM BRIGHTWELLI	0	0	0	0	0	0	0	0	0	20		
LEPTOCYLINDRUS DANICUS	0	0	0	0	0	0	0	0	0	60		
LEPTOCYLINDRUS MINIMUS	0	0	0	0	0	0	40	0	0	20		
NITZSCHIA CLOSTERIUM	0	0	0	0	0	20	0	0	0	20		
NITZSCHIA DELICATISSIMA	0	0	0	0	0	0	0	0	40	400		
NITZSCHIA PUNGENS	0	0	20	0	0	20	0	120	0	120		
PLEUROSIGMA ANGULATUM	0	0	0	0	0	0	40	0	0	0		
RHIZOSOLENIA DELICATULA	20	40	0	240	20	160	1060	220	140	1240		
SKELETONEMA COSTATUM	0	0	0	0	0	0	0	0	0	40		
DISTEPHANUS SPECULUM	0	0	0	0	0	0	0	0	40	440		
MESODINIUM RUBRUM	440	1260	140	120	560	480	260	680	120	920		
EUGLENA SP.	0	0	0	0	20	0	0	20	0	0		
HELICOSTOMELLA SP.	20	0	0	0	0	0	0	0	20	0		
TINTINNIDS	0	0	0	0	0	0	0	0	0	60		
TINTINNOPSIS SP.	0	0	0	0	20	0	20	20	20	0		
ACARTIA SP.	0	0	0	0	0	0	0	0	0	20		
UNIDENTIFIED GYMNODINIUM	0	0	0	20	0	20	0	0	0	20		

Appendix 4. (cont'd)

AUGUST 18 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	40	20	0	0	80	40	0		80		
GONYAULAX (PLANOZYGOTE)	0	0	0	0	0	0	0	0		20		
CERATIUM FUSUS	0	0	0	0	0	0	20	0		0		
CERATIUM LONGIPES	0	0	0	0	40	40	20	0		60		
DINOPHYSIS SP.	0	0	20	0	20	0	60	0		0		
DINOPHYSIS ACUMINATA	0	0	0	0	0	0	0	0		60		
DINOPHYSIS NORVEGICA	0	0	0	0	0	0	0	0		180		
PERIDINIUM SP.	0	0	0	0	0	0	0	0		220		
PERIDINIUM CONICUM	0	0	0	0	0	0	0	0		20		
PERIDINIUM DEPRESSUM	0	0	0	0	0	0	0	0		20		
PERIDINIUM TRIQUETA	0	0	0	0	0	0	0	0		40		
PERIDINIUM OVATUM	0	0	0	0	0	0	0	0		20		
SCRIPPSIELLA TROCHOIDEA	0	0	100	0	20	40	20	0		0		
GYRODINIUM SP.	20	0	0	0	20	0	0	0		20		
ASTERIONELLA JAPONICA	0	20	0	0	0	0	0	0		0		
CHAETOCEROS SP.	80	40	0	0	0	40	0	0		460		
CHAETOCEROS AFFINIS	0	0	0	0	0	0	0	0		100		
CHAETOCEROS CONSTRICTUS	0	0	0	0	0	0	0	0		400		
CHAETOCEROS CONVOLUTUS	0	0	0	40	0	0	0	0		0		
CHAETOCEROS DEBILIS	0	0	140	60	60	80	20	0		100		
CHAETOCEROS DECIPIENS	0	0	0	0	0	0	0	0		520		
CHAETOCEROS LACINIOSUS	0	0	60	20	0	40	0	0		180		
CHAETOCEROS SOCIALIS	0	0	20	0	0	0	0	0		0		
CHAETOCEROS WILLEI	0	0	0	0	0	0	0	0		1540		
COSCINOSIRA POLYCHORDA	0	0	20	0	0	0	0	0		0		
DITYLUM BRIGHTWELLI	0	0	0	0	0	20	0	0		40		
GYROSIGMA TENNUISSIMUM	0	0	0	0	0	0	0	0		20		
LEPTOCYLINDRUS DANICUS	0	0	0	0	0	0	0	0		20		
LEPTOCYLINDRUS MINIMUS	0	0	20	20	0	0	0	0		60		
NITZSCHIA CLOSTERIUM	0	0	20	0	0	0	0	0		180		
NITZSCHIA DELICATISSIMA	0	0	0	0	0	0	0	0		700		
NITZSCHIA PUNGENS	20	0	180	140	0	60	20	40		180		
PARALIA SULCATA	0	0	0	0	0	0	0	0		40		
RHIZOSOLENIA DELICATULA	20	40	80	140	60	40	460	40		580		
RHIZOSOLENIA HEBETATA	0	0	40	0	0	20	0	0		20		
SKELETONEMA COSTATUM	0	20	0	0	0	0	0	0		80		
THALASSIOSIRA NORDENSKIOELDII	0	0	0	0	0	0	0	0		20		
THALASSIOSIRA ROTULA	0	0	0	0	0	0	0	0		80		
THALASSIOTHRIX NITZSCHIODES	0	0	0	0	0	0	0	0		20		
DISTEPHANUS SPECULUM	0	0	0	0	0	0	0	0		20		
MESODINIUM RUBRUM	40	40	0	80	60	60	60	0		120		
EUGLENA SP.	0	0	0	0	0	0	0	0		20		
FAVELLA SP.	0	0	0	0	0	0	0	0		20		
HELICOSTOMELLA SP.	0	0	0	0	0	0	20	0		0		
TINTINNIDS	0	0	0	0	0	0	0	0		100		
TINTINNOPSIS SP.	0	20	0	0	20	0	0	0		0		
ACARTIA SP.	0	0	0	0	0	0	0	0		60		
UNIDENTIFIED GYMNODINIUM	40	0	0	0	0	0	0	0		0		

Appendix 4. (cont'd)

AUGUST 18 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	240	0		0	0	20			0		
CERATIUM FUSUS	0	0	20		0	0	0			0		
CERATIUM LONGIPES	0	20	0		0	0	0			20		
DINOPHYSIS SP.	0	20	20		0	0	0			0		
DINOPHYSIS NORVEGICA	0	0	0		0	0	0			40		
SCRIPPSIELLA TROCHOIDEA	0	120	0		0	40	0			0		
GYRODINIUM SP.	20	0	40		0	0	0			0		
ASTERIONELLA JAPONICA	0	20	0		0	0	0			0		
CHAETOCEROS SP.	60	180	40		0	60	0			240		
CHAETOCEROS AFFINIS	0	0	0		0	0	0			120		
CHAETOCEROS CONSTRICTUS	0	0	0		0	0	0			580		
CHAETOCEROS CONVOLUTUS	0	0	40		0	0	0			0		
CHAETOCEROS DEBILIS	0	0	320		20	0	340			100		
CHAETOCEROS DECIPIENS	0	0	0		0	0	0			500		
CHAETOCEROS LACINIOSUS	0	0	100		0	0	60			60		
CHAETOCEROS TERES	0	0	0		0	0	0			60		
CHAETOCEROS WILLEI	0	0	0		0	0	0			780		
CORETHRON CRIOPHILUM	0	0	0		0	0	0			20		
DITYLUM BRIGHTWELLI	0	0	0		0	0	0			40		
GYROSIGMA TENNUISSIMUM	0	0	0		0	0	0			20		
LEPTOCYLINDRUS MINIMUS	20	0	0		0	40	100			0		
NAVICULA SP.	0	0	0		0	0	0			20		
NITZSCHIA CLOSTERIUM	0	0	40		0	0	0			120		
NITZSCHIA DELICATISSIMA	0	0	0		0	0	0			360		
NITZSCHIA PUNGENS	20	20	260		20	40	200			60		
PLEUROSIGMA ANGULATUM	0	0	0		0	0	20			40		
RHIZOSOLENIA DELICATULA	120	120	180		40	80	660			740		
RHIZOSOLENIA HEBETATA	0	0	0		0	0	20			20		
SKELETONEMA COSTATUM	20	0	0		0	0	0			140		
THALASSIOSIRA ROTULA	0	0	0		0	0	0			60		
DISTEPHANUS SPECULUM	0	0	0		0	0	0			20		
MESODINIUM RUBRUM	60	1200	60		0	20	60			20		
EUGLENA SP.	0	0	0		0	20	0			0		
HELICOSTOMELLA SP.	0	0	0		0	20	0			0		
TINTINNIDS	0	0	0		0	0	0			60		
TINTINNOPSIS SP.	0	40	0		0	0	0			0		
UNIDENTIFIED GYMNODINIUM	0	20	0		0	0	0			0		

AUGUST 26 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	20	0	0	0	0	140	0	100	20	20
GONYAULAX TRIACANTHA	0	0	0	0	0	0	0	0	0	20	0	0
CERATIUM LONGIPES	0	0	0	0	0	20	60	0	0	20	20	0
DINOPHYSIS SP.	0	0	0	20	0	0	0	20	0	0	20	0
DINOPHYSIS ACUMINATA	0	0	0	0	20	0	0	0	0	0	0	0
DINOPHYSIS NORVEGICA	0	0	40	0	20	0	0	0	0	20	0	0
PERIDINIUM LIMBATUM	0	0	0	0	0	0	0	0	0	20	0	0
PERIDINIUM OVATUM	0	0	40	0	0	0	0	0	0	0	0	0
SCRIPPSIELLA TROCHOIDEA	0	0	80	0	0	0	0	120	0	80	40	0
BACTERIOSIRA FRAGILIS	0	60	0	0	0	0	0	0	0	0	0	0
BIDDULPHIA AURITA	0	0	0	0	0	0	0	0	0	20	0	0
CHAETOCEROS SP.	0	0	80	0	2060	0	0	720	0	120	0	0
CHAETOCEROS DEBILIS	0	0	20	20	100	160	20	100	160	40	0	0
CHAETOCEROS LACINIOSUS	0	0	100	40	0	0	0	240	120	120	0	0
DITYLUM BRIGHTWELLI	0	0	40	40	60	0	40	160	60	20	0	0
LEPTOCYLINDRUS DANICUS	0	0	0	0	0	0	0	0	0	100	0	0
LEPTOCYLINDRUS MINIMUS	0	0	0	0	60	0	0	60	20	0	0	0
NAVICULA SP.	0	0	0	0	40	0	0	0	0	0	0	0
NITZSCHIA CLOSTERIUM	0	0	0	0	0	0	0	0	0	20	0	0
NITZSCHIA DELICATISSIMA	300	580	1140	1660	5380	260	540	11340	60500	51980	1120	520
NITZSCHIA PUNGENS	0	0	40	0	120	0	0	420	0	500	0	0
PLEUROSIGMA ANGULATUM	0	0	20	0	0	0	0	40	40	20	0	0
RHIZOSOLENIA DELICATULA	20	60	380	480	1240	160	2660	1340	620	620	5260	4200
RHIZOSOLENIA HEBETATA	0	0	60	0	80	20	0	80	60	80	0	0
SKELETONEMA COSTATUM	20	0	0	40	300	40	40	0	100	0	20	60
THALASSIOSIRA GRAVIDA	0	0	0	0	20	0	0	0	0	0	0	0
THALASSIOSIRA SUBTILIS	0	0	0	0	0	0	0	0	0	40	0	0
MESODINIUM RUBRUM	0	0	160	0	140	0	20	180	0	220	300	260
FAVELLA SP.	0	0	0	0	0	0	20	0	0	0	0	0
HELICOSTOMELLA SP.	0	0	0	0	0	0	0	0	0	0	40	0
CODONELLA SP.	0	0	0	0	20	0	0	0	0	0	0	0
ACARTIA SP.	0	0	20	0	40	0	0	0	0	0	0	0
BRACHIONUS SP.	0	0	0	0	0	0	0	0	0	0	0	40
UNIDENTIFIED GYMNODINIUM	0	0	0	0	0	0	0	20	0	0	0	0

Appendix 4. (cont'd)

AUGUST 26 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	20	0	0	0	0	0	0	20	0	
CERATIUM LONGIPES	0	0	0	0	0	0	20	0	20	0	20	
DINOPHYSIS SP.	0	0	0	0	0	0	20	0	20	0	0	
DINOPHYSIS ACUMINATA	0	0	40	0	0	0	0	0	0	40	0	
DINOPHYSIS NORVEGICA	0	0	40	0	0	0	0	0	0	0	0	
SCRIPPSIELLA TROCHOIDEA	0	0	0	20	0	0	0	0	0	20	0	
CERATAULINA BERGONI	0	0	0	0	0	0	0	0	0	0	60	
CHAETOCEROS SP.	0	0	2660	0	0	0	0	0	0	180	0	
CHAETOCEROS DANICUS	0	40	0	100	0	80	0	0	0	0	0	
CHAETOCEROS DEBILIS	0	40	260	220	60	100	20	140	320	40	0	
CHAETOCEROS LACINIOSUS	0	0	260	0	20	0	0	140	80	120	0	
COSCINODISCUS SP.	0	0	20	0	0	0	0	0	0	0	0	
DITYLUM BRIGHTWELLI	0	0	180	60	20	0	40	20	80	60	0	
LEPTOCYLINDRUS DANICUS	0	0	0	0	0	0	0	0	0	120	0	
LEPTOCYLINDRUS MINIMUS	0	0	0	40	20	40	0	0	0	0	0	
LYCMOPHORA LYNGBYEI	0	0	20	0	0	0	0	0	0	0	0	
MELOSIRA NUMMULOIDES	0	0	0	0	0	20	0	0	0	0	0	
NAVICULA SP.	0	0	20	0	0	0	0	0	0	0	0	
NITZSCHIA CLOSTERIUM	0	0	60	0	0	0	0	0	0	0	0	
NITZSCHIA DELICATISSIMA	180	580	9400	1440	2520	780	2000	48560	50260	57080	2300	
NITZSCHIA PUNGENS	0	0	520	0	0	0	0	0	0	380	0	
PLEUROSIGMA ANGULATUM	0	20	80	0	20	20	40	0	20	40	0	
RHIZOSOLENIA DELICATULA	0	160	640	540	160	260	1540	140	780	620	3660	
RHIZOSOLENIA FRAGILLIMA	0	0	0	0	0	0	0	0	0	40	0	
RHIZOSOLENIA HEBETATA	0	20	40	60	0	40	40	20	20	40	0	
SKELETONEMA COSTATUM	20	40	720	40	80	40	40	40	300	0	20	
SYNEDRA SP.	0	0	0	0	0	0	0	0	0	20	0	
THALASSIOSIRA ROTULA	0	0	80	0	0	0	0	0	0	0	0	
MESODINIUM RUBRUM	0	0	80	20	0	0	0	0	0	40	0	
FAVELLA SP.	0	0	0	0	20	0	0	0	0	0	0	
HELICOSTOMELLA SP.	0	20	0	0	0	0	0	20	0	0	0	
CODONELLA SP.	0	0	60	0	0	0	0	0	0	0	0	

Appendix 4. (cont'd)

AUGUST 26 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA		0	0		60	0				0	0	
CERATIUM FURCA		0	20		0	0				0	0	
CERATIUM LONGIPES		0	0		20	0				0	20	
DINOPHYSIS NORVEGICA		20	0		0	0				0	0	
SCRIPPSIELLA TROCHOIDEA		0	20		0	0				0	0	
GYRODINIUM SP.		0	60		0	0				20	0	
BACTERIOSIRA FRAGILIS		0	0		0	0				20	0	
CERATAULINA BERGONI		0	0		0	0				0	100	
CHAETOCEROS SP.		140	240		80	0				260	0	
CHAETOCEROS AFFINIS		80	0		0	0				0	0	
CHAETOCEROS CONSTRICTUS		420	0		0	0				0	0	
CHAETOCEROS DANICUS		0	0		20	20				0	0	
CHAETOCEROS DEBILIS		180	100		20	100				80	20	
CHAETOCEROS DECIPIENS		20	0		0	0				0	0	
CHAETOCEROS LACINIOSUS		120	180		0	0				200	0	
CHAETOCEROS SOCIALIS		0	20		0	0				0	20	
CHAETOCEROS WILLEI		240	0		0	0				0	0	
CORETHRON CRIOPHILUM		20	0		0	0				0	0	
COSCINOSIRA POLYCHORDA		0	0		20	0				0	0	
DITYLUM BRIGHTWELLI		100	20		40	0				40	20	
GYROSIGMA FASCIOLA		20	0		0	0				0	0	
GUINARDIA FLACCIDA		100	0		0	0				0	0	
LEPTOCYLINDRUS DANICUS		0	0		0	0				180	0	
LEPTOCYLINDRUS MINIMUS		0	80		420	0				0	0	
LYCMOPHORA LYNGBYEI		20	0		0	0				0	0	
MELOSIRA NUMMULOIDES		0	20		0	0				0	0	
NAVICULA SP.		60	0		160	0				0	0	
NITZSCHIA CLOSTERIUM		80	20		120	0				0	0	
NITZSCHIA DELICATISSIMA		6180	1060		9540	260				6400	3900	
NITZSCHIA PUNGENS		140	120		140	0				100	0	
PLEUROSIGMA ANGULATUM		140	120		0	60				20	20	
RHIZOSOLENIA DELICATULA		1240	840		800	100				320	1240	
RHIZOSOLENIA HEBETATA		20	80		0	0				0	20	
SKELETONEMA COSTATUM		340	20		480	20				0	40	
SYNEDRA SP.		0	20		0	0				0	0	
THALASSIOSIRA GRAVIDA		0	0		60	0				0	0	
THALASSIOTHRIX NITZSCHIODES		20	0		20	0				0	0	
MESODINIUM RUBRUM		40	80		100	0				20	60	
FAVELLA SP.		0	40		0	0				0	0	
HELICOSTOMELLA SP.		0	60		0	0				0	0	
TINTINNIDS		80	0		0	0				0	0	
CODONELLA SP.		0	0		20	0				0	0	
ACARTIA SP.		0	0		20	0				0	0	
UNIDENTIFIED GYMNODINIUM		0	0		0	0				20	0	

SEPTEMBER 1 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	20	0	0	0	0	40	40	20		
CERATIUM LONGIPES	0	0	0	20	0	0	0	20	0	0		
DINOPHYSIS SP.	0	0	0	0	0	0	0	0	20	0		
PERIDINIUM LIMBATUM	0	0	0	0	20	0	0	0	0	60		
SCRIPPSIELLA TROCHOIDEA	0	20	0	20	0	20	0	80	80	0		
CHAETOCEROS DEBILIS	0	0	40	0	0	100	0	0	0	20		
CHAETOCEROS LACINIOSUS	0	0	0	40	0	0	0	20	20	20		
CHAETOCEROS MITRA	0	0	0	0	80	0	0	0	100	0		
DITYLUM BRIGHTWELLI	40	40	40	40	40	120	20	200	120	100		
LEPTOCYLINDRUS MINIMUS	0	0	0	0	0	20	0	20	0	0		
NITZSCHIA DELICATISSIMA	1380	1140	50180	1100	65600	7240	34080	195100	176360	136320		
RHIZOSOLENIA DELICATULA	40	100	80	100	100	200	180	140	40	280		
RHIZOSOLENIA HEBETATA	0	20	0	0	0	20	0	40	20	0		
SKELETONEMA COSTATUM	20	0	0	20	40	60	0	20	60	60		
MESODINIUM RUBRUM	0	0	0	0	20	120	0	0	40	40		
FAVELLA SP.	0	0	0	0	0	0	0	0	20	0		
HELICOSTOMELLA SP.	0	40	0	0	0	60	60	60	40	40		
TINTINNOPSIS SP.	0	0	0	0	0	60	0	0	0	0		

Appendix 4. (cont'd)

SEPTEMBER 1 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	0	0	0	20	0	20	0	0		
CERATIUM LONGIPES	20	0	20	0	0	20	0	0	20	0		
DINOPHYSIS NORVEGICA	0	0	0	0	0	0	0	20	0	0		
SCRIPPSIELLA TROCHOIDEA	0	0	20	0	0	0	0	20	20	0		
CHAETOCEROS DEBILIS	20	0	40	160	40	180	0	180	0	0		
CHAETOCEROS LACINIOSUS	0	0	0	20	0	0	0	20	0	0		
CHAETOCEROS MITRA	0	0	0	0	40	0	0	0	0	0		
DITYLUM BRIGHTWELLI	60	20	60	40	40	180	40	320	120	260		
LEPTOCYLINDRUS MINIMUS	0	0	0	0	0	0	0	0	20	20		
NITZSCHIA DELICATISSIMA	26420	800	50260	79240	47720	106500	3900	245380	234300	154220		
PLEUROSIGMA ANGULATUM	0	0	0	0	0	0	0	20	0	0		
PINNULARIA SP.	0	0	0	0	0	0	20	0	0	0		
RHIZOSOLENIA DELICATULA	180	80	0	220	120	580	240	380	140	240		
RHIZOSOLENIA HEBETATA	0	0	0	60	20	0	0	60	20	20		
SKELETONEMA COSTATUM	0	20	80	100	0	320	0	100	100	40		
MESODINIUM RUBRUM	0	0	20	40	40	0	0	20	40	0		
HELICOSTOMELLA SP.	0	0	20	0	0	40	0	20	0	20		

SEPTEMBER 1 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
CHAETOCEROS DEBILIS	0	0	60		0					20		
CHAETOCEROS LACINIOSUS	20	0	0		40					0		
CHAETOCEROS MITRA	0	0	0		120					0		
DITYLUM BRIGHTWELLI	20	0	80		40					100		
NITZSCHIA DELICATISSIMA	28960	0	92020		134620					206180		
PINNULARIA SP.	0	20	0		0					0		
RHIZOSOLENIA DELICATULA	180	0	40		140					140		
RHIZOSOLENIA HEBETATA	20	0	80		0					0		
SKELETONEMA COSTATUM	60	0	120		60					200		
MESODINIUM RUBRUM	20	0	0		40					0		
HELICOSTOMELLA SP.	0	20	40		0					0		

SEPTEMBER 8 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	20	40	0	80	20	0	0	180	0	0		
CERATIUM LONGIPES	0	0	20	0	20	0	0	0	20	0		
DINOPHYSIS SP.	0	0	0	0	20	0	20	0	0	0		
SCRIPPSIELLA TROCHOIDEA	0	0	0	0	0	0	0	100	0	0		
DITYLUM BRIGHTWELLI	100	360	160	80	700	160	20	20	60	240		
FRAGILARIA SP.	0	0	0	0	0	0	0	0	0	20		
NITZSCHIA DELICATISSIMA	1880	1040	960	260	440	300	100	320	600	980		
PLEUROSIGMA ANGULATUM	0	0	0	0	60	0	40	0	20	0		
RHIZOSOLENIA DELICATULA	0	80	20	0	40	0	0	0	0	20		
RHIZOSOLENIA HEBETATA	0	0	40	0	0	0	0	0	0	20		
SKELETONEMA COSTATUM	40	120	120	80	460	60	0	20	0	60		
THALASSIOSIRA NORDENSKIOELDII	0	0	0	0	0	0	0	0	0	20		
DISTEPHANUS SPECULUM	0	0	0	0	0	0	40	0	20	0		
MESODINIUM RUBRUM	0	0	0	20	0	0	20	0	0	0		
FAVELLA SP.	0	20	20	0	0	0	0	0	0	20		
HELICOSTOMELLA SP.	40	20	0	40	40	0	20	20	0	40		

SEPTEMBER 8 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	40	0	0	0	20	0	0	0	0		
CERATIUM LONGIPES	0	0	0	0	0	20	0	0	0	0		
CERATIUM MINUTUM	20	0	0	0	0	0	0	0	20	0		
DINOPHYSIS SP.	0	0	0	0	0	0	0	20	0	0		
SCRIPPSIELLA TROCHOIDEA	0	0	0	0	0	20	0	20	0	0		
DITYLUM BRIGHTWELLI	160	320	180	100	320	360	20	80	100	120		
NITZSCHIA DELICATISSIMA	420	120	0	120	640	1120	80	0	880	60		
PLEUROSIGMA ANGULATUM	0	0	0	0	20	20	40	0	20	0		
RHIZOSOLENIA DELICATULA	40	40	20	40	20	60	0	0	140	40		
RHIZOSOLENIA HEBETATA	0	0	40	0	0	40	0	0	0	20		
SKELETONEMA COSTATUM	60	60	80	60	120	60	20	0	40	60		
DISTEPHANUS SPECULUM	0	0	0	0	0	0	0	0	0	20		
HELICOSTOMELLA SP.	20	20	40	20	0	0	40	0	0	0		

Appendix 4. (cont'd)

SEPTEMBER 8 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	20	0		0	20		0	0	0		
CERATIUM LONGIPES	0	0	0		0	20		0	0	0		
CHAETOCEROS DEBILIS	20	0	0		0	0		0	0	0		
DITYLUM BRIGHTWELLI	260	180	100		540	100		40	80	120		
NITZSCHIA DELICATISSIMA	520	1060	100		500	320		60	780	1020		
PLEUROSIGMA ANGULATUM	0	40	0		0	40		0	20	0		
RHIZOSOLENIA DELICATULA	20	0	40		20	20		0	0	40		
RHIZOSOLENIA HEBETATA	0	20	20		140	60		0	0	20		
SKELETONEMA COSTATUM	200	140	60		180	40		0	20	20		
DISTEPHANUS SPECULUM	0	0	20		0	0		0	0	0		
HELICOSTOMELLA SP.	0	20	0		0	20		20	0	20		

SEPTEMBER 29 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	0	0	0	0	0	0	20	0	0	20
GONYAULAX SPINIFERA	0	0	0	0	0	20	0	0	40	0	0	0
CERATIUM LONGIPES	0	0	20	40	20	0	0	0	60	0	0	0
CERATIUM MINUTUM	0	20	20	20	0	20	0	20	40	0	0	0
DINOPHYSIS SP.	40	0	0	0	0	0	20	0	0	0	0	0
DINOPHYSIS ACUTA	0	0	0	0	20	0	0	0	20	0	0	0
DINOPHYSIS ACUMINATA	0	0	0	0	20	0	0	20	20	0	0	0
DINOPHYSIS NORVEGICA	0	0	0	0	0	20	0	40	0	0	0	20
DINOPHYSIS ROTUNDATA	0	0	0	0	0	0	0	0	0	0	0	20
PERIDINIUM SP.	0	20	0	80	60	20	40	0	80	0	0	80
PERIDINIUM TRIQUETA	0	0	0	0	0	0	0	40	40	0	0	0
PERIDINIUM OVATUM	0	20	0	40	0	0	0	0	0	0	0	0
SCRIPPSIELLA TROCHOIDEA	0	120	40	180	0	0	40	0	0	0	0	0
CHAETOCEROS SP.	0	0	0	60	0	0	0	20	0	0	0	0
CHAETOCEROS COMPRESSUS	0	0	0	0	20	0	0	0	0	0	0	0
CHAETOCEROS DEBILIS	0	0	0	60	0	0	500	0	0	0	0	0
CHAETOCEROS DECIPIENS	0	0	0	0	0	60	0	20	20	0	0	0
CHAETOCEROS LORENZIANUS	0	0	0	0	0	0	20	0	0	0	0	0
COCCONEIS SP.	0	0	0	0	0	0	0	0	20	0	0	0
CORETHRON CRIOPHILUM	20	20	0	60	0	0	20	0	20	0	0	40
COSCINODISCUS SP.	0	0	40	0	0	0	0	0	0	0	0	40
COSCINOSIRA POLYCHORDA	0	0	0	0	0	0	0	0	0	20	0	0
DETONULA CYSTIFERA	0	0	0	0	0	0	420	0	0	0	0	0
DITYLUM BRIGHTWELLI	20	140	100	220	120	40	500	60	100	60	20	80
GYROSIGMA SP.	0	0	0	0	0	0	20	0	0	0	0	0
GYROSIGMA BALTICA	0	0	0	0	0	0	0	0	0	0	0	40
GYROSIGMA PROLONGATUM	0	0	0	0	0	0	0	0	0	0	0	20
LEPTOCYLINDRUS MINIMUS	0	0	100	240	0	0	80	0	0	0	0	0
NAVICULA SP.	0	20	0	0	0	0	60	0	0	0	0	0
NITZSCHIA SP.	140	80	200	600	0	0	960	0	0	0	0	0
NITZSCHIA CLOSTERIUM	0	0	0	0	0	0	0	20	0	0	0	40
NITZSCHIA DELICATISSIMA	0	20	0	0	40	0	0	20	20	0	0	0
NITZSCHIA PUNGENS	60	200	340	480	0	0	1560	0	0	0	0	0
PLEUROSIGMA ANGULATUM	0	0	20	0	0	0	20	20	0	0	0	0
PARALIA SULCATA	0	0	0	0	20	0	0	0	0	0	0	0
RHIZOSOLENIA SP.	0	0	0	0	0	0	40	0	0	0	0	0
RHIZOSOLENIA DELICATULA	0	0	40	80	0	0	200	0	20	0	0	0
SKELETONEMA COSTATUM	0	760	1280	540	60	20	3880	20	0	0	0	20
THALASSIOSIRA SP.	0	0	0	0	0	0	120	0	0	0	0	0
THALASSIOSIRA GRAVIDA	80	120	220	120	0	0	0	0	0	0	0	0
THALASSIOSIRA ROTULA	0	0	0	0	0	0	0	0	60	0	0	0
THALASSIOSIRA SUBTILIS	0	0	0	0	0	0	400	0	0	0	0	0
THALASSIOTHRIX NITZSCHIODES	0	0	80	300	0	0	20	20	80	0	0	0
DISTEPHANUS SPECULUM	60	40	20	300	40	0	80	60	20	0	0	0
MESODINIUM RUBRUM	0	240	40	20	680	160	0	100	140	60	20	340
EUGLENA SP.	0	0	0	0	120	0	0	20	40	0	40	0
FAVELLA SP.	0	0	0	0	0	0	0	0	0	0	0	20
TINTINNIDS	0	0	0	0	280	180	0	120	100	0	0	140
ACARTIA SP.	0	0	0	0	40	0	0	20	20	0	0	40
UNIDENTIFIED GYMNODINIUM	0	0	0	0	0	0	0	0	20	0	0	20

Appendix 4. (cont'd)

SEPTEMBER 29 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	0	0	0	0	0	0	0	0	20	
GONYAULAX SPINIFERA	0	0	0	0	0	0	0	0	20	0	0	
CERATIUM FURCA	40	0	0	0	0	0	0	0	0	0	0	
CERATIUM LONGIPES	0	0	0	0	0	0	0	0	20	20	0	
CERATIUM MINUTUM	0	40	0	20	0	0	0	0	0	0	0	
DINOPHYSIS SP.	0	20	40	0	0	0	0	0	0	0	0	
DINOPHYSIS ACUMINATA	0	0	0	0	0	0	0	0	40	20	0	
DINOPHYSIS NORVEGICA	0	0	0	60	0	20	0	0	0	0	0	
PERIDINIUM SP.	100	0	0	0	0	0	0	0	40	40	0	
PERIDINIUM LIMBATUM	0	0	0	0	0	0	0	0	0	0	20	
PERIDINIUM OVATUM	0	0	20	0	0	0	0	0	0	0	0	
SCRIPPSIELLA TROCHOIDEA	0	60	0	0	0	0	0	0	0	0	0	
GYRODINIUM SP.	0	0	0	0	20	0	0	0	0	0	0	
BACTERIOSIRA FRAGILIS	0	0	160	0	0	0	20	0	0	0	0	
CERATAULINA BERGONI	0	0	100	0	0	0	0	0	0	0	0	
CHAETOCEROS SP.	0	0	0	0	0	0	260	0	0	20	0	
CHAETOCEROS DEBILIS	0	0	420	0	20	0	0	0	0	0	0	
CHAETOCEROS DECIPIENS	0	0	0	20	0	0	0	20	20	0	0	
CHAETOCEROS LORENZIANUS	0	0	0	0	0	0	0	0	20	0	0	
CORETHRON CRIOPHILUM	0	20	40	0	0	20	20	40	0	20	0	
COSCINODISCUS SP.	0	0	40	0	0	0	0	0	0	0	0	
DITYLUM BRIGHTWELLI	160	140	300	240	20	160	700	180	280	420	60	
FRAGILARIA SP.	0	0	40	0	20	0	0	0	0	0	0	
GYROSIGMA FASCIOLA	0	0	0	0	0	0	0	20	0	0	0	
LEPTOCYLINDRUS MINIMUS	60	0	80	0	0	0	20	20	0	0	20	
LYCMOPHORA LYNGBYEI	0	20	0	20	0	0	0	0	0	0	0	
MELOSIRA NUMMULOIDES	0	0	100	0	0	0	0	0	0	0	0	
NAVICULA SP.	0	0	0	0	0	0	60	20	0	0	0	
NITZSCHIA SP.	420	280	540	0	0	0	520	0	0	0	0	
NITZSCHIA CLOSTERIUM	0	0	0	200	0	0	0	60	60	60	0	
NITZSCHIA DELICATISSIMA	0	0	0	20	0	0	0	20	40	100	0	
NITZSCHIA PUNGENS	280	60	600	0	0	0	140	0	0	0	0	
PLEUROSIGMA ANGULATUM	0	20	0	0	20	0	0	80	0	20	20	
RHIZOSOLENIA DELICATULA	40	220	180	20	0	0	0	140	40	20	0	
RHIZOSOLENIA FRAGILLIMA	0	0	0	0	0	0	20	0	0	0	0	
SKELETONEMA COSTATUM	220	1640	2380	40	60	60	1180	160	60	300	60	
SYNEDRA SP.	0	0	0	0	0	0	0	0	20	0	0	
THALASSIOSIRA SP.	0	0	0	0	0	0	60	0	0	0	0	
THALASSIOSIRA GRAVIDA	140	420	600	0	0	0	0	0	0	0	0	
THALASSIOSIRA ROTULA	0	0	0	20	0	0	0	20	0	20	0	
THALASSIOTHRIX NITZSCHIODES	160	180	400	100	0	20	340	80	40	60	0	
DISTEPHANUS SPECULUM	20	20	60	0	0	20	160	0	0	0	0	
MESODINIUM RUBRUM	20	20	0	0	0	20	0	20	80	60	0	
EUGLENA SP.	0	0	0	0	0	40	0	0	0	40	0	
HELICOSTOMELLA SP.	0	0	0	0	0	20	0	0	0	0	0	
TINTINNIDS	0	0	0	20	0	20	0	20	40	80	0	
ACARTIA SP.	0	0	0	0	0	40	0	0	40	40	0	
UNIDENTIFIED GYMNODINIUM	0	0	0	0	20	0	0	0	0	0	0	
UNIDENTIFIED DINOPHYSIS	0	0	0	0	0	0	0	20	0	0	0	

Appendix 4. (cont'd)

SEPTEMBER 29 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA		0	0		0	0			0	0	20	
CERATIUM LONGIPES		60	0		0	0			40	20	0	
CERATIUM MINUTUM		20	40		0	0			0	0	0	
DINOPHYSIS ACUTA		0	0		0	0			20	0	0	
DINOPHYSIS ACUMINATA		0	0		0	0			20	0	0	
PERIDINIUM SP.		0	20		0	20			0	0	0	
GYRODINIUM SP.		0	0		20	0			0	0	0	
BACTERIOSIRA FRAGILIS		0	120		0	0			0	0	0	
CERATAULINA BERGONI		0	40		0	0			0	0	0	
CHAETOCEROS SP.		0	60		0	0			20	20	0	
CHAETOCEROS DEBILIS		0	260		0	0			0	0	0	
CHAETOCEROS LACINIOSUS		0	0		0	0			0	40	0	
CORETHRON CRIOPHILUM		0	20		0	0			20	20	0	
COSCINODISCUS SP.		0	80		0	0			20	0	0	
DITYLUM BRIGHTWELLI		140	540		100	160			300	460	60	
GYROSIGMA SP.		0	60		0	20			0	0	0	
GYROSIGMA FASCIOLA		0	0		0	20			40	20	0	
GYROSIGMA TENNUISSIMUM		0	0		0	40			0	20	0	
LEPTOCYLINDRUS MINIMUS		80	0		0	0			0	0	0	
MELOSIRA NUMMULOIDES		240	0		0	0			0	0	0	
NAVICULA SP.		0	0		0	0			0	20	0	
NITZSCHIA SP.		360	880		0	0			0	0	0	
NITZSCHIA CLOSTERIUM		0	0		0	0			20	40	0	
NITZSCHIA DELICATISSIMA		0	0		0	0			40	40	0	
NITZSCHIA PUNGENS		500	880		0	0			0	0	0	
PLEUROSIGMA ANGULATUM		20	0		0	40			0	20	0	
RHIZOSOLENIA DELICATULA		0	240		0	0			0	60	0	
SKELETONEMA COSTATUM		1340	4660		20	100			140	180	20	
SYNEDRA SP.		0	0		0	0			40	20	0	
THALASSIOSIRA GRAVIDA		280	2040		0	0			0	0	0	
THALASSIOTHRIX NITZSCHIODES		320	460		0	40			80	120	0	
DISTEPHANUS SPECULUM		20	0		0	0			0	0	0	
MESODINIUM RUBRUM		40	0		0	0			0	0	0	
EUGLENA SP.		0	0		0	40			40	0	0	
TINTINNIDS		0	0		0	80			20	20	0	
ACARTIA SP.		0	0		0	20			0	0	0	
UNIDENTIFIED GYMNODINIUM		0	0		20	0			0	0	0	

OCTOBER 6 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
CERATIUM LONGIPES	0	0	0	0	0	20	20	20		20		
PERIDINIUM SP.	0	0	0	0	0	0	0	80		0		
CHAETOCEROS SP.	0	0	0	0	0	0	0	80		20		
DITYLUM BRIGHTWELLI	60	40	40	20	60	140	80	80		180		
NAVICULA SP.	0	0	0	0	0	0	0	0		20		
NITZSCHIA DELICATISSIMA	0	0	0	0	20	60	40	0		0		
NITZSCHIA PUNGENS	0	0	0	0	0	0	0	20		0		
PLEUROSIGMA ANGULATUM	0	0	0	0	0	40	20	0		20		
RHIZOSOLENIA DELICATULA	0	20	0	0	0	0	0	0		0		
RHIZOSOLENIA HEBETATA	0	0	0	0	0	0	0	60		0		
SKELETONEMA COSTATUM	20	40	40	0	0	160	60	40		180		
THALASSIOSIRA GRAVIDA	0	0	0	0	0	0	0	40		0		
THALASSIOTHRIX NITZSCHIODES	0	0	0	0	0	0	0	20		0		
DISTEPHANUS SPECULUM	0	0	0	0	0	0	0	20		40		
MESODINIUM RUBRUM	0	0	0	0	60	120	220	200		260		
TINTINNIDS	0	0	0	0	0	0	0	60		120		
TINTINNOPSIS SP.	0	0	0	0	0	0	80	0		0		
ACARTIA SP.	0	0	0	0	0	0	0	20		0		

Appendix 4. (cont'd)

OCTOBER 6 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
CERATIUM LONGIPES	0	0	0	0	0	20	20	0		80		
DINOPHYSIS SP.	0	0	0	0	0	0	20	0		0		
PERIDINIUM SP.	0	0	0	0	0	0	0	0		20		
CHAETOCEROS SP.	0	0	0	0	0	20	20	0		0		
CORETHRON CRIOPHILUM	0	0	20	0	0	0	0	0		0		
DITYLUM BRIGHTWELLI	0	40	60	0	40	340	160	100		240		
DIPLONEIS SP.	0	0	0	0	0	0	20	0		0		
LEPTOCYLINDRUS MINIMUS	0	0	0	0	0	0	0	0		20		
LYCMOPHORA LYNGBYEI	0	0	0	0	0	0	20	0		0		
MELOSIRA NUMMULOIDES	0	0	0	0	0	20	0	0		0		
NITZSCHIA DELICATISSIMA	0	20	20	0	0	100	60	0		0		
NITZSCHIA PUNGENS	0	0	0	0	0	0	0	0		40		
PLEUROSIGMA ANGULATUM	0	0	0	20	0	0	0	0		20		
RHABDONEMA ADRIATICUM	0	0	0	0	0	0	0	20		0		
RHIZOSOLENIA DELICATULA	0	20	0	40	0	0	0	0		0		
RHIZOSOLENIA HEBETATA	0	0	0	0	0	0	20	0		0		
SKELETONEMA COSTATUM	60	0	20	20	0	160	40	80		180		
DISTEPHANUS SPECULUM	0	0	0	0	0	0	0	0		20		
MESODINIUM RUBRUM	0	0	0	0	0	200	200	60		120		
HELICOSTOMELLA SP.	0	0	0	0	0	0	20	0		0		
TINTINNIDS	0	0	0	0	0	0	0	60		0		
TINTINNOPSIS SP.	0	0	0	0	0	20	60	0		0		
ACARTIA SP.	0	0	0	0	0	0	0	0		20		

OCTOBER 6 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
CERATIUM LONGIPES	0	0	0		0	20	0	40		0		
CHAETOCEROS SP.	0	0	0		0	40	40	80		0		
DITYLUM BRIGHTWELLI	100	60	60		60	120	80	240		40		
NAVICULA SP.	0	0	0		0	0	60	40		0		
NITZSCHIA CLOSTERIUM	0	0	0		0	0	0	140		0		
NITZSCHIA DELICATISSIMA	20	0	0		0	40	20	0		0		
NITZSCHIA PUNGENS	0	0	0		0	0	0	100		20		
PLEUROSIGMA ANGULATUM	0	0	0		0	20	40	0		0		
RHABDONEMA ADRIATICUM	0	0	0		0	20	0	0		0		
RHIZOSOLENIA HEBETATA	0	0	0		0	0	20	0		0		
SKELETONEMA COSTATUM	40	40	20		0	100	60	140		240		
THALASSIOTHRIX NITZSCHIODES	0	0	0		0	0	20	120		20		
DISTEPHANUS SPECULUM	0	0	0		0	0	0	60		0		
MESODINIUM RUBRUM	0	0	0		0	140	120	0		0		
TINTINNIDS	0	0	0		0	0	0	80		20		
TINTINNOPSIS SP.	0	0	0		0	40	40	0		0		
ACARTIA SP.	0	0	0		0	0	0	60		0		

OCTOBER 20 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	0	20	0	0	0	0	80	60	0	0
GONYAULAX TRIACANTHA	0	0	0	20	0	0	0	0	0	0	0	0
CERATIUM LONGIPES	0	0	0	0	0	0	0	0	0	0	20	0
CERATIUM MINUTUM	20	0	20	0	0	0	20	40	40	20	0	0
SCRIPPSIELLA TROCHOIDEA	0	0	0	0	0	0	20	40	60	20	0	0
CHAETOCEROS DEBILIS	0	20	0	0	0	0	0	0	0	0	0	0
DISTEPHANUS SPECULUM	0	20	20	0	60	0	40	0	0	40	0	0
MESODINIUM RUBRUM	1000	140	40	360	180	60	260	280	80	400	0	0
FAVELLA SP.	0	0	0	20	0	0	0	0	0	0	0	0
TINTINNOPSIS SP.	0	0	20	40	0	20	0	0	0	0	0	0

Appendix 4. (cont'd)

OCTOBER 20 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
CERATIUM LONGIPES	0	0	20	0	0	0	0	0	0	0	0	
CERATIUM MINUTUM	0	0	0	0	0	0	0	0	20	0	0	
DINOPHYSIS SP.	0	0	0	0	0	0	20	0	0	0	0	
SCRIPPSIELLA TROCHOIDEA	0	0	0	20	0	0	0	0	0	0	0	
NITZSCHIA DELICATISSIMA	0	0	0	0	0	20	0	0	0	0	0	
PLEUROSIGMA ANGULATUM	0	0	0	0	0	20	0	0	0	0	0	
RHIZOSOLENIA DELICATULA	0	0	20	0	0	40	0	0	0	0	0	
DISTEPHANUS SPECULUM	20	0	0	0	0	0	80	0	0	0	0	
MESODINIUM RUBRUM	80	0	120	20	20	0	0	20	0	0	0	
FAVELLA SP.	0	0	0	0	0	20	0	0	0	0	0	
TINTINNOPSIS SP.	20	0	0	0	0	0	0	0	0	0	0	

OCTOBER 20 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	20		0	0				0	0	
CERATIUM LONGIPES	0	20	0		0	0				0	0	
CERATIUM MINUTUM	0	0	40		0	20				0	0	
SCRIPPSIELLA TROCHOIDEA	0	0	0		20	0				0	0	
DITYLUM BRIGHTWELLI	0	20	0		0	0				0	0	
DISTEPHANUS SPECULUM	0	20	0		0	0				60	0	
MESODINIUM RUBRUM	20	60	20		0	20				60	0	
TINTINNOPSIS SP.	0	0	0		0	0				20	0	

NOVEMBER 19 1987 DEPTH : SURFACE

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	0	0	0	0		0	0	0	0	20
CERATIUM MINUTUM	0	0	0	0	0	0		20	20	0	0	0
NITZSCHIA DELICATISSIMA	0	0	0	60	0	0		0	0	0	0	0
PLEUROSIGMA ANGULATUM	0	0	0	0	0	0		0	0	0	20	0
DISTEPHANUS SPECULUM	0	0	20	0	0	0		0	0	0	0	0
MESODINIUM RUBRUM	20	0	0	0	0	0		0	0	0	0	0

NOVEMBER 19 1987 DEPTH : 10 METRES

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
CORETHRON CRIOPHILUM	0	40	0	0	0			0	0	0	0	
NITZSCHIA DELICATISSIMA	0	20	60	0	0			0	20	20	0	
PLEUROSIGMA ANGULATUM	0	0	20	0	0			0	20	0	0	
RHIZOSOLENIA HEBETATA	0	0	0	0	0			0	0	20	0	
SKELETONEMA COSTATUM	0	0	40	20	0			0	0	0	0	

NOVEMBER 19 1987 DEPTH : BOTTOM

ORGANISMS	STATION											
	1	2	3	4	5	6	7	8	9	10	11	12
GONYAULAX EXCAVATA	0	0	0		0					20	0	
CERATIUM MINUTUM	0	0	0		20					0	0	
MELOSIRA NUMMULOIDES	0	0	0		0					20	0	
NAVICULA SP.	0	0	0		20					0	0	
NITZSCHIA DELICATISSIMA	0	0	80		20					60	0	
PLEUROSIGMA ANGULATUM	0	0	0		0					0	20	
DISTEPHANUS SPECULUM	0	20	0		0					0	0	