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OCEAN FRONTRAL AREAS PHYTOPLANKTON ENUMERATION AND
BIOMASS ESTIMATES -- OP. (U) UNIVERSITY OF SOUTHERN
MISSISSIPPI HATTIESBURG G ANDERSON ET AL JAN 86

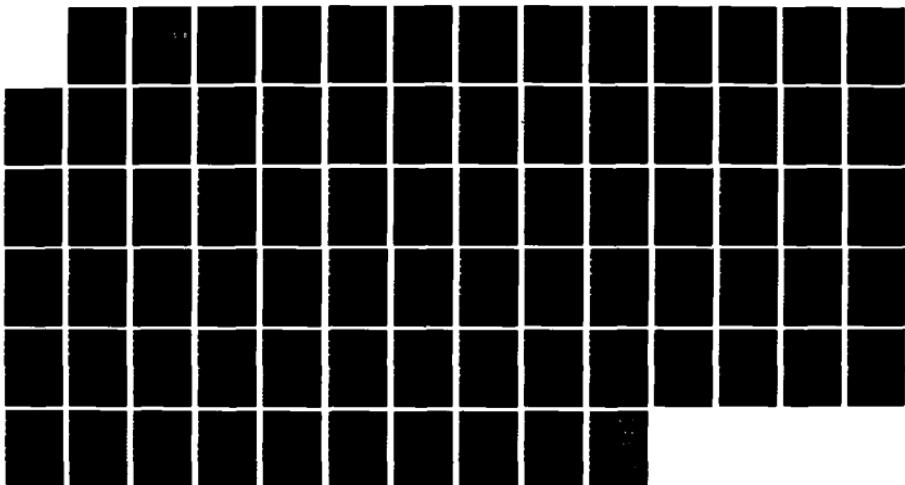
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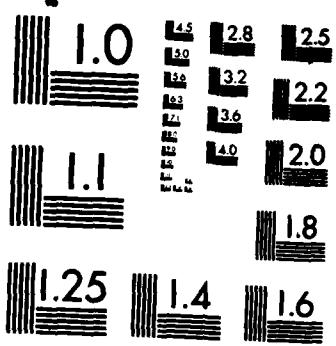
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OCEAN FRONTAL AREAS

PHYTOPLANKTON ENUMERATION AND BIOMASS ESTIMATES --
OPERATION GUIDING LIGHT (APRIL-MAY 1985)

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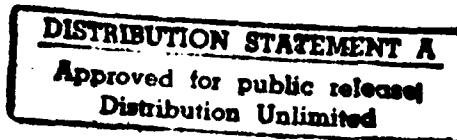
FINAL TECHNICAL REPORT FOR
CONTRACT #N00014-85-K-0353

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SUBMITTED BY

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HATTIESBURG, MS 39406

JANUARY 1986



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ABSTRACT

1. During the pilot field exercise for Operation Guiding Light (April-May, 1985), 39 phytoplankton samples were collected in the shelf-slope frontal region and 72 phytoplankton samples were collected in the Gulf Stream frontal region (both survey areas are located in the western North Atlantic Ocean). Samples were obtained using either a towed underwater pumping system (TUPS) at a depth of two meters or a rosette sampler (various depths) and preserved for subsequent analysis.

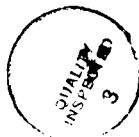
2. Based on preliminary pigment analyses completed several weeks subsequent to the cruise, the Chief Scientific Officer selected a total of 52 samples for analysis (21 TUPS samples and 31 station samples). For those samples, we identified (to species, where possible) enumerated and estimated biomass of the phytoplankton present.

3. The results detailed herein may be summarized as follows:

a) Phytoplankton biomass ranged from $5-29,308 \text{ mm}^3 \times 10^{-6}/\ell$.

b) Phytoplankton biomass south of the Gulf Stream front was significantly greater than north of the front or at the frontal boundary (TUPS samples); biomass estimates for station samples far exceeded those for underway samples and were usually substantially greater for samples obtained in cool water ($12-16^\circ\text{C}$) than in warm water ($18-21^\circ\text{C}$).

c) In the shelf slope-frontal region, estimated biomass for several of the underway samples was considerably greater than for any of the underway samples obtained in the southern survey area; in contrast to TUPS results obtained in the southern survey area, sample biomass south of the frontal boundary was low compared with that of samples obtained both at and north of the frontal boundary.



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d) In most samples, biomass of dinoflagellates exceeded (often by 2-4 fold) biomass of diatoms; only in some of the samples obtained in the shelf-slope frontal area did biomass of groups other than diatoms and dinoflagellates comprise a substantial (>25%) proportion of total biomass.

Introduction

In 1985, personnel from the Department of Biological Sciences at the University of Southern Mississippi participated in the first phase of Operation Guiding Light, a study to evaluate oceanographic processes associated with ocean frontal areas. This study is being directed by the Naval Ocean Research and Development Activity. The primary objectives of our involvement were as follows:

1) We provided a graduate student to participate in the pilot field exercise of Operation Guiding Light (April-May, 1985) to study the shelf-slope and Gulf Stream fronts in the western North Atlantic Ocean. The student's shipboard responsibilities included collecting and preserving phytoplankton samples for subsequent analysis as well as assisting other cruise participants, when appropriate.

2) We analyzed selected phytoplankton samples during Summer, 1985. Our analyses included identification of phytoplankton (to species, where possible), enumeration of phytoplankton cells and estimation of phytoplankton biomass in 52 samples chosen by the Chief Scientific Officer.

This final report details our sample analyses. It includes a description of our methodology, tabulations of results for each of the 52 samples analyzed, and a brief discussion.

Materials and Methods

1. Sample Collection. Two sampling methodologies were employed during the pilot field study conducted during April and May 1985. Samples taken while underway were pumped aboard from a depth of 2 m using a towed underwater pumping system (TUPS) designed by NORDA. Water was collected within a 100 liter Nalgene vat equipped with a 20 μm mesh

plankton cup at the bottom. Phytoplankton samples were concentrated from known volumes (generally 40-80 l) of seawater and preserved for subsequent analysis (see below). TUPS samples which we analyzed were obtained at several locations during one tow made in the southern survey area (Samples 1-7) and during two tows made in the northern survey area (Samples UPSN1-UPSN10 and UPSS1-UPSS4).

The second sampling methodology was utilized while on station. It involved collection of water samples from 30 l Niskin bottles which were suspended via a rosette sampler at desired depths from 1-35 m. Samples (0.5 l) obtained were preserved for subsequent analysis (see below).

2. Sample Preservation and Storage. The final sample volumes (all 500 cc regardless of sampling method employed) were determined using a graduated cylinder; 10 cc neutralized formalin (Throndsen, 1978) was added to each sample to make a 0.4% HCHO solution. The preserved samples were enclosed within polyethylene bottles and refrigerated until examined during Summer, 1985.

3. Selection of Samples for Examination. During the field exercise, samples were collected at 104 different locations. Since one replicate for each was also obtained, a total of over 200 preserved phytoplankton samples have been archived at NORDA. The Chief Scientific Officer selected 52 of them to be analyzed by us; selection was based on analyses of photosynthetic pigment distribution conducted by other cruise participants. Hence, the samples we investigated were expected to contain abundant phytoplankton relative to those we did not examine.

4. Examination of Samples. After shaking a sample thoroughly for one minute, a 50 ml aliquot of it was poured into a settling chamber for subsequent study using the Utermöhl technique (Hasle, 1978). After a

settling period of at least two days, samples were examined using a Zeiss inverted microscope equipped with phase contrast. Initially, samples were scanned at low magnification (160X) to determine how best to achieve a total phytoplankton count of at least 300, as recommended elsewhere (e.g. Woodmansee and McLelland, 1984; Fryxell et al., 1985). Where phytoplankters were dense, a random field method (Venrick, 1978; Woodmansee and McLelland, 1984) was selected; for samples with relatively few phytoplankters, the entire area of the settling chamber was examined. Phytoplankton were identified (to species, where possible) using the appropriate magnification (either 160X, 400X, or 1000X, depending on cell size). Identification aids utilized are provided in Appendix I.

For each species encountered, cell size was measured for 25 individuals (Smayda, 1978), wherever possible. Measurements of size included consideration of appropriate morphological features (i.e. spines, horns, etc.) as discussed by Smayda (1978). Such an approach was necessary so that average cell volume for each species could be estimated.

5. Calculations.

a. Average cell size (volume in $\text{mm}^3 \times 10^{-6}$) was determined for each species encountered in each sample by dividing the total calculated volume of all the cells measured (up to 25) by the number of cells measured. (Note: for irregularly shaped specimens such as dinoflagellates, cell volume was determined by summing the volumes of the various cell parts. For example, for Ceratium spp., the cell body was treated as a cylinder to which was added the volume of the cone-shaped horns. Formulae used for calculating volumes of the geometric shapes encountered are provided in Appendix II.)

b. Number of cells/liter was calculated for each species using the formula below:

$$N = C \left(\frac{A_t}{F \cdot A_f} \right) \cdot \left(\frac{V_s}{V_a} \right)$$

where N = cell number/liter, C = number of cells counted, A_t = area of the counting chamber, F = the number of fields counted, A_f is the area of the field, V_s is the sample volume, V_a is the aliquot volume and V is the volume filtered. (Note: when the total area of the counting chamber was examined, $\left(\frac{A_t}{F \cdot A_f} \right) = 1.$)

c. Biomass (in $\text{mm}^3 \times 10^{-6}/\ell$) was estimated for each taxon by multiplying cell volume by the number of cells present per liter.

All of the methods we have employed conform to procedures which have been outlined in the UNESCO Phytoplankton Manual (Sournia, 1978) and evaluated in detail therein by various workers [e.g., preservation methods by Throndsen; pump sampling by Beers; inverted microscope (settling) by Hasle; counting by Smayda and Venrick; biomass estimation by Smayda]. Additional considerations regarding the methods we have used have been discussed by Kutkuhn, 1958; Lund et al., 1958; and Sicko-Goad et al., 1977.

Results

The results of our sample analyses are provided in Tables 1-52. Table 53 summarizes the total biomass estimates for all samples. Table 54 provides a complete listing, by taxonomic division, of all of the genera and species encountered in our analyses of samples. Finally, Appendix III provides the computer file names (stored at NORDA) which correspond to our samples.

Table 1

SAMPLE NUMBER 1
 DATE 5/01/85
 TIME 1430 GMT
 DEPTH 2m(TUPS)

LOCATION :lat 37 59.75N
 :long 72 59.20W
 VOLUME FILTERED 40L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\text{l}$
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>			
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>	2	2.35	4.71
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	5	1.67	8.4
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>			
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>			
<i>Rhizosolenia setigera</i>	1	.0007	0
<i>Rhizosolenia styliformis</i>	4	.06	.23
<i>Skeletonema costatum</i>	46	.013	.58
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.	1	.00004	0
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	5	.393	2
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>	6	4.68	28.11
<i>Ceratium minutum</i>	7	.124	.87
<i>Ceratium pentagonum</i>			
<i>Ceratium tripos</i>	5	4.357	21.79
<i>Dinophysis caudata</i>	1	2.624	2.62
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	100	.058	5.83
<i>Prorocentrum micans</i>			
<i>Prorocentrum rostratum</i>			
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccilithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	2	.0238	.05
MONADS	36	.004	.17

Table 2

SAMPLE NUMBER 2
 DATE 5/01/85
 TIME 1500 GMT
 DEPTH 2m(TUPS)

LOCATION :lat 37 55.68N
 :long 72 56.37W
 VOLUME FILTERED 40L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\ell$
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>			
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>	2	.1635	.33
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	11	1.65	18.16
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>			
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>			
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>	5	.0228	.11
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	5	.3413	1.71
<i>Ceratium lineatum</i>	17	.2543	4.32
<i>Ceratium longipes</i>	5	1.963	9.82
<i>Ceratium minutum</i>	3	.71	2.13
<i>Ceratium pentagonum</i>			
<i>Ceratium tripos</i>			
<i>Dinophysis caudata</i>	4	.9475	3.8
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	92	.3867	35.6
<i>Prorocentrum micans</i>			
<i>Prorocentrum rostratum</i>	1	.0263	.03
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccilithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.			
MONADS	26	.005	.13

Table 3

9

SAMPLE NUMBER	3	LOCATION	:lat	37 59.94N
DATE	5/01/85		:long	72 48.95W
TIME	2030 GMT	VOLUME	FILTERED	40L
DEPTH	2m(TUPS)	SAMPLE	VOLUME	50ml
		NUMBER OF	AVERAGE	BIOMASS
		CELLS/L	CELL SIZE	ESTIMATE
			mm ³ x 10 ⁻⁶	mm ³ x 10 ⁻⁶ /l
DIATOMS				
<i>Bacteriastrum delicatulum</i>				
<i>Chaetoceros atlanticum</i>				
<i>Chaetoceros breve</i>				
<i>Chaetoceros decipiens</i>				
<i>Corethron hystrix</i>				
<i>Coscinodiscus centralis</i>	4		2.382	9.53
<i>Coscinodiscus granii</i>				
<i>Coscinodiscus lineatus</i>				
<i>Guinardia flaccida</i>	2		1.05	2.1
<i>Hemiaulus hauckii</i>				
<i>Leptocylindrus danicus</i>				
<i>Lithodesmium undulatum</i>				
<i>Melosira</i> sp.	9		.25	2.25
<i>Navicula</i> sp.				
<i>Nitzschia seriata</i>				
<i>Pleurosigma</i> sp.				
<i>Rhizosolenia alata</i>				
<i>Rhizosolenia setigera</i>				
<i>Rhizosolenia styliformis</i>				
<i>Skeletonema costatum</i>				
<i>Stephanopyxis turris</i>				
<i>Synedra</i> sp.	1		.00011	.0001
<i>Thalassionema nitzschoides</i>				
<i>Thalassiothrix frauenfeldi</i>				
DINOFLAGELLATES				
<i>Ceratium contortum</i>				
<i>Ceratium furca</i>				
<i>Ceratium fusus</i>				
<i>Ceratium lineatum</i>	2		.2014	.453
<i>Ceratium longipes</i>	5		.2631	1.31
<i>Ceratium minutum</i>				
<i>Ceratium pentagonum</i>				
<i>Ceratium tripos</i>				
<i>Dinophysis caudata</i>				
<i>Dinophysis ovum</i>				
<i>Peridinium depressum</i>	37		.0796	2.95
<i>Prorocentrum micans</i>				
<i>Prorocentrum rostratum</i>	1		.06	.06
<i>Prorocentrum triangulatum</i>				
COCCOLITHOPHORES				
<i>Coccolithus huxleyi</i>				
SILICOFLAGELLATES				
<i>Dictyocha fibula</i>				
<i>Distephanus speculum</i>				
MISCELLANEOUS PHYTOPLANKTON				
<i>Cryptomonas</i> sp.				
MONADS	33		.004	.132

Table 4

10

SAMPLE NUMBER 4
 DATE 5/01/85
 TIME 2230 GMT
 DEPTH 2m(TUPS)

LOCATION :lat 37 56.16N
 :long 72 47.28W
 VOLUME SAMPLE FILTERED 40L
 VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIO MASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\text{l}$
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>			
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>	5	.14578	.73
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	7	.94554	6.62
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>			
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>			
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	2	.6285	1.26
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>	3	3.488	10.5
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>			
<i>Ceratium tripos</i>	1	1.9625	1.9625
<i>Dinophysis caudata</i>	1	.3886	.39
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	1	1.256	1.26
<i>Prorocentrum micans</i>			
<i>Prorocentrum rostratum</i>			
<i>Prorocentrum triangulatum</i>	1	.01	.01
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	1	.263	.263
MONADS	33	.005	.16

Table 5

11

SAMPLE NUMBER 5
 DATE 5/01/85
 TIME 2300 GMT
 DEPTH 2m(TUPS)

LOCATION :lat 37 59.94N
 :long 72 48.95W
 VOLUME FILTERED 80L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /L
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DIATOMS

<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>			
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>	2	1.41	2.82
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	5	.984	4.92
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>			
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>			
<i>Rhizosolenia setigera</i>	1	.0746	.075
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>	19	.0225	.427
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			

DINOFLAGELLATES

<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	2	.6285	1.26
<i>Ceratium lineatum</i>	8	.2352	1.9
<i>Ceratium longipes</i>	6	.385	2.31
<i>Ceratium minutum</i>	4	.196	.784
<i>Ceratium pentagonum</i>			
<i>Ceratium tripos</i>	3	2.292	6.87
<i>Dinophysis caudata</i>	1	2.5592	2.56
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	20	.135	2.7
<i>Prorocentrum micans</i>			
<i>Prorocentrum rostratum</i>			
<i>Prorocentrum triangulatum</i>	1	.0255	.025

COCCOLITHOPHORES

<i>Coccolithus huxleyi</i>			
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SILICOFLAGELLATES

<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			

MISCELLANEOUS PHYTOPLANKTON

<i>Cryptomonas</i> sp.			
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MONADS

28	.004	.12
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Table 6

12

SAMPLE NUMBER 6
 DATE 5/02/85
 TIME 0030 GMT
 DEPTH 2m(TUPS)

LOCATION :lat 38 10.42N
 :long 72 54.63W
 VOLUME FILTERED 40L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIO MASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\text{l}$
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	10	1.96	19.62
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>	20	2.18	43.68
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	618	1.57	963.25
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>			
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>			
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>	7489	.045	374
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.	39	.098	3.46
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	135	.625	101.36
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>	330	.243	77.14
<i>Ceratium pentagonum</i>	124	.209	26.61
<i>Ceratium tripos</i>	132	2.55	293.24
<i>Dinophysis caudata</i>	31	1.8	55.85
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	1453	.063	94.64
<i>Prorocentrum micans</i>	10	.04	.4
<i>Prorocentrum rostratum</i>			
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.			
MONADS	872	.004	3.49

Table 7

SAMPLE NUMBER 7
 DATE 5/02/85
 TIME 1240 GMT
 DEPTH 2m(TUPS)

LOCATION :lat 38 05.21N
 :long 72 37.19W
 VOLUME FILTERED 40L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\ell$
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	21	.42	8.81
<i>Corethron hystrix</i>	29	.07	2
<i>Coscinodiscus centralis</i>	128	.33	42.35
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	482	1.3	627.81
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>			
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.	10	.04	.4
<i>Navicula</i> sp.	191	.002	.38
<i>Nitzschia seriata</i>	41	.021	.85
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>			
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>	1687	.03	49.4
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.	38	.0033	.13
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>	63	2.91	183.22
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	160	.692	110.67
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>	752	.235	176.43
<i>Ceratium pentagonum</i>	334	.194	64.98
<i>Ceratium tripos</i>	118	4.77	563.24
<i>Dinophysis caudata</i>	18	.494	8.89
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	1132	.076	90.5
<i>Prorocentrum micans</i>	72	.026	1.88
<i>Prorocentrum rostratum</i>			
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccilithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>	18	.011	.197
<i>Diaphanosus speculum</i>	10	.019	.19
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	165	.019	3.15
<i>MONADS</i>	2375	.004	9.5

Table 8

SAMPLE NUMBER	UPS-N1	LOCATION	:lat	39 44.93N
DATE	5/10/85		:long	71 25.67W
TIME	1630 GMT	VOLUME	FILTERED	40L
DEPTH	2m(TUPS)	SAMPLE	VOLUME	50ml
		NUMBER OF	AVERAGE	BIOMASS
		CELLS/L	CELL SIZE	ESTIMATE
			mm ³ x 10 ⁻⁶	mm ³ x 10 ⁻⁶ /l
DIATOMS				
Bacteriastrum delicatulum				
Chaetoceros atlanticum				
Chaetoceros breve				
Chaetoceros decipiens	28		.18	5.11
Corethron hystrix				
Coscinodiscus centralis	46		.31	10.7
Coscinodiscus granii	351		1.05	371.87
Coscinodiscus lineatus				
Guinardia flaccida	749		1.33	999
Hemiaulus hauckii	10		.088	.88
Leptocylindrus danicus	1094		.1	109.4
Lithodesmium undulatum	125		.05	11.09
Melosira sp.	10		.157	1.57
Navicula sp.				
Nitzschia seriata	21		.0052	.11
Pleurosigma sp.				
Rhizosolenia alata	131		.129	17.11
Rhizosolenia setigera	419		.00007	.0315
Rhizosolenia styliformis				
Skeletonema costatum	8		.14	1.12
Stephanopyxis turris				
Synedra sp.				
Thalassionema nitzschoides				
Thalassiothrix frauenfeldi				
DINOFLAGELLATES				
Ceratium contortum	192		1.72	356.23
Ceratium furca				
Ceratium fusus	421		.55	233.48
Ceratium lineatum				
Ceratium longipes				
Ceratium minutum				
Ceratium pentagonum	423		.21	89.07
Ceratium tripos	1560		2.23	3479.88
Dinophysis caudata	179		.58	103.8
Dinophysis ovum				
Peridinium depressum	4335		.16	690.14
Prorocentrum micans	678		.0112	7.62
Prorocentrum rostratum	138		.0042	.588
Prorocentrum triangulatum				
COCCOLITHOPHORES				
Coccolithus huxleyi	4785		.139	719.2
SILICOFLAGELLATES				
Dictyocha fibula	10		.006	.06
Distephanus speculum				
MISCELLANEOUS PHYTOPLANKTON				
Cryptomonas sp.	97		.0142	1.38
MONADS	3144		.004	12.58

Table 9

15

SAMPLE NUMBER UPS-N2
 DATE 5/10/85
 TIME 1645 GMT
 DEPTH 2m(TUFS)

LOCATION :lat 39 47.05N
 :long 71 25.56W
 VOLUME SAMPLE FILTERED
 VOLUME

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIO MASS ESTIMATE mm ³ x 10 ⁻⁶ /L
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	1	.1759	.176
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>	2	4.648	9.3
<i>Coscinodiscus granii</i>	5	.5236	2.62
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	10	1.193	12
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>	20	.08823	1.8
<i>Lithodesmium undulatum</i>	2	.392	.8
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>	2	.01166	.02
<i>Pleurosigma</i> sp.	1	.0272	.03
<i>Rhizosolenia alata</i>	4	.0731	.3
<i>Rhizosolenia setigera</i>	16	.00008	0
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>	1	.06	.06
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>	1	2.23	2.23
<i>Ceratium furca</i>	2	1.179	2.36
<i>Ceratium fusus</i>	9	.605	5.44
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	9	.229	2.1
<i>Ceratium tripos</i>	28	2.292	64.2
<i>Dinophysis caudata</i>	2	4.71	9.42
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	46	.1662	7.64
<i>Prorocentrum micans</i>	13	.0109	.14
<i>Prorocentrum rostratum</i>	2	.004	.008
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>	73	.1386	10.12
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	3	.0142	.04
MONADS	63	.005	.31

Table 10

SAMPLE NUMBER UPS-N3
 DATE 5/10/85
 TIME 1700 GMT
 DEPTH 2m(TUPS)

LOCATION :lat 39 49.19N
 :long 71 26.16W
 VOLUME FILTERED 40L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\ell$
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	1	.2263	.2263
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>	1	6.63	6.63
<i>Coscinodiscus granii</i>	4	.5154	2.1
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	7	1.238	8.7
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>	14	.08173	1.14
<i>Lithodesmium undulatum</i>	1	.3136	.314
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>	2	.0077	.01
<i>Pleurosigma</i> sp.	1	.0258	.026
<i>Rhizosolenia alata</i>	2	.0897	.18
<i>Rhizosolenia setigera</i>	12	.00008	0
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>	1	2.05	2.05
<i>Ceratium furca</i>	3	1.05	3.15
<i>Ceratium fusus</i>	3	.7085	2.12
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	3	.205	.61
<i>Ceratium tripos</i>	15	2.229	33.44
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	33	.0152	5
<i>Prorocentrum micans</i>	6	.0108	.06
<i>Prorocentrum rostratum</i>	1	.021	.021
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccilithus huxleyi</i>	32	.2303	7.4
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	1	.0142	.014
MONADS	41	.004	.164

Table 11

17

SAMPLE NUMBER UPS-N4
 DATE 5/10/85
 TIME 1730 GMT
 DEPTH 2m(TUPS)

LOCATION :lat 39 51.36N
 :long 71 26.34W
 VOLUME FILTERED 40L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\ell$
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>			
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>	1	.25	.25
<i>Coscinodiscus granii</i>	6	.255	1.53
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	19	1.263	24
<i>Hemialulus hauckii</i>	1	.1697	.17
<i>Leptocylindrus danicus</i>	21	.066	1.4
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>	5	.02072	.103
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>	1	.1758	.176
<i>Rhizosolenia setigera</i>	9	.00785	.071
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>	1	1.925	1.925
<i>Ceratium furca</i>	1	.441	.441
<i>Ceratium fusus</i>	9	.6637	6
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	8	.196	1.6
<i>Ceratium tripos</i>	15	2.292	34.4
<i>Dinophysis caudata</i>	1	.4613	.4613
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	64	.1662	10.64
<i>Prorocentrum micans</i>	10	.0076	.076
<i>Prorocentrum rostratum</i>	2	.004	.008
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>	113	.2853	32.24
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>	1	.0056	.0056
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	3	.0142	.043
MONADS	75	.004	.3

Table 12

SAMPLE NUMBER UPS-N5
 DATE 5/10/85
 TIME 1745 GMT
 DEPTH 2m(TUPS)

LOCATION :lat 39 54.05N
 :long 71 26.46W
 VOLUME FILTERED 40L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\text{l}$
DIATOMS			
Bacteriastrum delicatulum			
Chaetoceros atlanticum			
Chaetoceros breve			
Chaetoceros decipiens	54	.182	4.95
Corethron hystrix			
Coscinodiscus centralis	31	.18	5.58
Coscinodiscus granii	86	.998	128.37
Coscinodiscus lineatus			
Guinardia flaccida	835	1.14	1009.84
Hemimalus hauckii	21	.866	18.2
Leptocylindrus danicus	966	.095	90.22
Lithodesmium undulatum	39	.0784	3.06
Melosira sp.	10	.471	4.71
Navicula sp.			
Nitzschia seriata	407	.011	4.28
Pleurosigma sp.			
Rhizosolenia alata	209	.08	16.08
Rhizosolenia setigera	320	.0008	2.56
Rhizosolenia styliformis			
Skeletonema costatum			
Stephanopyxis turris			
Synedra sp.			
Thalassionema nitzschoides			
Thalassiothrix frauenfeldi			
DINOFLAGELLATES			
Ceratium contortum	115	1.83	205.04
Ceratium furca			
Ceratium fusus	384	.61	234.05
Ceratium lineatum			
Ceratium longipes			
Ceratium minutum	10	.33	3.3
Ceratium pentagonum	470	.21	96.56
Ceratium tripos	505	2.25	1131.9
Dinophysis caudata	167	1.01	200.46
Dinophysis ovum	33	.162	5.35
Peridinium depressum	3338	.12	474.2
Prorocentrum micans	454	.01	4.52
Prorocentrum rostratum	108	.007	.96
Prorocentrum triangulatum			
COCCOLITHOPHORES			
Coccolithus huxleyi	10708	.205	2147.39
SILICOFLAGELLATES			
Dictyocha fibula	66	.009	.47
Distephanus speculum			
MISCELLANEOUS PHYTOPLANKTON			
Cryptomonas sp.	38	.0142	.54
MONADS	4303	.004	17.212

Table 13

19

SAMPLE NUMBER UPS-N6	LOCATION :lat	39 58.85N	
DATE 5/10/85	:long	71 26.51W	
TIME 1802 GMT	VOLUME FILTERED	0.5L	
DEPTH 2m(TUPS)	SAMPLE VOLUME	50ml	
	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	140	.2875	40.25
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>			
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	40	.196	7.85
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>	60	.071	4.24
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.	420	.00471	2
<i>Rhizosolenia alata</i>			
<i>Rhizosolenia setigera</i>	720	.00008	.06
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>	120	.0032	2.28
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>			
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	20	.0653	1.31
<i>Ceratium tripos</i>			
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	440	.00684	3.01
<i>Procentrum micans</i>	20	.0094	.19
<i>Procentrum rostratum</i>	100	.00415	.42
<i>Procentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccilithus huxleyi</i>	1100	.2241	246.51
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.			
MONADS	3500	.004	14

Table 14

20

SAMPLE NUMBER UPS-17		LOCATION :lat	39 58.53N	
DATE 5/11/85		:long	71 26.53W	
TIME 1800 GMT		VOLUME	FILTERED 50L	
DEPTH 2m(TUPS)		SAMPLE	VOLUME 50ml	
	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\text{l}$	
DIATOMS				
<i>Bacteriastrum delicatulum</i>				
<i>Chaetoceros atlanticum</i>				
<i>Chaetoceros breve</i>	3	.17	.51	
<i>Chaetoceros decipiens</i>	12	.2875	3.45	
<i>Corethron hystrix</i>				
<i>Coscinodiscus centralis</i>	1	.396	.4	
<i>Coscinodiscus granii</i>	3	.4482	1.34	
<i>Coscinodiscus lineatus</i>				
<i>Guinardia flaccida</i>	2	1.115	2.22	
<i>Hemiaulus hauckii</i>				
<i>Leptocylindrus danicus</i>	1	.071	.071	
<i>Lithodesmium undulatum</i>	1	.098	.1	
<i>Melosira</i> sp.				
<i>Navicula</i> sp.				
<i>Nitzschia seriata</i>				
<i>Pleurosigma</i> sp.				
<i>Rhizosolenia alata</i>	1	.16	.16	
<i>Rhizosolenia setigera</i>	5	.0001	.0005	
<i>Rhizosolenia styliformis</i>				
<i>Skeletonema costatum</i>				
<i>Stephanopyxis turris</i>				
<i>Synedra</i> sp.				
<i>Thalassionema nitzschoides</i>				
<i>Thalassiothrix frauenfeldi</i>				
DINOFLAGELLATES				
<i>Ceratium contortum</i>	2	1.96	3.92	
<i>Ceratium furca</i>				
<i>Ceratium fusus</i>	1	1.09	1.09	
<i>Ceratium lineatum</i>				
<i>Ceratium longipes</i>				
<i>Ceratium minutum</i>				
<i>Ceratium pentagonum</i>	1	.0653	.0653	
<i>Ceratium tripos</i>	8	2.29	18.32	
<i>Dinophysis caudata</i>	1	.864	.864	
<i>Dinophysis ovum</i>				
<i>Peridinium depressum</i>	20	.4015	8.03	
<i>Prorocentrum micans</i>	2	.0125	.025	
<i>Prorocentrum rostratum</i>				
<i>Prorocentrum triangulatum</i>				
COCCOLITHOPHORES				
<i>Coccolithus huxleyi</i>	55	.1385	7.62	
SILICOFLAGELLATES				
<i>Dictyocha fibula</i>				
<i>Distephanus speculum</i>				
MISCELLANEOUS PHYTOPLANKTON				
<i>Cryptomonas</i> sp.	1	.0142	.014	
MONADS	45	.004	.18	

Table 15

21

SAMPLE NUMBER UPS-N3
 DATE 5/11/85
 TIME 1820 GMT
 DEPTH 2m(TUPS)

LOCATION :lat 40 01.58N
 :long 71 26.23W
 VOLUME FILTERED 50L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\text{l}$
DIATOMS			
Bacteriastrum delicatulum			
Chaetoceros atlanticum			
Chaetoceros breve			
Chaetoceros decipiens	2	.4874	1
Corethron hystrix			
Coscinodiscus centralis			
Coscinodiscus granii	2	.148	.296
Coscinodiscus lineatus			
Guinardia flaccida			
Hemiaulus hauckii			
Leptocylindrus danicus			
Lithodesmium undulatum			
Melosira sp.			
Navicula sp.			
Nitzschia seriata			
Pleurosigma sp.	3	.00471	.014
Rhizosolenia alata			
Rhizosolenia setigera	2	.00008	.00016
Rhizosolenia styliformis			
Skeletonema costatum			
Stephanopyxis turris			
Synedra sp.			
Thalassionema nitzschoides			
Thalassiothrix frauenfeldi			
DINOFLAGELLATES			
Ceratium contortum			
Ceratium furca			
Ceratium fusus			
Ceratium lineatum			
Ceratium longipes			
Ceratium minutum			
Ceratium pentagonum			
Ceratium tripos	3	2.29	6.87
Dinophysis caudata			
Dinophysis ovum			
Peridinium depressum	4	.319	1.28
Prorocentrum micans			
Prorocentrum rostratum			
Prorocentrum triangulatum			
COCCOLITHOPHORES			
Coccolithus huxleyi	3	.0653	.2
SILICOFLAGELLATES			
Dictyocha fibula			
Distephanus speculum			
MISCELLANEOUS PHYTOPLANKTON			
Cryptomonas sp.	2	.0158	.032
MONADS	28	.004	.112

Table 16

22

SAMPLE NUMBER	UPS-N9	LOCATION	:lat	40 04.62N
DATE	5/10/85		:long	71 25.76W
TIME	1840 GMT	VOLUME	FILTERED	40L
DEPTH	2m(TUPS)	SAMPLE	VOLUME	50ml
		NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\text{l}$
DIATOMS				
<i>Bacteriastrum delicatulum</i>				
<i>Chaetoceros atlanticum</i>				
<i>Chaetoceros breve</i>	2		.2043	.41
<i>Chaetoceros decipiens</i>	8		.3246	2.6
<i>Corethron hystrix</i>				
<i>Coscinodiscus centralis</i>	1		.208	.21
<i>Coscinodiscus granii</i>	4		.006	.025
<i>Coscinodiscus lineatus</i>				
<i>Guinardia flaccida</i>				
<i>Hemiaulus hauckii</i>				
<i>Leptocylindrus danicus</i>				
<i>Lithodesmium undulatum</i>	1		.078	.08
<i>Melosira</i> sp.				
<i>Navicula</i> sp.				
<i>Nitzschia seriata</i>	1		.0104	.01
<i>Pleurosigma</i> sp.				
<i>Rhizosolenia alata</i>				
<i>Rhizosolenia setigera</i>				
<i>Rhizosolenia styliformis</i>				
<i>Skeletonema costatum</i>				
<i>Stephanopyxis turris</i>				
<i>Synedra</i> sp.				
<i>Thalassionema nitzschoides</i>				
<i>Thalassiothrix frauenfeldi</i>				
DINOFLAGELLATES				
<i>Ceratium contortum</i>	2		1.925	3.85
<i>Ceratium furca</i>				
<i>Ceratium fusus</i>	2		.826	1.65
<i>Ceratium lineatum</i>				
<i>Ceratium longipes</i>				
<i>Ceratium minutum</i>				
<i>Ceratium pentagonum</i>				
<i>Ceratium tripos</i>	5		2.16	10.8
<i>Dinophysis caudata</i>				
<i>Dinophysis ovum</i>				
<i>Peridinium depressum</i>	2		.156	.31
<i>Prorocentrum micans</i>				
<i>Prorocentrum rostratum</i>				
<i>Prorocentrum triangulatum</i>				
COCCOLITHOPHORES				
<i>Coccilithus huxleyi</i>	6		.356	2.14
SILICOFLAGELLATES				
<i>Dictyocha fibula</i>				
<i>Distephanus speculum</i>				
MISCELLANEOUS PHYTOPLANKTON				
<i>Cryptomonas</i> sp.	1		.142	.14
MONADS	19		.005	.1

Table 17

23

SAMPLE NUMBER UPS-N10
 DATE 5/10/85
 TIME 1855 GMT
 DEPTH 2m(TUPS)

LOCATION :lat 40 06.87N
 :long 71 25.60W
 VOLUME FILTERED 40L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\ell$
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	1	.153	.153
<i>Corethron hystrix</i>	1	.094	.094
<i>Coscinodiscus centralis</i>	2	3.14	6.28
<i>Coscinodiscus granii</i>	4	.121	.484
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>			
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>			
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>			
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	2	1.089	2.2
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	1	.215	.22
<i>Ceratium tripos</i>	4	2.21	8.84
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	1	.218	.218
<i>Prorocentrum micans</i>			
<i>Prorocentrum rostratum</i>			
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccilithus huxleyi</i>	4	.227	.91
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	3	.0142	.043
MONADS	50	.005	.025

Table 18

SAMPLE NUMBER	UPS-S1	LOCATION	:lat	40 10.74N
DATE	5/10/85		:long	71 24.64W
TIME	1930 GMT	VOLUME	FILTERED	40L
DEPTH	2m(TUPS)	SAMPLE	VOLUME	50ml
		NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\text{l}$
DIATOMS				
Bacteriastrum delicatulum				
Chaetoceros atlanticum				
Chaetoceros breve	1		.219	.22
Chaetoceros decipiens	22		.357	7.9
Corethron hystrix				
Coscinodiscus centralis	1		2.93	2.93
Coscinodiscus granii	3		.699	2.1
Coscinodiscus lineatus				
Guinardia flaccida				
Hemiaulus hauckii				
Leptocylindrus danicus				
Lithodesmium undulatum	3		.08	.24
Melosira sp.				
Navicula sp.				
Nitzschia seriata				
Pleurosigma sp.				
Rhizosolenia alata	1		.146	.15
Rhizosolenia setigera	1		.000078	.000078
Rhizosolenia styliformis				
Skeletonema costatum				
Stephanopyxis turris				
Synedra sp.				
Thalassionema nitzschoides				
Thalassiothrix frauenfeldi				
DINOFLAGELLATES				
Ceratium contortum				
Ceratium furca				
Ceratium fusus	1		.628	.63
Ceratium lineatum				
Ceratium longipes				
Ceratium minutum				
Ceratium pentagonum				
Ceratium tripos	3		2.17	6.5
Dinophysis caudata				
Dinophysis ovum				
Peridinium depressum	5		.49	2.45
Prorocentrum micans				
Prorocentrum rostratum	1		.004	.004
Prorocentrum triangulatum				
COCCOLITHOPHORES				
Coccolithus huxleyi	9		.248	2.2
SILICOFLAGELLATES				
Dictyocha fibula				
Distephanus speculum				
MISCELLANEOUS PHYTOPLANKTON				
Cryptomonas sp.	1		.104	.104
MONADS	44		.005	.22

Table 19

25

SAMPLE NUMBER UPS-S2
 DATE 5/10/85
 TIME 2030 GMT
 DEPTH 2m(TUPS)

LOCATION :lat 40 02.62N
 :long 71 19.45W
 VOLUME FILTERED 40L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\ell$
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>	2	.205	.41
<i>Chaetoceros decipiens</i>	10	.337	3.4
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>	1	.18	.18
<i>Coscinodiscus granii</i>	2	.237	.47
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	1	.973	.973
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>			
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>	1	.015	.015
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>	1	.134	.134
<i>Rhizosolenia setigera</i>	7	.000078	.00055
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>	2	1.66	3.34
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	1	.704	.704
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>			
<i>Ceratium tripos</i>	7	2.104	14.73
<i>Dinophysis caudata</i>	1	.699	.7
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	5	.156	.8
<i>Prorocentrum micans</i>			
<i>Prorocentrum rostratum</i>			
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>	66	.5236	34.6
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.			
MONADS	53	.005	.26

Table 20

SAMPLE NUMBER	UPS-S3	LOCATION	:lat	40 00.17N
DATE	5/10/85		:long	71 17.87W
TIME	2050 GMT	VOLUME	FILTERED	40L
DEPTH	2m(TUPS)	SAMPLE	VOLUME	50ml
	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIO MASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\ell$	
DIATOMS				
<i>Bacteriastrum delicatulum</i>				
<i>Chaetoceros atlanticum</i>				
<i>Chaetoceros breve</i>	1	.03535	.03535	
<i>Chaetoceros decipiens</i>	1	.0735	.0735	
<i>Corethron hystrix</i>				
<i>Coscinodiscus centralis</i>	1	7.33	7.33	
<i>Coscinodiscus granii</i>	3	.38	1.14	
<i>Coscinodiscus lineatus</i>				
<i>Guinardia flaccida</i>	28	1.22	34.2	
<i>Hemiaulus hauckii</i>				
<i>Leptocylindrus danicus</i>	25	.0616	1.54	
<i>Lithodesmium undulatum</i>				
<i>Melosira</i> sp.				
<i>Navicula</i> sp.				
<i>Nitzschia seriata</i>	3	.0103	.03	
<i>Pleurosigma</i> sp.	6	.000054	.00032	
<i>Rhizosolenia alata</i>	2	.1012	.2	
<i>Rhizosolenia setigera</i>	4	.008	.03	
<i>Rhizosolenia styliformis</i>				
<i>Skeletinema costatum</i>				
<i>Stephanopyxis turris</i>				
<i>Synedra</i> sp.				
<i>Thalassionema nitzschoides</i>				
<i>Thalassiothrix frauenfeldi</i>				
DINOFLAGELLATES				
<i>Ceratium contortum</i>				
<i>Ceratium furca</i>				
<i>Ceratium fusus</i>	5	.4965	2.5	
<i>Ceratium lineatum</i>				
<i>Ceratium longipes</i>				
<i>Ceratium minutum</i>				
<i>Ceratium pentagonum</i>	4	.198	.8	
<i>Ceratium tripos</i>	13	2.29	29.8	
<i>Dinophysis caudata</i>	1	3.14	3.14	
<i>Dinophysis ovum</i>				
<i>Peridinium depressum</i>	46	.1564	7.2	
<i>Prorocentrum micans</i>	10	.0086	.086	
<i>Prorocentrum rostratum</i>	1	.0041	.0041	
<i>Prorocentrum triangulatum</i>				
COCCOLITHOPHORES				
<i>Coccolithus huxleyi</i>	119	.1936	23	
SILICOFLAGELLATES				
<i>Dictyocha fibula</i>				
<i>Distephanus speculum</i>				
MISCELLANEOUS PHYTOPLANKTON				
<i>Cryptomonas</i> sp.	1	.018	.018	
MONADS	63	.005	.315	

Table 21

SAMPLE NUMBER	UPS-S4	LOCATION	:lat	40 05.39N
DATE	5/11/85		:long	71 07.79W
TIME	0142 GMT	VOLUME	FILTERED	40L
DEPTH	2m(TUPS)	SAMPLE	VOLUME	50ml
		NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\text{l}$
DIATOMS				
<i>Bacteriastrum delicatulum</i>				
<i>Chaetoceros atlanticum</i>				
<i>Chaetoceros breve</i>	1		.03535	.03535
<i>Chaetoceros decipiens</i>				
<i>Corethron hystrix</i>				
<i>Coscinodiscus centralis</i>				
<i>Coscinodiscus granii</i>				
<i>Coscinodiscus lineatus</i>				
<i>Guinardia flaccida</i>	1		.916	.916
<i>Hemiaulus hauckii</i>				
<i>Leptocylindrus danicus</i>	2		.0601	.12
<i>Lithodesmium undulatum</i>				
<i>Melosira</i> sp.				
<i>Navicula</i> sp.				
<i>Nitzschia seriata</i>				
<i>Pleurosigma</i> sp.	6		.000054	.00032
<i>Rhizosolenia alata</i>				
<i>Rhizosolenia setigera</i>	7		.0000785	.00055
<i>Rhizosolenia styliformis</i>				
<i>Skeletonema costatum</i>				
<i>Stephanopyxis turris</i>				
<i>Synedra</i> sp.				
<i>Thalassionema nitzschoides</i>				
<i>Thalassiothrix frauenfeldi</i>				
DINOFLAGELLATES				
<i>Ceratium contortum</i>				
<i>Ceratium furca</i>				
<i>Ceratium fusus</i>				
<i>Ceratium lineatum</i>				
<i>Ceratium longipes</i>				
<i>Ceratium minutum</i>				
<i>Ceratium pentagonum</i>				
<i>Ceratium tripos</i>	1		2.35	2.35
<i>Dinophysis caudata</i>				
<i>Dinophysis ovum</i>				
<i>Peridinium depressum</i>	1		.18	.18
<i>Prorocentrum micans</i>	2		.006	.012
<i>Prorocentrum rostratum</i>	1		.0041	.0041
<i>Prorocentrum triangulatum</i>				
COCCOLITHOPHORES				
<i>Coccilithus huxleyi</i>	8		.1386	1.11
SILICOFLAGELLATES				
<i>Dictyocha fibula</i>				
<i>Distephanus speculum</i>				
MISCELLANEOUS PHYTOPLANKTON				
<i>Cryptomonas</i> sp.	1		.0142	.0142
<i>MONADS</i>	44		.005	.22

Table 22

SAMPLE NUMBER	5-1	LOCATION	:lat	38 20.9N
DATE	5/02/85		:long	72 42.4W
TIME	1700 GMT	VOLUME	FILTERED	0.5L
DEPTH	15m	SAMPLE	VOLUME	50ml
		NUMBER OF	AVERAGE	BIOMASS
		CELLS/L	CELL SIZE	ESTIMATE
			mm ³ x 10 ⁻⁶	mm ³ x 10 ⁻⁶ /l
DIATOMS				
<i>Bacteriastrum delicatulum</i>				
<i>Chaetoceros atlanticum</i>				
<i>Chaetoceros breve</i>				
<i>Chaetoceros decipiens</i>	1650		.0318	52.5
<i>Corethron hystrix</i>				
<i>Coscinodiscus centralis</i>	2255		.049	94.77
<i>Coscinodiscus granii</i>				
<i>Coscinodiscus lineatus</i>				
<i>Guinardia flaccida</i>	5499		1.77	10779.59
<i>Hemiaulus hauckii</i>				
<i>Leptocylindrus danicus</i>				
<i>Lithodesmium undulatum</i>				
<i>Melosira</i> sp.				
<i>Navicula</i> sp.	3300		.003	9.4
<i>Nitzschia seriata</i>	55864		.0043	184.97
<i>Pleurosigma</i> sp.				
<i>Rhizosolenia alata</i>				
<i>Rhizosolenia setigera</i>	101393		.0003	25.51
<i>Rhizosolenia styliformis</i>	825		.0942	77.71
<i>Skeletonema costatum</i>	156048		.083	3203.88
<i>Stephanopyxis turris</i>				
<i>Synedra</i> sp.				
<i>Thalassionema nitzschoides</i>				
<i>Thalassiothrix frauenfeldi</i>				
DINOFLAGELLATES				
<i>Ceratium contortum</i>				
<i>Ceratium furca</i>				
<i>Ceratium fusus</i>	605		.495	299.41
<i>Ceratium lineatum</i>				
<i>Ceratium longipes</i>				
<i>Ceratium minutum</i>				
<i>Ceratium pentagonum</i>	4289		.2481	1064.35
<i>Ceratium tripos</i>				
<i>Dinophysis caudata</i>				
<i>Dinophysis ovum</i>				
<i>Peridinium depressum</i>	68676		.039	2950.74
<i>Prorocentrum micans</i>	1210		.006	7.3
<i>Prorocentrum rostratum</i>				
<i>Prorocentrum triangulatum</i>				
COCCOLITHOPHORES				
<i>Coccolithus huxleyi</i>				
SILICOFLAGELLATES				
<i>Dictyocha fibula</i>				
<i>Distephanus speculum</i>				
MISCELLANEOUS PHYTOPLANKTON				
<i>Cryptomonas</i> sp.	6379		.089	222.6
MONADS	162481		.005	812.32

Table 23

29

SAMPLE NUMBER 5-2
 DATE 5/02/85
 TIME 1700 GMT
 DEPTH 25m

LOCATION :lat 38 20.9N
 :long 72 42.4W
 VOLUME FILTERED 0.5L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	2035	.025	46.26
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>	3299	.151	497.49
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	10172	1.65	16743.8
<i>Hemiallus hauckii</i>			
<i>Leptocylindrus danicus</i>			
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.	1650	.0065	10.74
<i>Nitzschia seriata</i>	108045	.0098	1475.3
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>			
<i>Rhizosolenia setigera</i>	42612	.006	386.26
<i>Rhizosolenia styliformis</i>	3849	.044	98.46
<i>Skeletonema costatum</i>	121735	.03	3619
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>			
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	2419	.206	497.83
<i>Ceratium tripos</i>	825	3.14	2590
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	330020	.0136	4329.76
<i>Prorocentrum micans</i>	10447	.007	74.17
<i>Prorocentrum rostratum</i>			
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>	2255	.0096	23.15
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	825	.0142	11.71
<i>MONADS</i>	292244	.0002	46.76

Table 24

30

SAMPLE NUMBER 6-1
 DATE 5/02/85
 TIME 2215 GMT
 DEPTH 25m

LOCATION :lat 38 05.3N
 :long 72 31.3W
 VOLUME FILTERED 0.5L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS			
Bacteriastrum delicatulum			
Chaetoceros atlanticum			
Chaetoceros breve			
Chaetoceros decipiens			
Corethron hystrix			
Coscinodiscus centralis			
Coscinodiscus granii	120	.60423	72.5
Coscinodiscus lineatus			
Guinardia flaccida			
Hemiaulus hauckii			
Leptocylindrus danicus	20	.3535	7.07
Lithodesmium undulatum			
Melosira sp.			
Navicula sp.			
Nitzschia seriata	120	.0441	5.3
Pleurosigma sp.	40	.08375	3.35
Rhizosolenia alata	140	.0219	3.06
Rhizosolenia setigera			
Rhizosolenia styliformis			
Skeletonema costatum			
Stephanopyxis turris			
Synedra sp.			
Thalassionema nitzschoides			
Thalassiothrix frauenfeldi			
DINOFLAGELLATES			
Ceratium contortum			
Ceratium furca			
Ceratium fusus			
Ceratium lineatum			
Ceratium longipes			
Ceratium minutum			
Ceratium pentagonum			
Ceratium tripos			
Dinophysis caudata			
Dinophysis ovum			
Peridinium depressum	540	.2173	117.34
Prorocentrum micans			
Prorocentrum rostratum	120	.0141	1.7
Prorocentrum triangulatum			
COCCOLITHOPHORES			
Coccolithus huxleyi	4620	.0158	72.8
SILICOFLAGELLATES			
Dictyocha fibula			
Distephanus speculum			
IMISCELLANEOUS PHYTOPLANKTON			
Cryptomonas sp.	220	.077	17
MONADS	2400	.005	12

Table 25

31

SAMPLE NUMBER 6-2
 DATE 5/02/85
 TIME 2215 GMT
 DEPTH 35m

LOCATION :lat 38 05.3N
 :long 72 31.3W
 VOLUME FILTERED 0.5L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS			
<i>Bacteriastrum delicatulum</i>	20	.0462	.924
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>			
<i>Corethron hystrix</i>	40	.2324	9.3
<i>Coscinodiscus centralis</i>			
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	40	.6874	27.5
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>	60	.233	14
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.	140	.073	10.22
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>			
<i>Rhizosolenia setigera</i>	80	.06285	5.03
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>			
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>			
<i>Ceratium tripos</i>			
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	6320	.0118	74.64
<i>Prorocentrum micans</i>			
<i>Prorocentrum rostratum</i>	20	.0415	.83
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	20	.0142	.28
<i>MONADS</i>	5700	.005	28.5

Table 26

SAMPLE NUMBER 7-1
 DATE 5/03/85
 TIME 0148 GMT
 DEPTH 12m

LOCATION :lat 38 09.12N
 :long 72 32.69W
 VOLUME FILTERED 0.5L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\ell$
DIATOMS			
<i>Bacteriastrum delicatulum</i>	40	.00785	.31
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>			
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>	20	.0653	1.31
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>			
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>			
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>			
<i>Rhizosolenia setigera</i>	240	.052	12.5
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>			
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>			
<i>Ceratium tripos</i>			
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	8700	.0131	113.82
<i>Prorocentrum micans</i>			
<i>Prorocentrum rostratum</i>			
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccilithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	200	.0318	6.4
MONADS	12000	.005	60

Table 27

SAMPLE NUMBER	7-2	LOCATION	:lat	38 09.12N
DATE	5/03/85		:long	72 32.69W
TIME	0058 GMT	VOLUME	FILTERED	0.5L
DEPTH	31.8m	SAMPLE	VOLUME	50ml
		NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIO MASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\ell$
DIATOMS				
<i>Bacteriastrum delicatulum</i>	20		.0157	.314
<i>Chaetoceros atlanticum</i>				
<i>Chaetoceros breve</i>				
<i>Chaetoceros decipiens</i>	60		.05535	3.32
<i>Corethron hystrix</i>				
<i>Coscinodiscus centralis</i>				
<i>Coscinodiscus granii</i>	240		22.24	5337
<i>Coscinodiscus lineatus</i>				
<i>Guinardia flaccida</i>	380		15.49	5886
<i>Hemiaulus hauckii</i>				
<i>Leptocylindrus danicus</i>				
<i>Lithodesmium undulatum</i>				
<i>Melosira</i> sp.				
<i>Navicula</i> sp.				
<i>Nitzschia seriata</i>				
<i>Pleurosigma</i> sp.				
<i>Rhizosolenia alata</i>				
<i>Rhizosolenia setigera</i>				
<i>Rhizosolenia styliformis</i>	160		01815	3
<i>Skeletonema costatum</i>				
<i>Stephanopyxis turris</i>	100		.0976	9.76
<i>Synedra</i> sp.				
<i>Thalassionema nitzschoides</i>				
<i>Thalassiothrix frauenfeldi</i>				
DINOFLAGELLATES				
<i>Ceratium contortum</i>				
<i>Ceratium furca</i>				
<i>Ceratium fusus</i>				
<i>Ceratium lineatum</i>				
<i>Ceratium longipes</i>				
<i>Ceratium minutum</i>				
<i>Ceratium pentagonum</i>				
<i>Ceratium tripos</i>	20		8.835	176.7
<i>Dinophysis caudata</i>				
<i>Dinophysis ovum</i>				
<i>Peridinium depressum</i>	2680		.0455	122
<i>Prorocentrum micans</i>				
<i>Prorocentrum rostratum</i>	180		.0106	1.91
<i>Prorocentrum triangulatum</i>				
COCCOLITHOPHORES				
<i>Coccolithus huxleyi</i>	12500		.032	395.9
SILICOFLAGELLATES				
<i>Dictyocha fibula</i>				
<i>Distephanus speculum</i>				
MISCELLANEOUS PHYTOPLANKTON				
<i>Cryptomonas</i> sp.	640		.0668	39.5
MONADS	3200		.005	16

Table 28

34

SAMPLE NUMBER 8-1
 DATE 5/05/85
 TIME 1550 GMT
 DEPTH 32m

LOCATION :lat 38 01.34N
 :long 72 43.08W
 VOLUME FILTERED 0.5L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	6700	.1921	1287
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>	20	.0653	1.31
<i>Coscinodiscus granii</i>	20	33.512	670.24
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	20	25.12	502.4
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>	7300	.11965	873.42
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.	480	.036	17.35
<i>Rhizosolenia alata</i>	180	.00733	1.32
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>	40	.3771	15
<i>Skeletonema costatum</i>	100	.05	5
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	40	7.065	282.6
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	40	2.355	94.2
<i>Ceratium tripos</i>	20	25.12	502.4
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	700	.0876	61.4
<i>Prorocentrum micans</i>			
<i>Prorocentrum rostratum</i>	300	.0143	4.3
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>	80	.055	4.4
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>	60	.03	1.8
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	40	.0142	.6
MONADS	3000	.005	15

Table 29

SAMPLE NUMBER	8-1-1	LOCATION	:lat	38 00.69N
DATE	5/05/85		:long	72 50.22W
TIME	1402 GMT	VOLUME	FILTERED	0.5L
DEPTH	30m	SAMPLE	VOLUME	50ml
		NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS				
<i>Bacteriastrum delicatulum</i>				
<i>Chaetoceros atlanticum</i>				
<i>Chaetoceros breve</i>				
<i>Chaetoceros decipiens</i>	4780		.204	974.35
<i>Corethron hystrix</i>				
<i>Coscinodiscus centralis</i>				
<i>Coscinodiscus granii</i>	60		19.252	1155
<i>Coscinodiscus lineatus</i>				
<i>Guinardia flaccida</i>	180		18.317	3297
<i>Hemiaulus hauckii</i>				
<i>Leptocylindrus danicus</i>	7420		.222	1645.32
<i>Lithodesmium undulatum</i>				
<i>Melosira</i> sp.				
<i>Navicula</i> sp.	40		.0142	.57
<i>Nitzschia seriata</i>	240		.006	1.6
<i>Pleurosigma</i> sp.	280		.006	1.76
<i>Rhizosolenia alata</i>	200		.009	1.89
<i>Rhizosolenia setigera</i>				
<i>Rhizosolenia styliformis</i>	20		.377	7.54
<i>Skeletonema costatum</i>				
<i>Stephanopyxis turris</i>				
<i>Synedra</i> sp.				
<i>Thalassionema nitzschoides</i>				
<i>Thassiothrix frauenfeldi</i>				
DINOFLAGELLATES				
<i>Ceratium contortum</i>				
<i>Ceratium furca</i>				
<i>Ceratium fusus</i>	80		7.33	586.13
<i>Ceratium lineatum</i>				
<i>Ceratium longipes</i>				
<i>Ceratium minutum</i>				
<i>Ceratium pentagonum</i>	260		3.95	1025.67
<i>Ceratium tripos</i>	40		43.69	1747.64
<i>Dinophysis caudata</i>				
<i>Dinophysis ovum</i>				
<i>Peridinium depressum</i>	1680		.1134	190.54
<i>Prorocentrum micans</i>				
<i>Prorocentrum rostratum</i>	160		.018	3
<i>Prorocentrum triangulatum</i>				
COCCOLITHOPHORES				
<i>Coccolithus huxleyi</i>	1140		.0019	2.14
SILICOFLAGELLATES				
<i>Dictyocha fibula</i>	60		.237	14.25
<i>Distephanus speculum</i>				
MISCELLANEOUS PHYTOPLANKTON				
<i>Cryptomonas</i> sp.	120		.057	6.88
MONADS	4100		.005	20.5

Table 30

SAMPLE NUMBER 10-1
 DATE 5/05/85
 TIME 2250 GMT
 DEPTH 5.6m

LOCATION :lat 37 55.89N
 :long 72 51.39W
 VOLUME SAMPLE FILTERED 0.5L
 VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	460	.111	51.1
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>			
<i>Coscinodiscus granii</i>	20	14.14	282.8
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	140	13.82	1934.24
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>	3240	.396	1283.83
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.	40	.09	3.6
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>	540	.028	15
<i>Pleurosigma</i> sp.	180	.078	2.82
<i>Rhizosolenia alata</i>	160	.016	2.5
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>	40	.406	16.3
<i>Skeletonema costatum</i>	600	.122	73.5
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	20	1.96	39.2
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	120	1.36	163.72
<i>Ceratium tripos</i>	40	11.38	455.4
<i>Dinophysis caudata</i>	20	11.66	233.24
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	4900	.082	403.7
<i>Prorocentrum micans</i>			
<i>Prorocentrum rostratum</i>	940	.05	47.2
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>	1720	.004	8.3
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	420	.072	30.1
<i>MONADS</i>	2500	.005	12.5

Table 31

37

SAMPLE NUMBER	10-2	LOCATION	:lat	37 55.89N
DATE	5/05/85		:long	72 51.39W
TIME	2250 GMT	VOLUME	FILTERED	0.5L
DEPTH	30m	SAMPLE	VOLUME	50ml
		NUMBER OF	AVERAGE	BIOMASS
		CELLS/L	CELL SIZE	ESTIMATE
			mm ³ x 10 ⁻⁶	mm ³ x 10 ⁻⁶ /l
DIATOMS				
<i>Bacteriastrum delicatulum</i>				
<i>Chaetoceros atlanticum</i>				
<i>Chaetoceros breve</i>				
<i>Chaetoceros decipiens</i>	760		.065	49.5
<i>Corethron hystrix</i>				
<i>Coscinodiscus centralis</i>	20		.0653	1.31
<i>Coscinodiscus granii</i>				
<i>Coscinodiscus lineatus</i>				
<i>Guinardia flaccida</i>	280		1.4	392.5
<i>Hemiaulus hauckii</i>				
<i>Leptocylindrus danicus</i>	4120		1.34	550.53
<i>Lithodesmium undulatum</i>				
<i>Melosira</i> sp.				
<i>Navicula</i> sp.				
<i>Nitzschia seriata</i>	180		.36	6.42
<i>Pleurosigma</i> sp.	100		.008	.84
<i>Rhizosolenia alata</i>	140		.005	.7
<i>Rhizosolenia setigera</i>				
<i>Rhizosolenia styliformis</i>				
<i>Skeletonema costatum</i>	1900		.0137	26
<i>Stephanopyxis turris</i>				
<i>Synedra</i> sp.				
<i>Thalassionema nitzschoides</i>				
<i>Thalassiothrix frauenfeldi</i>	20		.025	.5
DINOFLAGELLATES				
<i>Ceratium contortum</i>				
<i>Ceratium furca</i>				
<i>Ceratium fusus</i>	60		.542	32.5
<i>Ceratium lineatum</i>				
<i>Ceratium longipes</i>				
<i>Ceratium minutum</i>				
<i>Ceratium pentagonum</i>	500		.198	99
<i>Ceratium tripos</i>	40		2.355	94.2
<i>Dinophysis caudata</i>				
<i>Dinophysis ovum</i>				
<i>Peridinium depressum</i>	6400		.019	122.5
<i>Prorocentrum micans</i>	1040		.008	9
<i>Prorocentrum rostratum</i>	160		.007	1.12
<i>Prorocentrum triangulatum</i>				
COCCOLITHOPHORES				
<i>Coccilithus huxleyi</i>				
SILICOFLAGELLATES				
<i>Dictyocha fibula</i>	100		.00745	.745
<i>Distephanus speculum</i>				
MISCELLANEOUS PHYTOPLANKTON				
<i>Cryptomonas</i> sp.	120		.3123	3.75
MONADS	3000		.005	15

Table 32

38

SAMPLE NUMBER 11-1
 DATE 5/09/85
 TIME 1209 GMT
 DEPTH 2m

LOCATION :lat 39 52.18N
 :long 70 27.64W
 VOLUME SAMPLE FILTERED 0.5L
 VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /L
DIATOMS			
Bacteriastrum delicatulum	20	.0141	.283
Chaetoceros atlanticum			
Chaetoceros breve	560	.026	14.5
Chaetoceros decipiens	60	.425	25.5
Corethron hystrix			
Coscinodiscus centralis			
Coscinodiscus granii			
Coscinodiscus lineatus			
Guinardia flaccida	300	1.12	336
Hemialulus hauckii	280	.098	27.33
Leptocylindrus danicus	3300	.0142	47
Lithodesmium undulatum			
Melosira sp.			
Navicula sp.			
Nitzschia seriata	360	.0052	1.86
Pleurosigma sp.	40	.0071	.28
Rhizosolenia alata			
Rhizosolenia setigera	1340	.008	10.43
Rhizosolenia styliformis	540	.131	70.69
Skeletonema costatum	60	.4945	10
Stephanopyxis turris			
Synedra sp.			
Thalassionema nitzschoides			
Thalassiothrix frauenfeldi			
DINOFLAGELLATES			
Ceratium contortum			
Ceratium furca			
Ceratium fusus			
Ceratium lineatum			
Ceratium longipes			
Ceratium minutum			
Ceratium pentagonum			
Ceratium tripos	20	2.355	47.1
Dinophysis caudata			
Dinophysis ovum			
Peridinium depressum	80	.18	14.4
Prorocentrum micans	80	.009	.75
Prorocentrum rostratum	40	.006	.24
Prorocentrum triangulatum			
COCCOLITHOPHORES			
Coccolithus huxleyi	260	.2063	53.64
SILICOFLAGELLATES			
Dictyocha fibula	200	.011	2.29
Distephanus speculum			
MISCELLANEOUS PHYTOPLANKTON			
Cryptomonas sp.	20	.0142	.28
MONADS	3900	.005	19.5

Table 33

SAMPLE NUMBER	11-2	LOCATION	:lat	39 52.18N
DATE	5/09/85		:long	70 27.64W
TIME	1209 GMT	VOLUME	FILTERED	0.5L
DEPTH	18m	SAMPLE	VOLUME	50ml
		NUMBER OF	AVERAGE	BIOMASS
		CELLS/L	CELL SIZE	ESTIMATE
			mm ³ x 10 ⁻⁶	mm ³ x 10 ⁻⁶ /l
DIATOMS				
<i>Bacteriastrum delicatulum</i>				
<i>Chaetoceros atlanticum</i>				
<i>Chaetoceros breve</i>	600		.0166	10
<i>Chaetoceros decipiens</i>	120		1.42	170.5
<i>Corethron hystrix</i>				
<i>Coscinodiscus centralis</i>				
<i>Coscinodiscus granii</i>				
<i>Coscinodiscus lineatus</i>				
<i>Guinardia flaccida</i>	240		1.19	285
<i>Hemiaulus hauckii</i>	120		.077	9.33
<i>Leptocylindrus danicus</i>	4160		.688	114
<i>Lithodesmium undulatum</i>				
<i>Melosira</i> sp.				
<i>Navicula</i> sp.				
<i>Nitzschia seriata</i>	620		.052	32.1
<i>Pleurosigma</i> sp.				
<i>Rhizosolenia alata</i>				
<i>Rhizosolenia setigera</i>	1740		.007	12.84
<i>Rhizosolenia styliformis</i>				
<i>Skeletonema costatum</i>	100		.0542	5.42
<i>Stephanopyxis turris</i>				
<i>Synedra</i> sp.				
<i>Thalassionema nitzschoides</i>				
<i>Thalassiothrix frauenfeldi</i>				
DINOFLAGELLATES				
<i>Ceratium contortum</i>				
<i>Ceratium furca</i>				
<i>Ceratium fusus</i>				
<i>Ceratium lineatum</i>				
<i>Ceratium longipes</i>				
<i>Ceratium minutum</i>				
<i>Ceratium pentagonum</i>	20		.196	3.92
<i>Ceratium tripos</i>	20		1.57	31.4
<i>Dinophysis caudata</i>				
<i>Dinophysis ovum</i>				
<i>Peridinium depressum</i>	140		.229	32
<i>Prorocentrum micans</i>	100		.009	.9
<i>Prorocentrum rostratum</i>	80		.006	.48
<i>Prorocentrum triangulatum</i>				
COCCOLITHOPHORES				
<i>Coccilithus huxleyi</i>	260		.242	62.81
SILICOFLAGELLATES				
<i>Dictyocha fibula</i>	60		.007	.43
<i>Distephanus speculum</i>				
MISCELLANEOUS PHYTOPLANKTON				
<i>Cryptomonas</i> sp.				
<i>MONADS</i>	5000		.005	25

Table 34

SAMPLE NUMBER 12-1
 DATE 5/09/85
 TIME 1440 GMT
 DEPTH 1m

LOCATION :lat 40 00.00N
 :long 70 30.98W
 VOLUME FILTERED 0.5L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	180	.018	3.33
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>			
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	240	1.12	268
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>	1800	.027	48
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>	340	.0052	1.76
<i>Pleurosigma</i> sp.	40	.023	.92
<i>Rhizosolenia alata</i>	80	.371	29.7
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>	340	.099	34
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>	40	.028	1.12
DINOFLAGELLATES			
<i>Ceratium contortum</i>	20	2.31	46.2
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	80	.8485	67.88
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	100	.196	19.6
<i>Ceratium tripos</i>	100	2.09	209
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	280	.164	45.81
<i>Prorocentrum micans</i>	460	.078	3.6
<i>Prorocentrum rostratum</i>	240	.006	1.44
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>	4180	.067	279.3
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>	20	.031	.62
<i>Distephanus speculum</i>	20	.031	.62
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	60	.0142	.85
MONADS	3500	.005	17.5

Table 35

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SAMPLE NUMBER	12-2	LOCATION	:lat	40 00.00N
DATE	5/09/85		:long	70 30.98W
TIME	1440 GMT	VOLUME	FILTERED	0.5L
DEPTH	12m	SAMPLE	VOLUME	50ml
		NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS				
Bacteriastrum delicatulum	20		.0118	.24
Chaetoceros atlanticum	20		3.063	61.26
Chaetoceros breve				
Chaetoceros decipiens	100		.058	5.8
Corethron hystrix				
Coscinodiscus centralis				
Coscinodiscus granii				
Coscinodiscus lineatus				
Guinardia flaccida	280		1.626	455.3
Hemiaulus hauckii	20		.3	6
Leptocylindrus danicus	480		.258	123.8
Lithodesmium undulatum				
Melosira sp.				
Navicula sp.				
Nitzschia seriata				
Pleurosigma sp.				
Rhizosolenia alata	360		.05	18
Rhizosolenia setigera				
Rhizosolenia styliformis				
Skeletonema costatum	40		.039	1.6
Stephanopyxis turris				
Synedra sp.				
Thalassionema nitzschoides				
Thalassiothrix frauenfeldi				
		DINOFLAGELLATES		
Ceratium contortum				
Ceratium furca				
Ceratium fusus	40		.4242	17
Ceratium lineatum				
Ceratium longipes				
Ceratium minutum				
Ceratium pentagonum	200		.196	39.2
Ceratium tripos	20		2.355	47.1
Dinophysis caudata				
Dinophysis ovum	20		.0653	1.31
Peridinium depressum	4100		.028	115.77
Prorocentrum micans	320		.006	2
Prorocentrum rostratum	240		.007	1.68
Prorocentrum triangulatum				
		COCCOLITHOPHORES		
Coccolithus huxleyi				
		SILICOFLAGELLATES		
Dictyocha fibula	120		.007	.83
Distephanus speculum				
		MISCELLANEOUS PHYTOPLANKTON		
Cryptomonas sp.	140		.0115	1.6
MONADS	4800		.005	24

Table 36

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SAMPLE NUMBER 12-3
 DATE 5/09/85
 TIME 1440 GMT
 DEPTH 18m

LOCATION :lat 40 00.00N
 :long 70 30.98W
 VOLUME SAMPLE FILTERED 0.5L
 VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIO MASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	580	.111	64.2
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>			
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	280	1.31	366.3
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>	360	.2525	90.9
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>	80	.03	2.4
<i>Pleurosigma</i> sp.	20	.015	.3
<i>Rhizosolenia alata</i>	580	.045	26.1
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>	320	.028	8.9
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>	40	1.73	69.3
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	60	.47	28.3
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>	20	.5656	11.3
<i>Ceratium pentagonum</i>	60	.196	11.8
<i>Ceratium tripos</i>	60	2.62	157
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	2900	.021	59.7
<i>Prorocentrum micans</i>	420	.008	3.5
<i>Prorocentrum rostratum</i>	160	.006	.96
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccilithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>	60	.009	.2
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.			
MONADS	4300	.005	21.5

Table 37

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SAMPLE NUMBER 12-4
 DATE 5/09/85
 TIME 1440 GMT
 DEPTH 25m

LOCATION :lat	40 00.00N
:long	70 30.98W
VOLUME	FILTERED 0.5L
SAMPLE	VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\ell$
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	180	.094	17
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>			
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	160	1.86	298.3
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>	320	.237	75.8
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>	60	.009	.54
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>	180	.054	9.72
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>	80	.019	1.6
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	60	.4713	28.3
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	160	.196	31.4
<i>Ceratium tripos</i>	40	2.355	94.2
<i>Dinophysis caudata</i>	20	4.76	95.2
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	4540	.019	86.5
<i>Prorocentrum micans</i>	320	.007	2.25
<i>Prorocentrum rostratum</i>	160	.006	.96
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>	20	.006	.12
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	40	.005	.2
<i>MONADS</i>	4400	.005	22

Table 38

SAMPLE NUMBER 13-1
 DATE 5/09/85
 TIME 1725 GMT
 DEPTH 15m

LOCATION :lat 40 04.04N
 :long 70 34.22W
 VOLUME FILTERED 0.5L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIO MASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS			
<i>Bacteriastrum delicatulum</i>	20	.0314	.628
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>			
<i>Corethron hystrix</i>	20	.196	4
<i>Coscinodiscus centralis</i>			
<i>Coscinodiscus granii</i>	20	1.767	35.34
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	240	1.34	321.85
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>	60	.047	2.8
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.	20	.157	3.14
<i>Navicula</i> sp.	860	.007	6.75
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.	400	.006	2.4
<i>Rhizosolenia alata</i>	180	.006	1.08
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>	920	.021	19
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>	40	1.925	77
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>			
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	20	.294	5.9
<i>Ceratium tripos</i>	40	2.159	86.35
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	3060	.0146	44.6
<i>Prorocentrum micans</i>	100	.01	1
<i>Prorocentrum rostratum</i>	20	.007	.14
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	440	.005	2.2
<i>MONADS</i>	7500	.005	37.5

Table 39

SAMPLE NUMBER 13-2
 DATE 5/9/85
 TIME 1725 GMT
 DEPTH 25m

LOCATION :lat 40 04.04N
 :long 70 34.22W
 VOLUME FILTERED 0.5L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm³ x 10⁻⁶	BIO MASS ESTIMATE mm³ x 10⁻⁶/l
DIATOMS			
<i>Bacteriastrum delicatulum</i>	20	.4	8
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	40	.98	39.2
<i>Corethron hystrix</i>	20	.196	4
<i>Coscinodiscus centralis</i>			
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>	80	.36	28.14
<i>Guinardia flaccida</i>	340	1.75	596.6
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>	80	.062	5
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.	400	.0155	6.2
<i>Rhizosolenia alata</i>	1100	.005	5.5
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>	740	.008	6
<i>Skeletonema costatum</i>	20	.022	.44
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>	20	1.925	38.5
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>			
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	20	.196	4
<i>Ceratium tripos</i>			
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	2900	.014	40
<i>Prorocentrum micans</i>	140	.01	1.4
<i>Prorocentrum rostratum</i>	20	.006	.12
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccilithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>	20	.006	.12
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	240	.015	3.6
<i>MONADS</i>	5500	.005	27.5

Table 40

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SAMPLE NUMBER 14-1
 DATE 5/09/85
 TIME 1940 GMT
 DEPTH 11m

LOCATION :lat 40 20.85N
 :long 70 40.34W
 VOLUME FILTERED 0.5L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
--	-------------------	--	--

DIATOMS

Bacteriastrum delicatulum
Chaetoceros atlanticum
Chaetoceros breve
Chaetoceros decipiens 40 .98 39.2
Corethron hystrix
Coscinodiscus centralis
Coscinodiscus granii
Coscinodiscus lineatus
Guinardia flaccida
Hemiaulus hauckii
Leptocylindrus danicus
Lithodesmium undulatum
Melosira sp.
Navicula sp.
Nitzschia seriata
Pleurosigma sp.
Rhizosolenia alata
Rhizosolenia setigera
Rhizosolenia styliformis
Skeletonema costatum
Stephanopyxis turris
Synedra sp.
Thalassionema nitzschoides
Thalassiothrix frauenfeldi

DINOFLAGELLATES

<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>			
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>			
<i>Ceratium tripos</i>			
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	80	.027	2.16
<i>Prorocentrum micans</i>	20	.009	.18
<i>Prorocentrum rostratum</i>			
<i>Prorocentrum triangulatum</i>			

COCCOLITHOPHORES

Coccolithus huxleyi

SILICOFLAGELLATES

Dictyocha fibula
D. stephanus speculum

MISCELLANEOUS PHYTOPLANKTON

<i>Cryptomonas</i> sp.	20	.0142	.28
MONADS	10000	.005	50

Table 41

SAMPLE NUMBER 15-1
 DATE 5/11/85
 TIME 1610 GMT
 DEPTH 23m

LOCATION	:lat	40 09.31N
	:long	71 40.51W
VOLUME	FILTERED	0.5L
SAMPLE	VOLUME	50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\ell$
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>	20	.2514	5
<i>Chaetoceros decipiens</i>	20	.98	19.6
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>			
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>			
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>			
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.	20	.005	.1
<i>Rhizosolenia alata</i>	20	.007	.14
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>	20	1.925	38.5
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>			
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>			
<i>Ceratium tripos</i>	20	1.155	23.1
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	20	.0142	.28
<i>Prorocentrum micans</i>			
<i>Prorocentrum rostratum</i>			
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	1500	.0132	19.8
<i>MONADS</i>	8000	.005	40

Table 42

SAMPLE NUMBER 15-2
 DATE 5/11/85
 TIME 1610 GMT
 DEPTH 30m

LOCATION :lat 40 09.31N
 :long 71 40.51W
 VOLUME FILTERED 0.5L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
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DIATOMS

<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>			
<i>Corethron hystrix</i>	20	.1257	2.5
<i>Coscinodiscus centralis</i>			
<i>Coscinodiscus granii</i>	100	.088	8.8
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>			
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>			
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.	100	.0142	1.42
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>			
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>	20	.007	.14
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			

DINOFLAGELLATES

<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>			
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>			
<i>Ceratium tripos</i>			
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>	20	.18	3.6
<i>Peridinium depressum</i>	40	.009	.36
<i>Prorocentrum micans</i>	80	.008	.64
<i>Prorocentrum rostratum</i>			
<i>Prorocentrum triangulatum</i>			

COCCOLITHOPHORES

Coccilithus huxleyi

SILICOFLAGELLATES

Dictyocha fibula
Distephanus speculum

MISCELLANEOUS PHYTOPLANKTON

<i>Cryptomonas</i> sp.	340	.015	5.14
MONADS	3400	.005	17

Table 43

49

SAMPLE NUMBER	16-1	LOCATION	:lat	39 56.27N
DATE	5/11/85		:long	71 34.25W
TIME	1925 GMT	VOLUME	FILTERED	0.5L
DEPTH	11m	SAMPLE	VOLUME	50ml
		NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\ell$
DIATOMS				
<i>Bacteriastrum delicatulum</i>				
<i>Chaetoceros atlanticum</i>				
<i>Chaetoceros breve</i>				
<i>Chaetoceros decipiens</i>	100		.8624	86.24
<i>Corethron hystrix</i>				
<i>Coscinodiscus centralis</i>				
<i>Coscinodiscus granii</i>	20		.1131	2.3
<i>Coscinodiscus lineatus</i>				
<i>Guinardia flaccida</i>				
<i>Hemiaulus hauckii</i>				
<i>Leptocylindrus danicus</i>				
<i>Lithodesmium undulatum</i>				
<i>Melosira</i> sp.				
<i>Navicula</i> sp.				
<i>Nitzschia seriata</i>				
<i>Pleurosigma</i> sp.				
<i>Rhizosolenia alata</i>				
<i>Rhizosolenia setigera</i>				
<i>Rhizosolenia styliformis</i>				
<i>Skeletonema costatum</i>				
<i>Stephanopyxis turris</i>				
<i>Synedra</i> sp.				
<i>Thalassionema nitzschoides</i>				
<i>Thalassiothrix frauenfeldi</i>				
DINOFLAGELLATES				
<i>Ceratium contortum</i>				
<i>Ceratium furca</i>				
<i>Ceratium fusus</i>				
<i>Ceratium lineatum</i>				
<i>Ceratium longipes</i>				
<i>Ceratium minutum</i>				
<i>Ceratium pentagonum</i>				
<i>Ceratium tripos</i>				
<i>Dinophysis caudata</i>				
<i>Dinophysis ovum</i>				
<i>Peridinium depressum</i>	120		.125	15
<i>Prorocentrum micans</i>				
<i>Prorocentrum rostratum</i>	20		.012	.24
<i>Prorocentrum triangulatum</i>				
COCCOLITHOPHORES				
<i>Coccilithus huxleyi</i>				
SILICOFLAGELLATES				
<i>Dictyocha fibula</i>				
<i>Distephanus speculum</i>				
MISCELLANEOUS PHYTOPLANKTON				
<i>Cryptomonas</i> sp.	1300		.0123	16
MONADS	4000		.005	20

Table 44

50

SAMPLE NUMBER 16-2
 DATE 5/11/85
 TIME 1925 GMT
 DEPTH 19m

LOCATION :lat 39 56.27N
 :long 71 34.25W
 VOLUME SAMPLE FILTERED 0.5L
 VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIO MASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	60	1.01	61
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>			
<i>Coscinodiscus granii</i>			
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>			
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>	160	.22	35
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.	100	.0051	.51
<i>Rhizosolenia alata</i>	280	.006	1.68
<i>Rhizosolenia setigera</i>			
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>	20	.0471	1
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>			
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>			
<i>Ceratium tripos</i>	20	2.355	47.1
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	1700	.0142	24.14
<i>Prorocentrum micans</i>	80	.009	.72
<i>Prorocentrum rostratum</i>	120	.007	.84
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>			
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	1480	.017	25.3
MONADS	8000	.005	40

Table 45

51

SAMPLE NUMBER 16-3
 DATE 5/11/85
 TIME 1925 GMT
 DEPTH 25m

LOCATION :lat 39 56.27N
 :long 71 34.25W
 VOLUME FILTERED 0.5L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIO MASS ESTIMATE mm ³ x 10 ⁻⁶ /2
DIATOMS			
<i>Bacteriastrum delicatulum</i>	40	.006	.24
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	40	.2156	8.6
<i>Corethron hystrix</i>	20	.071	1.4
<i>Coscinodiscus centralis</i>			
<i>Coscinodiscus granii</i>	20	.0335	.7
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	40	.294	11.8
<i>Hemiaulus hauckii</i>			
<i>Leptocylindrus danicus</i>	80	.291	23.3
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.	20	.007	.14
<i>Nitzschia seriata</i>			
<i>Pleurosigma</i> sp.			
<i>Rhizosolenia alata</i>	220	.007	1.54
<i>Rhizosolenia setigera</i>	20	.471	9.42
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>			
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	80	.196	15.7
<i>Ceratium tripos</i>			
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	2860	.018	52.3
<i>Procentrum micans</i>	220	.008	1.76
<i>Procentrum rostratum</i>	220	.008	1.76
<i>Procentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>			
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>	20	.009	.18
<i>Distephanus speculum</i>	20	.006	.12
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	880	.0122	10.74
<i>MONADS</i>	5400	.005	27

Table 46

SAMPLE NUMBER	17-1	LOCATION	:lat	39 50.57N
DATE	5/11/85		:long	71 32.08W
TIME	2200 GMT	VOLUME	FILTERED	0.5L
DEPTH	12.5m	SAMPLE	VOLUME	50ml
		NUMBER OF	AVERAGE	BIOMASS
		CELLS/L	CELL SIZE	ESTIMATE
			mm ³ x 10 ⁻⁶	mm ³ x 10 ⁻⁶ /L
DIATOMS				
<i>Bacteriastrum delicatulum</i>	40		.006	.24
<i>Chaetoceros atlanticum</i>				
<i>Chaetoceros breve</i>				
<i>Chaetoceros decipiens</i>	80		.0424	3.4
<i>Corethron hystrix</i>				
<i>Coscinodiscus centralis</i>				
<i>Coscinodiscus granii</i>				
<i>Coscinodiscus lineatus</i>				
<i>Guinardia flaccida</i>	360		1.31	471
<i>Hemiaulus hauckii</i>				
<i>Leptocylindrus danicus</i>	740		.181	134.3
<i>Lithodesmium undulatum</i>				
<i>Melosira</i> sp.				
<i>Navicula</i> sp.				
<i>Nitzschia seriata</i>	60		.017	1
<i>Pleurosigma</i> sp.	20		.007	.14
<i>Rhizosolenia alata</i>	20		.091	1.83
<i>Rhizosolenia setigera</i>	160		.009	1.44
<i>Rhizosolenia styliformis</i>				
<i>Skeletonema costatum</i>	60		.058	3.45
<i>Stephanopyxis turris</i>				
<i>Synedra</i> sp.				
<i>Thalassionema nitzschoides</i>				
<i>Thalassiothrix frauenfeldi</i>				
DINOFLAGELLATES				
<i>Ceratium contortum</i>				
<i>Ceratium furca</i>				
<i>Ceratium fusus</i>	80		.722	57.8
<i>Ceratium lineatum</i>				
<i>Ceratium longipes</i>				
<i>Ceratium minutum</i>				
<i>Ceratium pentagonum</i>	40		.196	7.84
<i>Ceratium tripos</i>	60		2.355	141.3
<i>Dinophysis caudata</i>				
<i>Dinophysis ovum</i>				
<i>Peridinium depressum</i>	6060		.019	120.2
<i>Prorocentrum micans</i>	400		.009	3.6
<i>Prorocentrum rostratum</i>	300		.007	2.1
<i>Prorocentrum triangulatum</i>				
COCCOLITHOPHORES				
<i>Coccolithus huxleyi</i>				
SILICOFLAGELLATES				
<i>Dictyocha fibula</i>	20		.005	.1
<i>Distephanus speculum</i>				
MISCELLANEOUS PHYTOPLANKTON				
<i>Cryptomonas</i> sp.	520		.013	7
MONADS	8800		.005	44

Table 47

SAMPLE NUMBER	17-2	LOCATION	:lat	39 50.57N
DATE	5/11/85		:long	71 32.08W
TIME	2200 GMT	VOLUME	FILTERED	0.5L
DEPTH	20m	SAMPLE	VOLUME	50ml
		NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS				
<i>Bacteriastrum delicatulum</i>	60		.012	.71
<i>Chaetoceros atlanticum</i>				
<i>Chaetoceros breve</i>				
<i>Chaetoceros decipiens</i>	900		.048	43.2
<i>Corethron hystrix</i>				
<i>Coscinodiscus centralis</i>				
<i>Coscinodiscus granii</i>	60		.31	18.6
<i>Coscinodiscus lineatus</i>				
<i>Guinardia flaccida</i>	1020		20.02	1361
<i>Hemiaulus hauckii</i>	180		.143	25.87
<i>Leptocylindrus danicus</i>	2080		.185	386
<i>Lithodesmium undulatum</i>				
<i>Melosira</i> sp.				
<i>Navicula</i> sp.				
<i>Nitzschia seriata</i>	840		.005	4.35
<i>Pleurosigma</i> sp.				
<i>Rhizosolenia alata</i>				
<i>Rhizosolenia setigera</i>	1780		.009	16.02
<i>Rhizosolenia styliformis</i>	700		.278	195
<i>Skeletonema costatum</i>	140		.659	13
<i>Stephanopyxis turris</i>				
<i>Synedra</i> sp.				
<i>Thalassionema nitzschoides</i>				
<i>Thalassiothrix frauenfeldi</i>				
DINOFLAGELLATES				
<i>Ceratium contortum</i>	20		1.925	38.5
<i>Ceratium furca</i>				
<i>Ceratium fusus</i>	40		.4242	17
<i>Ceratium lineatum</i>				
<i>Ceratium longipes</i>				
<i>Ceratium minutum</i>				
<i>Ceratium pentagonum</i>	160		.211	33.71
<i>Ceratium tripos</i>	40		2.74	110
<i>Dinophysis caudata</i>	20		1.55	31.09
<i>Dinophysis ovum</i>				
<i>Peridinium depressum</i>	5720		.0211	120.71
<i>Prorocentrum micans</i>	1380		.008	11.7
<i>Prorocentrum rostratum</i>	560		.006	3.36
<i>Prorocentrum triangulatum</i>				
COCCOLITHOPHORES				
<i>Coccolithus huxleyi</i>				
SILICOFLAGELLATES				
<i>Dictyocha fibula</i>				
<i>Distephanus speculum</i>				
MISCELLANEOUS PHYTOPLANKTON				
<i>Cryptomonas</i> sp.	520		.0141	7.34
MONADS	7400		.005	37

Table 48

SAMPLE NUMBER 17-3
 DATE 5/11/85
 TIME 2200 GMT
 DEPTH 30m

LOCATION :lat 39 50.57N
 :long 71 32.08W
 VOLUME FILTERED 0.5L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIO MASS ESTIMATE mm ³ x 10 ⁻⁶ /L
DIATOMS			
<i>Bacteriastrum delicatulum</i>	60	.005	.3
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>	20	.3535	7.1
<i>Chaetoceros decipiens</i>	400	.041	16.4
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>			
<i>Coscinodiscus granii</i>	120	.141	17
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	460	1.65	760.32
<i>Hemiaulus hauckii</i>	20	.085	1.7
<i>Leptocylindrus danicus</i>	880	.102	89.7
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>	120	.015	1.8
<i>Pleurosigma</i> sp.	20	.015	.3
<i>Rhizosolenia alata</i>	20	.011	.21
<i>Rhizosolenia setigera</i>	220	.008	1.76
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>	80	.0942	7.54
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>			
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	60	.6285	37.7
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	200	.206	41.2
<i>Ceratium tripos</i>	60	2.22	133.45
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	1700	.048	81.4
<i>Prorocentrum micans</i>	1620	.009	15.1
<i>Prorocentrum rostratum</i>	620	.007	4.34
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>	10900	.023	249.35
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>	100	.009	.9
<i>Distephanus speculum</i>	20	.005	.11
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	660	.011	7.3
<i>MONADS</i>	8200	.005	41

Table 49

SAMPLE NUMBER	23-1	LOCATION	:lat	39 38.49N
DATE	5/12/85		:long	71 26.51W
TIME	1350 GMT	VOLUME	FILTERED	0.5L
DEPTH	10m	SAMPLE	VOLUME	50ml
		NUMBER OF CELLS/L	AVERAGE CELL SIZE $\text{mm}^3 \times 10^{-6}$	BIOMASS ESTIMATE $\text{mm}^3 \times 10^{-6}/\ell$
DIATOMS				
Bacteriastrum delicatulum				
Chaetoceros atlanticum				
Chaetoceros breve				
Chaetoceros decipiens				
Corethron hystrix				
Coscinodiscus centralis	20		.18	3.6
Coscinodiscus granii				
Coscinodiscus lineatus				
Guinardia flaccida	360		1.48	533.8
Hemiaulus hauckii				
Leptocylindrus danicus	200		.219	43.83
Lithodesmium undulatum				
Melosira sp.				
Navicula sp.				
Nitzschia seriata	100		.012	1.2
Pleurosigma sp.	40		.022	.88
Rhizosolenia alata				
Rhizosolenia setigera	120		.008	.96
Rhizosolenia styliformis				
Skeletonema costatum				
Stephanopyxis turris				
Synedra sp.				
Thalassionema nitzschoides				
Thalassiothrix frauenfeldi				
DINOFLAGELLATES				
Ceratium contortum	20		1.155	23.1
Ceratium furca				
Ceratium fusus	140		.539	75.42
Ceratium lineatum				
Ceratium longipes				
Ceratium minutum				
Ceratium pentagonum				
Ceratium tripos				
Dinophysis caudata	20		.216	4.32
Dinophysis ovum				
Peridinium depressum	4160		.0264	110.1
Prorocentrum micans	200		.008	1.6
Prorocentrum rostratum	1180		.006	7.08
Prorocentrum triangulatum				
COCCOLITHOPHORES				
Coccilithus huxleyi	13240		.0142	188
SILICOFLAGELLATES				
Dictyocha fibula	120		.028	3.36
Distephanus speculum				
MISCELLANEOUS PHYTOPLANKTON				
Cryptomonas sp.	320		.01452	4.65
MONADS	5800		.005	29

Table 50

56

SAMPLE NUMBER	23-2	LOCATION	:lat	39 38.49N
DATE	5/12/85		:long	71 26.51W
TIME	1350 GMT	VOLUME	FILTERED	0.5L
DEPTH	16m	SAMPLE	VOLUME	50ml
		NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS				
Bacteriastrum delicatulum				
Chaetoceros atlanticum				
Chaetoceros breve				
Chaetoceros decipiens				
Corethron hystrix				
Coscinodiscus centralis				
Coscinodiscus granii	80		.0653	5.22
Coscinodiscus lineatus				
Guinardia flaccida	280		1.32	369
Hemiaulus hauckii				
Leptocylindrus danicus	100		.2404	24.04
Lithodesmium undulatum				
Melosira sp.				
Navicula sp.				
Nitzschia seriata	80		.021	1.68
Pleurosigma sp.	20		.023	.46
Rhizosolenia alata				
Rhizosolenia setigera				
Rhizosolenia styliformis				
Skeletonema costatum				
Stephanopyxis turris				
Synedra sp.				
Thalassionema nitzschoides				
Thalassiothrix frauenfeldi				
DINOFLAGELLATES				
Ceratium contortum				
Ceratium furca				
Ceratium fusus	20		.3535	7.1
Ceratium lineatum				
Ceratium longipes				
Ceratium minutum				
Ceratium pentagonum	20		.196	4
Ceratium tripos				
Dinophysis caudata				
Dinophysis ovum				
Peridinium depressum	700		.099	69.55
Prorocentrum micans	680		.008	5.44
Prorocentrum rostratum	300		.013	3.9
Prorocentrum triangulatum				
COCCOLITHOPHORES				
Coccolithus huxleyi	11100		.012	133.2
SILICOFLAGELLATES				
Dictyocha fibula	20		.006	.12
Distephanus speculum				
MISCELLANEOUS PHYTOPLANKTON				
Cryptomonas sp.	200		.0142	2.84
MONADS	5300		.005	26.5

Table 51

SAMPLE NUMBER 23-3
 DATE 5/12/85
 TIME 1350 GMT
 DEPTH 25m

LOCATION :lat 39 38.49N
 :long 71 26.51W
 VOLUME FILTERED 0.5L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS			
<i>Bacteriastrum delicatulum</i>			
<i>Chaetoceros atlanticum</i>			
<i>Chaetoceros breve</i>			
<i>Chaetoceros decipiens</i>	60	.3535	21.21
<i>Corethron hystrix</i>			
<i>Coscinodiscus centralis</i>	20	4.189	83.8
<i>Coscinodiscus granii</i>	140	.311	43.54
<i>Coscinodiscus lineatus</i>			
<i>Guinardia flaccida</i>	1020	1.36	1387.9
<i>Hemiallus hauckii</i>			
<i>Leptocylindrus danicus</i>	580	.184	106.62
<i>Lithodesmium undulatum</i>			
<i>Melosira</i> sp.			
<i>Navicula</i> sp.			
<i>Nitzschia seriata</i>	300	.0155	4.7
<i>Pleurosigma</i> sp.	40	.042	1.68
<i>Rhizosolenia alata</i>	240	.396	95.04
<i>Rhizosolenia setigera</i>	280	.006	1.68
<i>Rhizosolenia styliformis</i>			
<i>Skeletonema costatum</i>			
<i>Stephanopyxis turris</i>			
<i>Synedra</i> sp.			
<i>Thalassionema nitzschoides</i>			
<i>Thalassiothrix frauenfeldi</i>			
DINOFLAGELLATES			
<i>Ceratium contortum</i>	40	3.53	141.3
<i>Ceratium furca</i>			
<i>Ceratium fusus</i>	40	.318	12.73
<i>Ceratium lineatum</i>			
<i>Ceratium longipes</i>			
<i>Ceratium minutum</i>			
<i>Ceratium pentagonum</i>	140	.2016	28.22
<i>Ceratium tripos</i>	140	1.96	274.4
<i>Dinophysis caudata</i>			
<i>Dinophysis ovum</i>			
<i>Peridinium depressum</i>	2400	.599	1438.75
<i>Prorocentrum micans</i>	1600	.009	14.4
<i>Prorocentrum rostratum</i>	320	.012	4
<i>Prorocentrum triangulatum</i>			
COCCOLITHOPHORES			
<i>Coccolithus huxleyi</i>	14600	.014	204.4
SILICOFLAGELLATES			
<i>Dictyocha fibula</i>	140	.01	1.4
<i>Distephanus speculum</i>			
MISCELLANEOUS PHYTOPLANKTON			
<i>Cryptomonas</i> sp.	160	.0142	2.3
MONADS	12000	.005	60

Table 52

SAMPLE NUMBER 23-4
 DATE 5/12/85
 TIME 1350 GMT
 DEPTH 33m

LOCATION :lat 39 38.49N
 :long 71 26.15W
 VOLUME FILTERED 0.5L
 SAMPLE VOLUME 50ml

	NUMBER OF CELLS/L	AVERAGE CELL SIZE mm ³ x 10 ⁻⁶	BIOMASS ESTIMATE mm ³ x 10 ⁻⁶ /l
DIATOMS			
Bacteriastrum delicatulum	100	.031	3.1
Chaetoceros atlanticum			
Chaetoceros breve			
Chaetoceros decipiens	60	.3535	21.21
Corethron hystrix			
Coscinodiscus centralis			
Coscinodiscus granii	60	.6325	38
Coscinodiscus lineatus			
Guinardia flaccida	1280	1.41	1800
Hemiaulus hauckii			
Leptocylindrus danicus	220	.2153	47.4
Lithodesmium undulatum			
Melosira sp.			
Navicula sp.			
Nitzschia seriata	20	.031	.62
Pleurosigma sp.			
Rhizosolenia alata	80	.026	2.08
Rhizosolenia setigera	80	.08	6.4
Rhizosolenia styliformis			
Skeletonema costatum			
Stephanopyxis turris			
Synedra sp.			
Thalassionema nitzschoides			
Thalassiothrix frauenfeldi			
DINOFLAGELLATES			
Ceratium contortum			
Ceratium furca			
Ceratium fusus			
Ceratium lineatum			
Ceratium longipes			
Ceratium minutum			
Ceratium pentagonum	60	.21	12.6
Ceratium tripos	100	3.415	341.5
Dinophysis caudata	20	.66	13.2
Dinophysis ovum	20	.031	.62
Peridinium depressum	1100	.163	179.3
Prorocentrum micans	220	.008	1.76
Prorocentrum rostratum	3200	.006	19.2
Prorocentrum triangulatum			
COCCOLITHOPHORES			
Coccilithus huxleyi	17700	.014	244.25
SILICOFLAGELLATES			
Dictyocha fibula	40	.007	.28
Distephanus speculum	20	.009	.18
MISCELLANEOUS PHYTOPLANKTON			
Cryptomonas sp.	20	.0142	.284
MONADS	9500	.005	47.5

Table 53

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TOTAL BIOMASS ESTIMATE ($\text{mm}^3 \times 10^{-6}/\ell$)

FOR EACH SAMPLE

<u>SAMPLE #</u>	<u>BIOMASS ESTIMATE</u>	<u>SAMPLE #</u>	<u>BIOMASS ESTIMATE</u>
1	76.58	7-2	11975.90
2	76.03	8-1	4339.70
3	18.70	8-1-1	14234.58
4	23.48	10-1	5159.60
5	26.60	10-2	1456.80
6	2047.60	11-1	666.30
7	2021.25	11-2	1344.10
UPS-N1	7209.69	12-1	1065.15
UPS-N2	130.66	12-2	883.30
UPS-N3	66.45	12-3	897.20
UPS-N4	115.47	12-4	756.10
UPS-N5	5808.98	13-1	648.80
UPS-N6	325.36	13-2	810.90
UPS-N7	47.85	14-1	91.90
UPS-N8	12.63	15-1	107.70
UPS-N9	22.10	15-2	39.80
UPS-N10	15.04	16-1	139.70
UPS-S1	37.06	16-2	202.30
UPS-S2	60.70	16-3	163.40
UPS-S3	104.00	17-1	1001.95
UPS-S4	4.94	17-2	2471.16
5-1	19870.69	17-3	1513.90
5-2	29307.98	23-1	1027.70
6-1	313.40	23-2	657.38
6-2	158.24	23-3	3925.30
7-1	194.30	23-4	2809.79

SPECIES LIST

Bacillariophyta; Bacillariophyceae (Diatoms)

Bacteriastrum delicatulum Cleve
Chaetoceros atlanticum Cleve
Chaetoceros breve Schutt
Chaetoceros decipiens Cleve
Corethron hystrix Hensen
Coscinodiscus centralis Ehrenberg
Coscinodiscus granii Gough
Coscinodiscus lineatus Ehrenberg
Guinardia flaccida (Castracane) H. Peragallo
Gyrosigma sp. Hassall
Hemialulus hauckii Grunow
Leptocylindrus danicus Cleve
Lithodesmium undulatum Ehrenberg
Melosira sp. Agardh
Navicula sp. Bory
Nitzschia seriata Cleve
Pleurosigma sp. W. Smith
Rhizosolenia alata Brightwell
Rhizosolenia setigera Brightwell
Rhizosolenia styliformis Brightwell
Skeletonema costatum (Greville) Cleve
Stephanopyxis turris (Greville) Ralfs
Synedra sp. Ehrenberg
Thalassionema nitzschiooides Grunow
Thalassiosira nordenskioeldi Cleve
Thalassiothrix frauenfeldi Grunow

Pyrrhophyta; Dinophyceae (Dinoflagellates)

Ceratium contortum (Gourret) Cleve
Ceratium furca (Ehrenberg) Cleve
Ceratium fusus (Ehrenberg) Clap and Swenzy
Ceratium lineatum (Ehrenberg) Cleve
Ceratium longipes (Bailey) Gran
Ceratium minutum Jorgensen
Ceratium pentagonum Gourret
Ceratium tripos O. F. Muller
Dinophysis caudata Kent
Dinophysis ovum Schutt
Peridinium depressum Bailey
Prorocentrum micans Ehrenberg
Prorocentrum rostratum Stein
Prorocentrum triangulatum Schiller

Coccolithophorida; Coccolithophoridaceae (Coccolithophores)

Coccolithus huxleyi (Lohmann) Kamptner

Chrysophyta; Chrysophyceae (Silicoflagellates)

Dictyocha fibula Ehrenberg
Distephanus speculum (Ehrenberg) Haeckel

Table 54 (continued)

Chrysophyta; Cryptophyceae (Cryptomonads)
Cryptomonas sp. Ehrenberg

Chlorophyta; Chlorophyceae (Monads)
Monads

DISCUSSION

We feel that some degree of caution in interpretation of our results is warranted due to three methodological considerations relating to our analyses:

1. Results of microscopic examinations (Tables 1-54) are based on enumeration and evaluation of only one 50 ml aliquot of each sample; time constraints together with the large number of samples processed precluded analyses of replicates. Hence, statistically valid comparisons between samples have not been made. Although several workers have considered the issue of precision in plankton counting (see review by Venrick, 1978), as of now no uniform counting procedure has been accepted by all planktologists. Rather "The disparity of recommendations in the literature reflects different laboratory methods as well as different theoretical concepts and assumptions" (Venrick, 1978). Although precision is certainly a function of total cells counted, Shaw (1964) reported that whenever a taxon is present at only the 1% level in a population, it will likely be encountered (95% probability) when at least 300 cells are counted, as done in analyses of our samples. Of further relevance is the observation of Uehlinger (1964) that by counting cells in 30-40 microscope fields, one can reasonably estimate (within $\pm 2\sigma$) the true sample mean (i.e. that obtained by counting all cells present in the entire settling chamber). In the present study, total counts (entire chamber) were made in all cases except for the densely populated samples (6, 7, UPS-N1, UPS-N5, 5-1, and 5-2). For each of these exceptions, cells in 42 microscope fields were counted. Hence, we feel that our counting methodology is defensible.

2. Considerable controversy exists regarding the validity of biomass estimates using the "total cell volume" technique as applied in the present investigation. Several of the important reservations held regarding the techniques have been reviewed elsewhere (e.g. Sicko-Goad et al., 1977; Smayda, 1978) and are as follows:

- a) There is poor correlation between biovolume estimates and estimates using other techniques.
- b) It is exceedingly difficult to estimate volume of microscopic irregularly shaped cells.
- c) There are differing amounts of metabolizing cytoplasm, vacuolar volume and cell wall material between taxa.
- d) The physiological state of the cell greatly affects cell size and proportions of the cellular components (i.e. those in c above).
- e) Use of the technique results in an exaggeration of the contribution of larger celled taxa to phytoplankton community dynamics relative to smaller celled taxa.

Since it has been suggested that metabolizing biovolume may range from 30-80% of total cell volume depending on species, we assume that our biomass estimates greatly exceed ecologically significant values (e.g. metabolizing biovolume). However, despite its many shortcomings, determination of total cell volume remains an established procedure for indirectly estimating phytoplankton biomass.

3. Two different sample collection methods were employed in our study (the first using a towed pumping system and plankton cup for concentrating samples; the second utilizing unconcentrated water bottle samples obtained at various depths). Moreover, station samples to be analyzed were selected a posteriori according to presumed abundance of

phytoplankton as predicted from in situ fluorescence measurements. Hence, between-sample comparisons as well as direct comparisons of our results to those of other workers employing systematic sampling strategies are a bit tenuous. Nevertheless, we feel that some general conclusions may be drawn from our analyses.

With respect to frontal zone dynamics, results for analyses of samples 1-7 (TUPS data from the southern survey area) are interesting in that they demonstrate substantial differences (total biomass and species composition) between the water masses on either side of the frontal boundary. Total biomass was substantially less (under 100*) north of and at the boundary (Samples 1-4) than south of the boundary (over 2000 in samples 6 and 7). Ceratium tripos was the dominant species of dinoflagellate in Samples 5-7 obtained at and south of the frontal boundary. Either C. longipes or Peridinium depressum was the dominant dinoflagellate north of the boundary (Samples 1-5). Biomass of dinoflagellates generally exceeded that of diatoms (exceptions were noted in Samples 3 and 6). Usually, Guinardia flaccida was the dominant species of diatom; Coscinodiscus centralis predominated in Sample 3. As noted earlier, use of all volume comparisons does tend to emphasize contributions made by larger-celled species (e.g. Ceratium spp., Coscinodiscus spp., Guinardia sp., etc.) which are often represented by relatively few cells. In most samples, the small dinoflagellate Peridinium depressum and diatom Skeletonema costatum, were the most abundant species in terms of numbers of individuals per unit volume. Neither coccolithophorids, silicoflagellates nor miscellaneous plankton (including monads) were of much importance in any of these samples.

Samples UPS N 1-UPS N 10 were made in the northern survey area using

*All biomass values are expressed as $\text{mm}^3 \times 10^{-6}/\ell$.

the TUPS (Sample UPS N 5 was at the frontal boundary while samples UPS N 1-4 and UPS N 6-10 were south and north of the boundary, respectively). As in the southern survey area, sample biomass was substantial at the frontal boundary (over 5800 in UPS N 5) relative to most others (generally less than 200), although sample UPS N 1, the southernmost station along this track, exhibited the highest value (over 7200). Except for sample UPS N 6, where Peridinium depressum was dominant in terms of biomass, Ceratium tripos was the dominant form in all samples. Although Guinardia flaccida and Coscinodiscus spp. were the dominant diatoms in most samples, in UPS N 6-9, Chaetoceros decipiens was the dominant form.

Biomass of coccolithophorids was substantial in the samples obtained in the northern survey area (in contrast to TUPS Samples 1-7 from the southern survey area); in samples UPS N 5 and UPS N 6, Coccolithus (=Emiliania) huxleyi was the dominant phytoplankton, in terms of total biomass. Although miscellaneous phytoplankton were more important in the northern than southern survey area, they still constituted a rather small proportion of total phytoplankton (1% of the total estimated biomass).

Finally, we noted that the diatoms, Leptocylindrus danicus, Rhizosolenia setigera and dinoflagellate, Peridinium depressum, were generally the most important species in terms of cell numbers. The former two species are rare to nonexistent in samples collected in the southern survey area.

Examination of TUPS Samples UPS S 1-4 revealed that total biomass was low for each. However, sample UPS S 3, obtained in the front, exhibited a higher biomass value than the others. Again, these four samples were dominated by the diatom species, Chaetoceros decipiens (UPS S 1-2), Coscinodiscus spp. (UPS S 1), Guinardia flaccida (UPS S 3) and dinoflagellate Ceratium tripos (UPS S 1-3). Coccolithus huxleyi was most

important in samples UPS S 1-2. Sample UPS S 4 exhibited the lowest estimated biomass (less than 5) of any we examined.

Results of analyses of bottle samples collected at various locations and depths in the southern survey area are provided in Tables 22-31. Since all of these samples were selected for analysis on the basis of predicted phytoplankton abundance (based on in situ floourescence measurements), we feel that direct comparisons of these samples with either one another or the TUPS samples would be rather tenuous. Hence, it comes as no surprise that biomass estimates for several of these samples (e.g. S-1, 5-2, 7-2, 8-1-1) far exceed those for other samples. However, a few conclusions regarding the results in Tables 22-31 may be drawn:

1. As with the TUPS samples collected in the southern region, coccolithophorids are virtually absent from the bottle samples. Exceptions were noted in Samples 6-1 and 7-2, located near the frontal boundary.
2. Many taxa which were either not observed or not important in TUPS samples from the southern survey region were rather important (in terms of biomass and/or cell numbers) in the bottle samples. For example, Skeletonema costatum (5-1,5-2), Nitschia seriata (5-1, 5-2) and Leptocylindrus danicus (8-1, 8-1-1, 10-1, 10-2) were very important in terms of numbers and biomass. Other species which were rare or nonexistent in the TUPS surface samples were noteworthy in the bottle samples. For example, Ceratium fusus (8-1, 8-1-1), C. pentagonum (8-1, 8-1-1, 10-1, 10-2), Dinophysis caudata (10-1) and Coscinodiscus granii (6-1, 7-2, 8-1, 8-1-1, 10-1) were fairly important.
3. In several of these samples, cell numbers of monads were substantially greater than in the TUPS samples (5-1, 5-2, 7-1).
4. Taxa which dominated the TUPS samples are also important in a number of the bottle samples (e.g. C. tripos, Peridinium depressum,

Guinardia flaccida and Coscinodiscus spp.).

Results for analyses of bottle samples obtained in the northern survey area are provided in Tables 32-52. Generally, biomass estimates for these are in fairly close agreement with the TUPS samples obtained in the northern survey area, as compared with the lack of agreement between TUPS and bottle samples obtained in the southern survey area (discussed earlier). In most cases, generalizations regarding Tables 32-52 are similar to those for the TUPS samples in regard to dominant species. However, a few analyses provided results which were somewhat surprising:

1. Monads constituted a high proportion of several samples and were especially noteworthy in samples collected at stations 14, 15, and 16.
2. Coccolithophorids, abundant in most of the TUPS samples collected in the northern survey area, were absent in a number of the station samples, including those at the frontal boundary (Stations 13 and 17).

Generally, we feel that many of the observations regarding dominant taxa are in fairly close agreement with several of the studies published for phytoplankton assemblages in the North Atlantic by Marshall and his coworkers (e.g. 1976, 1978, 1983, and 1984). Some of the observations we made which seem worthy of follow up in subsequent studies include the following.

1. We tentatively conclude that significant differences between phytoplankton assemblages are exhibited at ocean fronts. Rigorous analyses of samples from comparable depths at three sites (at and on both sides of the frontal boundary) should be performed in subsequent studies.
2. Several taxa were observed to exhibit dramatic changes in abundance with respect to biomass and cell numbers in the two survey areas. We feel that future counting efforts need to continue to focus on them. Possibly, they may be good indicators of frontal boundaries or other

phenomena related to water mass differences (e.g. coccolithophorids and monads).

3. Often, it appears that total biomass was greatest at or near the frontal boundaries. Testable hypotheses regarding this tentative conclusion could be developed for subsequent surveys.

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Appendix I

Identification Aids Used in the Present Study

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Appendix II
Formulae Used for Cell Volume Calculations

Shape of Morphological Feature	Formula used
Spherical	$V = \frac{4}{3}\pi r^3$
Cylindrical	$V = \pi r^2 L$
Ellipsoid	$V = \frac{4}{3}\pi \frac{L}{2} \frac{W}{2}^2$
Trianguloid	$V = \frac{L}{2} W \frac{L}{4}$
Conical	$V = \frac{1}{3}\pi r^2 L$

Where V = cell volume, L = length, W = width, and $r = \frac{W}{2}$

Appendix III

<u>SAMPLE NUMBER</u>	<u>FILE NAME</u>
1	SAMPLEONE
2	SAMPLETWO
3	SAMPLETHREE
4	SAMPLEFOUR
5	SAMPLEFIVE
6	SAMPLESIX
7	SAMPLESEVEN
UPS-N1	UPSNONE
UPS-N2	UPSNTWO
UPS-N3	UPSNTHREE
UPS-N4	UPSNFOUR
UPS-N5	UPSNFIVE
UPS-N6	UPSNSIX
UPS-N7	UPSNSEVEN
UPS-N8	UPSNEIGHT
UPS-N9	UPSNNINE
UPS-N10	UPSNTEN
UPS-S1	UPSSONE
UPS-S2	UPSSTWO
UPS-S3	UPSSTHREE
UPS-S4	UPSSFOUR
5-1	FIVETWO
5-2	FIVEONE
6-1	SIXONE
6-2	SIXTWO
7-1	SEVENONE
7-2	SEVENTWO
8-1	EIGHTONE
8-1-1	EIGHTTWO
10-1	TENONE
10-2	TENTWO
11-1	ELEVENONE
11-2	ELEVENTWO
12-1	TWELVEONE
12-2	TWELVETWO
12-3	TWELVETHREE
12-4	TWELVEFOUR
13-1	THIRTONE
13-2	THIRTTWO
14-1	FOURTEEN
15-1	FIVETEONE
15-2	FIVETETWO
16-1	SIXTEONE
16-2	SIXTETWO
16-3	SIXTETHR
17-1	SEVTEONE
17-2	SEVTETWO
17-3	SEVTETHRE
23-1	TWENTONE
23-2	TWENTTWO
23-3	TWENTTHRE
23-4	TWENTFOUR

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19. ABSTRACT <i>(Continue on reverse if necessary and identify by block number)</i> During the pilot field exercise for Operation Guiding Light (April-May, 1985), 39 phytoplankton samples were collected in the shelf-slope frontal region and 72 phytoplankton samples were collected in the Gulf Stream frontal region (both survey areas are located in the western North Atlantic Ocean). Samples were obtained using either a towed underwater pumping system (TUPS) at a depth of two meters or a rosette sampler (various depths) and preserved for subsequent analysis. For each sample we identified (to species, where possible) enumerated and estimated biomass of the phytoplankton present. <i>Key results: Copepods, TUPS, Phytoplankton; Guiding light experiments</i>							
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