# Sea Ice Microalgal Data from Eclipse Sound, 1976 and 1977



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Fisheries and Marine Service

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## ABSTRACT

Hsiao, S. I. C. 1979. Sea ice microalgal data from Eclipse Sound, 1976 and 1977. Fish. Mar. Serv. Data Rep. 131: iv + 34 p.

Sea ice microalgal collections, made in Eclipse Sound in 1976 and 1977, are tabulated quantitatively. Thirty-three genera and 116 species of sea ice microalgae were identified; ice diatoms formed the largest group with 28 genera and 113 species.

Key words: Sea ice microalgae, ice diatoms, quantitative species composition, vertical distribution, standing stock, Arctic.

## RESUME

Hsiao, S. I. C. 1979. Sea ice microalgal data from Eclipse Sound, 1976 and 1977. Fish. Mar. Serv. Data Rep. 131: iv + 34 p.

Au cours des annees 1976 et 1977, des prélévements de glace marine provenant du chenal de l'Eclipse ont permis une classification quantitative des algues microscopiques. Au total, 33 genres et 116 espèces ont pu être identifiés; les diatomés, contenus dans la glace, constituent le groupe le plus important avec 28 genres et 113 espèces.

# INTRODUCTION

Brown, yellow-brown, greenish-brown or reddish color bands are commonly seen at the interface of snow and ice on broken and drifting ice-floes (Gran, 1900; Meguro, 1962), and on the underside of solid, unbroken sea ice with variable snow cover (Apollonio, 1961; Bunt and Wood, 1963; Bunt 1963). These bands are caused by large numbers of diatoms, and trace amounts of dinoflagellates, green flagellates and chrysophytes growing on or trapped within the ice. Although the ecological importance of this ice microalgal flora is not well known, its primary production appears to be substantial. It may provide an important source of energy for both planktonic and benthic animal populations.

The composition of arctic ice flora was reported by Cleve and Grunow (1880) from Kara Sea, Cleve (1883) from Cape Wankarema, Grunow (1884) from Barent Sea, Oestrup (1895) from east coast of Greenland, Cleve (1884, 1898, 1899, 1900) from Discovery Bay, Franz Josef Land, Sptizbergen and north of Jan Mayen, Gran (1900) from the Arctic Ocean, and Usachev (1938, 1949) from the north pole. All of this information was obtained from drifting ice-floes. Although Apollonio (1961, 1965) and Meguro et al. (1966, 1967) used SIPRE ice corer to take samples from solid, unbroken sea ice for chlorophyll content, they did not quantitatively examine samples for species composition. Recently, Alexander et al. (1974) studied standing stock of the ice community at Barrow, Alaska.

The purpose of this report is to investigate and to compare two sampling techniques for quantitative and qualitative species composition, vertical distribution and standing stock of the sea ice microalgae from Eclipse Sound.

## METHODS

The sea ice microalgal data presented here were derived from 16 collections made by Mr. Hermann A. R. Steltner of Steltner Development and Manufacturing Company, Ltd., Pond Inlet, N.W.T. for the Arctic Biological Station. The sea ice flora samples were collected with a 7.5 cm diameter SIPRE ice corer from the top to the bottom of the sea ice at Stations 1, 2, 3 and 4 in Eclipse Sound during May 1976 (Fig. 1). The length of ice core was measured, and 1 cm sections were cut from the top, middle and bottom with a fine toothed meat saw. In order to compare quantitative and qualitative composition of sea ice microalgae, both a SIPRE and an ABS ice corer were employed in March 1977 at Station 1 only. The ABS ice corer has the same basic design as the SIPRE ice corer, but is only 20 cm long and has 2 very fine (20) mesh stainless steel screen windows (2.5 cm X 1.3 cm) at the end of its barrel. The samples were taken by SCUBA divers from underneath the sea ice. All these samples were brought to the surface. Ten cm sections were cut from the bottom of the ice core and placed in clean plastic containers, and then thawed in the laboratory at room temperature. They were immediately preserved with concentrated formaldehyde neutralized with calcium carbonate at a final concentration of 2%.

The preserved sea ice flora samples were quantitatively and qualitatively analyzed for species composition and standing stock. The techniques to prepare permanent slides of cleaned diatoms for species identification were described by Foy and Hsiao (1976). Sea ice microalgae were identified with the aid of a Leitz phase-contrast compound microscope.

References used to identify the species were Smith (1853, 1856), Cleve and Grunow (1880), Cleve (1873, 1883, 1894-96, 1896), Grunow (1884), Oestrup (1895), Van Heurck (1896), Gran (1900, 1904, 1908), Boyer (1916, 1926-27), Mann (1925), Heiden and Kolbe (1928), Lebour (1930), Hustedt (1930, 1959, 1961-66), Cupp (1943), Cleve-Euler (1951-55), Schmidt et al. (1874-1959), Hendey (1964), Hasle (1964, 1965a, b, 1972) and Van Landingham (1967, 1968, 1969, 1971, 1975) for diatoms; Lebour (1925), Paulsen (1907, 1908, 1910, 1949), Schiller (1933), Lemmermann (1908), Leedale (1967) and Kol (1968) for dinoflagellates, chrysophytes and flagellates.

All preserved samples were thoroughly shaken to suspend the cells. One mL of subsample was then taken by a pipette into a Zeiss 10 mL phytoplankton sedimentation chamber with an addition of 4 mL distilled water. The cells were allowed to settle for 12-24 hours, and were enumerated with the aid of a Leitz inverted microscope at a magnification of 500 times. The cells in an area equivalent to 3227 microscope fields were counted when cell density was low, and to 89 microscope fields when the density was high. They were identified to the species when possible, to higher taxonomic levels or groups when not. Total cell counts were used to estimate the standing stock of sea ice microalgae. Standing stock is given in cells per litre for each species. The results were tabulated. A "+" indicates that the sea ice microalgae were observed at some time during the analysis but not during the count, while a "-" indicates that the sea ice microalgae were not observed at any stage of the analysis. Cell numbers given as "spp." may include individuals of species listed that could not be identified during the count and/or different species.

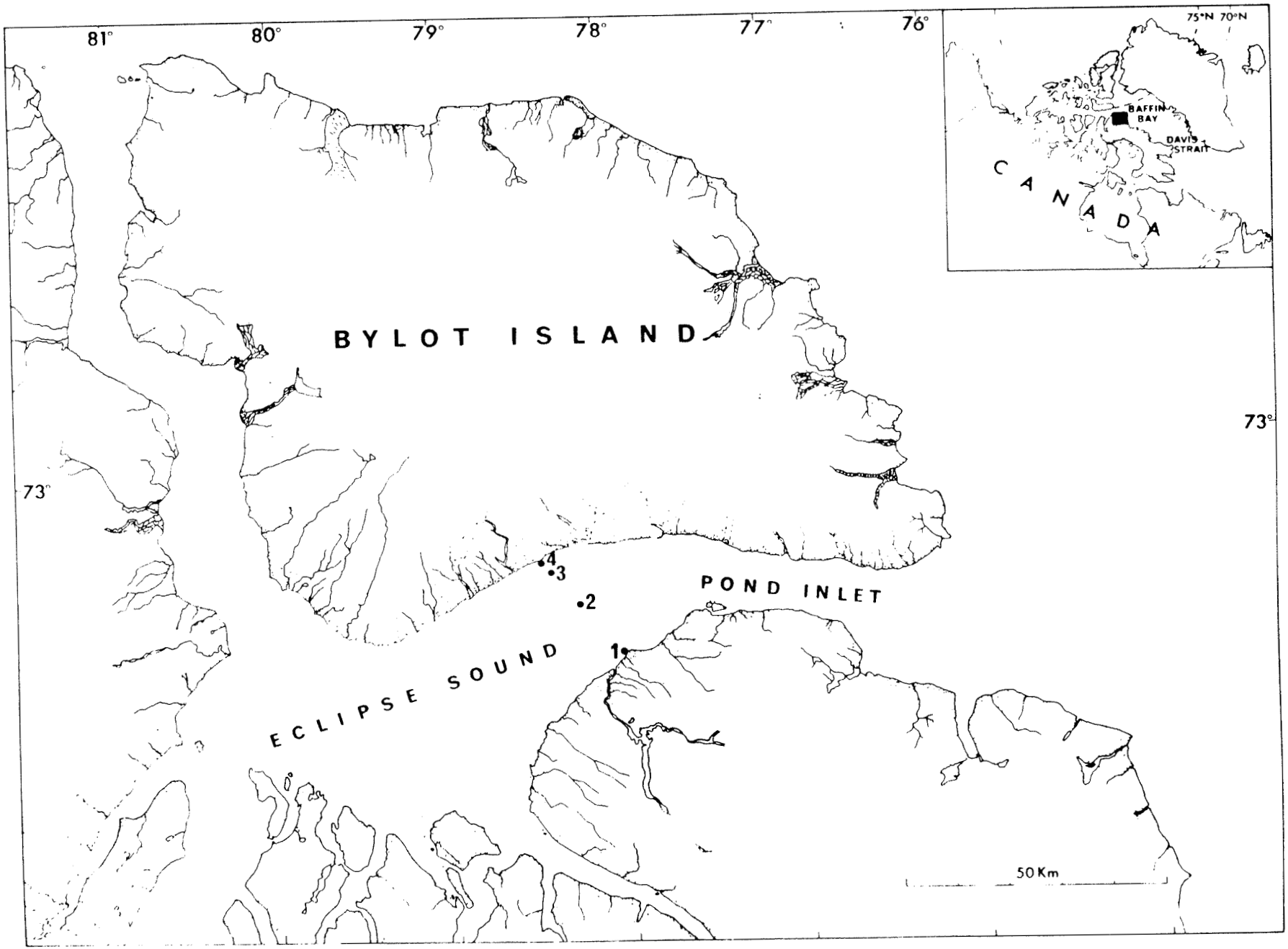


Fig. 1. Station locations in Eclipse Sound.

# RESULTS

## List of Tables

Table 1. Genera and species of sea ice microalgae from Eclipse Sound.

Bacillariophyta
  Centrales
    *Chaetoceros* Ehrenberg
      *C. decipiens* Cleve
    *Eucampia* Ehrenberg
    *Melosira* Agardh
      *M. arctica* (Ehrenberg) Dickie *in* Pritchard
    *Porosira* Joergensen
      *P. glacialis* (Grunow) Joergensen
    *Rhizosolenia* Ehrenberg
      *R. alata* Brightwell
    *Thalassiosira* Cleve
      *T. bioculatus* (Grunow) Ostenfeld
      *T. gravida* Cleve
      *T. nordenskioldii* Cleve
    *Trigonium* Cleve
      *T. arcticum* (Brightwell) Cleve
  Pennales
    *Achnanthes* Bory
    *Amphiprora* Ehrenberg
      *A. concilians* Cleve
      *A. gigantea* var. *septentrionalis* (Grunow *in* Cleve and Grunow) Cleve
      *A. kjellmanii* Cleve *in* Cleve and Grunow
      *A. kjellmanii* var. *kariana* (Grunow *in* Cleve and Grunow) Cleve
      *A. kjellmanii* var. *striolata* (Grunow *in* Cleve and Grunow) Cleve
      *A. kryophila* Cleve
    *Amphora* Ehrenberg
      *A. angusta* var. *ventricosa* (Gregory) Cleve
      *A. eunotia* Cleve
      *A. exsecta* Grunow *in* Schmidt et al.
      *A. laevis* var. *laevissima* (Gregory) Cleve
      *A. laevissima* var. *minuta* Cleve
    *Bacillaria* Gmelin
      *B. paradoxa* Gmelin *in* Linnaeus
    *Caloneis* Cleve
      *C. kryophila* (Cleve) Cleve
      *C. liber* (Wm. Smith) Cleve
      *C. obtusa* (Wm. Smith) Cleve
    *Cocconeis* Ehrenberg
    *Diploneis* Ehrenberg
      *D. litoralis* var. *arctica* Cleve
      *D. litoralis* var. *clathrata* (Oestrup) Cleve
    *Fragilaria* Lyngbye
    *Gomphonema* Agardh
      *G. exiguum* Kuetzing
      *G. exiguum* var. *pachycladum* (Brébisson *in* Brébisson and Godey) Cleve
      *G. groenlandicum* Oestrup

Table 1. (Continued)

*Hantzschia* Grunow
*H. weyprechtii* Grunow *in* Cleve and Grunow
*Licmophora* Agardh
*L. hyalina* (Kuetzing) Grunow
*Navicula* Bory
*N. algida* Grunow
*N. cancellata* Donkin
*N. crassirostris* Grunow *in* Cleve and Grunow
*N. crucigeroides* Hustedt
*N. decipiens* O'Meara
*N. digitoradiata* (Gregory) Ralfs *in* Pritchard
*N. directa* (Wm. Smith) Ralfs *in* Pritchard
*N. directa* var. *subtilis* (Gregory) Cleve
*N. forcipata* Greville
*N. gastrum* (Ehrenberg) Kuetzing
*N. gelida* Grunow
*N. glacialis* (Cleve) Grunow
*N. granii* (E. Joergensen) Gran
*N. imperfecta* Cleve
*N. kariana* Grunow *in* Cleve and Grunow
*N. kariana* var. *detersa* Grunow *in* Cleve and Grunow
*N. kjellmanii* (Cleve *in* Cleve and Grunow) Cleve
*N. marina* Ralfs *in* Pritchard
*N. novadecipiens* Hustedt
*N. obtusa* (Cleve *in* Cleve and Möller) Cleve
*N. oestrupi* Cleve
*N. quadripedis* Cleve-Euler
*N. recurvata* Gran
*N. siberica* (Grunow *in* Cleve and Möller) Cleve
*N. subinflata* Grunow *in* Cleve and Möller
*N. superba* Cleve
*N. superba* var. *crassa* (Oestrup) Gran
*N. superba* var. *subacuta* Gran
*N. transitans* Cleve
*N. transitans* var. *derasa* (Grunow *in* Cleve and Grunow) Cleve
*N. transitans* var. *erosa* (Cleve) Cleve
*N. transitans* var. *incudiformis* (Grunow *in* Cleve) Cleve
*N. trigonocephala* Cleve
*N. trigonocephala* var. *depressa* Oestrup
*N. valida* Cleve and Grunow
*N. valida* var. *minuta* Cleve
*Nitzschia* Hassall
*N. angularis* Wm. Smith
*N. angulata* Hasle
*N. brébissonii* var. *borealis* Grunow
*N. closterium* (Ehrenberg) Wm. Smith
*N. cylindrus* Hasle

Table 1. (Continued)

*N. curta* (Van Heurck) Hasle
*N. delicatissima* Cleve
*N. distans* var. *erratica* Cleve
*N. frigida* Grunow
*N. gelida* Cleve and Grunow
*N. gruendleri* Grunow
*N. grunowii* Hasle
*N. hybrida* Grunow
*N. laevissima* Grunow
*N. lanceolata* var. *pygmaea* Cleve
*N. lecointei* Heurck
*N. linearis* var. *tenuis* (Wm. Smith) Grunow
*N. lineata* Hasle
*N. longissima* (Brébisson) Ralfs
*N. marginulata* Grunow
*N. obliquecostata* (Van Heurck) Hasle
*N. polaris* Grunow
*N. seriata* Cleve
*Pinnularia* Ehrenberg
*P. ambigua* Cleve
*P. quadratarea* var. *bicontracta* Oestrup
*P. quadratarea* var. *bicuneata* Heiden and Kolbe
*P. quadratarea* var. *constricta* Oestrup
*P. quadratarea* var. *leptostauron* Cleve
*P. quadratarea* var. *maxima* Oestrup
*P. quadratarea* var. *minima* Oestrup
*P. quadratarea* var. *stuxbergii* (Cleve *in* Cleve and Grunow) Cleve
*P. semiinflata* var. *decipiens* (Cleve) Gran
*Pleurosigma* Wm. Smith
*P. angulatum* (Quekett) Wm. Smith
*P. antarcticum* Heiden and Kolbe
*P. clevei* Grunow
*P. cuspidatum* Cleve
*P. karianum* Grunow
*P. longum* Cleve
*P. marinum* Donkin
*P. stuxbergii* Cleve and Grunow
*P. stuxbergii* var. *minor* Grunow
*P. stuxbergii* var. *rhomboides* Cleve
*Stenoneis* Cleve
*S. inconspicua* var. *baculus* (Cleve) Cleve
*Synedra* Ehrenberg
*S. tabulata* (Agardh) Kuetzing
*Tabellaria* Ehrenberg
*T. fenestrata* (Lyngbye) Kuetzing
*Trachyneis* Cleve
*T. aspera* var. *aspera* (Ehrenberg) Cleve

Table 1. (Continued)

*Tropidoneis* Cleve
*T. maxima* var. *dubia* (Cleve and Grunow) Cleve

Chlorophyta
*Chlamydomonas* Ehrenberg
*C. ballenyana* Kol and Flint

Chrysophyta
*Chloridella* Pascher
*C. glacialis* Kol

Euglenophyta
*Euglena* Ehrenberg
*E. geniculata* Dujardin

Pyrrophyta
*Peridinium* Ehrenberg
*Prorocentrum* Ehrenberg

Table 2. Quantitative composition of sea ice microalgae in Eclipse Sound at Station 1 during May 1976.

| Date | 15 May | 20 May | 27 May |
|---|---|---|---|
| Sea ice thickness (cm) | 182 | 196 | 193 |
| Total sea ice microalgae (cells/litre) | 62,736,113 | 91,664,798 | 110,700,616 |
| Bacillariophyta | 59,645,141 | 91,664,798 | 110,671,814 |
| Centrales | 7,284,302 | 3,704,814 | 2,074,009 |
| *Chaetoceros* | 783,259 | 313,303 | - |
| *C.* spp. | 783,259 | 313,303 | - |
| *Melosira* | 3,054,710 | + | 288,057 |
| *M. arctica* | + | + | 86,415 |
| *M.* spp. | 3,054,710 | 3,234,860 | 201,642 |
| *Porosira* | 39,162 | - | - |
| *P. glacialis* | 39,162 | - | - |
| *Rhizosolenia* | 117,488 | - | - |
| *R. alata* | 117,488 | - | - |
| *Thalassiosira* | 626,604 | 35,246 | 230,440 |
| *T. bioculatus* | 117,488 | + | + |
| *T. gravida* | 39,162 | + | 57,609 |
| *T. nordenskioldii* | 234,977 | + | + |
| *T.* spp. | 234,977 | 35,246 | 172,831 |
| *Trigonium* | 39,162 | - | - |
| *T. arcticum* | 39,162 | - | - |
| Unidentified | 2,623,917 | 121,405 | 1,555,512 |
| Pennales | 52,360,839 | 87,959,984 | 108,597,805 |
| *Achnanthes* | 3,524,665 | + | + |
| *A.* spp. | 3,524,665 | + | + |
| *Amphiprora* | 1,958,145 | 822,420 | 7,633,525 |
| *A. concilians* | 39,162 | - | - |
| *A. gigantea* var. *septentrionalis* | 430,792 | 54,828 | 576,112 |
| *A. kjellmanii* | + | 15,665 | 921,783 |
| *A. kjellmanii* var. *kariana* | + | 46,995 | 662,532 |
| *A. Kjellmanii* var. *striolata* | 587,444 | 187,982 | 662,532 |
| *A. kryophila* | 195,814 | 15,665 | 86,415 |
| *A.* spp. | 704,933 | 501,285 | 4,724,151 |
| *Amphora* | 1,253,212 | 383,795 | 1,728,343 |
| *A. angusta* var. *ventricosa* | - | 7,832 | 86,415 |
| *A. eunotia* | 156,651 | 3,916 | - |
| *A. laevis* var. *laevissima* | 39,162 | 46,995 | 835,367 |
| *A.* spp. | 1,057,399 | 325,052 | 806,561 |
| *Bacillaria* | 78,325 | - | - |
| *B. paradoxa* | 78,325 | - | - |
| *Caloneis* | + | 7,832 | + |
| *C. kryophila* | - | - | + |
| *C. obtusa* | + | 7,832 | - |
| *Diploneis* | 78,325 | + | 57,609 |
| *D. litoralis* var. *arctica* | 78,325 | - | - |
| *D.* spp. | + | + | 57,609 |

Table 2. (Continued)

| Date | 15 May | 20 May | 27 May |
|---|---|---|---|
| *Fragilaria* | 665,770 | 15,179,563 | 14,460,516 |
| *F.* spp. | 665,770 | 15,179,563 | 14,460,516 |
| *Gomphonema* | 979,073 | 129,236 | 748,951 |
| *G. exiguum* var. *pachycladum* | 744,096 | 78,325 | 201,642 |
| *G. groenlandicum* | + | - | - |
| *G.* spp. | 234,977 | 50,911 | 547,309 |
| *Hantzschia* | 78,325 | - | - |
| *H. weyprechtii* | 78,325 | - | - |
| *Navicula* | 4,112,099 | 38,211,294 | 17,917,176 |
| *N. algida* | - | + | 28,802 |
| *N. cancellata* | - | + | + |
| *N. crassirostris* | - | 3,916 | - |
| *N. crucigeroides* | 195,814 | 203,647 | 259,247 |
| *N. decipiens* | + | + | + |
| *N. digitoradiata* | - | + | + |
| *N. directa* | 78,325 | 31,330 | 230,445 |
| *N. gastrum* | 117,488 | - | - |
| *N. glacialis* | 117,488 | - | - |
| *N. granii* | - | 105,739 | 1,181,035 |
| *N. kariana* | - | - | 28,802 |
| *N. kariana* var. *detersa* | - | + | 28,802 |
| *N. kjellmanii* | 39,162 | + | + |
| *N. marina* | + | 3,916 | 28,802 |
| *N. novadecipiens* | + | - | - |
| *N. oestrupi* | + | - | - |
| *N. quadripedis* | 2,075,636 | 6,920,095 | 8,036,819 |
| *N. recurvata* | 39,162 | 15,665 | - |
| *N. siberica* | 78,325 | + | + |
| *N. subinflata* | - | 7,832 | - |
| *N. superba* | 117,488 | + | + |
| *N. superba* var. *crassa* | + | - | - |
| *N. superba* var. *subacuta* | + | - | - |
| *N. transitans* | 39,162 | 219,312 | 432,087 |
| *N. transitans* var. *derasa* | + | 7,832 | + |
| *N. transitans* var. *erosa* | + | 3,916 | 28,802 |
| *N. transitans* var. *incudiformis* | 156,651 | 3,916 | 28,802 |
| *N. trigonocephala* | 195,814 | 3,916 | 28,802 |
| *N. trigonocephala* var. *depressa* | + | + | + |
| *N. valida* | + | 15,665 | + |
| *N. valida* var. *minuta* | 39,162 | + | + |
| *N.* spp. | 822,422 | 30,664,597 | 7,575,929 |
| *Nitzschia* | 29,019,745 | 17,940,547 | 34,509,346 |
| *N. angulata* | - | + | + |
| *N. angularis* | 1,409,866 | + | 5,357,877 |
| *N. closterium* | 704,933 | 93,991 | 1,411,483 |

Table 2. (Continued)

| Date | 15 May | 20 May | 27 May |
|---|---|---|---|
| *N. cylindrus* | 13,041,265 | 6,830,020 | 11,003,819 |
| *N. distans* var. *erratica* | 39,162 | 422,959 | 2,390,880 |
| *N. frigida* | 1,527,355 | - | - |
| *N. gruendleri* | 469,955 | - | - |
| *N. grunowii* | + | 11,748 | + |
| *N. hybrida* | 1,762,333 | 219,312 | 3,226,251 |
| *N. laevissima* | 156,651 | 321,136 | 1,123,425 |
| *N. lanceolata* var. *pygmaea* | 117,488 | - | - |
| *N. lecointei* | + | - | - |
| *N. linearis* var. *tenuis* | 704,933 | - | - |
| *N. lineata* | + | 3,904,547 | 2,304,464 |
| *N. longissima* | 78,325 | - | - |
| *N. polaris* | 2,702,244 | 422,959 | 2,966,996 |
| *N. seriata* | 665,770 | - | - |
| *N.* spp. | 5,639,465 | 5,713,875 | 4,724,151 |
| *Pinnularia* | 469,951 | 250,640 | 345,657 |
| *P. ambigua* | + | + | + |
| *P. quadratarea* var. *bicontracta* | + | 7,832 | 28,802 |
| *P. quadratarea* var. *bicuneata* | 39,162 | - | - |
| *P. quadratarea* var. *constricta* | 78,325 | 23,497 | 57,609 |
| *P. quadratarea* var. *leptostauron* | 39,162 | - | - |
| *P. quadratarea* var. *minima* | + | + | - |
| *P. quadratarea* var. *stuxbergii* | 39,162 | 74,409 | 86,415 |
| *P. semiinflata* var. *decipiens* | + | - | - |
| *P.* spp. | 274,140 | 144,902 | 172,831 |
| *Pleurosigma* | 39,162 | 180,147 | 28,802 |
| *P. angulatum* | + | 50,911 | + |
| *P. clevei* | 39,162 | - | - |
| *P. karianum* | - | 78,325 | - |
| *P. stuxbergii* | + | + | 28,802 |
| *P.* spp. | - | 50,911 | + |
| *Synedra* | - | + | 1,037,001 |
| *S. tabulata* | - | + | 921,783 |
| *S.* spp. | - | - | 115,218 |
| *Tropidoneis* | 39,162 | - | - |
| *T. maxima* var. *dubia* | 39,162 | - | - |
| Unidentified | 10,064,880 | 14,854,510 | 30,130,879 |
| Chrysophyta | | | |
| *Chloridella* | 2,973,484 | - | - |
| *C. glacialis* | 2,973,484 | - | - |
| Euglenophyta | 117,488 | - | - |
| *Euglena* | 117,488 | - | - |
| *E. geniculata* | 117,488 | - | - |
| Pyrrophyta | - | - | 28,802 |
| *Peridinium* | - | - | 28,802 |
| *P.* spp. | - | - | 28,802 |

Table 3. Quantitative composition of sea ice microalgae in Eclipse Sound at Station 2 during May 1976.

| Date | 17 May | 18 May | 24 May |
|---|---|---|---|
| Sea ice thickness (cm) | 193 | 193 | 192 |
| Total sea ice microalgae (cells/litre) | 25,808,366 | 2,349,764 | 11,631,363 |
| Bacillariophyta | 25,769,204 | 2,349,764 | 11,631,363 |
| Centrales | 3,485,499 | 78,324 | 391,626 |
| *Chaetoceros* | 39,162 | - | - |
| *C.* spp. | 39,162 | - | - |
| *Melosira* | 1,018,236 | + | 39,162 |
| *M. arctica* | 509,118 | + | 39,162 |
| *M.* spp. | 509,118 | - | - |
| *Thalassiosira* | 313,302 | 39,162 | 156,650 |
| *T. gravida* | 117,488 | + | + |
| *T. nordenskioldii* | + | 39,162 | 78,325 |
| *T.* spp. | 195,814 | + | 78,325 |
| Unidentified | 2,114,799 | 39,162 | 195,814 |
| Pennales | 22,283,705 | 2,271,440 | 11,239,737 |
| *Amphiprora* | 1,527,351 | 78,324 | 744,092 |
| *A. gigantea* var. *septentrionalis* | 78,325 | + | 195,814 |
| *A. kjellmanii* var. *kariana* | 156,651 | 39,162 | 195,814 |
| *A. kjellmanii* var. *striolata* | 117,488 | + | 39,162 |
| *A. kryophila* | 39,162 | + | 234,977 |
| *A.* spp. | 1,135,725 | 39,162 | 78,325 |
| *Amphora* | 78,324 | + | 626,606 |
| *A. eunotia* | + | - | - |
| *A. laevis* var. *laevissima* | + | + | 156,651 |
| *A. laevissima* var. *minuta* | 39,162 | + | - |
| *A.* spp. | 39,162 | + | 469,955 |
| *Bacillaria* | - | + | + |
| *B. paradoxa* | - | + | + |
| *Caloneis* | - | - | + |
| *C. kryophila* | - | - | + |
| *Cocconeis* | - | 39,162 | - |
| *C.* spp. | - | 39,162 | - |
| *Diploneis* | - | 39,162 | 39,162 |
| *D. litoralis* var. *clathrata* | - | 39,162 | 39,162 |
| *Gomphonema* | 274,139 | 39,162 | 39,162 |
| *G. exiguum* | + | - | - |
| *G. exiguum* var. *pachycladum* | 39,162 | 39,162 | 39,162 |
| *G. groenlandicum* | + | + | + |
| *G.* spp. | 234,977 | - | - |
| *Navicula* | 3,798,803 | 1,174,887 | 2,428,095 |
| *N. algida* | + | + | + |
| *N. cancellata* | - | + | + |

Table 3. (Continued)

| Date | 17 May | 18 May | 24 May |
|---|---|---|---|
| *N. crassirostris* | + | + | 78,325 |
| *N. crucigeroides* | 39,162 | + | 39,162 |
| *N. decipiens* | + | + | + |
| *N. digitoradiata* | + | + | + |
| *N. directa* | + | + | 195,814 |
| *N. directa* var. *subtilis* | - | + | + |
| *N. forcipata* | - | + | + |
| *N. gelida* | 39,162 | + | + |
| *N. glacialis* | + | - | - |
| *N. granii* | 548,281 | - | - |
| *N, kjellmanii* | + | + | 39,162 |
| *N. marina* | + | + | + |
| *N. quadripedis* | 1,135,725 | 979,074 | 1,096,562 |
| *N. recurvata* | + | + | 39,162 |
| *N. siberica* | - | + | + |
| *N. superba* | + | + | 78,325 |
| *N. transitans* | 117,488 | 39,162 | 39,162 |
| *N. transitans* var. *derasa* | + | + | 39,162 |
| *N. transitans* var. *erosa* | + | + | + |
| *N. transitans* var. *incudiformis* | + | + | - |
| *N. trigonocephala* | + | + | + |
| *N. trigonocephala* var. *depressa* | + | + | + |
| *N. valida* | + | + | + |
| *N. valida* var. *minuta* | - | - | + |
| *N.* spp. | 1,918,985 | 156,651 | 783,259 |
| *Nitzschia* | 9,555,757 | 469,953 | 2,584,749 |
| *N. angularis* | 391,629 | - | - |
| *N. closterium* | 78,325 | 78,325 | 195,814 |
| *N. cylindrus* | 3,172,199 | + | 391,629 |
| *N. distans* var. *erratica* | 313,303 | + | 78,325 |
| *N. gruendleri* | - | + | 39,162 |
| *N. grunowii* | + | + | + |
| *N. hybrida* | 979,074 | + | 78,325 |
| *N. laevissima* | 39,162 | + | 78,325 |
| *N. lecointei* | - | + | + |
| *N. lineata* | - | + | + |
| *N. marginulata* | + | - | - |
| *N. polaris* | 1,292,377 | 234,977 | 156,651 |
| *N.* spp. | 3,289,688 | 156,651 | 1,566,518 |
| *Pinnularia* | 274,137 | 78,325 | 156,649 |
| *P. ambigua* | + | + | + |
| *P. quadratarea* var. *bicontracta* | + | 78,325 | 78,325 |
| *P. quadratarea* var. *constricta* | 39,162 | + | 39,162 |
| *P. quadratarea* var. *maxima* | 39,162 | + | - |
| *P. quadratarea* var. *minima* | - | - | + |
| *P. quadratarea* var. *stuxbergii* | 117,488 | + | + |
| *P.* spp. | 78,325 | - | 39,162 |

Table 3. (Continued)

| Date | 17 May | 18 May | 24 May |
|---|---|---|---|
| *Pleurosigma* | 430,789 | 39,162 | 313,298 |
| *P. angulatum* | 117,488 | + | 39,162 |
| *P. clevei* | + | + | 78,325 |
| *P. cuspidatum* | + | + | 39,162 |
| *P. longum* | + | - | - |
| *P. marinum* | - | - | + |
| *P. stuxbergii* | 39,162 | + | 39,162 |
| *P. stuxbergii* var. *minor* | 156,651 | 39,162 | 78,325 |
| *P.* spp. | 117,488 | + | 39,162 |
| *Synedra* | + | + | 78,325 |
| *S.* spp. | + | + | 78,325 |
| *Trachyneis* | + | - | - |
| *T. aspera* var. *aspera* | + | - | - |
| *Tropidoneis* | + | - | - |
| *T. maxima* var. *dubia* | + | - | - |
| Unidentified | 11,670,562 | 313,303 | 4,229,599 |
| Pyrrophyta | 39,162 | - | - |
| *Peridinium* | 39,162 | - | - |
| *P.* spp. | 39,162 | - | - |

Table 4. Quantitative composition of sea ice microalgae in Eclipse Sound at Station 3 during May 1976.

| Date | 18 May |
|---|---|
| Sea ice thickness (cm) | -- |
| Total sea ice microalgae (cells/litre) | 62,491,490 |
| Bacillariophyta | 62,491,490 |
| Centrales | 1,096,562 |
| *Chaetoceros* | 352,466 |
| *C.* spp. | 352,466 |
| *Melosira* | + |
| *M. arctica* | + |
| *Thalassiosira* | + |
| *T. gravida* | + |
| *T. nordenskioldii* | + |
| Unidentified | 744,096 |
| Pennales | 61,394,928 |
| *Amphiprora* | 2,545,589 |
| *A. gigantea* var. *septentrionalis* | 78,325 |
| *A. kjellmanii* var. *kariana* | 195,814 |
| *A. kjellmanii* var. *striolata* | 626,607 |
| *A. kryophila* | 313,303 |
| *A.* spp. | 1,331,540 |
| *Amphora* | 3,368,012 |
| *A. exsecta* | 39,162 |
| *A. laevis* var. *laevissima* | 195,814 |
| *A. laevissima* var. *minuta* | + |
| *A.* spp. | 3,133,036 |
| *Caloneis* | + |
| *C. kryophila* | + |
| *Diploneis* | + |
| *D. litoralis* var. *arctica* | + |
| *Fragilaria* | 7,597,614 |
| *F.* spp. | 7,597,614 |
| *Gomphonema* | 783,258 |
| *G. exiguum* var. *pachycladum* | 587,444 |
| *G. groenlandicum* | + |
| *G.* spp. | 195,814 |
| *Hantzschia* | + |
| *H. weyprechtii* | + |
| *Navicula* | 1,449,021 |
| *N. algida* | + |
| *N. crassirostris* | + |
| *N. crucigeroides* | 78,325 |
| *N. decipiens* | 78,325 |
| *N. digitoradiata* | + |

Table 4. (Continued)

| Date | 18 May |
|---|---|
| *N. directa* | 117,488 |
| *N. gastrum* | + |
| *N. gelida* | 39,162 |
| *N. glacialis* | + |
| *N. imperfecta* | + |
| *N. kariana* var. *detersa* | + |
| *N. kjellmanii* | + |
| *N. marina* | + |
| *N. novadecipiens* | + |
| *N. quadripedis* | 665,770 |
| *N. recurvata* | + |
| *N. siberica* | + |
| *N. superba* | 117,488 |
| *N. superba* var. *subacuta* | 234,977 |
| *N. transitans* | 39,162 |
| *N. transitans* var. *derasa* | + |
| *N. transitans* var. *erosa* | + |
| *N. transitans* var. *incudiformis* | + |
| *N. trigonocephala* | 39,162 |
| *N. trigonocephala* var. *depressa* | 39,162 |
| *N. valida* | + |
| *N. valida* var. *minuta* | + |
| *Nitzschia* | 16,827,503 |
| *N. cylindrus* | 5,313,600 |
| *N. distans* var. *erratica* | 587,444 |
| *N. glida* | 78,325 |
| *N. gruendleri* | 234,977 |
| *N. grunowii* | 39,162 |
| *N. hybrida* | 391,629 |
| *N. laevissima* | 1,253,214 |
| *N. lecointei* | 78,325 |
| *N. lineata* | + |
| *N. obliquecostata* | + |
| *N. polaris* | 1,292,377 |
| *N. seriata* | 313,303 |
| *N.* spp. | 7,245,147 |
| *Pinnularia* | 313,302 |
| *P. ambigua* | + |
| *P. quadratarea* var. *bicontracta* | + |
| *P. quadratarea* var. *constricta* | + |
| *P. quadratarea* var. *minima* | + |
| *P. quadratarea* var. *stuxbergii* | 39,162 |
| *P. semiinflata* var. *decipiens* | + |
| *P.* spp. | 274,140 |

Table 4. (Continued)

| Date | 18 May |
|---|---|
| *Pleurosigma* | 391,625 |
| *P. angulatum* | 39,162 |
| *P. clevei* | 78,325 |
| *P. cuspidatum* | + |
| *P. stuxbergii* | 39,162 |
| *P. stuxbergii* var. *minor* | 78,325 |
| *P. stuxbergii* var. *rhomboides* | + |
| *P.* spp. | 156,651 |
| *Stenoneis* | + |
| *S. inconspicua* var. *baculus* | + |
| *Synedra* | + |
| *S.* spp. | + |
| *Trachyneis* | + |
| *T. aspera* var. *aspera* | + |
| *Tropidoneis* | 39,162 |
| *T. maxima* var. *dubia* | 39,162 |
| Unidentified | 28,079,842 |

Table 5. Quantitative composition of sea ice microalgae in Eclipse Sound at Station 4 during May 1976.

| Date | 18 May | 25 May |
|---|---|---|
| Sea ice thickness (cm) | 216 | 217 |
| Total sea ice microalgae (cells/litre) | 127,319,753 | 160,229,950 |
| Bacillariophyta | 127,319,753 | 160,190,788 |
| Centrales | 2,232,287 | 2,193,124 |
| *Chaetoceros* | 156,651 | - |
| *C.* spp. | 156,651 | - |
| *Eucampia* | + | + |
| *E.* spp. | + | + |
| *Thalassiosira* | + | + |
| *T. gravida* | + | + |
| *T. nordenskioldii* | + | + |
| *Trigonium* | - | 39,162 |
| *T. arcticum* | - | 39,162 |
| Unidentified | 2,075,636 | 2,153,962 |
| Pennales | 125,087,466 | 157,997,664 |
| *Achnanthes* | 12,414,658 | 12,140,517 |
| *A.* spp. | 12,414,658 | 12,140,517 |
| *Amphiprora* | 9,047,642 | 9,687,567 |
| *A. gigantea* var. *septentrionalis* | 509,118 | 234,977 |
| *A. kjellmanii* var. *kariana* | 783,259 | 352,466 |
| *A. kjellmanii* var. *striolata* | 1,058,400 | 1,620,000 |
| *A. kryophila* | 352,466 | 1,292,377 |
| *A.* spp. | 6,344,399 | 6,187,747 |
| *Amphora* | 2,937,221 | 2,349,775 |
| *A. eunotia* | - | 117,488 |
| *A. laevis* var. *laevissima* | 1,644,844 | 1,057,399 |
| *A.* spp. | 1,292,377 | 1,174,888 |
| *Bacillaria* | 156,651 | 1,997,310 |
| *B. paradoxa* | 156,651 | 1,997,310 |
| *Caloneis* | + | + |
| *C. kryophila* | + | + |
| *Diploneis* | + | - |
| *D. litoralis* var. *arctica* | + | - |
| *Fragilaria* | 1,684,007 | 1,840,659 |
| *F.* spp. | 1,684,007 | 1,840,659 |
| *Gomphonema* | 2,976,383 | 1,762,332 |
| *G. exiguum* var. *pachycladum* | 1,370,703 | 979,074 |
| *G. groenlandicum* | 117,488 | 78,325 |
| *G.* spp. | 1,488,192 | 704,933 |
| *Hantzschia* | + | - |
| *H. weyprechtii* | + | - |

Table 5. (Continued)

| Date | 18 May | 25 May |
|---|---|---|
| *Navicula* | 10,848,130 | 18,054,112 |
| *N. algida* | 39,162 | + |
| *N. crucigeroides* | 900,748 | 704,933 |
| *N. decipiens* | + | 39,162 |
| *N. digitoradiata* | + | + |
| *N. directa* | 39,162 | 195,814 |
| *N. gelida* | + | 39,162 |
| *N. glacialis* | 78,325 | 39,162 |
| *N. kariana* var. *detersa* | + | + |
| *N. kjellmanii* | 78,325 | + |
| *N. marina* | + | + |
| *N. novadecipiens* | 39,162 | + |
| *N. obtusa* | - | + |
| *N. oestrupi* | + | 117,488 |
| *N. quadripedis* | 5,208,673 | 12,414,658 |
| *N. recurvata* | + | 39,162 |
| *N. siberica* | 39,162 | 117,488 |
| *N. superba* | + | 78,325 |
| *N. superba* var. *crassa* | 78,325 | 39,162 |
| *N. superba* var. *subacuta* | 39,162 | 313,303 |
| *N. transitans* | + | 39,162 |
| *N. transitans* var. *derasa* | + | + |
| *N. transitans* var. *erosa* | + | + |
| *N. transitans* var. *incudiformis* | + | - |
| *N. trigonocephala* | + | 78,325 |
| *N. trigonocephala* var. *depressa* | - | + |
| *N. valida* | 39,162 | 39,162 |
| *N. valida* var. *minuta* | + | + |
| *N.* spp. | 4,268,762 | 3,759,644 |
| *Nitzschia* | 33,993,443 | 47,622,154 |
| *N. closterium* | 626,607 | 939,911 |
| *N. cylindrus* | 3,368,014 | 1,135,725 |
| *N. distans* var. *erratica* | + | + |
| *N. frigida* | 9,829,902 | 19,307,339 |
| *N. gruendleri* | + | 430,792 |
| *N. grunowii* | + | + |
| *N. hybrida* | 1,997,310 | 2,036,473 |
| *N. laevissima* | 2,232,288 | 2,545,592 |
| *N. lecointei* | 78,325 | + |
| *N. linearis* var. *tenuis* | 1,879,822 | 6,892,680 |
| *N. lineata* | + | + |
| *N. polaris* | 3,642,155 | 4,895,370 |
| *N. seriata* | 1,801,496 | 2,663,081 |
| *N.* spp. | 8,537,524 | 6,775,191 |

Table 5. (Continued)

| Date | 18 May | 25 May |
|---|---|---|
| *Pinnularia* | 313,302 | 548,277 |
| *P. ambigua* | + | - |
| *P. quadratarea* var. *bicontracta* | + | - |
| *P. quadratarea* var. *constricta* | 39,162 | 78,325 |
| *P. quadratarea* var. *minima* | + | 39,162 |
| *P. quadratarea* var. *stuxbergii* | + | 195,814 |
| *P. semiinflata* var. *decipiens* | + | 78,325 |
| *P.* spp. | 274,140 | 156,651 |
| *Pleurosigma* | 430,789 | 1,762,330 |
| *P. angulatum* | 117,488 | 352,466 |
| *P. clevei* | 39,162 | 234,977 |
| *P. karianum* | + | + |
| *P. longum* | - | 234,977 |
| *P. stuxbergii* | 117,488 | 744,096 |
| *P. stuxbergii* var. *minor* | - | + |
| *P.* spp. | 156,651 | 195,814 |
| *Stenoneis* | + | + |
| *S. inconspicua* var. *baculus* | + | + |
| *Synedra* | + | 274,140 |
| *S.* spp. | + | 274,140 |
| *Trachyneis* | + | + |
| *T. aspera* var. *aspera* | + | + |
| *Tropidoneis* | + | + |
| *T. maxima* var. *dubia* | + | + |
| Unidentified | 50,285,240 | 59,958,491 |
| Pyrrophyta | | |
| *Prorocentrum* | | |
| *P.* spp. | - | 39,162 |

Table 6. Quantitative composition and vertical distribution of sea ice microalgae in Eclipse Sound at Station 1, 21 March 1977.

| | | | |
|---|---|---|---|
| Snow cover (cm) | | 15-20 | |
| Sea ice thickness (cm) | | 124 | |
| Ice section 1 cm taken from | Top | Middle | Bottom |
| Total sea ice microalgae (cells/litre) | 28,000 | 4,000 | 29,000 |
| Bacillariophyta | 28,000 | 4,000 | 29,000 |
| Centrales | 16,000 | - | + |
| *Chaetoceros* | 7,000 | - | - |
| *C. decipiens* | 7,000 | - | - |
| *C.* spp. | + | - | - |
| *Melosira* | 9,000 | - | + |
| *M. arctica* | - | - | + |
| Unidentified | 9,000 | - | - |
| Pennales | 12,000 | 4,000 | 29,000 |
| *Amphiprora* | - | - | + |
| *A. kjellmanii* var. *striolata* | - | - | + |
| *Amphora* | - | - | + |
| *A.* spp. | - | - | + |
| *Bacillaria* | - | - | + |
| *B. paradoxa* | - | - | + |
| *Caloneis* | - | - | + |
| *C. liber* | - | - | + |
| *Navicula* | + | - | + |
| *N. directa* | - | - | + |
| *N. oestrupi* | - | - | + |
| *N.* spp. | + | - | - |
| *Nitzschia* | 10,000 | 1,000 | 6,000 |
| *N. closterium* | 1,000 | - | - |
| *N. curta* | + | - | - |
| *N. cylindrus* | 8,000 | - | - |
| *N. gelida* | + | - | - |
| *N. laevissima* | - | - | 1,000 |
| *N. lecointei* | - | - | + |
| *N. polaris* | - | - | + |
| *N. seriata* | + | + | - |
| *N.* spp. | 1,000 | 1,000 | 5,000 |
| *Pleurosigma* | - | - | 3,000 |
| *P. stuxbergii* | - | - | 2,000 |
| *P.* spp. | - | - | 1,000 |
| Unidentified | 2,000 | 3,000 | 20,000 |

Table 7. Quantitative composition of sea ice microalgae in Eclipse Sound at Station 1, 21 March 1977.

| | | | | |
|---|---|---|---|---|
| Snow cover (cm) | | | 15-20 | |
| Sea ice thickness (cm) | | | 124 | |
| Ice section 10 cm from bottom | Sipre Core #1 | Sipre Core #2 | Sipre Core #3 | ABS corer |
| Total sea ice microalgae (cells/litre) | 8,000 | 36,100 | 29,800 | 25,700 |
| Bacillariophyta | 8,000 | 35,000 | 29,300 | 20,260 |
| Centrales | - | 5,000 | 1,400 | 4,160 |
| *Chaetoceros* | - | 300 | - | 160 |
| *C.* spp. | - | 300 | - | 160 |
| *Coscinodiscus* | - | + | - | - |
| *C.* spp. | - | + | - | - |
| *Melosira* | - | - | - | 160 |
| *M.* spp. | - | - | - | 160 |
| *Rhizosolenia* | - | 200 | 100 | 640 |
| *R. alata* | - | 200 | 100 | 640 |
| *Thalassiosira* | - | 300 | 200 | 480 |
| *T. nordenskioldii* | - | + | + | - |
| *T.* spp. | - | 300 | 200 | 480 |
| *Trigonium* | - | 200 | 200 | 800 |
| *T. arcticum* | - | 200 | 200 | 800 |
| Unidentified | - | 4,000 | 900 | 1,920 |
| Pennales | 8,000 | 30,000 | 27,900 | 16,100 |
| *Achnanthes* | - | - | 400 | - |
| *A.* spp. | - | - | 400 | - |
| *Amphiprora* | - | 1,700 | 1,200 | 480 |
| *A. gigantea* var. *septentrionalis* | - | 500 | 500 | - |
| *A. kjellmanii* var. *striolata* | - | 200 | 200 | 160 |
| *A. kryophila* | - | - | + | - |
| *A.* spp. | - | 1,000 | 500 | 320 |

Table 7. (Continued)

| Ice section 10 cm from bottom | Sipre Core #1 | Sipre Core #2 | Sipre Core #3 | ABS corer |
|---|---|---|---|---|
| *Amphora* | 1,000 | 800 | 1,300 | 1,120 |
| *A. eunotia* | - | - | 200 | 320 |
| *A. laevis* var. *laevissima* | - | 300 | 200 | 160 |
| *A.* spp. | 1,000 | 500 | 900 | 640 |
| *Bacillaria* | - | - | + | - |
| *B. paradox* | - | - | + | - |
| *Diploneis* | - | 200 | 100 | - |
| *D. litoralis* var. *arctica* | - | 200 | 100 | - |
| *Gomphonema* | - | - | 100 | 160 |
| *G.* spp. | - | - | 100 | 160 |
| *Hantzschia* | - | + | - | - |
| *H. weyprechtii* | - | + | - | - |
| *Licmophora* | - | 100 | 100 | - |
| *L. hyalina* | - | 100 | 100 | - |
| *Navicula* | 1,000 | 2,400 | 2,100 | 1,760 |
| *N. crucigeroides* | 1,000 | 100 | 200 | 160 |
| *N. decipiens* | - | - | 100 | - |
| *N. directa* | - | 100 | 200 | - |
| *N. glacialis* | - | 100 | - | - |
| *N. kjellmanii* | + | 100 | - | - |
| *N. novadecipiens* | - | - | + | - |
| *N. oestrupi* | - | - | + | - |
| *N. quadripedis* | - | 500 | 100 | - |
| *N. recurvata* | - | + | + | - |
| *N. transitans* | - | + | + | - |
| *N. transitans* var. *incudiformis* | - | 300 | 500 | - |
| *N. superba* | - | - | + | - |
| *N. valida* | + | + | - | + |
| *N. valida* var. *minuta* | - | 200 | - | - |
| *N.* spp. | - | 1,000 | 1,000 | 1,600 |

Table 7. (Continued)

| Ice section 10 cm from bottom | Sipre Core #1 | Sipre Core #2 | Sipre Core #3 | ABS corer |
|---|---|---|---|---|
| *Nitzschia* | 3,000 | 16,000 | 18,100 | 7,780 |
| *N. brébissonii* var. *borealis* | - | 400 | 100 | - |
| *N. closterium* | - | 1,800 | 600 | 320 |
| *N. cylindrus* | + | 3,300 | 10,500 | - |
| *N. delicatissima* | - | 1,800 | 400 | - |
| *N. distans* var. *erratica* | + | + | - | - |
| *N. gruendleri* | + | - | - | - |
| *N. grunowii* | - | + | - | - |
| *N. hybrida* | - | 1,000 | 700 | 160 |
| *N. laevissima* | - | 500 | + | + |
| *N. lecointei* | - | 100 | 100 | - |
| *N. linearis* var. *tenuis* | - | 700 | 500 | 320 |
| *N. polaris* | 1,000 | 1,200 | 500 | 160 |
| *N. seriata* | - | 1,600 | 1,900 | 100 |
| *N.* spp. | 2,000 | 3,600 | 2,800 | 6,720 |
| *Pinnularia* | 1,000 | 100 | + | 320 |
| *P. quadratarea* var. *bicontracta* | - | + | + | - |
| *P. quadratarea* var. *constricta* | - | - | - | + |
| *P. quadratarea* var. *leptostauron* | - | - | - | + |
| *P. quadratarea* var. *stuxbergii* | - | + | + | 160 |
| *P.* spp. | 1,000 | 100 | - | 160 |
| *Pleurosigma* | + | 900 | 1,100 | 160 |
| *P. angulatum* | - | 100 | 100 | - |
| *P. antarcticum* | - | - | 100 | - |
| *P. clevei* | - | 100 | - | - |
| *P. stuxbergii* | - | - | + | - |
| *P. stuxbergii* var. *minor* | - | 400 | 400 | 160 |
| *P.* spp. | + | 300 | 500 | - |
| *Tabellaria* | - | 100 | - | - |
| *T. fenestrata* | - | 100 | - | - |

Table 7. (Continued)

| Ice section 10 cm from bottom | Sipre Core #1 | Sipre Core #2 | Sipre Core #3 | ABS corer |
|---|---|---|---|---|
| *Tropidoneis* | - | 100 | 100 | - |
| *T. maxima* var. *dubia* | - | 100 | 100 | - |
| Unidentified | 2,000 | 7,600 | 3,300 | 4,320 |
| Chlorophyta | - | - | - | 2,880 |
| *Chlamydomonas* | - | - | - | 2,880 |
| *C. ballenyana* | - | - | - | 320 |
| *C.* spp. | - | - | - | 2,560 |
| Pyrrophyta | - | 1,100 | 500 | 2,560 |
| Unidentified | - | 1,100 | 500 | 2,560 |

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