

#326/10-1-81

ACCESSION
NUMBER

87003476

DATA DOCUMENTATION FORM

313404

NOA FORM 14-13
(4-77)U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
WASHINGTON, DC 20235FORM APPROVED
O.M.B. No. 41-R2651
EXPIRES 1-81

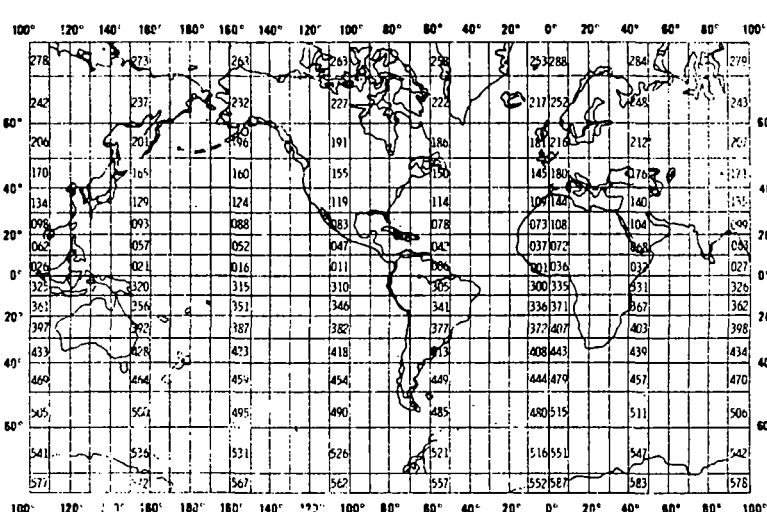
C100

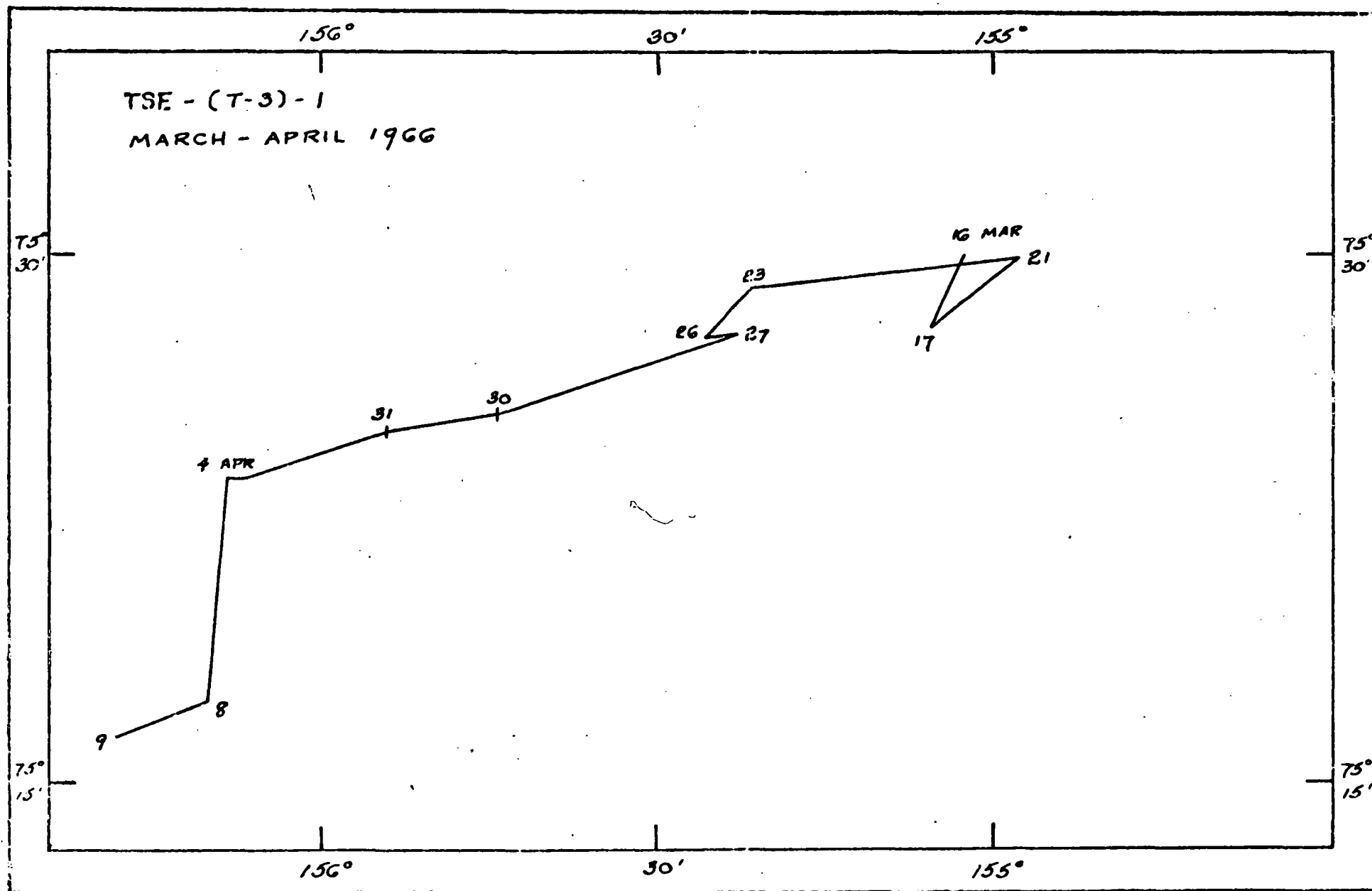
(While you are not required to use this form, it is the most desirable mechanism for providing the required ancillary information enabling the NODC and users to obtain the greatest benefit from your data.)

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED T. Saunders English School of Oceanography WB-10 University of Washington Seattle, WA 98195			
2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED Primary production and energy flow		3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT TSE--(T-3)--01	
4. PLATFORM NAME(S) Fletcher's Ice Island (T-3)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.) Ice island	6. PLATFORM AND OPERATOR NATIONALITY(IES) PLATFORM OPERATOR USA USA	7. DATES FROM: MO/DAY/YR TO: MO/DAY/YR 03/16/66 04/09/66
8. ARE DATA PROPRIETARY? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR MONTH		11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED. GENERAL AREA 	
9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?) <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> PART (SPECIFY BELOW) Should be available for international exchange			
10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER (AND ADDRESS IF OTHER THAN IN ITEM-1) Dr. Karl Banse School of Oceanography WB-10 University of Washington Seattle, WA 98195 (206) 543-8070			



TSE-(T-3)-01 16 Mar - 09 Apr 1966

Modifications to basic Program Methods

Thirty-eight (38) zooplankton samples were collected with an open 0.5 m ring net having a mesh size of 215 μ m. Vertical hauls were taken at intervals between the surface and 3800 m.

Two hydrographic station were taken and samples (48 each) were collected for temperature, salinity, and dissolved oxygen. For hydrographic data see: Tripp, R. B. 1967. Physical and chemical data from Fletcher's Ice Island (T-3): Beaufort Sea area, January-May 1966. University of Washington, Department of Oceanography Technical Report No. 187. 62 pp.

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Water transparency	meters	Secchi Disk	N/A	N/A
Depth of Sample	meters	Wire out	N/A	N/A
Temperature	°C	Reversing thermometers	N/A	N/A
Salinity	‰	Nansen bottles, modified Van Dorn bottles	Salinometer, University of Washington	N/A
Sigma-t	-	"	-	N/A
Dissolved oxygen	ml/l	"	Winkler	N/A
PO ₄	ug-atom/l	"	See Strickland and Parsons (1968)	N/A
NO ₃	"	"	"	N/A
SiO ₄	"	"	"	N/A
Chlorophyll <u>a</u>	mg m ⁻³	Van Dorn bottles	Spectrophotometer, fluorometer (Strickland and Parsons 1963)	N/A
Primary productivity (14C uptake)	mg C m ⁻³ h ⁻¹	"	Strickland and Parsons (1968)	N/A

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-1 ☐ ALGOL ☐ COBOL
☐ FORTRAN ☐ _____ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:

NAME AND PHONE NUMBER _____

ADDRESS _____

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

<p>5. RECORDING MODE <input type="checkbox"/> BCD <input type="checkbox"/> BINARY <input type="checkbox"/> ASCII <input checked="" type="checkbox"/> EBCDIC <input type="checkbox"/> _____</p>	<p>9. LENGTH OF INTER-RECORD GAP (IF KNOWN) <input checked="" type="checkbox"/> 3/4 INCH <input type="checkbox"/> _____</p>
<p>6. NUMBER OF TRACKS (CHANNELS) <input type="checkbox"/> SEVEN <input checked="" type="checkbox"/> NINE <input type="checkbox"/> _____</p>	<p>10. END OF FILE MARK <input type="checkbox"/> OCTAL 17 <input checked="" type="checkbox"/> Tape Mark</p>
<p>7. PARITY <input checked="" type="checkbox"/> ODD <input type="checkbox"/> EVEN</p>	<p>11. PASTE-ON-PAPER LABEL DESCRIPTION (INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER) <div style="border: 1px solid black; padding: 5px; margin-top: 5px;">Ice Island T-3 hydro, chlorophyll, & Productivity data sets. Specs.- 9 track, EBCDIC, odd parity, 1600 bpi, 5 files, D=PE, RL=120, MBL = 3000, CV = EB, F=S, LB=KU</div></p>
<p>8. DENSITY <input type="checkbox"/> 200 BPI <input checked="" type="checkbox"/> 1600 BPI <input type="checkbox"/> 556 BPI <input type="checkbox"/> 800 BPI <input type="checkbox"/> _____</p>	<p>12. PHYSICAL BLOCK LENGTH IN BYTES FL=120 MBL 3000 Char.</p> <p>13. LENGTH OF BYTES IN BITS</p>

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALI- BRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Fluorometer Turner Model 111		X			X				
Reversing thermometers		X	manufacturer		X				
Salinometer Univ. Washington		X			X				
Naval Arctic Research Lab.		X			X				

Primary Production and Energy Flow

The program was directed by the late Dr. T. Saunders English and funded by the Office of Naval Research Contract Nonr-477 (37) Project NR 083 12 and Contract N00014-67-0103-0005. Users of the data are requested to acknowledge the agency support.

The methods used by biological oceanographers of the Department of Oceanography, University of Washington, Seattle, from 1966 to 1974 on Fletcher's Ice Island (T-3) drifting in the Arctic Ocean (Fig. 1) are given below. These methods are to compliment the entries in the individual cruise Data Documentation Forms where modifications, if any, are given.

General

The field program was maintained at various intensities for eight years (March 1966 to June 1974), with personnel on T-3 continuously from April 1968 until the island was evacuated in June 1974. During this period, divided into 28 cruises (Table 1), biological and environmental parameters were measured (Table 2). The sampling program was structured to monitor periods of active change in the various parameters. Thus, hydrography and zooplankton sampling was a year round pursuit, field and logistic conditions permitting, whereas chlorophyll a concentrations and primary productivity (^{14}C uptake) were usually measured only during the summer (June to September). Various gear types, methodologies, and sampling strategies were tried and tested throughout the field program.

The oceanographic working area was located on 3-4 m thick sea ice in Colby Bay adjacent to the ice island. All sampling was done from inside a heated building positioned over a hole, ca. 1.5 m on a side, cut in the ice. The hut contained a space heater, oceanographic sampling equipment, and a Rankin winch powered by a 5 hp Wisconsin gasoline engine. The drum on the winch held about 4000 m of 5/32 inch hydrographic wire. The wire ran through a meter wheel attached to a tripod erected over the hole.

Geographic positions were provided by the Lamont-Doherty Geological Observatory, Palisades, NY (Hunkins and Tiemann 1977). Hydrography and biology (chlorophyll a and primary productivity) samples were not always taken from the same bottle cast or on the same day. Each kind of data has a separate sample numbering scheme. As a result, station positions may not always agree between the hydrographic and biological data. See individual cruise Data Documentation

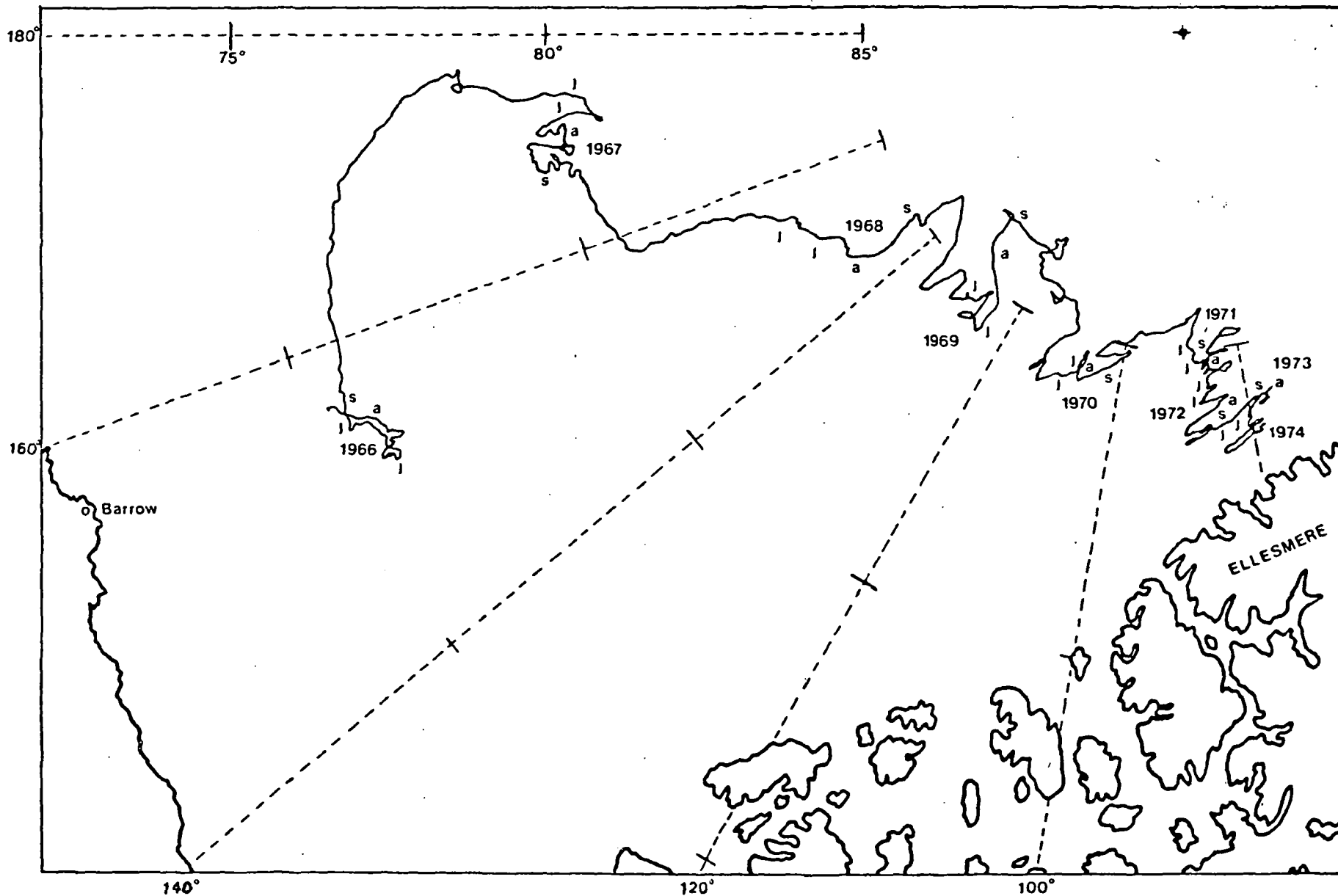


Fig. 1. Drift track of T-3 from June 1966 to April 1974. The months of June, July, August, and September are indicated in small letters for each year.

Table 1. Cruise numbers and dates of T-3 field program

Cruise		Cruise	
Number	Duration	Number	Duration
01	16 Mar 66 - 9 Apr 66	15	5 Oct 70 - 30 Dec 70
02	2 Jun 66 - 18 Oct 66	16	1 Jan 71 - 30 Mar 71
03	1 Feb 67 - 15 Feb 67	17	30 Mar 71 - 30 May 71
04	4 Jun 67 - 11 Sep 67	18	30 May 71 - 1 Oct 71
05	12 Sep 67 - 24 Sep 67	19	1 Oct 71 - 20 Dec 71
06	27 Apr 68 - 9 Jun 68	20	20 Dec 71 - 20 Mar 72
07	10 Jun 68 - 20 Sep 68	21	20 Mar 72 - 31 May 72
08	21 Sep 68 - 31 Jan 69	22	31 May 72 - 29 Sep 72
09	31 Jan 69 - 13 Jun 69	23	29 Sep 72 - 13 Dec 72
10	13 Jun 69 - 3 Oct 69	24	13 Dec 72 - 7 Apr 73
11	4 Oct 69 - 5 Jan 70	25	7 Apr 73 - 28 May 73
12	5 Jan 70 - 23 Mar 70	26	28 May 73 - 19 Oct 73
13	23 Mar 70 - 7 Jun 70	27	31 Oct 73 - 8 Mar 74
14	7 Jun 70 - 5 Oct 70	28	8 Mar 74 - 1 Jun 74

Table 2. Field data collected at T-3, March 1966 to June 1974

Parameter	Total Number of Samples	1966												1967												1968													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354				X																															X	X		
Temperature	5354				X																															X	X		
Dissolved oxygen	5198				X																															X	X		
Nutrients																																							
Nitrate	3611																																						
Silicate	3440																																						
Phosphate	3440																																						
Phytoplankton																																							
Chlorophyll <u>a</u>	8022							X	X							X	X	X	X										X	X	X	X							
Productivity	4978															X	X	X											X	X	X								
Cell Counts	5838																												X	X	X	X							
Zooplankton																																							
Acoustic traces	40 mo																																						
Plankton pump	427						X	X	X	X	X		X			X	X	X	X																				
Nets (mesh size μm)																																							
0.5 m ring (215)	38			X	X																																		
1 m closing ring (110)	355																												X	X	X	X	X						
1 m closing ring (215)	318															X	X	X																					
1 m ² plummet (571)*	56																																						
2 m ² umbrella (223) [†]	9112																	X											X	X	X	X	X	X	X				
2 m ² umbrella (569)	95																														X	X							
3 m ² umbrella (300)	104																													X	X	X							

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2. (cont.)

Parameter	Total Number of Samples	1969												1970												1971													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	
Temperature	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	
Nutrients																																							
Nitrate	3611																X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440																X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440																X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X							X	X	X	X						X		X	X	X	X								
Productivity	4978						X	X	X	X							X	X	X	X								X	X	X	X								
Cell Counts	5838				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X						
Zooplankton																																							
Acoustic traces	40 mo																X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X		
Plankton pump	427																																						
Nets (mesh size μm)																																							
0.5 m ring (215)	38																																						
1 m closing ring (110)	355			X																																			
1 m closing ring (215)	318					X	X																																
1 m ² plummet (571)*	56																																						
2 m ² umbrella (223) [†]	9112	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2 (cont.)

Parameter	Total Number of Samples	1972												1973												1974													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Temperature	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5198	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Nutrients																																							
Nitrate	3611	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X																													
Productivity	4978						X	X	X	X	X																												
Cell Counts	5838						X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Zooplankton																																							
Acoustic traces	40 mo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Plankton pump	427																																						
Nets (mesh size μm)																																							
0. 5 m ring (215)	38																																						
1 m closing ring (110)	355																																						
1 m closing ring (215)	318																																						
1 m ² plummet (571)*	56						X	X																															
2 m ² umbrella (223) †	9112	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Forms for kind of sampling bottle used.

Hydrography and Nutrients

Temperature, salinity, oxygen, and nutrient determinations were made on water collected with Van Dorn polyvinylchloride or uncoated Nansen water sampling bottles. The Van Dorn bottles contained surgical tubing which may or may not be toxic to organisms (see Price et al. 1986). In general, the upper 100 m was sampled at 5 m intervals, 125-375 m at 25 m intervals, 400-500 m at 50 m intervals, 600-1000 m at 100 m intervals, and 1000 m to the bottom at 250 m intervals with a 30 m interval between the last bottle and the bottom. Periodically, additional samples were taken at 2 m intervals around the pycnocline (usually 40-60 m). In periods when weekly casts were taken, an alternating pattern of sampling, 0-100 m, 0-500 m, 0-100 m, 0-deep, allowed a more frequent survey of short-term variation in the near-surface stratum without the additional burden of time-consuming deep casts. Because of heat lamps and cables and the accumulation of freshwater in the hydrohole, surface readings would not have been representative, therefore the top bottle of a hydrocast was usually placed 5 m below the water surface.

The highest observed wire angles during these cruises were about 4° . For a 1000 m cast, this would yield a true depth of 998 m at the bottom. Computations of thermometric depths (Wüst 1933) were performed for those observations deeper than 250 m where unprotected thermometers were used for which calibrations were still available (262 depths at 45 stations). With the exception of two casts (Cruise 11, station 1, cast 5, 1400-2000 m and Cruise 13, station 12, cast 5, 500-1300 m), all calculated values were generally within 2-3% of the nominal depths sampled. These two casts were corrected. All other depths reported here are uncorrected, but should be within 2-5% of the true value.

Temperatures were determined from reversing thermometers on each water bottle; protected thermometers were usually deployed in pairs. Bottles were tripped about 5 min after the top bottle reached its intended depth. Thermometers were read using a lighted magnifying glass about 15 min after retrieval. Readings were corrected from the auxiliary thermometers and the thermometer constants by an IBM 1130 program at the Department of Oceanography, University of Washington.

Over 100 reversing thermometers were used during the course of these observations. They were calibrated either by the manufacturers or at various times at the University of Washington. Calibration data available from the

latest date preceding the use of each thermometer on T-3 were used to correct the thermometer readings. The calibrations were usually 0.5-3 yr old when they were applied to these data.

Salinity samples were drawn into 250 ml clear polyethylene bottles, tightly sealed, and allowed to come to room temperature. Determinations were made on T-3 using an Industrial Instruments Model PS-7A (Industrial Instruments Co., Cedar Grove, NJ) or a Beckman Model RS-7B (Beckman Instruments, Inc., Fullerton, CA) portable induction salinometer calibrated against a standard seawater sample obtained from the Laboratoire Hydrographique (Copenhagen, Denmark). Substandards of seawater (ca. 34.9‰ collected from ca. 500 m) were used after each 10 samples and at the end of a run. Salinity was calculated using the tables in the salinometer manual (Industrial Instruments 1964). These values are considered to have an accuracy of ± 0.003 ppt.

Dissolved oxygen was analyzed by a modified Winkler method (Strickland and Parsons 1965). Brown BOD bottles of 250 ml capacity, an automatic 100 ml pipet, an automatic 25 ml burette readable to 0.01 ml, and an electric stirrer were used.

Nutrients were determined by the methods in Strickland and Parsons (1968). The samples were either analyzed immediately after collection or frozen for later analysis either on the ice, or during April and May 1971, at the University of Washington using a Beckman DU spectrophotometer (Beckman Instruments, Inc., Fullerton, CA) with 1 cm cells. After December 1972, nitrate determinations were run on a Brinkman PC/1000 colorimeter (Brinkman Instruments, Westbury, NY) with a fiber optics probe and calibrated against the spectrophotometer. Reagents and standards were prepared from water filtered through an Ion-X-Change column, Grade 1, consisting of a mixed bed non-regenerable resin (Illinois Water Treatment Co.) that produces triple distilled water. Comparisons between reagents and standards made up with this water and with distilled water sent from the Naval Arctic Research Laboratory at Barrow showed these procedures to be adequate. Standards were run with each set of samples and for each nitrate column.

Chlorophyll a

Chlorophyll a was determined according to Strickland and Parsons (1968). In 1968 through 1970, water was filtered through 47 mm 0.45 μ m Millipore filters (Millipore Corporation, Bedford, MA). Suction pressure was less than 250 mm Hg. In 1971 through 1973, Gelman A/E glass fiber filters (approximate

pore size = 1.0 μm) (Gelman Instrument Co., Ann Arbor, MI) were used. MgCO_3 was added to all filters near the end of the filtration. In 1968, samples of about 4 liters of water were analyzed using a Beckman DK spectrophotometer in Seattle and chlorophyll a was calculated using the SCOR-UNESCO equations (Unesco 1966). For 1968 through 1973, samples of about 2 liters of water were filtered and a Turner Model 111 fluorometer (G. K. Turner Associates, Palo Alto, CA) was used for analysis. Fluorometer filters were 5-60 and 2-64. The fluorometer was calibrated using either a Beckman DU spectrophotometer on T-3 or a Beckman DK scanning spectrophotometer in Seattle. For samples analyzed with the fluorometer, chlorophyll a was calculated using equations in Holm-Hansen et al. (1967). Phaeopigments were not determined.

Primary Productivity

Primary productivity was measured during the summers by the radiocarbon technique of Steemann-Nielsen (1952) as detailed by Strickland and Parsons (1968). Two experimental schemes were used:

1. Depth series - paired 130 ml light and dark bottles were filled with water collected from a number of depths and incubated under constant high illumination (for the level of irradiance, see below).
2. Graduated light series - five light and one dark bottle containing water from one depth were incubated under 0, 10, 25, 50, 75, and 100% irradiance provided by glass neutral density filters over the incubation bottles.

For both series, dark bottles were pre-wrapped with black tape and then covered with aluminum foil to insure complete darkness. Depths and frequencies of sampling varied from year to year.

The plastic incubator box was fronted with clear plexiglass and had a wheel that rotated in the vertical plane. The wheel accommodated 12 ground-glass stoppered 130 ml bottles. At various times, because of stripped gears, the wheel did not rotate or was manually turned periodically during incubation. Light, provided by a bank of 12 GE Cool-White fluorescent lamps (General Electric Corporation, Stamford, CT), and amount of radioactivity added varied from year to year. Highest irradiance (= 100%) in the incubator was between 1100 and 1400 ft-c measured with a GE Model No. 214 photometer (General Electric Corporation, Stamford, CT). A pumped water flow-through system maintained ambient incubator temperature near 0°C. Samples were incubated for 6 or 12 hr.

At the end of the incubation, the samples were filtered (suction pressure

less than 250 mm Hg) onto 25 mm, 0.45 μ m Millipore filters, washed with filtered seawater, air-dried, and stored over desiccant until analyzed. Filters were fumed over concentrated HCl and counted three times for 1000 counts, using a gas flow proportional counter (Nuclear Chicago Corporation, Des Plaines, IL). Counting was done either in Seattle using a Nuclear Chicago Model D-47 counter with micromil window, C-1110 automatic sample changer, 161-A scaler, and C111B printing timer, or on T-3 using a Nuclear Chicago manual, end-window Model 8770 scaler, Model 3053 sample changer, Model 108 G-M detector, and Model 8420 dual timer.

Carbon uptake was calculated from

$$P = (L-D)(W)(1.05)/(Z)(T)$$

where P is in mg C m⁻³ h⁻¹; L-D is the difference between the light and dark bottle in counts per minute corrected for machine background and coincidence; W is the total carbonate in mg C m⁻³ calculated from $W = (810)(S^{\circ}/\text{‰})$ as suggested by Dr. G. C. Anderson, Department of Oceanography, University of Washington; 1.05 is the isotope discrimination factor (Strickland 1960); Z is the total activity in counts per minute added to the sample and corrected for the counter efficiency of about 22.8%; T is the incubation time (6 or 12 hr).

All ¹⁴C ampoules used on T-3 were prepared in the Department of Oceanography, University of Washington, from aqueous sodium carbonate obtained from Nuclear Chicago Corporation. All glassware was rinsed with distilled water and autoclaved. The amount of solution to be made was determined by dividing the activity of the stock aqueous sodium carbonate by the desired activity per ml of final solution. Glass distilled water was filtered through 47 mm, 0.45 μ m Millipore filters. The pH was adjusted to 9.5-9.7 with NaOH. The solution was well mixed, and after adding the commercial sodium carbonate, mixed again. Glass ampoules holding 2 or 5 ml of solution were filled by an automatic volume dispenser. The ampoules were sealed using propane torches. The sealed ampoules were placed in large beakers, covered with water to which methylene blue dye was added, and autoclaved for ca. 1 hr at 120°C. After washing away the dye, the ampoules were inspected for any sign of color inside them. Ampoules that were even slightly discolored were discarded. The filled ampoules were color-coded with spray paint and stored.

Several ampoules from the beginning, middle, and end of the filling process were kept separate to be used for standardization. Standardization was done using methods then employed by the Department of Oceanography, University of Washington, where ampoules were either sent to Dr. C. R. Goldman, University of

California, Davis, and analyzed using gas phase (Goldman 1963; Steemann-Nielsen 1974) or, in the Department of Oceanography, University of Washington, were compared to samples obtained from the National Bureau of Standards. From 1970-1973, ampoules were standardized by liquid scintillation techniques and external standards at the Department of Oceanography.

Phytoplankton Cell Counts

Samples for phytoplankton identification and cell counts were usually taken from Nansen bottles during hydrocasts and stored in 250 ml glass jars. They were preserved with 4% formalin, buffered (sodium borate) or unbuffered, for a final strength of approximately 1%. Samples were shipped to Seattle for later analysis. Some samples were collected from a water pumping system during summer 1970 (see below).

Phytoplankton species were enumerated for some of the samples collected in the summers of 1968, 1969, and 1971 with the inverted microscope method (Hasle 1978a, b). Samples were individually counted or samples from two, three, or four days were combined for each depth. The samples combined to make a composite were separated in time by one week or less. After thorough mixing, the samples were poured into 5 and 50 ml Zeiss counting chambers (Carl Zeiss, Oberkochen Würt, FRG) and allowed to settle at least 20 hr before counting. A Zeiss inverted microscope was used for all enumerations. The 5 ml chamber was counted at 390 X using a 25 X objective, 12.5 X oculars, and a magnification factor of the optics carrier of 1.25. The 50 ml chamber was counted at 156 X with a 10 X objective, 12.5 X oculars, and the 1.25 X magnification factor. Cell counts were converted to cells per liter, cell volumes (Larrance 1964), and cell carbon (Mullin et al. 1966). These data are contained in an unpublished manuscript (Walline 1973) available from the School of Oceanography, University of Washington.

Zooplankton

Zooplankton sampling was maintained from March 1966 through April 1974. Gear types, sampling periods, and depth intervals sampled varied between and within years. Regardless of the gear used, all samples were concentrated and preserved in 4% V/V formalin (final concentration) buffered with either sodium acetate or sodium borate.

Initially, samples were taken with an open 0.5 m diameter ring net with 215 μ m mesh gauze. From June 1966 through July 1967, a 7.6 cm centrifugal

pump system with a 10 cm diameter hose intake was lowered. A 25 kg weight at the end of the wire held down the hose intake. Since wire angles were low, the depth of sampling was estimated from the length of the wire. Maximum depth of sampling was about 185 m. Samples of 5 to 18 m³ of water were filtered at a rate of 0.2 to 0.6 m³ per min through a net of 215 µm mesh size. Beginning in early July 1967, a closing 1 m diameter ring net of either 110 or 215 µm mesh was used to sample to 1000 m. This sampling overlapped with pumping stations to assure comparability.

Sampling with a 2 m² closing umbrella net began in September 1967 (Scott 1969; Macaulay and Daly 1987). Mesh size was 223 and 569 µm. This net, with a filtration ratio of 1.25:1, was the principal sampling device throughout the remaining field program though the netting itself was replaced with a high filtration type mesh (4:1 filtration ratio) in March 1972. All subsequent samples were collected with the 4:1 filtration ratio net.

An overlapping sampling scheme was used starting in October 1969. Sampling depths were at 10 m intervals from 300 to 10 m, 100 m intervals from 1000 to 10 m, and 500 m intervals from the bottom to 10 m. The 10 m upper limit was chosen to protect the net during retrieval through the hydrohole. Samples were collected from as deep as 2500 m.

Two other kinds of nets were sometimes employed: a 3 m² closing umbrella net with 300 µm mesh in summer 1968 and a 1 m² plummet net with 571 µm mesh initially in May 1971 and periodically thereafter. The plummet net is a downward fishing net with an opening-closing mechanism activated with a messenger (Macaulay 1978; Macaulay and Daly in prep.).

Sorting, identifying, and counting of some samples were done in Seattle (Table 3). Other samples have been analyzed for some groups of organisms, primarily copepods. These data are available in the School of Oceanography, but obtaining them will require an investigator to visit the University of Washington.

Echo-sounder

Echo-sounding was conducted from April 1970 to April 1974. A modified Ross 200A (100 kHz) echo-sounder and 10° transducer with an impedance matching box scanned depth ranges of 0-50, 50-100, 100-150, and 150-200 fm. The 0-50 fm depth range was emphasized because of interest in the scattering layer often found about 25 fm. The system included the standard Ross 200A transceiver unit, recorder unit, and a Sony TC-5600 stereo tape recorder. During regular

Table 3. List of T-3 zooplankton samples analyzed and used in theses, reports, and publications

Hughes (1968)	399 samples collected with a plankton pump
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
Scott (1969)	523 samples collected with a pump, 1 m closing ring net and 2 m ² umbrella net
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
	04 10 Jul - 6 Sep 1967
	05 13 Sep - 23 Sep 1967
Damkaer (1976)	52 samples collected with a 1 m closing ring net
Cruises:	04 12 Jul - 8 Sep 1967
	06 5 May 1968
	07 10 Jun - 18 Aug 1968
Heron and Damkaer (1976)	2 samples collected with a 1 m closing ring net
Cruises:	07 10 Jun 1968
	12 Jun 1968
Pautzke (1979)	16 samples collected with a 2 m ² umbrella net
Cruises:	14 7 Jun - 5 Oct 1970
	18 30 May - 1 Oct 1971
	22 31 May - 29 Sep 1972
	26 28 May - 19 Oct 1973
Heron, English, and Damkaer (1984)	54 samples collected with a 1 m closing ring net and 3 m ² umbrella net
Cruises:	06 5 May 1968
	07 10 Jun - 20 Sep 1968
	08 21 Sep 1968

operation, echo-sounding was conducted continuously, normally on the 0-50 fm scale. Daily recordings of 15-45 min were made using all depth ranges. Some of these data are available on 1/4 inch magnetic tape, but retrieval will be difficult.

Data Management

The data were available from computer printouts or raw data sheets. The original punched data cards could not be located so the data were re-entered directly to disk files on the University of Washington Cyber 180-855 computer using a Tandy Model DT-1 data terminal. After editing the files to correct data entry errors or to fill in gaps in the data, the files were transferred to a 9-track, EBCDIC-coded magnetic tape for NODC. The resulting tape contains three files of hydrographic data, one file of chlorophyll data, and one file of primary productivity data.

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DATA DOCUMENTATION FORM

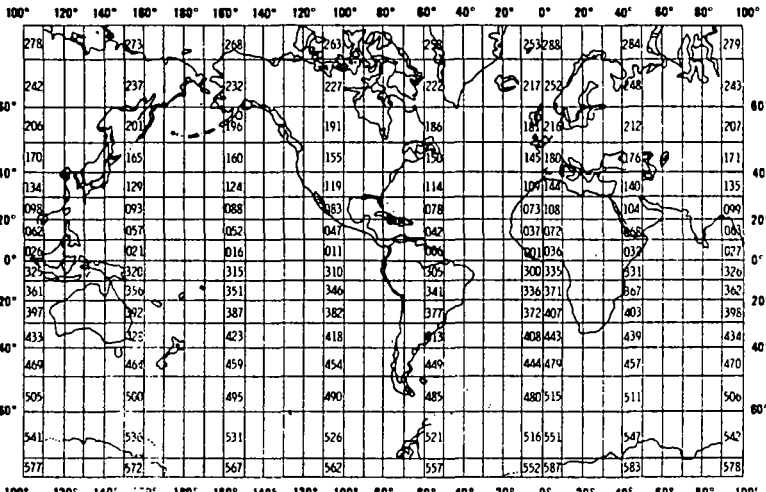
NOAA FORM 24-13
(4-77)U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
WASHINGTON, DC 20235FORM APPROVED
O.M.B. No. 41-R265
EXPIRES 1-81

(While you are not required to use this form, it is the most desirable mechanism for providing the required ancillary information enabling the NODC and users to obtain the greatest benefit from your data.)

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED Dr. T. Saunders English School of Oceanography WB-10 University of Washington Seattle, WA 98195			
2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED Primary production and energy flow		3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT TSE-(T-3)-02	
4. PLATFORM NAME(S) Fletcher's Ice Island (T-3)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.) Ice island	6. PLATFORM AND OPERATOR NATIONALITY(IES) USA USA	7. DATES FROM: MO/DAY/YR TO: MO/DAY/YR 06/02/66 10/18/66
8. ARE DATA PROPRIETARY? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR _____ MONTH _____		11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED. GENERAL AREA	
9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNA- TIONAL EXCHANGE?) <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> PART (SPECIFY BELOW) Data should be available for international exchange			
10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELE- PHONE NUMBER (AND ADDRESS IF OTHER THAN IN ITEM-1) Dr. Karl Banse School of Oceanography WB-10 University of Washington Seattle, WA 98195 (206) 543-5079			

TSE-(T-3)-2
JUNE-OCTOBER 1966

T-3
(to scale)

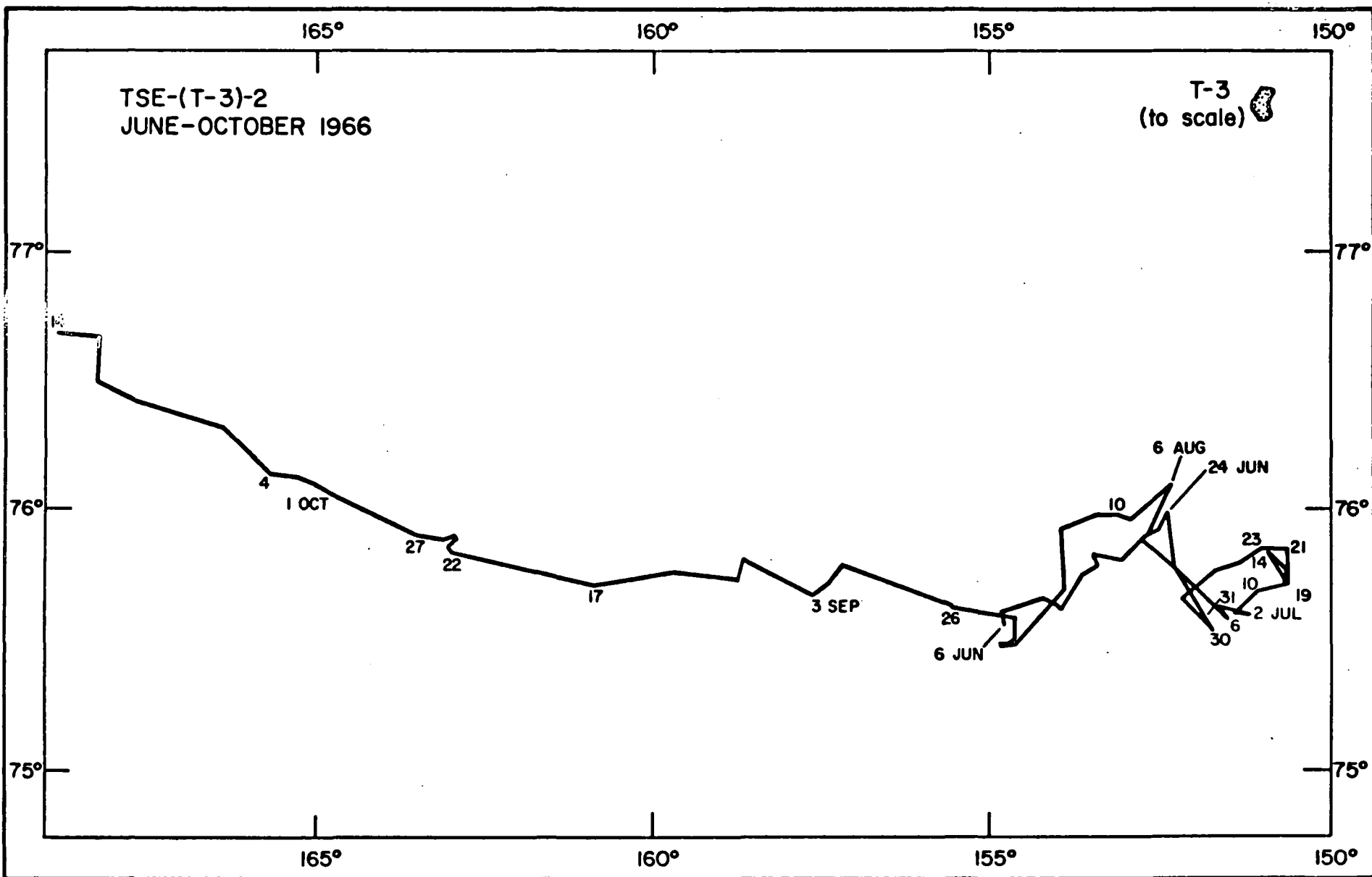


FIG. 1

TSE-(T-3)-02 Q2 Jun 1966 - 18 Oct 1966

Modifications to the basic Program Methods

Zooplankton samples were collected with a 7.6 cm centrifugal pump with water pumped through 10 cm diameter underwater hose clamped to the hydrographic wire. Rate of discharge varied from ca. 0.2 to 0.6 m³ per min. The water was filtered through a conical net having a base of 0.5 m and a height of 0.6 m suspended in a 0.1 m³ container. Net mesh size was 215 μ m.

Samples were collected at 5 m intervals over a depth range of 5 to 180 m for periods of 20 and 30 min. Volumes ranged from 5 to 18 m³.

20% methanol (final concentration unspecified) was added to the samples for antifreeze.

225 samples were collected (120 day, 105 night).

For sample analysis, see Hughes 1968; Scott 1969.

Data from 40 chlorophyll a samples collected with Van Dorn bottles during this cruise were lost.

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Water transparency	meters	Secchi Disk	N/A	N/A
Depth of Sample	meters	Wire out	N/A	N/A
Temperature	°C	Reversing thermometers	N/A	N/A
Salinity	‰	Nansen bottles, modified Van Dorn bottles	Salinometer, University of Washington	N/A
Sigma-t	-	"	-	N/A
Dissolved oxygen	ml/l	"	Winkler	N/A
PO ₄	ug-atom/l	"	See Strickland and Parsons (1968)	N/A
NO ₃	"	"	"	N/A
SiO ₄	"	"	"	N/A
Chlorophyll <u>a</u>	mg m ⁻³	Van Dorn bottles	Spectrophotometer, fluorometer (Strickland and Parsons 1963)	N/A
Primary productivity (¹⁴ C uptake)	mg C m ⁻³ h ⁻¹	"	Strickland and Parsons (1968)	N/A

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-1 ☐ ALGOL ☐ COBOL
☐ FORTRAN ☐ _____ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:

NAME AND PHONE NUMBER _____

ADDRESS _____

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

<p>5. RECORDING MODE</p> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> BCD <input type="checkbox"/> BINARY </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> ASCII <input checked="" type="checkbox"/> EBCDIC </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> _____ <input type="checkbox"/> _____ </div>	<p>9. LENGTH OF INTER-RECORD GAP (IF KNOWN) <input checked="" type="checkbox"/> 3/4 INCH <input type="checkbox"/> _____</p>
<p>6. NUMBER OF TRACKS (CHANNELS)</p> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> SEVEN <input checked="" type="checkbox"/> NINE </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> _____ <input type="checkbox"/> _____ </div>	<p>10. END OF FILE MARK <input type="checkbox"/> OCTAL 17 <input checked="" type="checkbox"/> <u>Tape Mark</u></p>
<p>7. PARITY</p> <div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> ODD <input type="checkbox"/> EVEN </div>	<p>11. PASTE-ON-PAPER LABEL DESCRIPTION (INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)</p> <p>Ice Island T-3 hydro, chlorophyll, & Productivity data sets. Specs.- 9 track, EBCDIC, odd parity, 1600 bpi, 5 files, D=PE, RL=120, MBL = 3000, CV = EB, F=S, LB=KU</p>
<p>8. DENSITY</p> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> 200 BPI <input checked="" type="checkbox"/> 1600 BPI </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> 556 BPI <input type="checkbox"/> 800 BPI </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> _____ <input type="checkbox"/> _____ </div>	<p>12. PHYSICAL BLOCK LENGTH IN BYTES FL=120 MBL=3000 Char.</p> <p>13. LENGTH OF BYTES IN BITS</p>

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALI- BRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Fluorometer Turner Model 111		X			X				
Reversing thermometers		X	manufacturer		X				
Salinometer Univ. Washington		X			X				
Naval Arctic Research Lab.		X			X				

Primary Production and Energy Flow

The program was directed by the late Dr. T. Saunders English and funded by the Office of Naval Research Contract Nonr-477 (37) Project NR 083 12 and Contract N00014-67-0103-0005. Users of the data are requested to acknowledge the agency support.

The methods used by biological oceanographers of the Department of Oceanography, University of Washington, Seattle, from 1966 to 1974 on Fletcher's Ice Island (T-3) drifting in the Arctic Ocean (Fig. 1) are given below. These methods are to compliment the entries in the individual cruise Data Documentation Forms where modifications, if any, are given.

General

The field program was maintained at various intensities for eight years (March 1966 to June 1974), with personnel on T-3 continuously from April 1968 until the island was evacuated in June 1974. During this period, divided into 28 cruises (Table 1), biological and environmental parameters were measured (Table 2). The sampling program was structured to monitor periods of active change in the various parameters. Thus, hydrography and zooplankton sampling was a year round pursuit, field and logistic conditions permitting, whereas chlorophyll a concentrations and primary productivity (^{14}C uptake) were usually measured only during the summer (June to September). Various gear types, methodologies, and sampling strategies were tried and tested throughout the field program.

The oceanographic working area was located on 3-4 m thick sea ice in Colby Bay adjacent to the ice island. All sampling was done from inside a heated building positioned over a hole, ca. 1.5 m on a side, cut in the ice. The hut contained a space heater, oceanographic sampling equipment, and a Rankin winch powered by a 5 hp Wisconsin gasoline engine. The drum on the winch held about 4000 m of 5/32 inch hydrographic wire. The wire ran through a meter wheel attached to a tripod erected over the hole.

Geographic positions were provided by the Lamont-Doherty Geological Observatory, Palisades, NY (Hunkins and Tiemann 1977). Hydrography and biology (chlorophyll a and primary productivity) samples were not always taken from the same bottle cast or on the same day. Each kind of data has a separate sample numbering scheme. As a result, station positions may not always agree between the hydrographic and biological data. See individual cruise Data Documentation

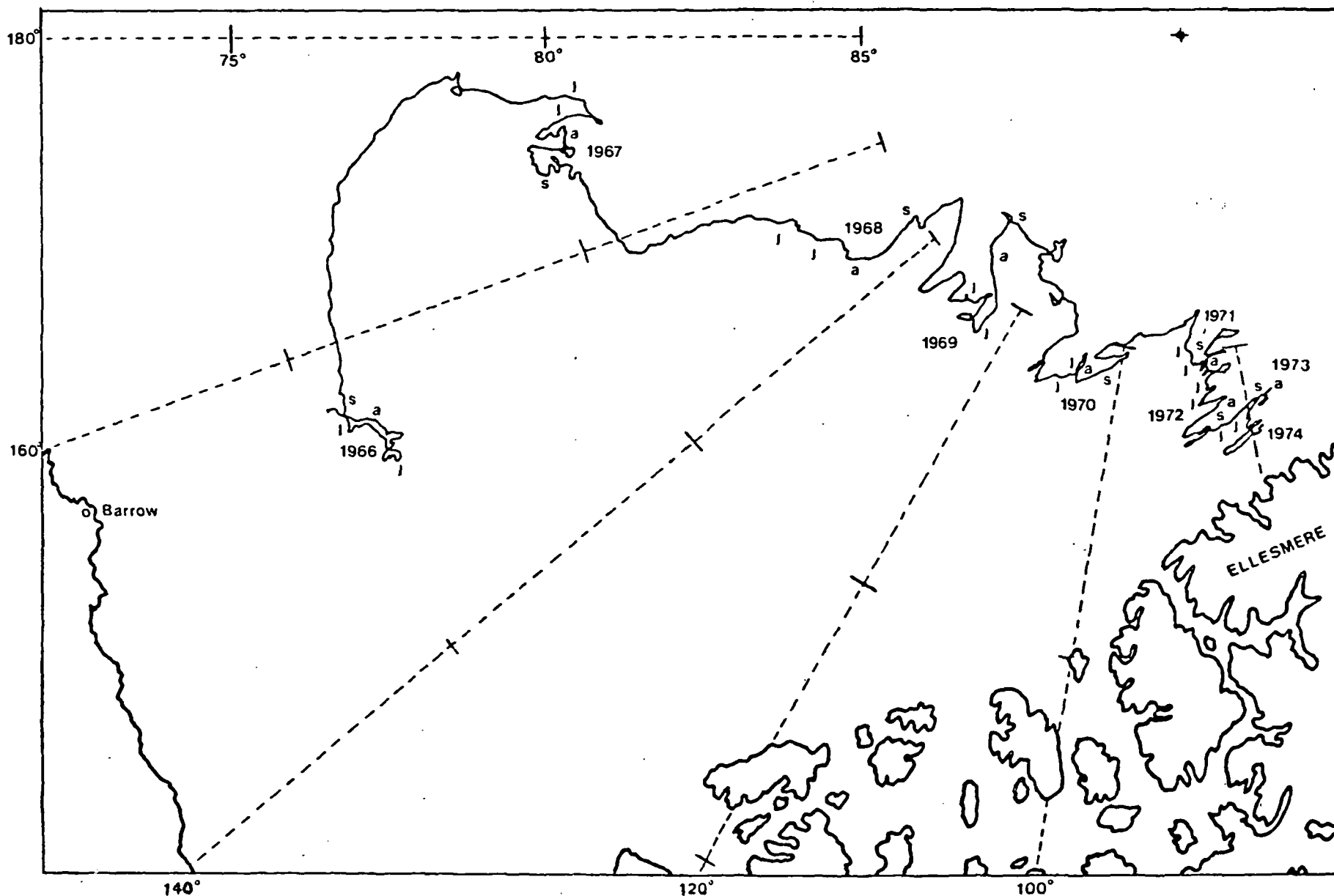


Fig. 1. Drift track of T-3 from June 1966 to April 1974. The months of June, July, August, and September are indicated in small letters for each year.

Table 1. Cruise numbers and dates of T-3 field program

Cruise		Cruise	
Number	Duration	Number	Duration
01	16 Mar 66 - 9 Apr 66	15	5 Oct 70 - 30 Dec 70
02	2 Jun 66 - 18 Oct 66	16	1 Jan 71 - 30 Mar 71
03	1 Feb 67 - 15 Feb 67	17	30 Mar 71 - 30 May 71
04	4 Jun 67 - 11 Sep 67	18	30 May 71 - 1 Oct 71
05	12 Sep 67 - 24 Sep 67	19	1 Oct 71 - 20 Dec 71
06	27 Apr 68 - 9 Jun 68	20	20 Dec 71 - 20 Mar 72
07	10 Jun 68 - 20 Sep 68	21	20 Mar 72 - 31 May 72
08	21 Sep 68 - 31 Jan 69	22	31 May 72 - 29 Sep 72
09	31 Jan 69 - 13 Jun 69	23	29 Sep 72 - 13 Dec 72
10	13 Jun 69 - 3 Oct 69	24	13 Dec 72 - 7 Apr 73
11	4 Oct 69 - 5 Jan 70	25	7 Apr 73 - 28 May 73
12	5 Jan 70 - 23 Mar 70	26	28 May 73 - 19 Oct 73
13	23 Mar 70 - 7 Jun 70	27	31 Oct 73 - 8 Mar 74
14	7 Jun 70 - 5 Oct 70	28	8 Mar 74 - 1 Jun 74

Table 2. Field data collected at T-3, March 1966 to June 1974

Parameter	Total Number of Samples	1966												1967												1968															
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D				
Hydrography																																									
Salinity	5354				X																															X	X				
Temperature	5354				X																															X	X				
Dissolved oxygen	5198				X																															X	X				
Nutrients																																									
Nitrate	3611																																								
Silicate	3440																																								
Phosphate	3440																																								
Phytoplankton																																									
Chlorophyll <u>a</u>	8022							X	X									X	X	X	X														X	X	X	X			
Productivity	4978																	X	X	X															X	X	X				
Cell Counts	5838																																			X	X	X	X		
Zooplankton																																									
Acoustic traces	40 mo																																								
Plankton pump	427						X	X	X	X	X		X					X	X	X	X																				
Nets (mesh size μ m)																																									
0.5 m ring (215)	38				X	X																																			
1 m closing ring (110)	355																																			X	X	X	X	X	
1 m closing ring (215)	318																	X	X	X																					
1 m ² plummet (571)*	56																																								
2 m ² umbrella (223) [†]	9112																			X															X	X	X	X	X	X	X
2 m ² umbrella (569)	95																																				X	X			
3 m ² umbrella (300)	104																																			X	X	X			

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2. (cont.)

Parameter	Total Number of Samples	1969												1970												1971													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Temperature	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Nutrients																																							
Nitrate	3611																X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440																X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440																X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X							X	X	X	X						X		X	X	X	X								
Productivity	4978						X	X	X	X							X	X	X	X								X	X	X	X								
Cell Counts	5838				X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
Zooplankton																																							
Acoustic traces	40 mo																X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X		
Plankton pump	427																																						
Nets (mesh size μm)																																							
0.5 m ring (215)	38																																						
1 m closing ring (110)	355			X																																			
1 m closing ring (215)	318					X	X																																
1 m ² plummet (571)*	56																																						
2 m ² umbrella (223) [†]	9112	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2 (cont.)

Parameter	Total Number of Samples	1972												1973												1974													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Temperature	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5198	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Nutrients																																							
Nitrate	3611	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X																													
Productivity	4978						X	X	X	X	X																												
Cell Counts	5838						X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Zooplankton																																							
Acoustic traces	40 mo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Plankton pump	427																																						
Nets (mesh size μ m)																																							
0.5 m ring (215)	38																																						
1 m closing ring (110)	355																																						
1 m closing ring (215)	318																																						
1 m ² plummet (571)*	56						X	X																															
2 m ² umbrella (223) †	9112	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Forms for kind of sampling bottle used.

Hydrography and Nutrients

Temperature, salinity, oxygen, and nutrient determinations were made on water collected with Van Dorn polyvinylchloride or uncoated Nansen water sampling bottles. The Van Dorn bottles contained surgical tubing which may or may not be toxic to organisms (see Price et al. 1986). In general, the upper 100 m was sampled at 5 m intervals, 125-375 m at 25 m intervals, 400-500 m at 50 m intervals, 600-1000 m at 100 m intervals, and 1000 m to the bottom at 250 m intervals with a 30 m interval between the last bottle and the bottom. Periodically, additional samples were taken at 2 m intervals around the pycnocline (usually 40-60 m). In periods when weekly casts were taken, an alternating pattern of sampling, 0-100 m, 0-500 m, 0-100 m, 0-deep, allowed a more frequent survey of short-term variation in the near-surface stratum without the additional burden of time-consuming deep casts. Because of heat lamps and cables and the accumulation of freshwater in the hydrohole, surface readings would not have been representative, therefore the top bottle of a hydrocast was usually placed 5 m below the water surface.

The highest observed wire angles during these cruises were about 4°. For a 1000 m cast, this would yield a true depth of 998 m at the bottom. Computations of thermometric depths (Wüst 1933) were performed for those observations deeper than 250 m where unprotected thermometers were used for which calibrations were still available (262 depths at 45 stations). With the exception of two casts (Cruise 11, station 1, cast 5, 1400-2000 m and Cruise 13, station 12, cast 5, 500-1300 m), all calculated values were generally within 2-3% of the nominal depths sampled. These two casts were corrected. All other depths reported here are uncorrected, but should be within 2-5% of the true value.

Temperatures were determined from reversing thermometers on each water bottle; protected thermometers were usually deployed in pairs. Bottles were tripped about 5 min after the top bottle reached its intended depth. Thermometers were read using a lighted magnifying glass about 15 min after retrieval. Readings were corrected from the auxiliary thermometers and the thermometer constants by an IBM 1130 program at the Department of Oceanography, University of Washington.

Over 100 reversing thermometers were used during the course of these observations. They were calibrated either by the manufacturers or at various times at the University of Washington. Calibration data available from the

latest date preceding the use of each thermometer on T-3 were used to correct the thermometer readings. The calibrations were usually 0.5-3 yr old when they were applied to these data.

Salinity samples were drawn into 250 ml clear polyethylene bottles, tightly sealed, and allowed to come to room temperature. Determinations were made on T-3 using an Industrial Instruments Model RS-7A (Industrial Instruments Co., Cedar Grove, NJ) or a Beckman Model RS-7B (Beckman Instruments, Inc., Fullerton, CA) portable induction salinometer calibrated against a standard seawater sample obtained from the Laboratoire Hydrographique (Copenhagen, Denmark). Substandards of seawater (ca. 34.9‰ collected from ca. 500 m) were used after each 10 samples and at the end of a run. Salinity was calculated using the tables in the salinometer manual (Industrial Instruments 1964). These values are considered to have an accuracy of ± 0.003 ppt.

Dissolved oxygen was analyzed by a modified Winkler method (Strickland and Parsons 1965). Brown BOD bottles of 250 ml capacity, an automatic 100 ml pipet, an automatic 25 ml burette readable to 0.01 ml, and an electric stirrer were used.

Nutrients were determined by the methods in Strickland and Parsons (1968). The samples were either analyzed immediately after collection or frozen for later analysis either on the ice, or during April and May 1971, at the University of Washington using a Beckman DU spectrophotometer (Beckman Instruments, Inc., Fullerton, CA) with 1 cm cells. After December 1972, nitrate determinations were run on a Brinkman PC/1000 colorimeter (Brinkman Instruments, Westbury, NY) with a fiber optics probe and calibrated against the spectrophotometer. Reagents and standards were prepared from water filtered through an Ion-X-Change column, Grade 1, consisting of a mixed bed non-regenerable resin (Illinois Water Treatment Co.) that produces triple distilled water. Comparisons between reagents and standards made up with this water and with distilled water sent from the Naval Arctic Research Laboratory at Barrow showed these procedures to be adequate. Standards were run with each set of samples and for each nitrate column.

Chlorophyll a

Chlorophyll a was determined according to Strickland and Parsons (1968). In 1968 through 1970, water was filtered through 47 mm 0.45 μ m Millipore filters (Millipore Corporation, Bedford, MA). Suction pressure was less than 250 mm Hg. In 1971 through 1973, Gelman A/E glass fiber filters (approximate

pore size = 1.0 μm) (Gelman Instrument Co., Ann Arbor, MI) were used. MgCO_3 was added to all filters near the end of the filtration. In 1968, samples of about 4 liters of water were analyzed using a Beckman DK spectrophotometer in Seattle and chlorophyll a was calculated using the SCOR-UNESCO equations (Unesco 1966). For 1968 through 1973, samples of about 2 liters of water were filtered and a Turner Model 111 fluorometer (G. K. Turner Associates, Palo Alto, CA) was used for analysis. Fluorometer filters were 5-60 and 2-64. The fluorometer was calibrated using either a Beckman DU spectrophotometer on T-3 or a Beckman DK scanning spectrophotometer in Seattle. For samples analyzed with the fluorometer, chlorophyll a was calculated using equations in Holm-Hansen et al. (1967). Phaeopigments were not determined.

Primary Productivity

Primary productivity was measured during the summers by the radiocarbon technique of Steemann-Nielsen (1952) as detailed by Strickland and Parsons (1968). Two experimental schemes were used:

1. Depth series - paired 130 ml light and dark bottles were filled with water collected from a number of depths and incubated under constant high illumination (for the level of irradiance, see below).
2. Graduated light series - five light and one dark bottle containing water from one depth were incubated under 0, 10, 25, 50, 75, and 100% irradiance provided by glass neutral density filters over the incubation bottles.

For both series, dark bottles were pre-wrapped with black tape and then covered with aluminum foil to insure complete darkness. Depths and frequencies of sampling varied from year to year.

The plastic incubator box was fronted with clear plexiglass and had a wheel that rotated in the vertical plane. The wheel accommodated 12 ground-glass stoppered 130 ml bottles. At various times, because of stripped gears, the wheel did not rotate or was manually turned periodically during incubation. Light, provided by a bank of 12 GE Cool-White fluorescent lamps (General Electric Corporation, Stamford, CT), and amount of radioactivity added varied from year to year. Highest irradiance (= 100%) in the incubator was between 1100 and 1400 ft-c measured with a GE Model No. 214 photometer (General Electric Corporation, Stamford, CT). A pumped water flow-through system maintained ambient incubator temperature near 0°C. Samples were incubated for 6 or 12 hr.

At the end of the incubation, the samples were filtered (suction pressure

less than 250 mm Hg) onto 25 mm, 0.45 μ m Millipore filters, washed with filtered seawater, air-dried, and stored over desiccant until analyzed. Filters were fumed over concentrated HCl and counted three times for 1000 counts, using a gas flow proportional counter (Nuclear Chicago Corporation, Des Plaines, IL). Counting was done either in Seattle using a Nuclear Chicago Model D-47 counter with micromil window, C-110 automatic sample changer, 161-A scaler, and C111B printing timer, or on T-3 using a Nuclear Chicago manual, end-window Model 8770 scaler, Model 3053 sample changer, Model 108 G-M detector, and Model 8420 dual timer.

Carbon uptake was calculated from

$$P = (L-D)(W)(1.05)/(Z)(T)$$

where P is in $\text{mg C m}^{-3} \text{ h}^{-1}$; L-D is the difference between the light and dark bottle in counts per minute corrected for machine background and coincidence; W is the total carbonate in mg C m^{-3} calculated from $W = (810)(S^{\circ}/\text{‰})$ as suggested by Dr. G. C. Anderson, Department of Oceanography, University of Washington; 1.05 is the isotope discrimination factor (Strickland 1960); Z is the total activity in counts per minute added to the sample and corrected for the counter efficiency of about 22.8%; T is the incubation time (6 or 12 hr).

All ^{14}C ampoules used on T-3 were prepared in the Department of Oceanography, University of Washington, from aqueous sodium carbonate obtained from Nuclear Chicago Corporation. All glassware was rinsed with distilled water and autoclaved. The amount of solution to be made was determined by dividing the activity of the stock aqueous sodium carbonate by the desired activity per ml of final solution. Glass distilled water was filtered through 47 mm, 0.45 μ m Millipore filters. The pH was adjusted to 9.5-9.7 with NaOH. The solution was well mixed, and after adding the commercial sodium carbonate, mixed again. Glass ampoules holding 2 or 5 ml of solution were filled by an automatic volume dispenser. The ampoules were sealed using propane torches. The sealed ampoules were placed in large beakers, covered with water to which methylene blue dye was added, and autoclaved for ca. 1 hr at 120°C. After washing away the dye, the ampoules were inspected for any sign of color inside them. Ampoules that were even slightly discolored were discarded. The filled ampoules were color-coded with spray paint and stored.

Several ampoules from the beginning, middle, and end of the filling process were kept separate to be used for standardization. Standardization was done using methods then employed by the Department of Oceanography, University of Washington, where ampoules were either sent to Dr. C. R. Goldman, University of

California, Davis, and analyzed using gas phase (Goldman 1963; Steemann-Nielsen 1974) or, in the Department of Oceanography, University of Washington, were compared to samples obtained from the National Bureau of Standards. From 1970-1973, ampoules were standardized by liquid scintillation techniques and external standards at the Department of Oceanography.

Phytoplankton Cell Counts

Samples for phytoplankton identification and cell counts were usually taken from Nansen bottles during hydrocasts and stored in 250 ml glass jars. They were preserved with 4% formalin, buffered (sodium borate) or unbuffered, for a final strength of approximately 1%. Samples were shipped to Seattle for later analysis. Some samples were collected from a water pumping system during summer 1970 (see below).

Phytoplankton species were enumerated for some of the samples collected in the summers of 1968, 1969, and 1971 with the inverted microscope method (Hasle 1978a, b). Samples were individually counted or samples from two, three, or four days were combined for each depth. The samples combined to make a composite were separated in time by one week or less. After thorough mixing, the samples were poured into 5 and 50 ml Zeiss counting chambers (Carl Zeiss, Oberkochen Würt, FRG) and allowed to settle at least 20 hr before counting. A Zeiss inverted microscope was used for all enumerations. The 5 ml chamber was counted at 390 X using a 25 X objective, 12.5 X oculars, and a magnification factor of the optics carrier of 1.25. The 50 ml chamber was counted at 156 X with a 10 X objective, 12.5 X oculars, and the 1.25 X magnification factor. Cell counts were converted to cells per liter, cell volumes (Larrance 1964), and cell carbon (Mullin et al. 1966). These data are contained in an unpublished manuscript (Walline 1973) available from the School of Oceanography, University of Washington.

Zooplankton

Zooplankton sampling was maintained from March 1966 through April 1974. Gear types, sampling periods, and depth intervals sampled varied between and within years. Regardless of the gear used, all samples were concentrated and preserved in 4% V/V formalin (final concentration) buffered with either sodium acetate or sodium borate.

Initially, samples were taken with an open 0.5 m diameter ring net with 215 μ m mesh gauze. From June 1966 through July 1967, a 7.6 cm centrifugal

pump system with a 10 cm diameter hose intake was lowered. A 25 kg weight at the end of the wire held down the hose intake. Since wire angles were low, the depth of sampling was estimated from the length of the wire. Maximum depth of sampling was about 185 m. Samples of 5 to 18 m³ of water were filtered at a rate of 0.2 to 0.6 m³ per min through a net of 215 µm mesh size. Beginning in early July 1967, a closing 1 m diameter ring net of either 110 or 215 µm mesh was used to sample to 1000 m. This sampling overlapped with pumping stations to assure comparability.

Sampling with a 2 m² closing umbrella net began in September 1967 (Scott 1969; Macaulay and Daly 1987). Mesh size was 223 and 569 µm. This net, with a filtration ratio of 1.25:1, was the principal sampling device throughout the remaining field program though the netting itself was replaced with a high filtration type mesh (4:1 filtration ratio) in March 1972. All subsequent samples were collected with the 4:1 filtration ratio net.

An overlapping sampling scheme was used starting in October 1969. Sampling depths were at 10 m intervals from 300 to 10 m, 100 m intervals from 1000 to 10 m, and 500 m intervals from the bottom to 10 m. The 10 m upper limit was chosen to protect the net during retrieval through the hydrohole. Samples were collected from as deep as 2500 m.

Two other kinds of nets were sometimes employed: a 3 m² closing umbrella net with 300 µm mesh in summer 1968 and a 1 m² plummet net with 571 µm mesh initially in May 1971 and periodically thereafter. The plummet net is a downward fishing net with an opening-closing mechanism activated with a messenger (Macaulay 1978; Macaulay and Daly in prep.).

Sorting, identifying, and counting of some samples were done in Seattle (Table 3). Other samples have been analyzed for some groups of organisms, primarily copepods. These data are available in the School of Oceanography, but obtaining them will require an investigator to visit the University of Washington.

Echo-sounder

Echo-sounding was conducted from April 1970 to April 1974. A modified Ross 200A (100 kHz) echo-sounder and 10° transducer with an impedance matching box scanned depth ranges of 0-50, 50-100, 100-150, and 150-200 fm. The 0-50 fm depth range was emphasized because of interest in the scattering layer often found about 25 fm. The system included the standard Ross 200A transceiver unit, recorder unit, and a Sony TC-5600 stereo tape recorder. During regular

Table 3. List of T-3 zooplankton samples analyzed and used in theses, reports, and publications

Hughes (1968)	399 samples collected with a plankton pump
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
Scott (1969)	523 samples collected with a pump, 1 m closing ring net and 2 m ² umbrella net
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
	04 10 Jul - 6 Sep 1967
	05 13 Sep - 23 Sep 1967
Damkaer (1976)	52 samples collected with a 1 m closing ring net
Cruises:	04 12 Jul - 8 Sep 1967
	06 5 May 1968
	07 10 Jun - 18 Aug 1968
Heron and Damkaer (1976)	2 samples collected with a 1 m closing ring net
Cruises:	07 10 Jun 1968
	12 Jun 1968
Pautzke (1979)	16 samples collected with a 2 m ² umbrella net
Cruises:	14 7 Jun - 5 Oct 1970
	18 30 May - 1 Oct 1971
	22 31 May - 29 Sep 1972
	26 28 May - 19 Oct 1973
Heron, English, and Damkaer (1984)	54 samples collected with a 1 m closing ring net and 3 m ² umbrella net
Cruises:	06 5 May 1968
	07 10 Jun - 20 Sep 1968
	08 21 Sep 1968

operation, echo-sounding was conducted continuously, normally on the 0-50 fm scale. Daily recordings of 15-45 min were made using all depth ranges. Some of these data are available on 1/4 inch magnetic tape, but retrieval will be difficult.

Data Management

The data were available from computer printouts or raw data sheets. The original punched data cards could not be located so the data were re-entered directly to disk files on the University of Washington Cyber 180-855 computer using a Tandy Model DT-1 data terminal. After editing the files to correct data entry errors or to fill in gaps in the data, the files were transferred to a 9-track, EBCDIC-coded magnetic tape for NODC. The resulting tape contains three files of hydrographic data, one file of chlorophyll data, and one file of primary productivity data.

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DATA DOCUMENTATION FORM

NOAA FORM 24-13
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(While you are not required to use this form, it is the most desirable mechanism for providing the required ancillary information enabling the NODC and users to obtain the greatest benefit from your data.)

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED Dr. T. Saunders English School of Oceanography WB-10 University of Washington Seattle, WA 98195			
2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED Primary Production and energy flow		3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT TSE-(T-3)-03	
4. PLATFORM NAME(S) Fletcher's Ice Island (T-3)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.) ice island	6. PLATFORM AND OPERATOR NATIONALITY(IES) USA USA	7. DATES FROM: MO/DAY/YR TO: MO/DAY/YR 02/01/67 02/15/67
8. ARE DATA PROPRIETARY? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR _____ MONTH _____		11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED. GENERAL AREA 	
9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?) <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> PART (SPECIFY BELOW) Should be available for international exchange			
10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER (AND ADDRESS IF OTHER THAN IN ITEM-1) Dr. Karl Banse School of Oceanography WB-10 University of Washington Seattle, WA 98195 (206) 543-5079			

TSE-(T-3) - 3
FEBRUARY 1967

T-3
(to scale)

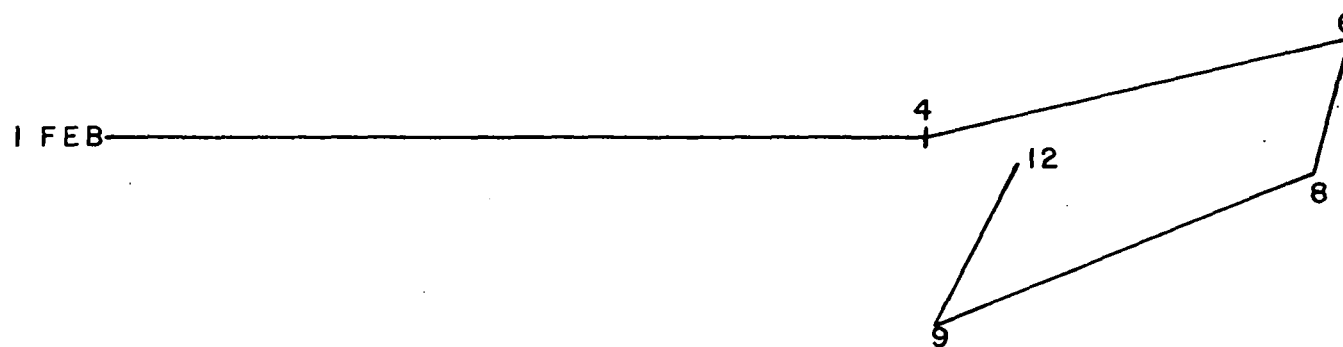


FIG. 1

TSE-(T-3)-03 01 Feb 1967 - 15 Feb 1967

Modifications to the basic program methods

Zooplankton samples were collected with a 7.6 cm centrifugal pump with water pumped through 10 cm diameter underwater hose clamped to the hydrographic wire. Rate of discharge varied from ca. 0.2 to 0.6 m³ per min. The water was filtered through a conical net having a base of 0.5 m and height of 0.6 m suspended in a 0.1 m³ container. Net mesh size was 215 μ m.

Samples were collected at 5 m intervals over a depth range of 10 to 185 m for periods of 20 and 30 min. Volumes ranged from 5 to 18 m³.

174 samples were collected (87 day, 87 night).

For sample analysis, see Hughes 1968; Scott 1969.

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Water transparency	meters	Secchi Disk	N/A	N/A
Depth of Sample	meters	Wire out	N/A	N/A
Temperature	°C	Reversing thermometers	N/A	N/A
Salinity	‰	Nansen bottles, modified Van Dorn bottles	Salinometer, University of Washington	N/A
Sigma-t	-	"	-	N/A
Dissolved oxygen	ml/l	"	Winkler	N/A
PO ₄	µg-atom/l	"	See Strickland and Parsons (1968)	N/A
NO ₃	"	"	"	N/A
SiO ₄	"	"	"	N/A
Chlorophyll <u>a</u>	mg m ⁻³	Van Dorn bottles	Spectrophotometer, fluorometer (Strickland and Parsons 1963)	N/A
Primary productivity (14C uptake)	mg C m ⁻³ h ⁻¹	"	Strickland and Parsons (1968)	N/A

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-1 ☐ ALGOL ☐ COBOL
☐ FORTRAN ☐ _____ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:

NAME AND PHONE NUMBER _____

ADDRESS _____

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

<p>5. RECORDING MODE</p> <p><input type="checkbox"/> BCD <input type="checkbox"/> BINARY</p> <p><input type="checkbox"/> ASCII <input checked="" type="checkbox"/> EBCDIC</p> <p><input type="checkbox"/> _____</p>	<p>9. LENGTH OF INTER-RECORD GAP (IF KNOWN) <input checked="" type="checkbox"/> 3/4 INCH</p> <p><input type="checkbox"/> _____</p>
<p>6. NUMBER OF TRACKS (CHANNELS)</p> <p><input type="checkbox"/> SEVEN</p> <p><input checked="" type="checkbox"/> NINE</p> <p><input type="checkbox"/> _____</p>	<p>10. END OF FILE MARK</p> <p><input type="checkbox"/> OCTAL 17</p> <p><input checked="" type="checkbox"/> Tape Mark</p>
<p>7. PARITY</p> <p><input checked="" type="checkbox"/> ODD</p> <p><input type="checkbox"/> EVEN</p>	<p>11. PASTE-ON-PAPER LABEL DESCRIPTION (INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)</p> <p>Ice Island T-3 hydro, chlorophyll, & Productivity data sets. Specs. - 9 track, EBCDIC, odd parity, 1600 bpi, 5 files, D=PE, RL=120, MBL = 3000, CV = EB, F=S, LB=KU</p>
<p>8. DENSITY</p> <p><input type="checkbox"/> 200 BPI <input checked="" type="checkbox"/> 1600 BPI</p> <p><input type="checkbox"/> 556 BPI</p> <p><input type="checkbox"/> 800 BPI</p> <p><input type="checkbox"/> _____</p>	<p>12. PHYSICAL BLOCK LENGTH IN BYTES</p> <p>FL=120 MBL=3000 Char.</p> <p>13. LENGTH OF BYTES IN BITS</p>

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALI- BRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Fluorometer Turner Model 111		X			X				
Reversing thermometers		X	manufacturer		X				
Salinometer Univ. Washington		X			X				
Naval Arctic Research Lab.		X			X				

Primary Production and Energy Flow

The program was directed by the late Dr. T. Saunders English and funded by the Office of Naval Research Contract Nonr-477 (37) Project NR 083 12 and Contract N00014-67-0103-0005. Users of the data are requested to acknowledge the agency support.

The methods used by biological oceanographers of the Department of Oceanography, University of Washington, Seattle, from 1966 to 1974 on Fletcher's Ice Island (T-3) drifting in the Arctic Ocean (Fig. 1) are given below. These methods are to compliment the entries in the individual cruise Data Documentation Forms where modifications, if any, are given.

General

The field program was maintained at various intensities for eight years (March 1966 to June 1974), with personnel on T-3 continuously from April 1968 until the island was evacuated in June 1974. During this period, divided into 28 cruises (Table 1), biological and environmental parameters were measured (Table 2). The sampling program was structured to monitor periods of active change in the various parameters. Thus, hydrography and zooplankton sampling was a year round pursuit, field and logistic conditions permitting, whereas chlorophyll a concentrations and primary productivity (^{14}C uptake) were usually measured only during the summer (June to September). Various gear types, methodologies, and sampling strategies were tried and tested throughout the field program.

The oceanographic working area was located on 3-4 m thick sea ice in Colby Bay adjacent to the ice island. All sampling was done from inside a heated building positioned over a hole, ca. 1.5 m on a side, cut in the ice. The hut contained a space heater, oceanographic sampling equipment, and a Rankin winch powered by a .5 hp Wisconsin gasoline engine. The drum on the winch held about 4000 m of 5/32 inch hydrographic wire. The wire ran through a meter wheel attached to a tripod erected over the hole.

Geographic positions were provided by the Lamont-Doherty Geological Observatory, Palisades, NY (Hunkins and Tiemann 1977). Hydrography and biology (chlorophyll a and primary productivity) samples were not always taken from the same bottle cast or on the same day. Each kind of data has a separate sample numbering scheme. As a result, station positions may not always agree between the hydrographic and biological data. See individual cruise Data Documentation

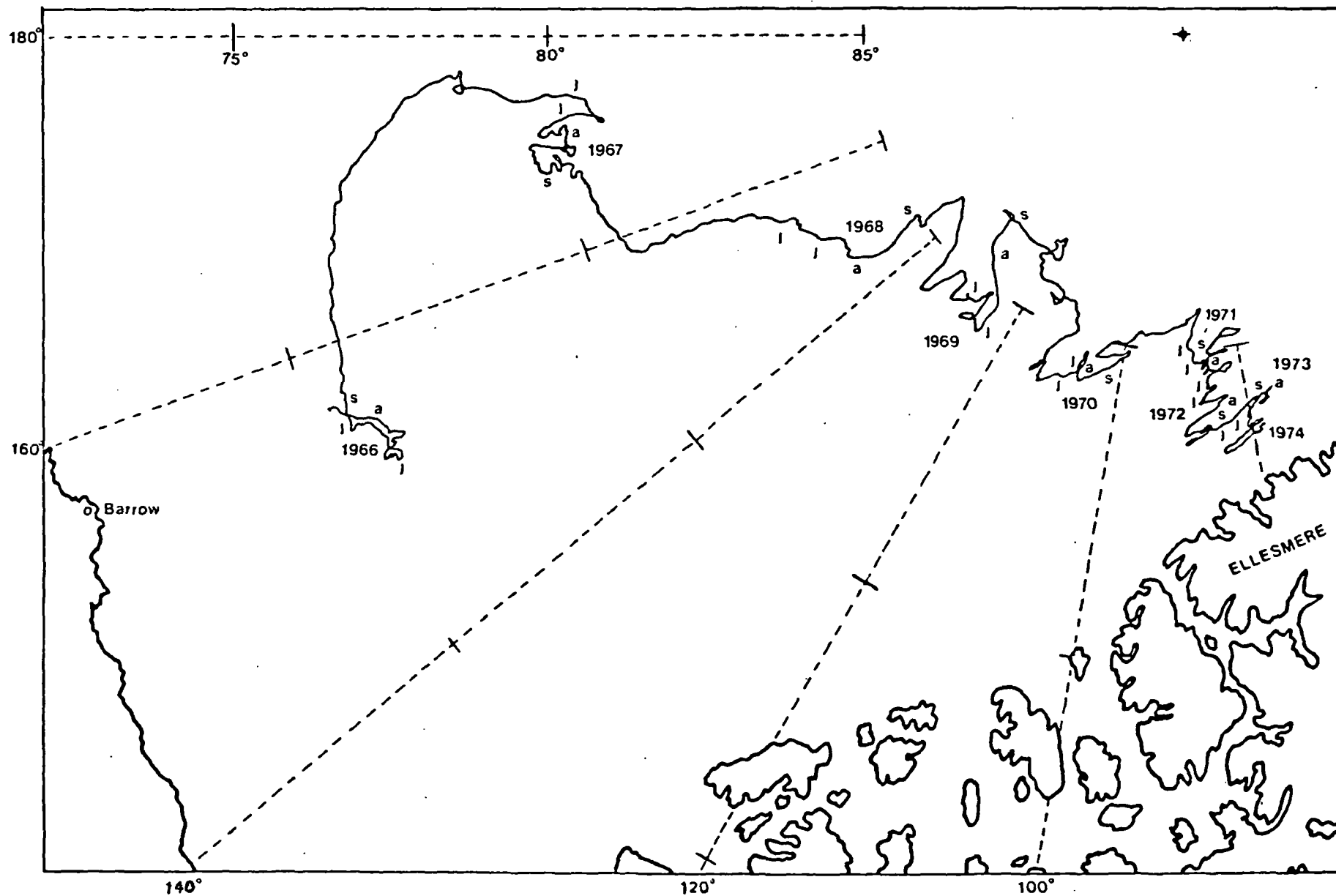


Fig. 1. Drift track of T-3 from June 1966 to April 1974. The months of June, July, August, and September are indicated in small letters for each year.

Table 1. Cruise numbers and dates of T-3 field program

Cruise		Cruise	
Number	Duration	Number	Duration
01	16 Mar 66 - 9 Apr 66	15	5 Oct 70 - 30 Dec 70
02	2 Jun 66 - 18 Oct 66	16	1 Jan 71 - 30 Mar 71
03	1 Feb 67 - 15 Feb 67	17	30 Mar 71 - 30 May 71
04	4 Jun 67 - 11 Sep 67	18	30 May 71 - 1 Oct 71
05	12 Sep 67 - 24 Sep 67	19	1 Oct 71 - 20 Dec 71
06	27 Apr 68 - 9 Jun 68	20	20 Dec 71 - 20 Mar 72
07	10 Jun 68 - 20 Sep 68	21	20 Mar 72 - 31 May 72
08	21 Sep 68 - 31 Jan 69	22	31 May 72 - 29 Sep 72
09	31 Jan 69 - 13 Jun 69	23	29 Sep 72 - 13 Dec 72
10	13 Jun 69 - 3 Oct 69	24	13 Dec 72 - 7 Apr 73
11	4 Oct 69 - 5 Jan 70	25	7 Apr 73 - 28 May 73
12	5 Jan 70 - 23 Mar 70	26	28 May 73 - 19 Oct 73
13	23 Mar 70 - 7 Jun 70	27	31 Oct 73 - 8 Mar 74
14	7 Jun 70 - 5 Oct 70	28	8 Mar 74 - 1 Jun 74

Table 2. Field data collected at T-3, March 1966 to June 1974

Parameter	Total Number of Samples	1966												1967												1968											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Hydrography																																					
Salinity	5354				X																															X	X
Temperature	5354				X																															X	X
Dissolved oxygen	5198				X																															X	X
Nutrients																																					
Nitrate	3611																																				
Silicate	3440																																				
Phosphate	3440																																				
Phytoplankton																																					
Chlorophyll <u>a</u>	8022							X	X								X	X	X	X									X	X	X	X					
Productivity	4978																X	X	X										X	X	X						
Cell Counts	5838																												X	X	X	X					
Zooplankton																																					
Acoustic traces	40 mo																																				
Plankton pump	427					X	X	X	X	X			X				X	X	X	X																	
Nets (mesh size μm)																																					
0.5 m ring (215)	38			X	X																																
1 m closing ring (110)	355																												X	X	X	X	X				
1 m closing ring (215)	318																X	X	X																		
1 m ² plummet (571)*	56																																				
2 m ² umbrella (223) [†]	9112																		X									X	X	X	X	X	X	X			
2 m ² umbrella (569)	95																														X	X					
3 m ² umbrella (300)	104																												X	X	X						

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2. (cont.)

[illegible]

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2 (cont.)

Parameter	Total Number of Samples	1972												1973												1974													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Temperature	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Dissolved oxygen	5198	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Nutrients																																							
Nitrate	3611	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Silicate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Phosphate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X									X	X	X	X																	
Productivity	4978						X	X	X	X	X								X	X	X	X																	
Cell Counts	5838						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Zooplankton																																							
Acoustic traces	40 mo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
Plankton pump	427																																						
Nets (mesh size μm)																																							
0. 5 m ring (215)	38																																						
1 m closing ring (110)	355																																						
1 m closing ring (215)	318																																						
1 m ² plummet (571)*	56					X	X																																
2 m ² umbrella (223) †	9112	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Forms for kind of sampling bottle used.

Hydrography and Nutrients

Temperature, salinity, oxygen, and nutrient determinations were made on water collected with Van Dorn polyvinylchloride or uncoated Nansen water sampling bottles. The Van Dorn bottles contained surgical tubing which may or may not be toxic to organisms (see Price et al. 1986). In general, the upper 100 m was sampled at 5 m intervals, 125-375 m at 25 m intervals, 400-500 m at 50 m intervals, 600-1000 m at 100 m intervals, and 1000 m to the bottom at 250 m intervals with a 30 m interval between the last bottle and the bottom. Periodically, additional samples were taken at 2 m intervals around the pycnocline (usually 40-60 m). In periods when weekly casts were taken, an alternating pattern of sampling, 0-100 m, 0-500 m, 0-100 m, 0-deep, allowed a more frequent survey of short-term variation in the near-surface stratum without the additional burden of time-consuming deep casts. Because of heat lamps and cables and the accumulation of freshwater in the hydrohose, surface readings would not have been representative, therefore the top bottle of a hydrocast was usually placed 5 m below the water surface.

The highest observed wire angles during these cruises were about 4°. For a 1000 m cast, this would yield a true depth of 998 m at the bottom. Computations of thermometric depths (Wüst 1933) were performed for those observations deeper than 250 m where unprotected thermometers were used for which calibrations were still available (262 depths at 45 stations). With the exception of two casts (Cruise 11, station 1, cast 5, 1400-2000 m and Cruise 13, station 12, cast 5, 590-1300 m), all calculated values were generally within 2-3% of the nominal depths sampled. These two casts were corrected. All other depths reported here are uncorrected, but should be within 2-5% of the true value.

Temperatures were determined from reversing thermometers on each water bottle; protected thermometers were usually deployed in pairs. Bottles were tripped about 5 min after the top bottle reached its intended depth. Thermometers were read using a lighted magnifying glass about 15 min after retrieval. Readings were corrected from the auxiliary thermometers and the thermometer constants by an IBM 1130 program at the Department of Oceanography, University of Washington.

Over 100 reversing thermometers were used during the course of these observations. They were calibrated either by the manufacturers or at various times at the University of Washington. Calibration data available from the

latest date preceding the use of each thermometer on T-3 were used to correct the thermometer readings. The calibrations were usually 0.5-3 yr old when they were applied to these data.

Salinity samples were drawn into 250 ml clear polyethylene bottles, tightly sealed, and allowed to come to room temperature. Determinations were made on T-3 using an Industrial Instruments Model RS-7A (Industrial Instruments Co., Cedar Grove, NJ) or a Beckman Model RS-7B (Beckman Instruments, Inc., Fullerton, CA) portable induction salinometer calibrated against a standard seawater sample obtained from the Laboratoire Hydrographique (Copenhagen, Denmark). Substandards of seawater (ca. 34.9‰ collected from ca. 500 m) were used after each 10 samples and at the end of a run. Salinity was calculated using the tables in the salinometer manual (Industrial Instruments 1964). These values are considered to have an accuracy of ± 0.003 ppt.

Dissolved oxygen was analyzed by a modified Winkler method (Strickland and Parsons 1965). Brown BOD bottles of 250 ml capacity, an automatic 100 ml pipet, an automatic 25 ml burette readable to 0.01 ml, and an electric stirrer were used.

Nutrients were determined by the methods in Strickland and Parsons (1968). The samples were either analyzed immediately after collection or frozen for later analysis either on the ice, or during April and May 1971, at the University of Washington using a Beckman DU spectrophotometer (Beckman Instruments, Inc., Fullerton, CA) with 1 cm cells. After December 1972, nitrate determinations were run on a Brinkman PC/1000 colorimeter (Brinkman Instruments, Westbury, NY) with a fiber optics probe and calibrated against the spectrophotometer. Reagents and standards were prepared from water filtered through an Ion-X-Change column, Grade 1, consisting of a mixed bed non-regenerable resin (Illinois Water Treatment Co.) that produces triple distilled water. Comparisons between reagents and standards made up with this water and with distilled water sent from the Naval Arctic Research Laboratory at Barrow showed these procedures to be adequate. Standards were run with each set of samples and for each nitrate column.

Chlorophyll a

Chlorophyll a was determined according to Strickland and Parsons (1968). In 1968 through 1970, water was filtered through 47 mm 0.45 μ m Millipore filters (Millipore Corporation, Bedford, MA). Suction pressure was less than 250 mm Hg. In 1971 through 1973, Gelman A/E glass fiber filters (approximate

pore size = 1.0 μm) (Gelman Instrument Co., Ann Arbor, MI) were used. MgCO_3 was added to all filters near the end of the filtration. In 1968, samples of about 4 liters of water were analyzed using a Beckman DK spectrophotometer in Seattle and chlorophyll a was calculated using the SCOR-UNESCO equations (Unesco 1966). For 1968 through 1973, samples of about 2 liters of water were filtered and a Turner Model 111 fluorometer (G. K. Turner Associates, Palo Alto, CA) was used for analysis. Fluorometer filters were 5-60 and 2-64. The fluorometer was calibrated using either a Beckman DU spectrophotometer on T-3 or a Beckman DK scanning spectrophotometer in Seattle. For samples analyzed with the fluorometer, chlorophyll a was calculated using equations in Holm-Hansen et al. (1967). Phaeopigments were not determined.

Primary Productivity

Primary productivity was measured during the summers by the radiocarbon technique of Steemann-Nielsen (1952) as detailed by Strickland and Parsons (1968). Two experimental schemes were used:

1. Depth series - paired 130 ml light and dark bottles were filled with water collected from a number of depths and incubated under constant high illumination (for the level of irradiance, see below).
2. Graduated light series - five light and one dark bottle containing water from one depth were incubated under 0, 10, 25, 50, 75, and 100% irradiance provided by glass neutral density filters over the incubation bottles.

For both series, dark bottles were pre-wrapped with black tape and then covered with aluminum foil to insure complete darkness. Depths and frequencies of sampling varied from year to year.

The plastic incubator box was fronted with clear plexiglass and had a wheel that rotated in the vertical plane. The wheel accommodated 12 ground-glass stoppered 130 ml bottles. At various times, because of stripped gears, the wheel did not rotate or was manually turned periodically during incubation. Light, provided by a bank of 12 GE Cool-White fluorescent lamps (General Electric Corporation, Stamford, CT), and amount of radioactivity added varied from year to year. Highest irradiance (= 100%) in the incubator was between 1100 and 1400 ft-c measured with a GE Model No. 214 photometer (General Electric Corporation, Stamford, CT). A pumped water flow-through system maintained ambient incubator temperature near 0°C. Samples were incubated for 6 or 12 hr.

At the end of the incubation, the samples were filtered (suction pressure

less than 250 mm Hg) onto 25 mm, 0.45 μ m Millipore filters, washed with filtered seawater, air-dried, and stored over desiccant until analyzed. Filters were fumed over concentrated HCl and counted three times for 1000 counts, using a gas flow proportional counter (Nuclear Chicago Corporation, Des Plaines, IL). Counting was done either in Seattle using a Nuclear Chicago Model D-47 counter with micromil window, C-110 automatic sample changer, 161-A scaler, and C111B printing timer, or on T-3 using a Nuclear Chicago manual, end-window Model 8770 scaler, Model 3053 sample changer, Model 108 G-M detector, and Model 8420 dual timer.

Carbon uptake was calculated from

$$P = (L-D)(W)(1.05)/(Z)(T)$$

where P is in $\text{mg C m}^{-3} \text{ h}^{-1}$; L-D is the difference between the light and dark bottle in counts per minute corrected for machine background and coincidence; W is the total carbonate in mg C m^{-3} calculated from $W = (810)(S^{\circ}/\text{‰})$ as suggested by Dr. G. C. Anderson, Department of Oceanography, University of Washington; 1.05 is the isotope discrimination factor (Strickland 1960); Z is the total activity in counts per minute added to the sample and corrected for the counter efficiency of about 22.8%; T is the incubation time (6 or 12 hr).

All ^{14}C ampoules used on T-3 were prepared in the Department of Oceanography, University of Washington, from aqueous sodium carbonate obtained from Nuclear Chicago Corporation. All glassware was rinsed with distilled water and autoclaved. The amount of solution to be made was determined by dividing the activity of the stock aqueous sodium carbonate by the desired activity per ml of final solution. Glass distilled water was filtered through 47 mm, 0.45 μ m Millipore filters. The pH was adjusted to 9.5-9.7 with NaOH. The solution was well mixed, and after adding the commercial sodium carbonate, mixed again. Glass ampoules holding 2 or 5 ml of solution were filled by an automatic volume dispenser. The ampoules were sealed using propane torches. The sealed ampoules were placed in large beakers, covered with water to which methylene blue dye was added, and autoclaved for ca. 1 hr at 120°C. After washing away the dye, the ampoules were inspected for any sign of color inside them. Ampoules that were even slightly discolored were discarded. The filled ampoules were color-coded with spray paint and stored.

Several ampoules from the beginning, middle, and end of the filling process were kept separate to be used for standardization. Standardization was done using methods then employed by the Department of Oceanography, University of Washington, where ampoules were either sent to Dr. C. R. Goldman, University of

California, Davis, and analyzed using gas phase (Goldman 1963; Steemann-Nielsen 1974) or, in the Department of Oceanography, University of Washington, were compared to samples obtained from the National Bureau of Standards. From 1970-1973, ampoules were standardized by liquid scintillation techniques and external standards at the Department of Oceanography.

Phytoplankton Cell Counts

Samples for phytoplankton identification and cell counts were usually taken from Nansen bottles during hydrocasts and stored in 250 ml glass jars. They were preserved with 4% formalin, buffered (sodium borate) or unbuffered, for a final strength of approximately 1%. Samples were shipped to Seattle for later analysis. Some samples were collected from a water pumping system during summer 1970 (see below).

Phytoplankton species were enumerated for some of the samples collected in the summers of 1968, 1969, and 1971 with the inverted microscope method (Hasle 1978a, b). Samples were individually counted or samples from two, three, or four days were combined for each depth. The samples combined to make a composite were separated in time by one week or less. After thorough mixing, the samples were poured into 5 and 50 ml Zeiss counting chambers (Carl Zeiss, Oberkochen Würt, FRG) and allowed to settle at least 20 hr before counting. A Zeiss inverted microscope was used for all enumerations. The 5 ml chamber was counted at 390 X using a 25 X objective, 12.5 X oculars, and a magnification factor of the optics carrier of 1.25. The 50 ml chamber was counted at 156 X with a 10 X objective, 12.5 X oculars, and the 1.25 X magnification factor. Cell counts were converted to cells per liter, cell volumes (Larrance 1964), and cell carbon (Mullin et al. 1966). These data are contained in an unpublished manuscript (Walline 1973) available from the School of Oceanography, University of Washington.

Zooplankton

Zooplankton sampling was maintained from March 1966 through April 1974. Gear types, sampling periods, and depth intervals sampled varied between and within years. Regardless of the gear used, all samples were concentrated and preserved in 4% V/V formalin (final concentration) buffered with either sodium acetate or sodium borate.

Initially, samples were taken with an open 0.5 m diameter ring net with 215 μ m mesh gauze. From June 1966 through July 1967, a 7.6 cm centrifugal

pump system with a 10 cm diameter hose intake was lowered. A 25 kg weight at the end of the wire held down the hose intake. Since wire angles were low, the depth of sampling was estimated from the length of the wire. Maximum depth of sampling was about 185 m. Samples of 5 to 18 m³ of water were filtered at a rate of 0.2 to 0.6 m³ per min through a net of 215 µm mesh size. Beginning in early July 1967, a closing 1 m diameter ring net of either 110 or 215 µm mesh was used to sample to 1000 m. This sampling overlapped with pumping stations to assure comparability.

Sampling with a 2 m² closing umbrella net began in September 1967 (Scott 1969; Macaulay and Daly 1987). Mesh size was 223 and 569 µm. This net, with a filtration ratio of 1.25:1, was the principal sampling device throughout the remaining field program though the netting itself was replaced with a high filtration type mesh (4:1 filtration ratio) in March 1972. All subsequent samples were collected with the 4:1 filtration ratio net.

An overlapping sampling scheme was used starting in October 1969. Sampling depths were at 10 m intervals from 300 to 10 m, 100 m intervals from 1000 to 10 m, and 500 m intervals from the bottom to 10 m. The 10 m upper limit was chosen to protect the net during retrieval through the hydrohole. Samples were collected from as deep as 2500 m.

Two other kinds of nets were sometimes employed: a 3 m² closing umbrella net with 300 µm mesh in summer 1968 and a 1 m² plummet net with 571 µm mesh initially in May 1971 and periodically thereafter. The plummet net is a downward fishing net with an opening-closing mechanism activated with a messenger (Macaulay 1978; Macaulay and Daly in prep.).

Sorting, identifying, and counting of some samples were done in Seattle (Table 3). Other samples have been analyzed for some groups of organisms, primarily copepods. These data are available in the School of Oceanography, but obtaining them will require an investigator to visit the University of Washington.

Echo-sounder

Echo-sounding was conducted from April 1970 to April 1974. A modified Ross 200A (100 kHz) echo-sounder and 10° transducer with an impedance matching box scanned depth ranges of 0-50, 50-100, 100-150, and 150-200 fm. The 0-50 fm depth range was emphasized because of interest in the scattering layer often found about 25 fm. The system included the standard Ross 200A transceiver unit, recorder unit, and a Sony TC-5600 stereo tape recorder. During regular

Table 3. List of T-3 zooplankton samples analyzed and used in theses, reports, and publications

Hughes (1968)	399 samples collected with a plankton pump
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
Scott (1969)	523 samples collected with a pump, 1 m closing ring net and 2 m ² umbrella net
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
	04 10 Jul - 6 Sep 1967
	05 13 Sep - 23 Sep 1967
Damkaer (1976)	52 samples collected with a 1 m closing ring net
Cruises:	04 12 Jul - 8 Sep 1967
	06 5 May 1968
	07 10 Jun - 18 Aug 1968
Heron and Damkaer (1976)	2 samples collected with a 1 m closing ring net
Cruises:	07 10 Jun 1968
	12 Jun 1968
Pautzke (1979)	16 samples collected with a 2 m ² umbrella net
Cruises:	14 7 Jun - 5 Oct 1970
	18 30 May - 1 Oct 1971
	22 31 May - 29 Sep 1972
	26 28 May - 19 Oct 1973
Heron, English, and Damkaer (1984)	54 samples collected with a 1 m closing ring net and 3 m ² umbrella net
Cruises:	06 5 May 1968
	07 10 Jun - 20 Sep 1968
	08 21 Sep 1968

operation, echo-sounding was conducted continuously, normally on the 0-50 fm scale. Daily recordings of 15-45 min were made using all depth ranges. Some of these data are available on 1/4 inch magnetic tape, but retrieval will be difficult.

Data Management

The data were available from computer printouts or raw data sheets. The original punched data cards could not be located so the data were re-entered directly to disk files on the University of Washington Cyber 180-855 computer using a Tandy Model DT-1 data terminal. After editing the files to correct data entry errors or to fill in gaps in the data, the files were transferred to a 9-track, EBCDIC-coded magnetic tape for NODC. The resulting tape contains three files of hydrographic data, one file of chlorophyll data, and one file of primary productivity data.

References

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DATA DOCUMENTATION FORM

NOAA FORM 24-13
(4-77)U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
WASHINGTON, DC 20235FORM APPROVED
O.M.B. No. 41-R2651
EXPIRES 1-81

(While you are not required to use this form, it is the most desirable mechanism for providing the required ancillary information enabling the NODC and users to obtain the greatest benefit from your data.)

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

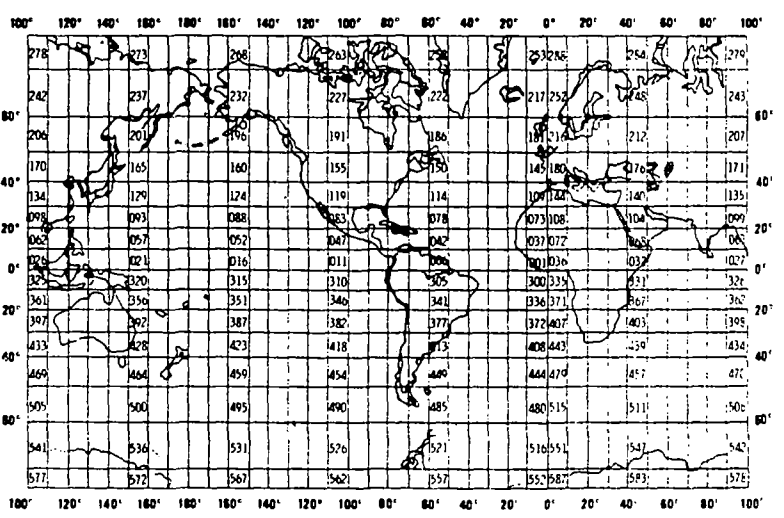
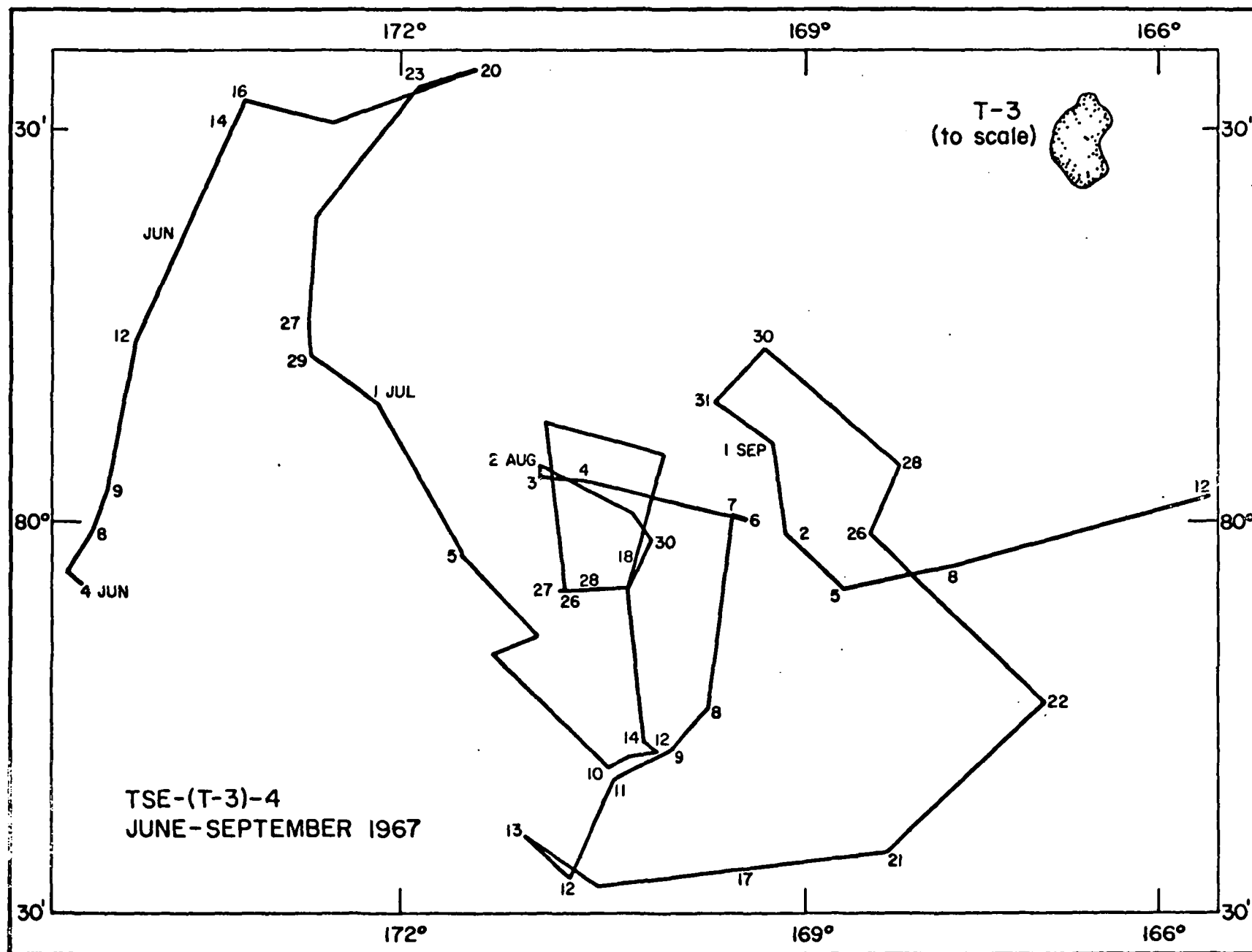
1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED Dr. T. Saunders English School of Oceanography WB-10 University of Washington Seattle, WA 98195			
2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED Primary production and energy flow		3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT TSE-(T-3)-04	
4. PLATFORM NAME(S) Fletcher's Ice Island (T-3)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.) Ice island	6. PLATFORM AND OPERATOR NATIONALITY(IES) PLATFORM OPERATOR USA USA	7. DATES FROM: MO/DAY/YR TO: MO/DAY/YR 06/04/67 09/11/67
8. ARE DATA PROPRIETARY? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR MONTH		11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED. GENERAL AREA 	
9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?) <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> PART (SPECIFY BELOW) Data should be available for international exchange			
10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER (AND ADDRESS IF OTHER THAN IN ITEM-1) Dr. Karl Banse School of Oceanography WB-10 University of Washington Seattle, WA 98195 (206)543-5079			

FIG. 1



TSE-(T-3)-04 04 Jun 1967 - 11 Sep 1967

Modifications to the basic program methods

Zooplankton samples were collected at 25 and 45 m with a 7.6 cm centrifugal pump with water pumped through 10 cm diameter underwater hose clamped to the hydrographic wire. Approximately 10 m³ of water were filtered through a 215 μ m mesh net. Fourteen day and fourteen night samples were collected.

Zooplankton samples were also collected with a 1 m closing ring net, mesh size 215 μ m, over 10 m depth intervals from 10 - 100 m, 20 m intervals from 100 - 200 m, 50 m intervals from 200 - 400 m, and 100 m intervals from 400 - 1000 m. Two hundred forty-three samples were collected.

Chlorophyll a and primary productivity data collected during this cruise were lost.

For zooplankton sample analysis see Hughes 1968; Scott 1969; Damkaer 1976.

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Water transparency	meters	Secchi Disk	N/A	N/A
Depth of Sample	meters	Wire out	N/A	N/A
Temperature	°C	Reversing thermometers	N/A	N/A
Salinity	‰	Nansen bottles, modified Van Dorn bottles	Salinometer, University of Washington	N/A
Sigma-t	-	"	-	N/A
Dissolved oxygen	ml/l	"	Winkler	N/A
PO ₄	µg-atom/l	"	See Strickland and Parsons (1968)	N/A
NO ₃	"	"	"	N/A
SiO ₄	"	"	"	N/A
Chlorophyll <u>a</u>	mg m ⁻³	Van Dorn bottles	Spectrophotometer, fluorometer (Strickland and Parsons 1968)	N/A
Primary productivity (14C uptake)	mg C m ⁻³ h ⁻¹	"	Strickland and Parsons (1968)	N/A

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

3. ATTRIBUTES AS EXPRESSED IN
- | | | |
|----------------------------------|--------------------------------|--------------------------------|
| <input type="checkbox"/> PL-1 | <input type="checkbox"/> ALGOL | <input type="checkbox"/> COBOL |
| <input type="checkbox"/> FORTRAN | <input type="checkbox"/> _____ | LANGUAGE |

4. RESPONSIBLE COMPUTER SPECIALIST:

NAME AND PHONE NUMBER _____

ADDRESS _____

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

<p>5. RECORDING MODE</p> <table style="width: 100%;"> <tr> <td><input type="checkbox"/> BCD</td> <td><input type="checkbox"/> BINARY</td> </tr> <tr> <td><input type="checkbox"/> ASCII</td> <td><input checked="" type="checkbox"/> EBCDIC</td> </tr> <tr> <td colspan="2"><input type="checkbox"/> _____</td> </tr> </table>	<input type="checkbox"/> BCD	<input type="checkbox"/> BINARY	<input type="checkbox"/> ASCII	<input checked="" type="checkbox"/> EBCDIC	<input type="checkbox"/> _____		<p>9. LENGTH OF INTER-RECORD GAP (IF KNOWN) <input checked="" type="checkbox"/> 3/4 INCH <input type="checkbox"/> _____</p>		
<input type="checkbox"/> BCD	<input type="checkbox"/> BINARY								
<input type="checkbox"/> ASCII	<input checked="" type="checkbox"/> EBCDIC								
<input type="checkbox"/> _____									
<p>6. NUMBER OF TRACKS (CHANNELS)</p> <table style="width: 100%;"> <tr> <td><input type="checkbox"/> SEVEN</td> </tr> <tr> <td><input checked="" type="checkbox"/> NINE</td> </tr> <tr> <td><input type="checkbox"/> _____</td> </tr> </table>	<input type="checkbox"/> SEVEN	<input checked="" type="checkbox"/> NINE	<input type="checkbox"/> _____	<p>10. END OF FILE MARK</p> <table style="width: 100%;"> <tr> <td><input type="checkbox"/> OCTAL 17</td> </tr> <tr> <td><input checked="" type="checkbox"/> Tape Mark</td> </tr> </table>	<input type="checkbox"/> OCTAL 17	<input checked="" type="checkbox"/> Tape Mark			
<input type="checkbox"/> SEVEN									
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<input checked="" type="checkbox"/> Tape Mark									
<p>7. PARITY</p> <table style="width: 100%;"> <tr> <td><input checked="" type="checkbox"/> ODD</td> </tr> <tr> <td><input type="checkbox"/> EVEN</td> </tr> </table>	<input checked="" type="checkbox"/> ODD	<input type="checkbox"/> EVEN	<p>11. PASTE-ON-PAPER LABEL DESCRIPTION (INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OR DATA TYPE, VOLUME NUMBER)</p> <p>Ice Island T-3 hydro, chlorophyll, & Productivity data sets. Specs.- 9 track, EBCDIC, odd parity, 1600 bpi, 5 files, D=PE, RL=120, MBL = 3000, CV = EB, F=S, LB=KU</p>						
<input checked="" type="checkbox"/> ODD									
<input type="checkbox"/> EVEN									
<p>8. DENSITY</p> <table style="width: 100%;"> <tr> <td><input type="checkbox"/> 200 BPI</td> <td><input checked="" type="checkbox"/> 1600 BPI</td> </tr> <tr> <td><input type="checkbox"/> 556 BPI</td> <td></td> </tr> <tr> <td><input type="checkbox"/> 800 BPI</td> <td></td> </tr> <tr> <td colspan="2"><input type="checkbox"/> _____</td> </tr> </table>	<input type="checkbox"/> 200 BPI	<input checked="" type="checkbox"/> 1600 BPI	<input type="checkbox"/> 556 BPI		<input type="checkbox"/> 800 BPI		<input type="checkbox"/> _____		<p>12. PHYSICAL BLOCK LENGTH IN BYTES FL=120 MBL=3000 Char.</p> <p>13. LENGTH OF BYTES IN BITS</p>
<input type="checkbox"/> 200 BPI	<input checked="" type="checkbox"/> 1600 BPI								
<input type="checkbox"/> 556 BPI									
<input type="checkbox"/> 800 BPI									
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D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALI- BRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Fluorometer Turner Model 111		X			X				
Reversing thermometers		X	manufacturer		X				
Salinometer Univ. Washington		X			X				
Naval Arctic Research Lab.		X			X				

Primary Production and Energy Flow

The program was directed by the late Dr. T. Saunders English and funded by the Office of Naval Research Contract Nonr-477 (37) Project NR 083 12 and Contract N00014-67-0103-0005. Users of the data are requested to acknowledge the agency support.

The methods used by biological oceanographers of the Department of Oceanography, University of Washington, Seattle, from 1966 to 1974 on Fletcher's Ice Island (T-3) drifting in the Arctic Ocean (Fig. 1) are given below. These methods are to compliment the entries in the individual cruise Data Documentation Forms where modifications, if any, are given.

General

The field program was maintained at various intensities for eight years (March 1966 to June 1974), with personnel on T-3 continuously from April 1968 until the island was evacuated in June 1974. During this period, divided into 28 cruises (Table 1), biological and environmental parameters were measured (Table 2). The sampling program was structured to monitor periods of active change in the various parameters. Thus, hydrography and zooplankton sampling was a year round pursuit, field and logistic conditions permitting, whereas chlorophyll a concentrations and primary productivity (^{14}C uptake) were usually measured only during the summer (June to September). Various gear types, methodologies, and sampling strategies were tried and tested throughout the field program.

The oceanographic working area was located on 3-4 m thick sea ice in Colby Bay adjacent to the ice island. All sampling was done from inside a heated building positioned over a hole, ca. 1.5 m on a side, cut in the ice. The hut contained a space heater, oceanographic sampling equipment, and a Rankin winch powered by a 5 hp Wisconsin gasoline engine. The drum on the winch held about 4000 m of 5/32 inch hydrographic wire. The wire ran through a meter wheel attached to a tripod erected over the hole.

Geographic positions were provided by the Lamont-Doherty Geological Observatory, Palisades, NY (Hunkins and Tiemann 1977). Hydrography and biology (chlorophyll a and primary productivity) samples were not always taken from the same bottle cast or on the same day. Each kind of data has a separate sample numbering scheme. As a result, station positions may not always agree between the hydrographic and biological data. See individual cruise Data Documentation

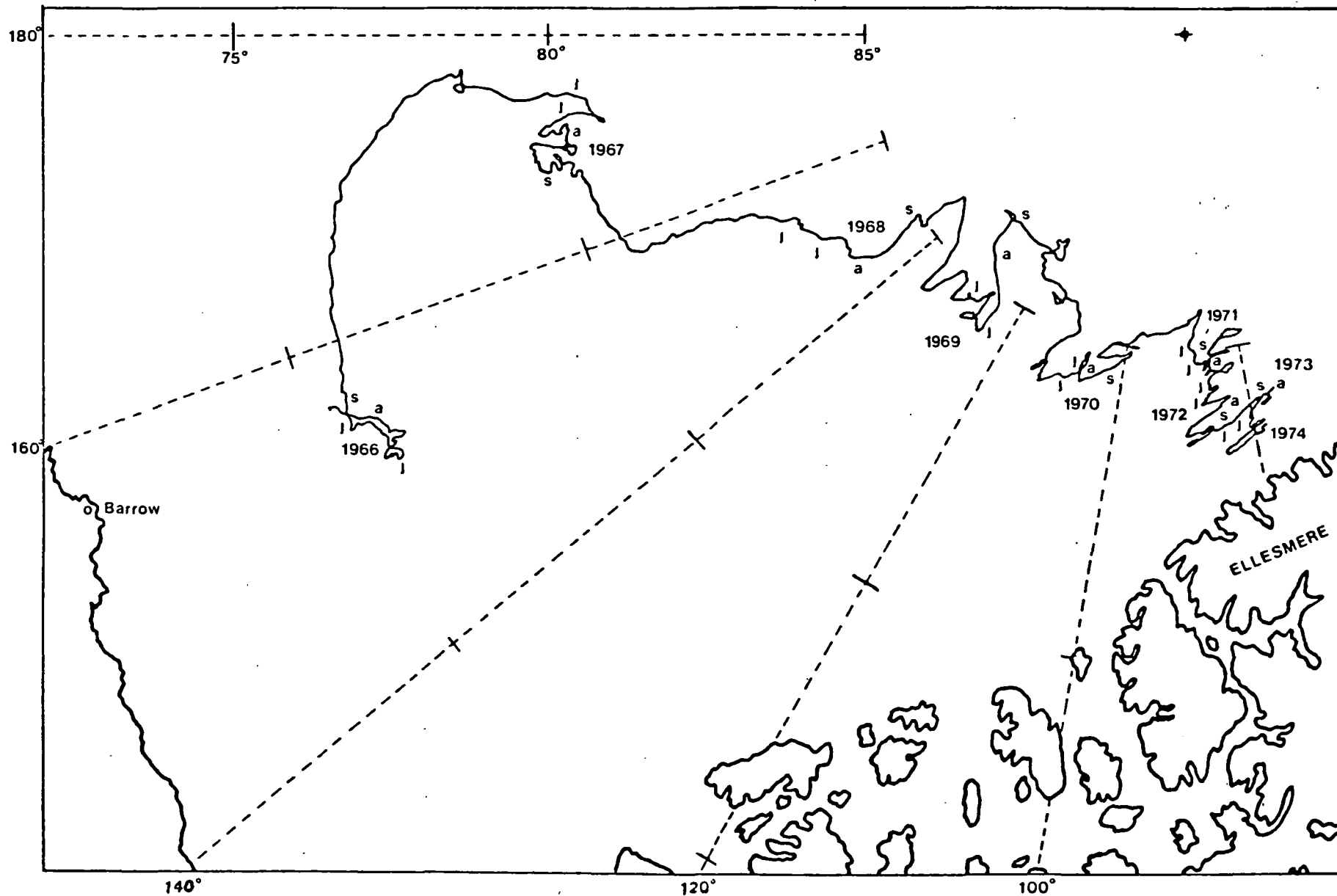


Fig. 1. Drift track of T-3 from June 1966 to April 1974. The months of June, July, August, and September are indicated in small letters for each year.

Table 1. Cruise numbers and dates of T-3 field program

Cruise		Cruise	
Number	Duration	Number	Duration
01	16 Mar 66 - 9 Apr 66	15	5 Oct 70 - 30 Dec 70
02	2 Jun 66 - 18 Oct 66	16	1 Jan 71 - 30 Mar 71
03	1 Feb 67 - 15 Feb 67	17	30 Mar 71 - 30 May 71
04	4 Jun 67 - 11 Sep 67	18	30 May 71 - 1 Oct 71
05	12 Sep 67 - 24 Sep 67	19	1 Oct 71 - 20 Dec 71
06	27 Apr 68 - 9 Jun 68	20	20 Dec 71 - 20 Mar 72
07	10 Jun 68 - 20 Sep 68	21	20 Mar 72 - 31 May 72
08	21 Sep 68 - 31 Jan 69	22	31 May 72 - 29 Sep 72
09	31 Jan 69 - 13 Jun 69	23	29 Sep 72 - 13 Dec 72
10	13 Jun 69 - 3 Oct 69	24	13 Dec 72 - 7 Apr 73
11	4 Oct 69 - 5 Jan 70	25	7 Apr 73 - 28 May 73
12	5 Jan 70 - 23 Mar 70	26	28 May 73 - 19 Oct 73
13	23 Mar 70 - 7 Jun 70	27	31 Oct 73 - 8 Mar 74
14	7 Jun 70 - 5 Oct 70	28	8 Mar 74 - 1 Jun 74

Table 2. Field data collected at T-3, March 1966 to June 1974

Parameter	Total Number of Samples	1966												1967												1968															
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D				
Hydrography																																									
Salinity	5354				X																																X	X			
Temperature	5354				X																																X	X			
Dissolved oxygen	5198				X																																X	X			
Nutrients																																									
Nitrate	3611																																								
Silicate	3440																																								
Phosphate	3440																																								
Phytoplankton																																									
Chlorophyll <u>a</u>	8022							X	X									X	X	X	X														X	X	X	X			
Productivity	4978																		X	X	X															X	X	X			
Cell Counts	5838																																				X	X	X	X	
Zooplankton																																									
Acoustic traces	40 mo																																								
Plankton pump	427						X	X	X	X	X		X					X	X	X	X																				
Nets (mesh size μ m)																																									
0.5 m ring (215)	38				X	X																																			
1 m closing ring (110)	355																																			X	X	X	X	X	
1 m closing ring (215)	318																		X	X	X																				
1 m ² plummet (571)*	56																																								
2 m ² umbrella (223) [†]	9112																			X																X	X	X	X	X	X
2 m ² umbrella (569)	95																																				X	X			
3 m ² umbrella (300)	104																																				X	X	X		

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2. (cont.)

Parameter	Total Number of Samples	1969												1970												1971																
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D					
Hydrography																																										
Salinity	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X				
Temperature	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X				
Dissolved oxygen	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X				
Nutrients																																										
Nitrate	3611																	X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X	X				
Silicate	3440																	X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X	X				
Phosphate	3440																	X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X	X				
Phytoplankton																																										
Chlorophyll <u>a</u>	8022						X	X	X	X								X	X	X	X					X		X	X	X	X											
Productivity	4978						X	X	X	X								X	X	X	X							X	X	X	X											
Cell Counts	5838				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X									
Zooplankton																																										
Acoustic traces	40 mo																	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X				
Plankton pump	427																																									
Nets (mesh size μm)																																										
0.5 m ring (215)	38																																									
1 m closing ring (110)	355			X																																						
1 m closing ring (215)	318					X	X																																			
1 m ² plummet (571)*	56																																			X	X	X	X	X	X	X
2 m ² umbrella (223) †	9112	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2 m ² umbrella (569)	95																																									
3 m ² umbrella (300)	104																																									

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2 (cont.)

Parameter	Total Number of Samples	1972												1973												1974												
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
Hydrography																																						
Salinity	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Temperature	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dissolved oxygen	5198	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nutrients																																						
Nitrate	3611	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Silicate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Phosphate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Phytoplankton																																						
Chlorophyll <u>a</u>	8022						X	X	X	X									X	X	X	X																
Productivity	4978						X	X	X	X	X								X	X	X	X																
Cell Counts	5838						X	X	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Zooplankton																																						
Acoustic traces	40 mo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Plankton pump	427																																					
Nets (mesh size μm)																																						
0. 5 m ring (215)	38																																					
1 m closing ring (110)	355																																					
1 m closing ring (215)	318																																					
1 m ² plummet (571)*	56						X	X																														
2 m ² umbrella (223) †	9112	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2 m ² umbrella (569)	95																																					
3 m ² umbrella (300)	104																																					

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Forms for kind of sampling bottle used.

Hydrography and Nutrients

Temperature, salinity, oxygen, and nutrient determinations were made on water collected with Van Dorn polyvinylchloride or uncoated Nansen water sampling bottles. The Van Dorn bottles contained surgical tubing which may or may not be toxic to organisms (see Price et al. 1986). In general, the upper 100 m was sampled at 5 m intervals, 125-375 m at 25 m intervals, 400-500 m at 50 m intervals, 600-1000 m at 100 m intervals, and 1000 m to the bottom at 250 m intervals with a 30 m interval between the last bottle and the bottom. Periodically, additional samples were taken at 2 m intervals around the pycnocline (usually 40-60 m). In periods when weekly casts were taken, an alternating pattern of sampling, 0-100 m, 0-500 m, 0-100 m, 0-deep, allowed a more frequent survey of short-term variation in the near-surface stratum without the additional burden of time-consuming deep casts. Because of heat lamps and cables and the accumulation of freshwater in the hydrohose, surface readings would not have been representative, therefore the top bottle of a hydrocast was usually placed 5 m below the water surface.

The highest observed wire angles during these cruises were about 4°. For a 1000 m cast, this would yield a true depth of 998 m at the bottom. Computations of thermometric depths (Wüst 1933) were performed for those observations deeper than 250 m where unprotected thermometers were used for which calibrations were still available (262 depths at 45 stations). With the exception of two casts (Cruise 11, station 1, cast 5, 1400-2000 m and Cruise 13, station 12, cast 5, 500-1300 m), all calculated values were generally within 2-3% of the nominal depths sampled. These two casts were corrected. All other depths reported here are uncorrected, but should be within 2-5% of the true value.

Temperatures were determined from reversing thermometers on each water bottle; protected thermometers were usually deployed in pairs. Bottles were tripped about 5 min after the top bottle reached its intended depth. Thermometers were read using a lighted magnifying glass about 15 min after retrieval. Readings were corrected from the auxiliary thermometers and the thermometer constants by an IBM 1130 program at the Department of Oceanography, University of Washington.

Over 100 reversing thermometers were used during the course of these observations. They were calibrated either by the manufacturers or at various times at the University of Washington. Calibration data available from the

latest date preceding the use of each thermometer on T-3 were used to correct the thermometer readings. The calibrations were usually 0.5-3 yr old when they were applied to these data.

Salinity samples were drawn into 250 ml clear polyethylene bottles, tightly sealed, and allowed to come to room temperature. Determinations were made on T-3 using an Industrial Instruments Model RS-7A (Industrial Instruments Co., Cedar Grove, NJ) or a Beckman Model RS-7B (Beckman Instruments, Inc., Fullerton, CA) portable induction salinometer calibrated against a standard seawater sample obtained from the Laboratoire Hydrographique (Copenhagen, Denmark). Substandards of seawater (ca. 34.9‰ collected from ca. 500 m) were used after each 10 samples and at the end of a run. Salinity was calculated using the tables in the salinometer manual (Industrial Instruments 1964). These values are considered to have an accuracy of ± 0.003 ppt.

Dissolved oxygen was analyzed by a modified Winkler method (Strickland and Parsons 1965). Brown BOD bottles of 250 ml capacity, an automatic 100 ml pipet, an automatic 25 ml burette readable to 0.01 ml, and an electric stirrer were used.

Nutrients were determined by the methods in Strickland and Parsons (1968). The samples were either analyzed immediately after collection or frozen for later analysis either on the ice, or during April and May 1971, at the University of Washington using a Beckman DU spectrophotometer (Beckman Instruments, Inc., Fullerton, CA) with 1 cm cells. After December 1972, nitrate determinations were run on a Brinkman PC/1000 colorimeter (Brinkman Instruments, Westbury, NY) with a fiber optics probe and calibrated against the spectrophotometer. Reagents and standards were prepared from water filtered through an Ion-X-Change column, Grade 1, consisting of a mixed bed non-regenerable resin (Illinois Water Treatment Co.) that produces triple distilled water. Comparisons between reagents and standards made up with this water and with distilled water sent from the Naval Arctic Research Laboratory at Barrow showed these procedures to be adequate. Standards were run with each set of samples and for each nitrate column.

Chlorophyll a

Chlorophyll a was determined according to Strickland and Parsons (1968). In 1968 through 1970, water was filtered through 47 mm 0.45 μ m Millipore filters (Millipore Corporation, Bedford, MA). Suction pressure was less than 250 mm Hg. In 1971 through 1973, Gelman A/E glass fiber filters (approximate

pore size = 1.0 μm) (Gelman Instrument Co., Ann Arbor, MI) were used. MgCO_3 was added to all filters near the end of the filtration. In 1968, samples of about 4 liters of water were analyzed using a Beckman DK spectrophotometer in Seattle and chlorophyll a was calculated using the SCOR-UNESCO equations (Unesco 1966). For 1968 through 1973, samples of about 2 liters of water were filtered and a Turner Model 111 fluorometer (G. K. Turner Associates, Palo Alto, CA) was used for analysis. Fluorometer filters were 5-60 and 2-64. The fluorometer was calibrated using either a Beckman DU spectrophotometer on T-3 or a Beckman DK scanning spectrophotometer in Seattle. For samples analyzed with the fluorometer, chlorophyll a was calculated using equations in Holm-Hansen et al. (1967). Phaeopigments were not determined.

Primary Productivity

Primary productivity was measured during the summers by the radiocarbon technique of Steemann-Nielsen (1952) as detailed by Strickland and Parsons (1968). Two experimental schemes were used:

1. Depth series - paired 130 ml light and dark bottles were filled with water collected from a number of depths and incubated under constant high illumination (for the level of irradiance, see below).
2. Graduated light series - five light and one dark bottle containing water from one depth were incubated under 0, 10, 25, 50, 75, and 100% irradiance provided by glass neutral density filters over the incubation bottles.

For both series, dark bottles were pre-wrapped with black tape and then covered with aluminum foil to insure complete darkness. Depths and frequencies of sampling varied from year to year.

The plastic incubator box was fronted with clear plexiglass and had a wheel that rotated in the vertical plane. The wheel accommodated 12 ground-glass stoppered 130 ml bottles. At various times, because of stripped gears, the wheel did not rotate or was manually turned periodically during incubation. Light, provided by a bank of 12 GE Cool-White fluorescent lamps (General Electric Corporation, Stamford, CT), and amount of radioactivity added varied from year to year. Highest irradiance (= 100%) in the incubator was between 1100 and 1400 ft-c measured with a GE Model No. 214 photometer (General Electric Corporation, Stamford, CT). A pumped water flow-through system maintained ambient incubator temperature near 0°C. Samples were incubated for 6 or 12 hr.

At the end of the incubation, the samples were filtered (suction pressure

less than 250 mm Hg) onto 25 mm, 0.45 μ m Millipore filters, washed with filtered seawater, air-dried, and stored over desiccant until analyzed. Filters were fumed over concentrated HCl and counted three times for 1000 counts, using a gas flow proportional counter (Nuclear Chicago Corporation, Des Plaines, IL). Counting was done either in Seattle using a Nuclear Chicago Model D-47 counter with micromil window, C-110 automatic sample changer, 161-A scaler, and C111B printing timer, or on T-3 using a Nuclear Chicago manual, end-window Model 8770 scaler, Model 3053 sample changer, Model 108 G-M detector, and Model 8420 dual timer.

Carbon uptake was calculated from

$$P = (L-D)(W)(1.05)/(Z)(T)$$

where P is in $\text{mg C m}^{-3} \text{ h}^{-1}$; L-D is the difference between the light and dark bottle in counts per minute corrected for machine background and coincidence; W is the total carbonate in mg C m^{-3} calculated from $W = (810)(S^\circ/_{\text{oo}})$ as suggested by Dr. G. C. Anderson, Department of Oceanography, University of Washington; 1.05 is the isotope discrimination factor (Strickland 1960); Z is the total activity in counts per minute added to the sample and corrected for the counter efficiency of about 22.8%; T is the incubation time (6 or 12 hr).

All ^{14}C ampoules used on T-3 were prepared in the Department of Oceanography, University of Washington, from aqueous sodium carbonate obtained from Nuclear Chicago Corporation. All glassware was rinsed with distilled water and autoclaved. The amount of solution to be made was determined by dividing the activity of the stock aqueous sodium carbonate by the desired activity per ml of final solution. Glass distilled water was filtered through 47 mm, 0.45 μ m Millipore filters. The pH was adjusted to 9.5-9.7 with NaOH. The solution was well mixed, and after adding the commercial sodium carbonate, mixed again. Glass ampoules holding 2 or 5 ml of solution were filled by an automatic volume dispenser. The ampoules were sealed using propane torches. The sealed ampoules were placed in large beakers, covered with water to which methylene blue dye was added, and autoclaved for ca. 1 hr at 120°C. After washing away the dye, the ampoules were inspected for any sign of color inside them. Ampoules that were even slightly discolored were discarded. The filled ampoules were color-coded with spray paint and stored.

Several ampoules from the beginning, middle, and end of the filling process were kept separate to be used for standardization. Standardization was done using methods then employed by the Department of Oceanography, University of Washington, where ampoules were either sent to Dr. C. R. Goldman, University of

California, Davis, and analyzed using gas phase (Goldman 1963; Steemann-Nielsen 1974) or, in the Department of Oceanography, University of Washington, were compared to samples obtained from the National Bureau of Standards. From 1970-1973, ampoules were standardized by liquid scintillation techniques and external standards at the Department of Oceanography.

Phytoplankton Cell Counts

Samples for phytoplankton identification and cell counts were usually taken from Nansen bottles during hydrocasts and stored in 250 ml glass jars. They were preserved with 4% formalin, buffered (sodium borate) or unbuffered, for a final strength of approximately 1%. Samples were shipped to Seattle for later analysis. Some samples were collected from a water pumping system during summer 1970 (see below).

Phytoplankton species were enumerated for some of the samples collected in the summers of 1968, 1969, and 1971 with the inverted microscope method (Hasle 1978a, b). Samples were individually counted or samples from two, three, or four days were combined for each depth. The samples combined to make a composite were separated in time by one week or less. After thorough mixing, the samples were poured into 5 and 50 ml Zeiss counting chambers (Carl Zeiss, Oberkochen Würt, FRG) and allowed to settle at least 20 hr before counting. A Zeiss inverted microscope was used for all enumerations. The 5 ml chamber was counted at 390 X using a 25 X objective, 12.5 X oculars, and a magnification factor of the optics carrier of 1.25. The 50 ml chamber was counted at 156 X with a 10 X objective, 12.5 X oculars, and the 1.25 X magnification factor. Cell counts were converted to cells per liter, cell volumes (Larrance 1964), and cell carbon (Mullin et al. 1966). These data are contained in an unpublished manuscript (Walline 1973) available from the School of Oceanography, University of Washington.

Zooplankton

Zooplankton sampling was maintained from March 1966 through April 1974. Gear types, sampling periods, and depth intervals sampled varied between and within years. Regardless of the gear used, all samples were concentrated and preserved in 4% V/V formalin (final concentration) buffered with either sodium acetate or sodium borate.

Initially, samples were taken with an open 0.5 m diameter ring net with 215 μ m mesh gauze. From June 1966 through July 1967, a 7.6 cm centrifugal

pump system with a 10 cm diameter hose intake was lowered. A 25 kg weight at the end of the wire held down the hose intake. Since wire angles were low, the depth of sampling was estimated from the length of the wire. Maximum depth of sampling was about 185 m. Samples of 5 to 18 m³ of water were filtered at a rate of 0.2 to 0.6 m³ per min through a net of 215 µm mesh size. Beginning in early July 1967, a closing 1 m diameter ring net of either 110 or 215 µm mesh was used to sample to 1000 m. This sampling overlapped with pumping stations to assure comparability.

Sampling with a 2 m² closing umbrella net began in September 1967 (Scott 1969; Macaulay and Daly 1987). Mesh size was 223 and 569 µm. This net, with a filtration ratio of 1.25:1, was the principal sampling device throughout the remaining field program though the netting itself was replaced with a high filtration type mesh (4:1 filtration ratio) in March 1972. All subsequent samples were collected with the 4:1 filtration ratio net.

An overlapping sampling scheme was used starting in October 1969. Sampling depths were at 10 m intervals from 300 to 10 m, 100 m intervals from 1000 to 10 m, and 500 m intervals from the bottom to 10 m. The 10 m upper limit was chosen to protect the net during retrieval through the hydrohole. Samples were collected from as deep as 2500 m.

Two other kinds of nets were sometimes employed: a 3 m² closing umbrella net with 300 µm mesh in summer 1968 and a 1 m² plummet net with 571 µm mesh initially in May 1971 and periodically thereafter. The plummet net is a downward fishing net with an opening-closing mechanism activated with a messenger (Macaulay 1978; Macaulay and Daly in prep.).

Sorting, identifying, and counting of some samples were done in Seattle (Table 3). Other samples have been analyzed for some groups of organisms, primarily copepods. These data are available in the School of Oceanography, but obtaining them will require an investigator to visit the University of Washington.

Echo-sounder

Echo-sounding was conducted from April 1970 to April 1974. A modified Ross 200A (100 kHz) echo-sounder and 10° transducer with an impedance matching box scanned depth ranges of 0-50, 50-100, 100-150, and 150-200 fm. The 0-50 fm depth range was emphasized because of interest in the scattering layer often found about 25 fm. The system included the standard Ross 200A transceiver unit, recorder unit, and a Sony TC-5600 stereo tape recorder. During regular

Table 3. List of T-3 zooplankton samples analyzed and used in theses, reports, and publications

Hughes (1968)	399 samples collected with a plankton pump
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
Scott (1969)	523 samples collected with a pump, 1 m closing ring net and 2 m ² umbrella net
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
	04 10 Jul - 6 Sep 1967
	05 13 Sep - 23 Sep 1967
Damkaer (1976)	52 samples collected with a 1 m closing ring net
Cruises:	04 12 Jul - 8 Sep 1967
	06 5 May 1968
	07 10 Jun - 18 Aug 1968
Heron and Damkaer (1976)	2 samples collected with a 1 m closing ring net
Cruises:	07 10 Jun 1968
	12 Jun 1968
Pautzke (1979)	16 samples collected with a 2 m ² umbrella net
Cruises:	14 7 Jun - 5 Oct 1970
	18 30 May - 1 Oct 1971
	22 31 May - 29 Sep 1972
	26 28 May - 19 Oct 1973
Heron, English, and Damkaer (1984)	54 samples collected with a 1 m closing ring net and 3 m ² umbrella net
Cruises:	06 5 May 1968
	07 10 Jun - 20 Sep 1968
	08 21 Sep 1968

operation, echo-sounding was conducted continuously, normally on the 0-50 fm scale. Daily recordings of 15-45 min were made using all depth ranges. Some of these data are available on 1/4 inch magnetic tape, but retrieval will be difficult.

Data Management

The data were available from computer printouts or raw data sheets. The original punched data cards could not be located so the data were re-entered directly to disk files on the University of Washington Cyber 180-855 computer using a Tandy Model DT-1 data terminal. After editing the files to correct data entry errors or to fill in gaps in the data, the files were transferred to a 9-track, EBCDIC-coded magnetic tape for NODC. The resulting tape contains three files of hydrographic data, one file of chlorophyll data, and one file of primary productivity data.

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DATA DOCUMENTATION FORM

NOAA FORM 24-13
(4-77)U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
WASHINGTON, DC 20235FORM APPROVED
O.M.B. No. 41-R2651
EXPIRES 1-81

(While you are not required to use this form, it is the most desirable mechanism for providing the required ancillary information enabling the NODC and users to obtain the greatest benefit from your data.)

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

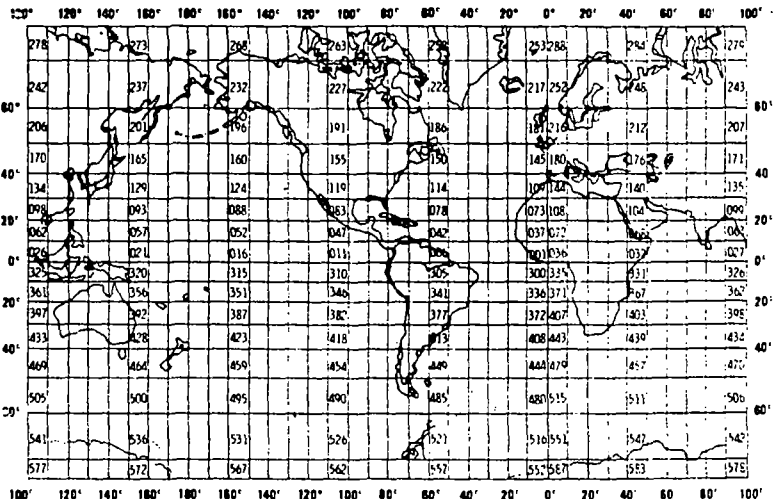
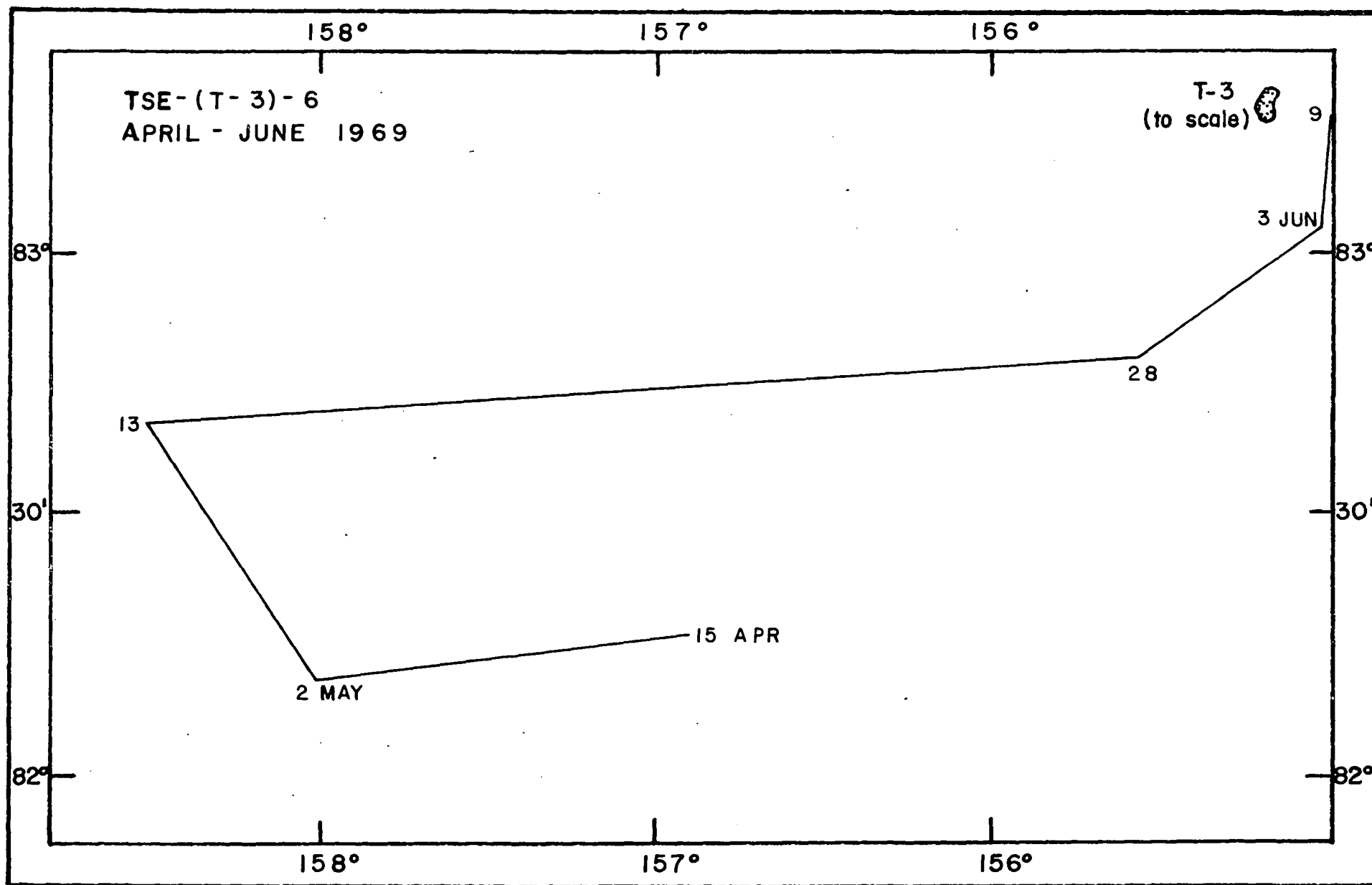
1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED Dr. T. Saunders English School of Oceanography WB-10 University of Washington Seattle, WA 98195			
2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED Primary production and energy flow		3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT TSE-(T-3)-06	
4. PLATFORM NAME(S) Fletcher's Ice Island (T-3)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.) Ice island	6. PLATFORM AND OPERATOR NATIONALITY(IES) USA USA	7. DATES FROM: MO/DAY/YR TO: MO/DAY/YR 04/27/68 06/09/68
8. ARE DATA PROPRIETARY? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR _____ MONTH _____		11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED. GENERAL AREA 	
9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?) <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> PART (SPECIFY BELOW) Data should be available for international exchange			
10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER (AND ADDRESS IF OTHER THAN IN ITEM-1) Dr. Karl Banse School of Oceanography WB-10 University of Washington Seattle, WA 98195 (206) 543-5079			

FIG. 1



TSE-(T-3)-06 27 Apr 1968 - 09 Jun 1968

Modifications to the basic program methods

Fifty-nine (59) zooplankton samples were collected with a 1 m closing ring net having a mesh size of 100 μ m. Samples were collected over 10 m depth intervals from 0-100 m, 20 m intervals from 100-200 m, 50 m intervals from 200-300 m, 100 m intervals from 300-500 m, and 500 m intervals from 500-1000 m.

For sample analysis see Damkaer 1976; Heron, English, and Damkaer 1984

One hundred twelve samples each were collected with Van Dorn bottles for chlorophyll a determinations and phytoplankton cell counts. Primary productivity was measured at 2 stations, 6 depths each.

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Water transparency	meters	Secchi Disk	N/A	N/A
Depth of Sample	meters	Wire out	N/A	N/A
Temperature	°C	Reversing thermometers	N/A	N/A
Salinity	‰	Nansen bottles, modified Van Dorn bottles	Salinometer, University of Washington	N/A
Sigma-t	-	"	-	N/A
Dissolved oxygen	ml/l	"	Winkler	N/A
PO ₄	µg-atom/l	"	See Strickland and Parsons (1968)	N/A
NO ₃	"	"	"	N/A
SiO ₄	"	"	"	N/A
Chlorophyll <u>a</u>	mg m ⁻³	Van Dorn bottles	Spectrophotometer, fluorometer (Strickland and Parsons 1963)	N/A
Primary productivity (14C uptake)	mg C m ⁻³ h ⁻¹	"	Strickland and Parsons (1968)	N/A

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

3. ATTRIBUTES AS EXPRESSED IN
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| <input type="checkbox"/> PL-1 | <input type="checkbox"/> ALGOL | <input type="checkbox"/> COBOL |
| <input type="checkbox"/> FORTRAN | <input type="checkbox"/> _____ | LANGUAGE |

4. RESPONSIBLE COMPUTER SPECIALIST:

NAME AND PHONE NUMBER _____

ADDRESS _____

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

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<p>6. NUMBER OF TRACKS (CHANNELS)</p> <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> SEVEN</td> </tr> <tr> <td><input checked="" type="checkbox"/> NINE</td> </tr> <tr> <td><input type="checkbox"/> _____</td> </tr> </table>	<input type="checkbox"/> SEVEN	<input checked="" type="checkbox"/> NINE	<input type="checkbox"/> _____	<p>10. END OF FILE MARK</p> <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> OCTAL 17</td> </tr> <tr> <td><input checked="" type="checkbox"/> Tape Mark</td> </tr> </table>	<input type="checkbox"/> OCTAL 17	<input checked="" type="checkbox"/> Tape Mark			
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<p>7. PARITY</p> <table style="width: 100%; border: none;"> <tr> <td><input checked="" type="checkbox"/> ODD</td> </tr> <tr> <td><input type="checkbox"/> EVEN</td> </tr> </table>	<input checked="" type="checkbox"/> ODD	<input type="checkbox"/> EVEN	<p>11. PASTE-ON-PAPER LABEL DESCRIPTION (INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)</p> <p>Ice Island T-3 hydro, chlorophyll, & Productivity data sets. Specs.- 9 track, EBCDIC, odd parity, 1600 bpi, 5 files, D=PE, RL=120, MBL = 3000, CV = EB, F=S, LB=KU</p>						
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<p>8. DENSITY</p> <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> 200 BPI</td> <td><input checked="" type="checkbox"/> 1600 BPI</td> </tr> <tr> <td><input type="checkbox"/> 556 BPI</td> <td></td> </tr> <tr> <td><input type="checkbox"/> 800 BPI</td> <td></td> </tr> <tr> <td colspan="2"><input type="checkbox"/> _____</td> </tr> </table>	<input type="checkbox"/> 200 BPI	<input checked="" type="checkbox"/> 1600 BPI	<input type="checkbox"/> 556 BPI		<input type="checkbox"/> 800 BPI		<input type="checkbox"/> _____		<p>12. PHYSICAL BLOCK LENGTH IN BYTES</p> <p>FL=120 MBL=3000 Char.</p> <p>13. LENGTH OF BYTES IN BITS</p>
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D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALI- BRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Fluorometer Turner Model 111		X			X				
Reversing thermometers		X	manufacturer		X				
Salinometer Univ. Washington		X			X				
Naval Arctic Research Lab.		X			X				

Primary Production and Energy Flow

The program was directed by the late Dr. T. Saunders English and funded by the Office of Naval Research Contract Nonr-477 (37) Project NR 083 12 and Contract N00014-67-0103-0005. Users of the data are requested to acknowledge the agency support.

The methods used by biological oceanographers of the Department of Oceanography, University of Washington, Seattle, from 1966 to 1974 on Fletcher's Ice Island (T-3) drifting in the Arctic Ocean (Fig. 1) are given below. These methods are to compliment the entries in the individual cruise Data Documentation Forms where modifications, if any, are given.

General

The field program was maintained at various intensities for eight years (March 1966 to June 1974), with personnel on T-3 continuously from April 1968 until the island was evacuated in June 1974. During this period, divided into 28 cruises (Table 1), biological and environmental parameters were measured (Table 2). The sampling program was structured to monitor periods of active change in the various parameters. Thus, hydrography and zooplankton sampling was a year round pursuit, field and logistic conditions permitting, whereas chlorophyll a concentrations and primary productivity (^{14}C uptake) were usually measured only during the summer (June to September). Various gear types, methodologies, and sampling strategies were tried and tested throughout the field program.

The oceanographic working area was located on 3-4 m thick sea ice in Colby Bay adjacent to the ice island. All sampling was done from inside a heated building positioned over a hole, ca. 1.5 m on a side, cut in the ice. The hut contained a space heater, oceanographic sampling equipment, and a Rankin winch powered by a 5 hp Wisconsin gasoline engine. The drum on the winch held about 4000 m of 5/32 inch hydrographic wire. The wire ran through a meter wheel attached to a tripod erected over the hole.

Geographic positions were provided by the Lamont-Doherty Geological Observatory, Palisades, NY (Hunkins and Tiemann 1977). Hydrography and biology (chlorophyll a and primary productivity) samples were not always taken from the same bottle cast or on the same day. Each kind of data has a separate sample numbering scheme. As a result, station positions may not always agree between the hydrographic and biological data. See individual cruise Data Documentation

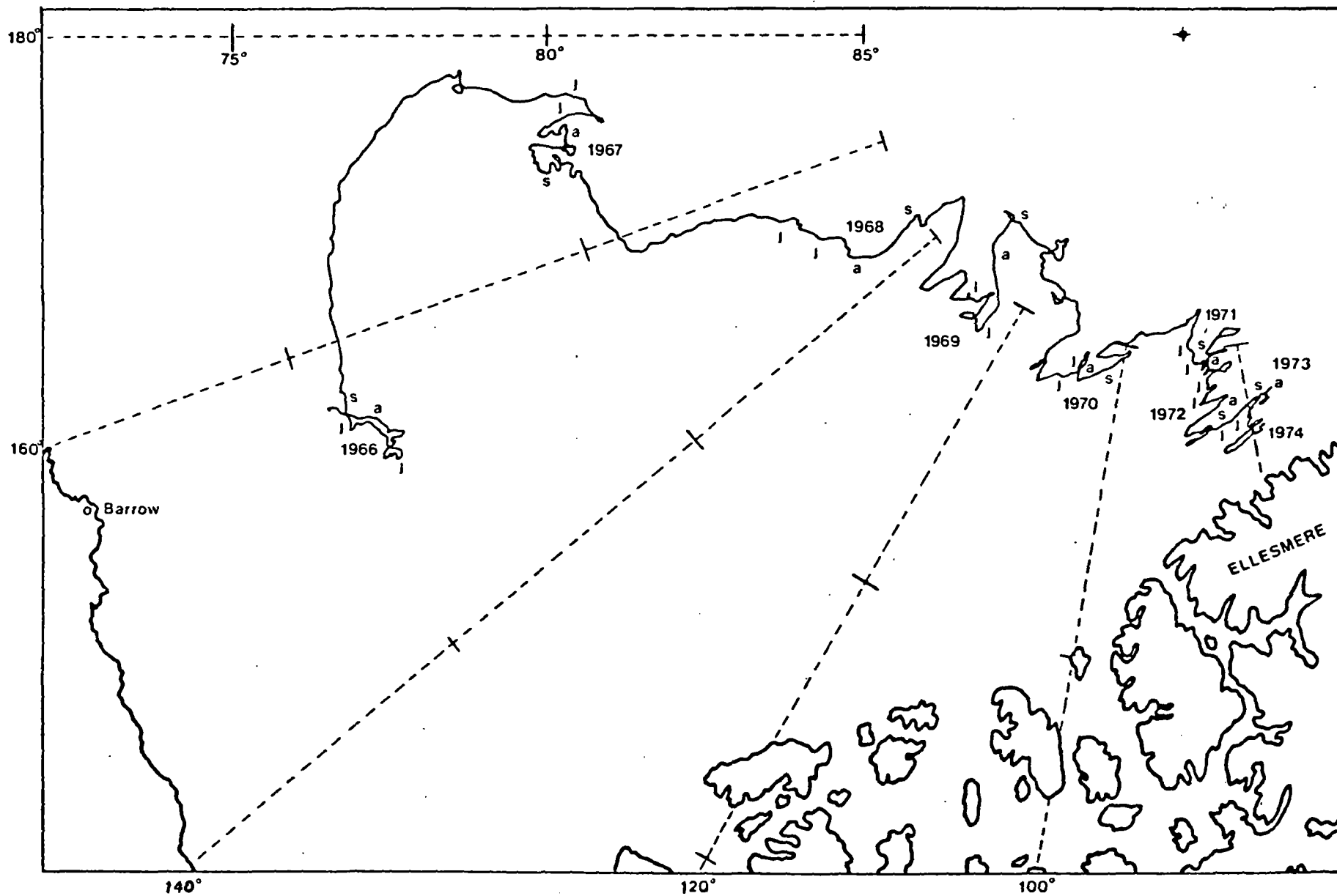


Fig. 1. Drift track of T-3 from June 1966 to April 1974. The months of June, July, August, and September are indicated in small letters for each year.

Table 1. Cruise numbers and dates of T-3 field program

Cruise		Cruise	
Number	Duration	Number	Duration
01	16 Mar 66 - 9 Apr 66	15	5 Oct 70 - 30 Dec 70
02	2 Jun 66 - 18 Oct 66	16	1 Jan 71 - 30 Mar 71
03	1 Feb 67 - 15 Feb 67	17	30 Mar 71 - 30 May 71
04	4 Jun 67 - 11 Sep 67	18	30 May 71 - 1 Oct 71
05	12 Sep 67 - 24 Sep 67	19	1 Oct 71 - 20 Dec 71
06	27 Apr 68 - 9 Jun 68	20	20 Dec 71 - 20 Mar 72
07	10 Jun 68 - 20 Sep 68	21	20 Mar 72 - 31 May 72
08	21 Sep 68 - 31 Jan 69	22	31 May 72 - 29 Sep 72
09	31 Jan 69 - 13 Jun 69	23	29 Sep 72 - 13 Dec 72
10	13 Jun 69 - 3 Oct 69	24	13 Dec 72 - 7 Apr 73
11	4 Oct 69 - 5 Jan 70	25	7 Apr 73 - 28 May 73
12	5 Jan 70 - 23 Mar 70	26	28 May 73 - 19 Oct 73
13	23 Mar 70 - 7 Jun 70	27	31 Oct 73 - 8 Mar 74
14	7 Jun 70 - 5 Oct 70	28	8 Mar 74 - 1 Jun 74

Table 2. Field data collected at T-3, March 1966 to June 1974

Parameter	Total Number of Samples	1966												1967												1968																
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D					
Hydrography																																										
Salinity	5354				X																															X	X					
Temperature	5354				X																															X	X					
Dissolved oxygen	5198				X																															X	X					
Nutrients																																										
Nitrate	3611								X	X								X	X	X	X														X	X	X	X				
Silicate	3440																		X	X	X														X	X	X					
Phosphate	3440																																									
Phytoplankton																																										
Chlorophyll <u>a</u>	8022								X	X								X	X	X	X														X	X	X	X				
Productivity	4978																		X	X	X														X	X	X					
Cell Counts	5838																																			X	X	X	X			
Zooplankton																																										
Acoustic traces	40 mo																																									
Plankton pump	427						X	X	X	X	X		X					X	X	X	X																					
Nets (mesh size μm)																																										
0.5 m ring (215)	38				X	X																																				
1 m closing ring (110)	355																																			X	X	X	X	X		
1 m closing ring (215)	318																		X	X	X																					
1 m ² plummet (571)*	56																																									
2 m ² umbrella (223)†	9112																			X																X	X	X	X	X	X	X
2 m ² umbrella (569)	95																																				X	X				
3 m ² umbrella (300)	104																																				X	X	X			

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2. (cont.)

Parameter	Total Number of Samples	1969												1970												1971													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Temperature	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Nutrients																																							
Nitrate	3611																X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440																X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440																X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X							X	X	X	X					X		X	X	X	X									
Productivity	4978						X	X	X	X							X	X	X	X							X	X	X	X									
Cell Counts	5838				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Zooplankton																																							
Acoustic traces	40 mo																X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Plankton pump	427																																						
Nets (mesh size μm)																																							
0.5 m ring (215)	38																																						
1 m closing ring (110)	355			X																																			
1 m closing ring (215)	318					X	X																																
1 m ² plummet (571)*	56																																						
2 m ² umbrella (223) †	9112	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2 (cont.)

Parameter	Total Number of Samples	1972												1973												1974													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Temperature	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5198	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Nutrients																																							
Nitrate	3611	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X									X	X	X	X																	
Productivity	4978						X	X	X	X	X								X	X	X	X																	
Cell Counts	5838						X	X	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Zooplankton																																							
Acoustic traces	40 mo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Plankton pump	427																																						
Nets (mesh size μ m)																																							
0.5 m ring (215)	38																																						
1 m closing ring (110)	355																																						
1 m closing ring (215)	318																																						
1 m ² plummet (571)*	56				X	X																																	
2 m ² umbrella (223) †	9112	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Forms for kind of sampling bottle used.

Hydrography and Nutrients

Temperature, salinity, oxygen, and nutrient determinations were made on water collected with Van Dorn polyvinylchloride or uncoated Nansen water sampling bottles. The Van Dorn bottles contained surgical tubing which may or may not be toxic to organisms (see Price et al. 1986). In general, the upper 100 m was sampled at 5 m intervals, 125-375 m at 25 m intervals, 400-500 m at 50 m intervals, 600-1000 m at 100 m intervals, and 1000 m to the bottom at 250 m intervals with a 30 m interval between the last bottle and the bottom. Periodically, additional samples were taken at 2 m intervals around the pycnocline (usually 40-60 m). In periods when weekly casts were taken, an alternating pattern of sampling, 0-100 m, 0-500 m, 0-100 m, 0-deep, allowed a more frequent survey of short-term variation in the near-surface stratum without the additional burden of time-consuming deep casts. Because of heat lamps and cables and the accumulation of freshwater in the hydrohole, surface readings would not have been representative, therefore the top bottle of a hydrocast was usually placed 5 m below the water surface.

The highest observed wire angles during these cruises were about 4°. For a 1000 m cast, this would yield a true depth of 998 m at the bottom. Computations of thermometric depths (Wüst 1933) were performed for those observations deeper than 250 m where unprotected thermometers were used for which calibrations were still available (262 depths at 45 stations). With the exception of two casts (Cruise 11, station 1, cast 5, 1400-2000 m and Cruise 13, station 12, cast 5, 500-1300 m), all calculated values were generally within 2-3% of the nominal depths sampled. These two casts were corrected. All other depths reported here are uncorrected, but should be within 2-5% of the true value.

Temperatures were determined from reversing thermometers on each water bottle; protected thermometers were usually deployed in pairs. Bottles were tripped about 5 min after the top bottle reached its intended depth. Thermometers were read using a lighted magnifying glass about 15 min after retrieval. Readings were corrected from the auxiliary thermometers and the thermometer constants by an IBM 1130 program at the Department of Oceanography, University of Washington.

Over 100 reversing thermometers were used during the course of these observations. They were calibrated either by the manufacturers or at various times at the University of Washington. Calibration data available from the

latest date preceding the use of each thermometer on T-3 were used to correct the thermometer readings. The calibrations were usually 0.5-3 yr old when they were applied to these data.

Salinity samples were drawn into 250 ml clear polyethylene bottles, tightly sealed, and allowed to come to room temperature. Determinations were made on T-3 using an Industrial Instruments Model RS-7A (Industrial Instruments Co., Cedar Grove, NJ) or a Beckman Model RS-7B (Beckman Instruments, Inc., Fullerton, CA) portable induction salinometer calibrated against a standard seawater sample obtained from the Laboratoire Hydrographique (Copenhagen, Denmark). Substandards of seawater (ca. 34.9‰ collected from ca. 500 m) were used after each 10 samples and at the end of a run. Salinity was calculated using the tables in the salinometer manual (Industrial Instruments 1964). These values are considered to have an accuracy of ± 0.003 ppt.

Dissolved oxygen was analyzed by a modified Winkler method (Strickland and Parsons 1965). Brown BOD bottles of 250 ml capacity, an automatic 100 ml pipet, an automatic 25 ml burette readable to 0.01 ml, and an electric stirrer were used.

Nutrients were determined by the methods in Strickland and Parsons (1968). The samples were either analyzed immediately after collection or frozen for later analysis either on the ice, or during April and May 1971, at the University of Washington using a Beckman DU spectrophotometer (Beckman Instruments, Inc., Fullerton, CA) with 1 cm cells. After December 1972, nitrate determinations were run on a Brinkman PC/1000 colorimeter (Brinkman Instruments, Westbury, NY) with a fiber optics probe and calibrated against the spectrophotometer. Reagents and standards were prepared from water filtered through an Ion-X-Change column, Grade 1, consisting of a mixed bed non-regenerable resin (Illinois Water Treatment Co.) that produces triple distilled water. Comparisons between reagents and standards made up with this water and with distilled water sent from the Naval Arctic Research Laboratory at Barrow showed these procedures to be adequate. Standards were run with each set of samples and for each nitrate column.

Chlorophyll a

Chlorophyll a was determined according to Strickland and Parsons (1968). In 1968 through 1970, water was filtered through 47 mm 0.45 μ m Millipore filters (Millipore Corporation, Bedford, MA). Suction pressure was less than 250 mm Hg. In 1971 through 1973, Gelman A/E glass fiber filters (approximate

pore size = 1.0 μm) (Gelman Instrument Co., Ann Arbor, MI) were used. MgCO_3 was added to all filters near the end of the filtration. In 1968, samples of about 4 liters of water were analyzed using a Beckman DK spectrophotometer in Seattle and chlorophyll a was calculated using the SCOR-UNESCO equations (Unesco 1966). For 1968 through 1973, samples of about 2 liters of water were filtered and a Turner Model 111 fluorometer (G. K. Turner Associates, Palo Alto, CA) was used for analysis. Fluorometer filters were 5-60 and 2-64. The fluorometer was calibrated using either a Beckman DU spectrophotometer on T-3 or a Beckman DK scanning spectrophotometer in Seattle. For samples analyzed with the fluorometer, chlorophyll a was calculated using equations in Holm-Hansen et al. (1967). Phaeopigments were not determined.

Primary Productivity

Primary productivity was measured during the summers by the radiocarbon technique of Steemann-Nielsen (1952) as detailed by Strickland and Parsons (1968). Two experimental schemes were used:

1. Depth series - paired 130 ml light and dark bottles were filled with water collected from a number of depths and incubated under constant high illumination (for the level of irradiance, see below).
2. Graduated light series - five light and one dark bottle containing water from one depth were incubated under 0, 10, 25, 50, 75, and 100% irradiance provided by glass neutral density filters over the incubation bottles.

For both series, dark bottles were pre-wrapped with black tape and then covered with aluminum foil to insure complete darkness. Depths and frequencies of sampling varied from year to year.

The plastic incubator box was fronted with clear plexiglass and had a wheel that rotated in the vertical plane. The wheel accommodated 12 ground-glass stoppered 130 ml bottles. At various times, because of stripped gears, the wheel did not rotate or was manually turned periodically during incubation. Light, provided by a bank of 12 GE Cool-White fluorescent lamps (General Electric Corporation, Stamford, CT), and amount of radioactivity added varied from year to year. Highest irradiance (= 100%) in the incubator was between 1100 and 1400 ft-c measured with a GE Model No. 214 photometer (General Electric Corporation, Stamford, CT). A pumped water flow-through system maintained ambient incubator temperature near 0°C. Samples were incubated for 6 or 12 hr.

At the end of the incubation, the samples were filtered (suction pressure

less than 250 mm Hg) onto 25 mm, 0.45 μ m Millipore filters, washed with filtered seawater, air-dried, and stored over desiccant until analyzed. Filters were fumed over concentrated HCl and counted three times for 1000 counts, using a gas flow proportional counter (Nuclear Chicago Corporation, Des Plaines, IL). Counting was done either in Seattle using a Nuclear Chicago Model D-47 counter with micromil window, C-110 automatic sample changer, 161-A scaler, and C111B printing timer, or on T-3 using a Nuclear Chicago manual, end-window Model 8770 scaler, Model 3053 sample changer, Model 108 G-M detector, and Model 8420 dual timer.

Carbon uptake was calculated from

$$P = (L-D)(W)(1.05)/(Z)(T)$$

where P is in $\text{mg C m}^{-3} \text{ h}^{-1}$; L-D is the difference between the light and dark bottle in counts per minute corrected for machine background and coincidence; W is the total carbonate in mg C m^{-3} calculated from $W = (810)(S^{\circ}/\text{‰})$ as suggested by Dr. G. C. Anderson, Department of Oceanography, University of Washington; 1.05 is the isotope discrimination factor (Strickland 1960); Z is the total activity in counts per minute added to the sample and corrected for the counter efficiency of about 22.8%; T is the incubation time (6 or 12 hr).

All ^{14}C ampoules used on T-3 were prepared in the Department of Oceanography, University of Washington, from aqueous sodium carbonate obtained from Nuclear Chicago Corporation. All glassware was rinsed with distilled water and autoclaved. The amount of solution to be made was determined by dividing the activity of the stock aqueous sodium carbonate by the desired activity per ml of final solution. Glass distilled water was filtered through 47 mm, 0.45 μ m Millipore filters. The pH was adjusted to 9.5-9.7 with NaOH. The solution was well mixed, and after adding the commercial sodium carbonate, mixed again. Glass ampoules holding 2 or 5 ml of solution were filled by an automatic volume dispenser. The ampoules were sealed using propane torches. The sealed ampoules were placed in large beakers, covered with water to which methylene blue dye was added, and autoclaved for ca. 1 hr at 120°C. After washing away the dye, the ampoules were inspected for any sign of color inside them. Ampoules that were even slightly discolored were discarded. The filled ampoules were color-coded with spray paint and stored.

Several ampoules from the beginning, middle, and end of the filling process were kept separate to be used for standardization. Standardization was done using methods then employed by the Department of Oceanography, University of Washington, where ampoules were either sent to Dr. C. R. Goldman, University of

California, Davis, and analyzed using gas phase (Goldman 1963; Steemann-Nielsen 1974) or, in the Department of Oceanography, University of Washington, were compared to samples obtained from the National Bureau of Standards. From 1970-1973, ampoules were standardized by liquid scintillation techniques and external standards at the Department of Oceanography.

Phytoplankton Cell Counts

Samples for phytoplankton identification and cell counts were usually taken from Nansen bottles during hydrocasts and stored in 250 ml glass jars. They were preserved with 4% formalin, buffered (sodium borate) or unbuffered, for a final strength of approximately 1%. Samples were shipped to Seattle for later analysis. Some samples were collected from a water pumping system during summer 1970 (see below).

Phytoplankton species were enumerated for some of the samples collected in the summers of 1968, 1969, and 1971 with the inverted microscope method (Hasle 1978a, b). Samples were individually counted or samples from two, three, or four days were combined for each depth. The samples combined to make a composite were separated in time by one week or less. After thorough mixing, the samples were poured into 5 and 50 ml Zeiss counting chambers (Carl Zeiss, Oberkochen Würt, FRG) and allowed to settle at least 20 hr before counting. A Zeiss inverted microscope was used for all enumerations. The 5 ml chamber was counted at 390 X using a 25 X objective, 12.5 X oculars, and a magnification factor of the optics carrier of 1.25. The 50 ml chamber was counted at 156 X with a 10 X objective, 12.5 X oculars, and the 1.25 X magnification factor. Cell counts were converted to cells per liter, cell volumes (Larrance 1964), and cell carbon (Mullin et al. 1966). These data are contained in an unpublished manuscript (Walline 1973) available from the School of Oceanography, University of Washington.

Zooplankton

Zooplankton sampling was maintained from March 1966 through April 1974. Gear types, sampling periods, and depth intervals sampled varied between and within years. Regardless of the gear used, all samples were concentrated and preserved in 4% V/V formalin (final concentration) buffered with either sodium acetate or sodium borate.

Initially, samples were taken with an open 0.5 m diameter ring net with 215 μ m mesh gauze. From June 1966 through July 1967, a 7.6 cm centrifugal

pump system with a 10 cm diameter hose intake was lowered. A 25 kg weight at the end of the wire held down the hose intake. Since wire angles were low, the depth of sampling was estimated from the length of the wire. Maximum depth of sampling was about 185 m. Samples of 5 to 18 m³ of water were filtered at a rate of 0.2 to 0.6 m³ per min through a net of 215 µm mesh size. Beginning in early July 1967, a closing 1 m diameter ring net of either 110 or 215 µm mesh was used to sample to 1000 m. This sampling overlapped with pumping stations to assure comparability.

Sampling with a 2 m² closing umbrella net began in September 1967 (Scott 1969; Macaulay and Daly 1987). Mesh size was 223 and 569 µm. This net, with a filtration ratio of 1.25:1, was the principal sampling device throughout the remaining field program though the netting itself was replaced with a high filtration type mesh (4:1 filtration ratio) in March 1972. All subsequent samples were collected with the 4:1 filtration ratio net.

An overlapping sampling scheme was used starting in October 1969. Sampling depths were at 10 m intervals from 300 to 10 m, 100 m intervals from 1000 to 10 m, and 500 m intervals from the bottom to 10 m. The 10 m upper limit was chosen to protect the net during retrieval through the hydrohole. Samples were collected from as deep as 2500 m.

Two other kinds of nets were sometimes employed: a 3 m² closing umbrella net with 300 µm mesh in summer 1968 and a 1 m² plummet net with 571 µm mesh initially in May 1971 and periodically thereafter. The plummet net is a downward fishing net with an opening-closing mechanism activated with a messenger (Macaulay 1978; Macaulay and Daly in prep.).

Sorting, identifying, and counting of some samples were done in Seattle (Table 3). Other samples have been analyzed for some groups of organisms, primarily copepods. These data are available in the School of Oceanography, but obtaining them will require an investigator to visit the University of Washington.

Echo-sounder

Echo-sounding was conducted from April 1970 to April 1974. A modified Ross 200A (100 kHz) echo-sounder and 10° transducer with an impedance matching box scanned depth ranges of 0-50, 50-100, 100-150, and 150-200 fm. The 0-50 fm depth range was emphasized because of interest in the scattering layer often found about 25 fm. The system included the standard Ross 200A transceiver unit, recorder unit, and a Sony TC-5600 stereo tape recorder. During regular

Table 3. List of T-3 zooplankton samples analyzed and used in theses, reports, and publications

Hughes (1968)	399 samples collected with a plankton pump
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
Scott (1969)	523 samples collected with a pump, 1 m closing ring net and 2 m ² umbrella net
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
	04 10 Jul - 6 Sep 1967
	05 13 Sep - 23 Sep 1967
Damkaer (1976)	52 samples collected with a 1 m closing ring net
Cruises:	04 12 Jul - 8 Sep 1967
	06 5 May 1968
	07 10 Jun - 18 Aug 1968
Heron and Damkaer (1976)	2 samples collected with a 1 m closing ring net
Cruises:	07 10 Jun 1968
	12 Jun 1968
Pautzke (1979)	16 samples collected with a 2 m ² umbrella net
Cruises:	14 7 Jun - 5 Oct 1970
	18 30 May - 1 Oct 1971
	22 31 May - 29 Sep 1972
	26 28 May - 19 Oct 1973
Heron, English, and Damkaer (1984)	54 samples collected with a 1 m closing ring net and 3 m ² umbrella net
Cruises:	06 5 May 1968
	07 10 Jun - 20 Sep 1968
	08 21 Sep 1968

operation, echo-sounding was conducted continuously, normally on the 0-50 fm scale. Daily recordings of 15-45 min were made using all depth ranges. Some of these data are available on 1/4 inch magnetic tape, but retrieval will be difficult.

Data Management

The data were available from computer printouts or raw data sheets. The original punched data cards could not be located so the data were re-entered directly to disk files on the University of Washington Cyber 180-855 computer using a Tandy Model DT-1 data terminal. After editing the files to correct data entry errors or to fill in gaps in the data, the files were transferred to a 9-track, EBCDIC-coded magnetic tape for NODC. The resulting tape contains three files of hydrographic data, one file of chlorophyll data, and one file of primary productivity data.

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DATA DOCUMENTATION FORM

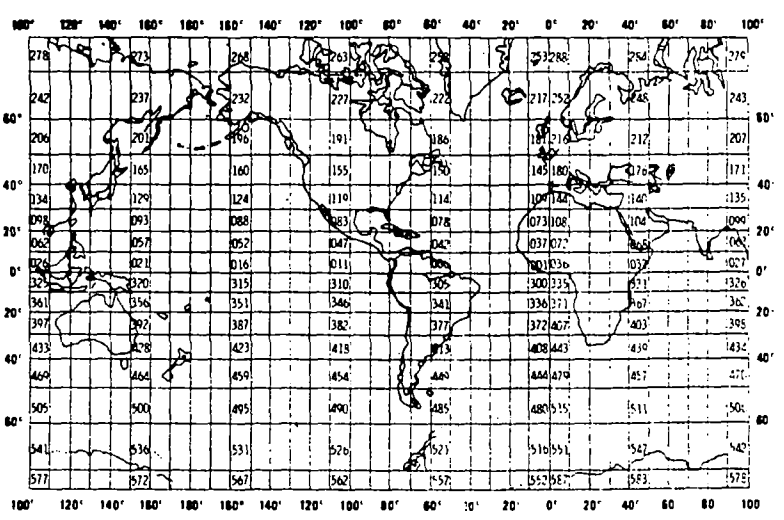
NOAA FORM 24-13
(4-77)U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
WASHINGTON, DC 20235FORM APPROVED
O.M.B. No. 41-R2651
EXPIRES 1-81

(While you are not required to use this form, it is the most desirable mechanism for providing the required ancillary information enabling the NODC and users to obtain the greatest benefit from your data.)

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED Dr. T. Saunders English School of Oceanography WB-10 University of Washington Seattle, WA 98195			
2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED Primary production and energy flow		3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT TSE-(T-3)-07	
4. PLATFORM NAME(S) Fletcher's Ice Island (T-3)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.) Ice island	6. PLATFORM AND OPERATOR NATIONALITY(IES) PLATFORM OPERATOR USA USA	7. DATES FROM: MO/DAY/YR TO: MO/DAY/YR 06/10/68 09/20/68
8. ARE DATA PROPRIETARY? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR MONTH		11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED. GENERAL AREA 	
9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?) <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> PART (SPECIFY BELOW) Data should be available for international exchange			
10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER (AND ADDRESS IF OTHER THAN IN ITEM-1) Dr. Karl Banse School of Oceanography WB-10 University of Washington Seattle, WA 98195 (206) 543-5079			

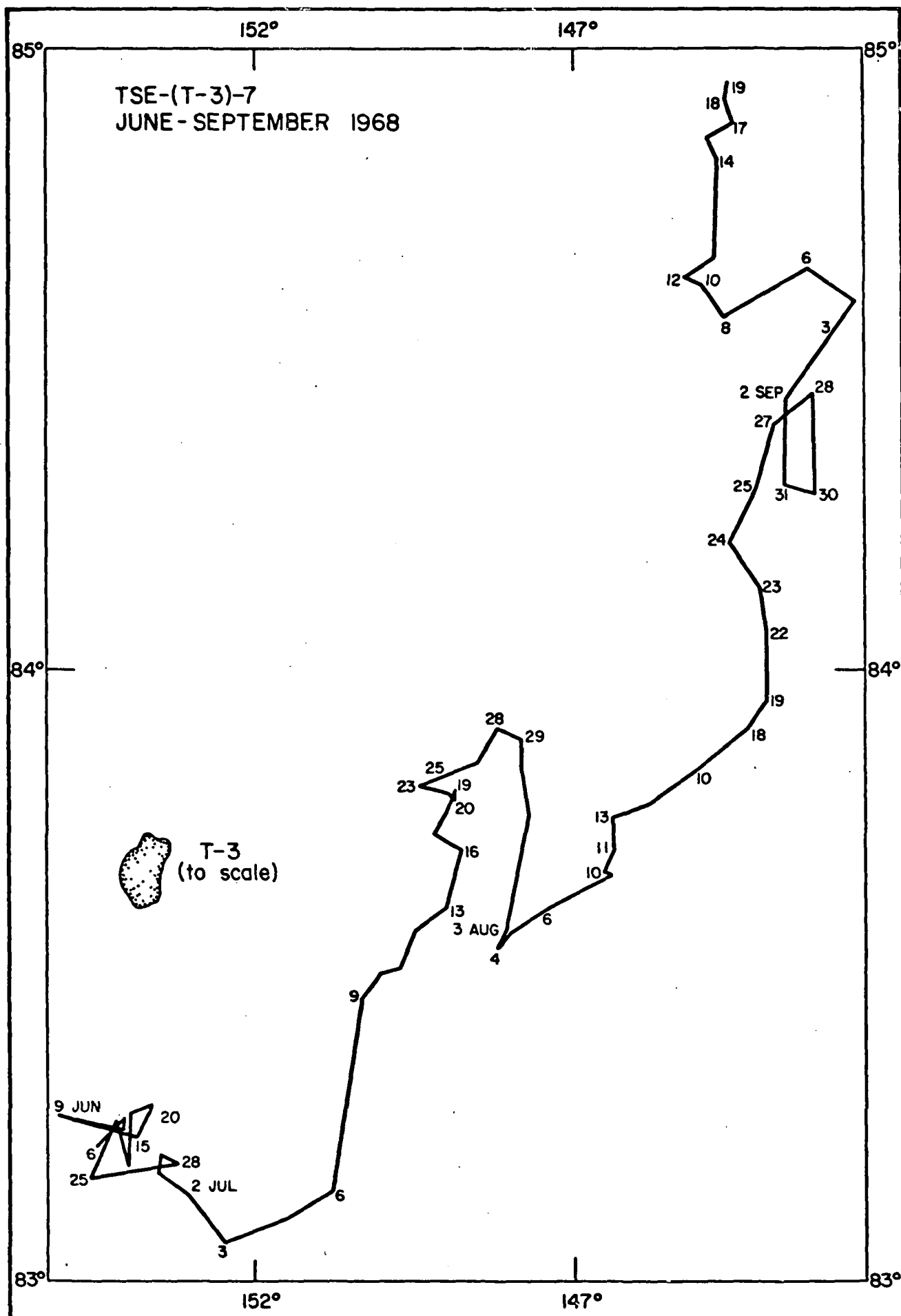


FIG. 1

TSE-(T-3)-07 10 Jun 1968 - 20 Sep 1968

Modifications to the basic program methods

Zooplankton samples were collected with three closing nets:

Dates	Net (m)	Mesh	# Samples	Depth (m)	
		Aperture (μ m)		Min	Max
10 Jun-19 Sep	1	110	272	0	3000
21 Jun-10 Sep	2 ²	223	285	5	2500
12 Aug-03 Sep	2 ²	569	95	5	2500
28 Jun-22 Aug	3 ²	300	104	5	2500

Sampling was done over 10 m depth intervals from 10 to 100 m, over 20 m intervals from 100 to 200 m, over 50 m intervals from 200 to 400 m, over 100 m intervals from 400 to 1000 m, and over 500 m intervals from 1000 to 2500 m

For some sample analysis, see Damkaer 1976; Heron and Damkaer 1976; Heron, English and Damkaer 1984.

Chlorophyll a (565) and phytoplankton cell count (529) samples were collected with Van Dorn bottles from 5, 7.5, 10, 12.5, 15, 17.5, 20, 25, 30, 40, 50, 60, 70, 80, 100, and 200 m at 35 stations between 11 June and 4 September. Primary productivity experiments were run at 8 stations between 5 Jul and 4 Sep at depths of 5, 10, 15, 20, 40, and 60 m. Incubations were all done at one light intensity.

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Water transparency	meters	Secchi Disk	N/A	N/A
Depth of Sample	meters	Wire out	N/A	N/A
Temperature	°C	Reversing thermometers	N/A	N/A
Salinity	‰	Nansen bottles, modified Van Dorn bottles	Salinometer, University of Washington	N/A
Sigma-t	-	"	-	N/A
Dissolved oxygen	ml/l	"	Winkler	N/A
PO ₄	µg-atom/l	"	See Strickland and Parsons (1968)	N/A
NO ₃	"	"	"	N/A
SiO ₄	"	"	"	N/A
Chlorophyll <u>a</u>	mg m ⁻³	Van Dorn bottles	Spectrophotometer, fluorometer (Strickland and Parsons 1963)	N/A
Primary productivity (14C uptake)	mg C m ⁻³ h ⁻¹	"	Strickland and Parsons (1968)	N/A

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-1 ☐ ALGOL ☐ COBOL
☐ FORTRAN ☐ _____ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:

NAME AND PHONE NUMBER _____

ADDRESS _____

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

<p>5. RECORDING MODE</p> <p><input type="checkbox"/> BCD <input type="checkbox"/> BINARY</p> <p><input type="checkbox"/> ASCII <input checked="" type="checkbox"/> EBCDIC</p> <p><input type="checkbox"/> _____</p>	<p>9. LENGTH OF INTER-RECORD GAP (IF KNOWN) <input checked="" type="checkbox"/> 3/4 INCH</p> <p><input type="checkbox"/> _____</p>
<p>6. NUMBER OF TRACKS (CHANNELS)</p> <p><input type="checkbox"/> SEVEN</p> <p><input checked="" type="checkbox"/> NINE</p> <p><input type="checkbox"/> _____</p>	<p>10. END OF FILE MARK</p> <p><input type="checkbox"/> OCTAL 17</p> <p><input checked="" type="checkbox"/> Tape Mark</p>
<p>7. PARITY</p> <p><input checked="" type="checkbox"/> ODD</p> <p><input type="checkbox"/> EVEN</p>	<p>11. PASTE-ON-PAPER LABEL DESCRIPTION (INCLUDE ORIGINATOR NAME AND SOME KEY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)</p> <p>Ice Island T-3 hydro, chlorophyll, & Productivity data sets. Specs.- 9 track, EBCDIC, odd parity, 1600 bpi, 5 files, D=PE, RL=120, MBL = 3000, CV = EB, F=S, LB=KU</p>
<p>8. DENSITY</p> <p><input type="checkbox"/> 200 BPI <input checked="" type="checkbox"/> 1600 BPI</p> <p><input type="checkbox"/> 556 BPI</p> <p><input type="checkbox"/> 800 BPI</p> <p><input type="checkbox"/> _____</p>	<p>12. PHYSICAL BLOCK LENGTH IN BYTES</p> <p>FL=120 MBL=3000 Char.</p> <p>13. LENGTH OF BYTES IN BITS</p>

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALI- BRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Fluorometer Turner Model 111		X			X				
Reversing thermometers		X	manufacturer		X				
Salinometer Univ. Washington		X			X				
Naval Arctic Research Lab.		X			X				

Primary Production and Energy Flow

The program was directed by the late Dr. T. Saunders English and funded by the Office of Naval Research Contract Nonr-477 (37) Project NR 083 12 and Contract N00014-67-0103-0005. Users of the data are requested to acknowledge the agency support.

The methods used by biological oceanographers of the Department of Oceanography, University of Washington, Seattle, from 1966 to 1974 on Fletcher's Ice Island (T-3) drifting in the Arctic Ocean (Fig. 1) are given below. These methods are to compliment the entries in the individual cruise Data Documentation Forms where modifications, if any, are given.

General

The field program was maintained at various intensities for eight years (March 1966 to June 1974), with personnel on T-3 continuously from April 1968 until the island was evacuated in June 1974. During this period, divided into 28 cruises (Table 1), biological and environmental parameters were measured (Table 2). The sampling program was structured to monitor periods of active change in the various parameters. Thus, hydrography and zooplankton sampling was a year round pursuit, field and logistic conditions permitting, whereas chlorophyll a concentrations and primary productivity (^{14}C uptake) were usually measured only during the summer (June to September). Various gear types, methodologies, and sampling strategies were tried and tested throughout the field program.

The oceanographic working area was located on 3-4 m thick sea ice in Colby Bay adjacent to the ice island. All sampling was done from inside a heated building positioned over a hole, ca. 1.5 m on a side, cut in the ice. The hut contained a space heater, oceanographic sampling equipment, and a Rankin winch powered by a 5 hp Wisconsin gasoline engine. The drum on the winch held about 4000 m of 5/32 inch hydrographic wire. The wire ran through a meter wheel attached to a tripod erected over the hole.

Geographic positions were provided by the Lamont-Doherty Geological Observatory, Palisades, NY (Hunkins and Tiemann 1977). Hydrography and biology (chlorophyll a and primary productivity) samples were not always taken from the same bottle cast or on the same day. Each kind of data has a separate sample numbering scheme. As a result, station positions may not always agree between the hydrographic and biological data. See individual cruise Data Documentation

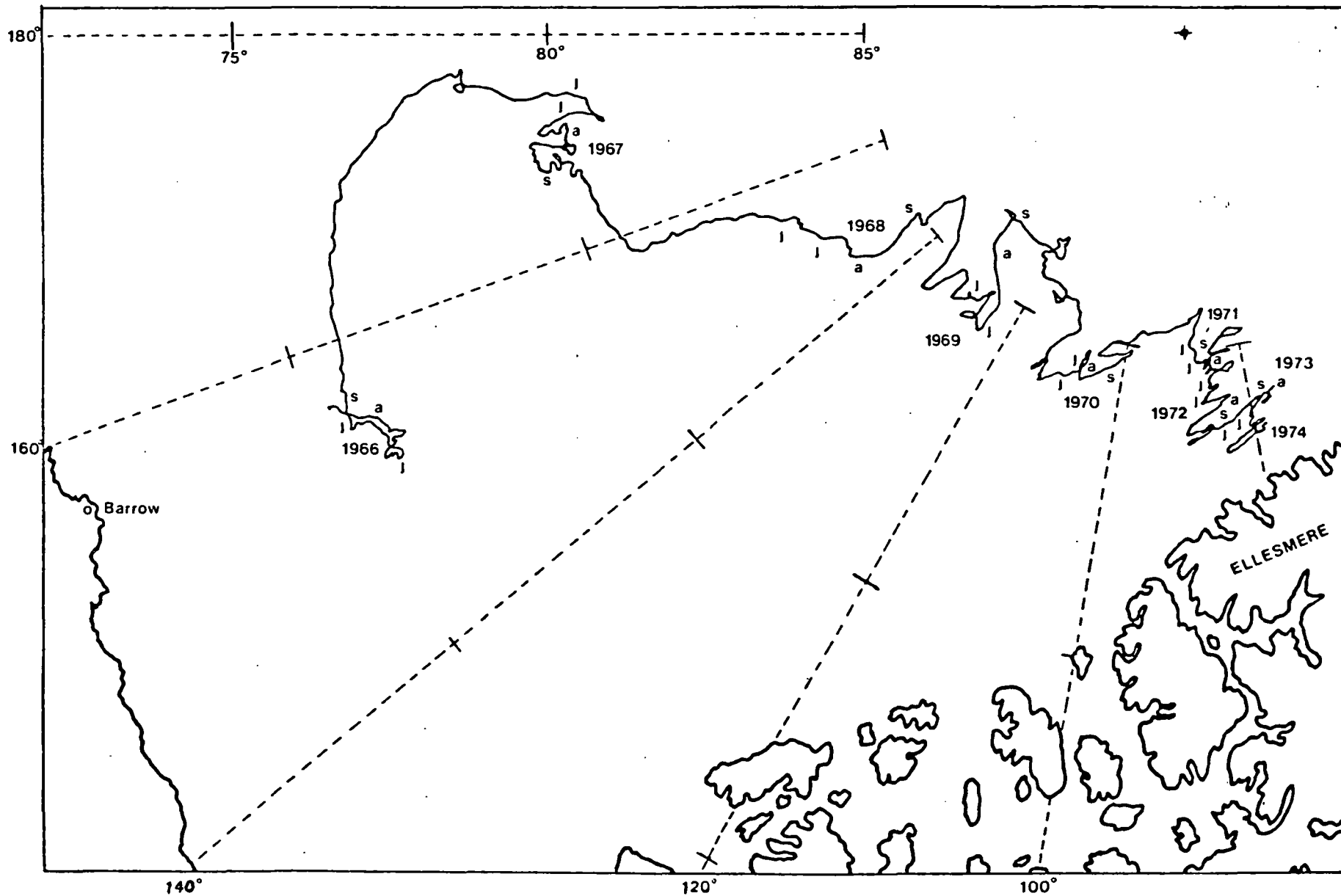


Fig. 1. Drift track of T-3 from June 1966 to April 1974. The months of June, July, August, and September are indicated in small letters for each year.

Table 1. Cruise numbers and dates of T-3 field program

Cruise		Cruise	
Number	Duration	Number	Duration
01	16 Mar 66 - 9 Apr 66	15	5 Oct 70 - 30 Dec 70
02	2 Jun 66 - 18 Oct 66	16	1 Jan 71 - 30 Mar 71
03	1 Feb 67 - 15 Feb 67	17	30 Mar 71 - 30 May 71
04	4 Jun 67 - 11 Sep 67	18	30 May 71 - 1 Oct 71
05	12 Sep 67 - 24 Sep 67	19	1 Oct 71 - 20 Dec 71
06	27 Apr 68 - 9 Jun 68	20	20 Dec 71 - 20 Mar 72
07	10 Jun 68 - 20 Sep 68	21	20 Mar 72 - 31 May 72
08	21 Sep 68 - 31 Jan 69	22	31 May 72 - 29 Sep 72
09	31 Jan 69 - 13 Jun 69	23	29 Sep 72 - 13 Dec 72
10	13 Jun 69 - 3 Oct 69	24	13 Dec 72 - 7 Apr 73
11	4 Oct 69 - 5 Jan 70	25	7 Apr 73 - 28 May 73
12	5 Jan 70 - 23 Mar 70	26	28 May 73 - 19 Oct 73
13	23 Mar 70 - 7 Jun 70	27	31 Oct 73 - 8 Mar 74
14	7 Jun 70 - 5 Oct 70	28	8 Mar 74 - 1 Jun 74

Table 2. Field data collected at T-3, March 1966 to June 1974

Parameter	Total Number of Samples	1966												1967												1968													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354				X																															X	X		
Temperature	5354				X																															X	X		
Dissolved oxygen	5198				X																															X	X		
Nutrients																																							
Nitrate	3611																																						
Silicate	3440																																						
Phosphate	3440																																						
Phytoplankton																																							
Chlorophyll <u>a</u>	8022							X	X							X	X	X	X													X	X	X	X				
Productivity	4978																X	X	X														X	X	X				
Cell Counts	5838																																	X	X	X	X		
Zooplankton																																							
Acoustic traces	40 mo																																						
Plankton pump	427						X	X	X	X	X			X			X	X	X	X																			
Nets (mesh size μm)																																							
0.5 m ring (215)	38				X	X																																	
1 m closing ring (110)	355																																	X	X	X	X	X	
1 m closing ring (215)	318																X	X	X																				
1 m ² plummet (571)*	56																																						
2 m ² umbrella (223) [†]	9112																			X												X	X	X	X	X	X		
2 m ² umbrella (569)	95																																		X	X			
3 m ² umbrella (300)	104																																	X	X	X			

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2.. (cont.)

Parameter	Total Number of Samples	1969												1970												1971													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	
Temperature	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	
Nutrients																																							
Nitrate	3611																X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440																X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440																X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X							X	X	X	X						X		X	X	X	X								
Productivity	4978						X	X	X	X							X	X	X	X								X	X	X	X								
Cell Counts	5838				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X						
Zooplankton																																							
Acoustic traces	40 mo																X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X		
Plankton pump	427																																						
Nets (mesh size μm)																																							
0.5 m ring (215)	38																																						
1 m closing ring (110)	355			X																																			
1 m closing ring (215)	318					X	X																																
1 m ² plummet (571)*	56																																						
2 m ² umbrella (223) †	9112	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2 (cont.)

Parameter	Total Number of Samples	1972												1973												1974												
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
Hydrography																																						
Salinity	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Temperature	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dissolved oxygen	5198	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nutrients																																						
Nitrate	3611	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Silicate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Phosphate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Phytoplankton																																						
Chlorophyll <u>a</u>	8022						X	X	X	X									X	X	X	X																
Productivity	4978						X	X	X	X	X								X	X	X	X																
Cell Counts	5838						X	X	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Zooplankton																																						
Acoustic traces	40 mo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Plankton pump	427																																					
Nets (mesh size μm)																																						
0.5 m ring (215)	38																																					
1 m closing ring (110)	355																																					
1 m closing ring (215)	318																																					
1 m ² plummet (571)*	56					X	X																															
2 m ² umbrella (223) †	9112	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2 m ² umbrella (569)	95																																					
3 m ² umbrella (300)	104																																					

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Forms for kind of sampling bottle used.

Hydrography and Nutrients

Temperature, salinity, oxygen, and nutrient determinations were made on water collected with Van Dorn polyvinylchloride or uncoated Nansen water sampling bottles. The Van Dorn bottles contained surgical tubing which may or may not be toxic to organisms (see Price et al. 1986). In general, the upper 100 m was sampled at 5 m intervals, 125-375 m at 25 m intervals, 400-500 m at 50 m intervals, 600-1000 m at 100 m intervals, and 1000 m to the bottom at 250 m intervals with a 30 m interval between the last bottle and the bottom. Periodically, additional samples were taken at 2 m intervals around the pycnocline (usually 40-60 m). In periods when weekly casts were taken, an alternating pattern of sampling, 0-100 m, 0-500 m, 0-100 m, 0-deep, allowed a more frequent survey of short-term variation in the near-surface stratum without the additional burden of time-consuming deep casts. Because of heat lamps and cables and the accumulation of freshwater in the hydrohole, surface readings would not have been representative, therefore the top bottle of a hydrocast was usually placed 5 m below the water surface.

The highest observed wire angles during these cruises were about 4°. For a 1000 m cast, this would yield a true depth of 998 m at the bottom. Computations of thermometric depths (Wüst 1933) were performed for those observations deeper than 250 m where unprotected thermometers were used for which calibrations were still available (262 depths at 45 stations). With the exception of two casts (Cruise 11, station 1, cast 5, 1400-2000 m and Cruise 13, station 12, cast 5, 500-1300 m), all calculated values were generally within 2-3% of the nominal depths sampled. These two casts were corrected. All other depths reported here are uncorrected, but should be within 2-5% of the true value.

Temperatures were determined from reversing thermometers on each water bottle; protected thermometers were usually deployed in pairs. Bottles were tripped about 5 min after the top bottle reached its intended depth. Thermometers were read using a lighted magnifying glass about 15 min after retrieval. Readings were corrected from the auxiliary thermometers and the thermometer constants by an IBM 1130 program at the Department of Oceanography, University of Washington.

Over 100 reversing thermometers were used during the course of these observations. They were calibrated either by the manufacturers or at various times at the University of Washington. Calibration data available from the

latest date preceding the use of each thermometer on T-3 were used to correct the thermometer readings. The calibrations were usually 0.5-3 yr old when they were applied to these data.

Salinity samples were drawn into 250 ml clear polyethylene bottles, tightly sealed, and allowed to come to room temperature. Determinations were made on T-3 using an Industrial Instruments Model RS-7A (Industrial Instruments Co., Cedar Grove, NJ) or a Beckman Model RS-7B (Beckman Instruments, Inc., Fullerton, CA) portable induction salinometer calibrated against a standard seawater sample obtained from the Laboratoire Hydrographique (Copenhagen, Denmark). Substandards of seawater (ca. 34.9‰ collected from ca. 500 m) were used after each 10 samples and at the end of a run. Salinity was calculated using the tables in the salinometer manual (Industrial Instruments 1964). These values are considered to have an accuracy of ± 0.003 ppt.

Dissolved oxygen was analyzed by a modified Winkler method (Strickland and Parsons 1965). Brown BOD bottles of 250 ml capacity, an automatic 100 ml pipet, an automatic 25 ml burette readable to 0.01 ml, and an electric stirrer were used.

Nutrients were determined by the methods in Strickland and Parsons (1968). The samples were either analyzed immediately after collection or frozen for later analysis either on the ice, or during April and May 1971, at the University of Washington using a Beckman DU spectrophotometer (Beckman Instruments, Inc., Fullerton, CA) with 1 cm cells. After December 1972, nitrate determinations were run on a Brinkman PC/1000 colorimeter (Brinkman Instruments, Westbury, NY) with a fiber optics probe and calibrated against the spectrophotometer. Reagents and standards were prepared from water filtered through an Ion-X-Change column, Grade 1, consisting of a mixed bed non-regenerable resin (Illinois Water Treatment Co.) that produces triple distilled water. Comparisons between reagents and standards made up with this water and with distilled water sent from the Naval Arctic Research Laboratory at Barrow showed these procedures to be adequate. Standards were run with each set of samples and for each nitrate column.

Chlorophyll a

Chlorophyll a was determined according to Strickland and Parsons (1968). In 1968 through 1970, water was filtered through 47 mm 0.45 μ m Millipore filters (Millipore Corporation, Bedford, MA). Suction pressure was less than 250 mm Hg. In 1971 through 1973, Gelman A/E glass fiber filters (approximate

pore size = 1.0 μm) (Gelman Instrument Co., Ann Arbor, MI) were used. MgCO_3 was added to all filters near the end of the filtration. In 1968, samples of about 4 liters of water were analyzed using a Beckman DK spectrophotometer in Seattle and chlorophyll a was calculated using the SCOR-UNESCO equations (Unesco 1966). For 1968 through 1973, samples of about 2 liters of water were filtered and a Turner Model 111 fluorometer (G. K. Turner Associates, Palo Alto, CA) was used for analysis. Fluorometer filters were 5-60 and 2-64. The fluorometer was calibrated using either a Beckman DU spectrophotometer on T-3 or a Beckman DK scanning spectrophotometer in Seattle. For samples analyzed with the fluorometer, chlorophyll a was calculated using equations in Holm-Hansen et al. (1967). Phaeopigments were not determined.

Primary Productivity

Primary productivity was measured during the summers by the radiocarbon technique of Steemann-Nielsen (1952) as detailed by Strickland and Parsons (1968). Two experimental schemes were used:

1. Depth series - paired 130 ml light and dark bottles were filled with water collected from a number of depths and incubated under constant high illumination (for the level of irradiance, see below).
2. Graduated light series - five light and one dark bottle containing water from one depth were incubated under 0, 10, 25, 50, 75, and 100% irradiance provided by glass neutral density filters over the incubation bottles.

For both series, dark bottles were pre-wrapped with black tape and then covered with aluminum foil to insure complete darkness. Depths and frequencies of sampling varied from year to year.

The plastic incubator box was fronted with clear plexiglass and had a wheel that rotated in the vertical plane. The wheel accommodated 12 ground-glass stoppered 130 ml bottles. At various times, because of stripped gears, the wheel did not rotate or was manually turned periodically during incubation. Light, provided by a bank of 12 GE Cool-White fluorescent lamps (General Electric Corporation, Stamford, CT), and amount of radioactivity added varied from year to year. Highest irradiance (= 100%) in the incubator was between 1100 and 1400 ft-c measured with a GE Model No. 214 photometer (General Electric Corporation, Stamford, CT). A pumped water flow-through system maintained ambient incubator temperature near 0°C. Samples were incubated for 6 or 12 hr.

At the end of the incubation, the samples were filtered (suction pressure

less than 250 mm Hg) onto 25 mm, 0.45 μ m Millipore filters, washed with filtered seawater, air-dried, and stored over desiccant until analyzed. Filters were fumed over concentrated HCl and counted three times for 1000 counts, using a gas flow proportional counter (Nuclear Chicago Corporation, Des Plaines, IL). Counting was done either in Seattle using a Nuclear Chicago Model D-47 counter with micromil window, C-110 automatic sample changer, 161-A scaler, and C111B printing timer, or on T-3 using a Nuclear Chicago manual, end-window Model 8770 scaler, Model 3053 sample changer, Model 108 G-M detector, and Model 8420 dual timer.

Carbon uptake was calculated from

$$P = (L-D)(W)(1.05)/(Z)(T)$$

where P is in $\text{mg C m}^{-3} \text{ h}^{-1}$; L-D is the difference between the light and dark bottle in counts per minute corrected for machine background and coincidence; W is the total carbonate in mg C m^{-3} calculated from $W = (810)(S^{\circ}/\text{‰})$ as suggested by Dr. G. C. Anderson, Department of Oceanography, University of Washington; 1.05 is the isotope discrimination factor (Strickland 1960); Z is the total activity in counts per minute added to the sample and corrected for the counter efficiency of about 22.8%; T is the incubation time (6 or 12 hr).

All ^{14}C ampoules used on T-3 were prepared in the Department of Oceanography, University of Washington, from aqueous sodium carbonate obtained from Nuclear Chicago Corporation. All glassware was rinsed with distilled water and autoclaved. The amount of solution to be made was determined by dividing the activity of the stock aqueous sodium carbonate by the desired activity per ml of final solution. Glass distilled water was filtered through 47 mm, 0.45 μ m Millipore filters. The pH was adjusted to 9.5-9.7 with NaOH. The solution was well mixed, and after adding the commercial sodium carbonate, mixed again. Glass ampoules holding 2 or 5 ml of solution were filled by an automatic volume dispenser. The ampoules were sealed using propane torches. The sealed ampoules were placed in large beakers, covered with water to which methylene blue dye was added, and autoclaved for ca. 1 hr at 120°C. After washing away the dye, the ampoules were inspected for any sign of color inside them. Ampoules that were even slightly discolored were discarded. The filled ampoules were color-coded with spray paint and stored.

Several ampoules from the beginning, middle, and end of the filling process were kept separate to be used for standardization. Standardization was done using methods then employed by the Department of Oceanography, University of Washington, where ampoules were either sent to Dr. C. R. Goldman, University of

California, Davis, and analyzed using gas phase (Goldman 1963; Steemann-Nielsen 1974) or, in the Department of Oceanography, University of Washington, were compared to samples obtained from the National Bureau of Standards. From 1970-1973, ampoules were standardized by liquid scintillation techniques and external standards at the Department of Oceanography.

Phytoplankton Cell Counts

Samples for phytoplankton identification and cell counts were usually taken from Nansen bottles during hydrocasts and stored in 250 ml glass jars. They were preserved with 4% formalin, buffered (sodium borate) or unbuffered, for a final strength of approximately 1%. Samples were shipped to Seattle for later analysis. Some samples were collected from a water pumping system during summer 1970 (see below).

Phytoplankton species were enumerated for some of the samples collected in the summers of 1968, 1969, and 1971 with the inverted microscope method (Hasle 1978a, b). Samples were individually counted or samples from two, three, or four days were combined for each depth. The samples combined to make a composite were separated in time by one week or less. After thorough mixing, the samples were poured into 5 and 50 ml Zeiss counting chambers (Carl Zeiss, Oberkochen Würt, FRG) and allowed to settle at least 20 hr before counting. A Zeiss inverted microscope was used for all enumerations. The 5 ml chamber was counted at 390 X using a 25 X objective, 12.5 X oculars, and a magnification factor of the optics carrier of 1.25. The 50 ml chamber was counted at 156 X with a 10 X objective, 12.5 X oculars, and the 1.25 X magnification factor. Cell counts were converted to cells per liter, cell volumes (Larrance 1964), and cell carbon (Mullin et al. 1966). These data are contained in an unpublished manuscript (Walline 1973) available from the School of Oceanography, University of Washington.

Zooplankton

Zooplankton sampling was maintained from March 1966 through April 1974. Gear types, sampling periods, and depth intervals sampled varied between and within years. Regardless of the gear used, all samples were concentrated and preserved in 4% V/V formalin (final concentration) buffered with either sodium acetate or sodium borate.

Initially, samples were taken with an open 0.5 m diameter ring net with 215 μ m mesh gauze. From June 1966 through July 1967, a 7.6 cm centrifugal

pump system with a 10 cm diameter hose intake was lowered. A 25 kg weight at the end of the wire held down the hose intake. Since wire angles were low, the depth of sampling was estimated from the length of the wire. Maximum depth of sampling was about 185 m. Samples of 5 to 18 m³ of water were filtered at a rate of 0.2 to 0.6 m³ per min through a net of 215 μ m mesh size. Beginning in early July 1967, a closing 1 m diameter ring net of either 110 or 215 μ m mesh was used to sample to 1000 m. This sampling overlapped with pumping stations to assure comparability.

Sampling with a 2 m² closing umbrella net began in September 1967 (Scott 1969; Macaulay and Daly 1987). Mesh size was 223 and 569 μ m. This net, with a filtration ratio of 1.25:1, was the principal sampling device throughout the remaining field program though the netting itself was replaced with a high filtration type mesh (4:1 filtration ratio) in March 1972. All subsequent samples were collected with the 4:1 filtration ratio net.

An overlapping sampling scheme was used starting in October 1969. Sampling depths were at 10 m intervals from 300 to 10 m, 100 m intervals from 1000 to 10 m, and 500 m intervals from the bottom to 10 m. The 10 m upper limit was chosen to protect the net during retrieval through the hydrohole. Samples were collected from as deep as 2500 m.

Two other kinds of nets were sometimes employed: a 3 m² closing umbrella net with 300 μ m mesh in summer 1968 and a 1 m² plummet net with 571 μ m mesh initially in May 1971 and periodically thereafter. The plummet net is a downward fishing net with an opening-closing mechanism activated with a messenger (Macaulay 1978; Macaulay and Daly in prep.).

Sorting, identifying, and counting of some samples were done in Seattle (Table 3). Other samples have been analyzed for some groups of organisms, primarily copepods. These data are available in the School of Oceanography, but obtaining them will require an investigator to visit the University of Washington.

Echo-sounder

Echo-sounding was conducted from April 1970 to April 1974. A modified Ross 200A (100 kHz) echo-sounder and 10° transducer with an impedance matching box scanned depth ranges of 0-50, 50-100, 100-150, and 150-200 fm. The 0-50 fm depth range was emphasized because of interest in the scattering layer often found about 25 fm. The system included the standard Ross 200A transceiver unit, recorder unit, and a Sony TC-5600 stereo tape recorder. During regular

Table 3. List of T-3 zooplankton samples analyzed and used in theses, reports, and publications

Hughes (1968)	399 samples collected with a plankton pump
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
Scott (1969)	523 samples collected with a pump, 1 m closing ring net and 2 m ² umbrella net
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
	04 10 Jul - 6 Sep 1967
	05 13 Sep - 23 Sep 1967
Damkaer (1976)	52 samples collected with a 1 m closing ring net
Cruises:	04 12 Jul - 8 Sep 1967
	06 5 May 1968
	07 10 Jun - 18 Aug 1968
Heron and Damkaer (1976)	2 samples collected with a 1 m closing ring net
Cruises:	07 10 Jun 1968
	12 Jun 1968
Pautzke (1979)	16 samples collected with a 2 m ² umbrella net
Cruises:	14 7 Jun - 5 Oct 1970
	18 30 May - 1 Oct 1971
	22 31 May - 29 Sep 1972
	26 28 May - 19 Oct 1973
Heron, English, and Damkaer (1984)	54 samples collected with a 1 m closing ring net and 3 m ² umbrella net
Cruises:	06 5 May 1968
	07 10 Jun - 20 Sep 1968
	08 21 Sep 1968

operation, echo-sounding was conducted continuously, normally on the 0-50 fm scale. Daily recordings of 15-45 min were made using all depth ranges. Some of these data are available on 1/4 inch magnetic tape, but retrieval will be difficult.

Data Management

The data were available from computer printouts or raw data sheets. The original punched data cards could not be located so the data were re-entered directly to disk files on the University of Washington Cyber 180-855 computer using a Tandy Model DT-1 data terminal. After editing the files to correct data entry errors or to fill in gaps in the data, the files were transferred to a 9-track, EBCDIC-coded magnetic tape for NODC. The resulting tape contains three files of hydrographic data, one file of chlorophyll data, and one file of primary productivity data.

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DATA DOCUMENTATION FORM

NOAA FORM 24-13
(4-77)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
WASHINGTON, DC 20235

FORM APPROVED
O.M.B. No. 41-R2651
EXPIRES 1-81

(While you are not required to use this form, it is the most desirable mechanism for providing the required ancillary information enabling the NODC and users to obtain the greatest benefit from your data.)

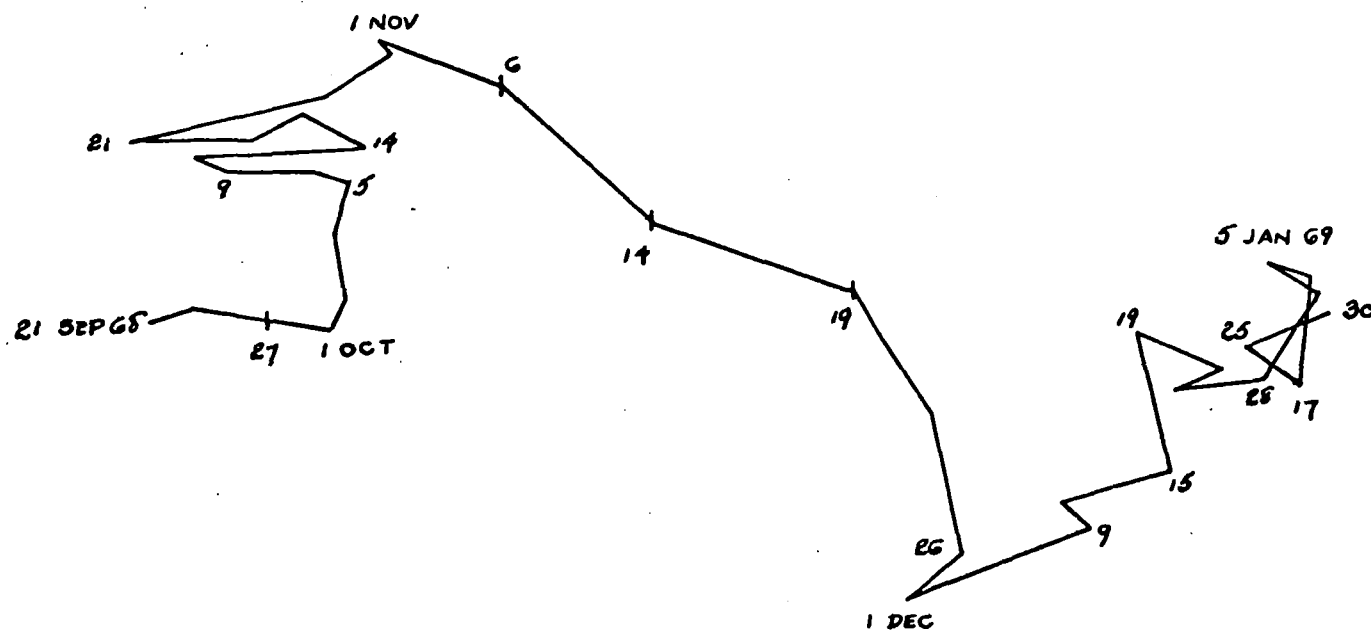
This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED Dr. T. Saunders English School of Oceanography WB-10 University of Washington Seattle, WA 98195			
2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED Primary production and energy flow		3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT TSE-(T-3)-08	
4. PLATFORM NAME(S) Fletcher's Ice Island (T-3)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.) Ice island	6. PLATFORM AND OPERATOR NATIONALITY(IES) USA USA	7. DATES FROM: MO/DAY/YR TO: MO/DAY/YR 09/21/68 01/31/69
8. ARE DATA PROPRIETARY? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR ____ MONTH ____		11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED. GENERAL AREA	
9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?) <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> PART (SPECIFY BELOW) Data should be available for international exchange			
10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER (AND ADDRESS IF OTHER THAN IN ITEM-1) Dr. Karl Banse School of Oceanography WB-10 University of Washington Seattle, WA 98195 (206)543-5079			

TSE - (T-3) - 8
SEPTEMBER 1968
JANUARY 1969



TSE-(T-3)-08

Modifications to the basic program methods

Zooplankton samples (71) were collected with a 2 m² closing net with a mesh size of 223 μ m. Sampling was done over 10 m depth intervals from 0-100 m, over 20 m intervals from 100-200 m, over 100 m intervals from 200-500 m, and over 500 m intervals from 500-2000 m.

Two hydrographic casts were done and 46 samples each were collected for temperature, salinity, and dissolved oxygen measurements, however oxygen values are missing from the data.

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Water transparency	meters	Secchi Disk	N/A	N/A
Depth of Sample	meters	Wire out	N/A	N/A
Temperature	°C	Reversing thermometers	N/A	N/A
Salinity	‰	Nansen bottles, modified Van Dorn bottles	Salinometer, University of Washington	N/A
Sigma-t	-	"	-	N/A
Dissolved oxygen	ml/l	"	Winkler	N/A
PO ₄	µg-atom/l	"	See Strickland and Parsons (1968)	N/A
NO ₃	"	"	"	N/A
SiO ₄	"	"	"	N/A
Chlorophyll <u>a</u>	mg m ⁻³	Van Dorn bottles	Spectrophotometer, fluorometer (Strickland and Parsons 1963)	N/A
Primary productivity (14C uptake)	mg C m ⁻³ h ⁻¹	"	Strickland and Parsons (1968)	N/A

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-1 ☐ ALGOL ☐ COBOL
☐ FORTRAN ☐ _____ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:

NAME AND PHONE NUMBER _____

ADDRESS _____

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

<p>5. RECORDING MODE</p> <p><input type="checkbox"/> BCD <input type="checkbox"/> BINARY</p> <p><input type="checkbox"/> ASCII <input checked="" type="checkbox"/> EBCDIC</p> <p><input type="checkbox"/> _____</p>	<p>9. LENGTH OF INTER-RECORD GAP (IF KNOWN) <input checked="" type="checkbox"/> 3/4 INCH</p> <p><input type="checkbox"/> _____</p>
<p>6. NUMBER OF TRACKS (CHANNELS)</p> <p><input type="checkbox"/> SEVEN</p> <p><input checked="" type="checkbox"/> NINE</p> <p><input type="checkbox"/> _____</p>	<p>10. END OF FILE MARK</p> <p><input type="checkbox"/> OCTAL 17</p> <p><input checked="" type="checkbox"/> Tape Mark</p>
<p>7. PARITY</p> <p><input checked="" type="checkbox"/> ODD</p> <p><input type="checkbox"/> EVEN</p>	<p>11. PASTE-ON-PAPER LABEL DESCRIPTION (INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)</p> <p>Ice Island T-3 hydro, chlorophyll, & Productivity data sets.</p> <p>Specs.- 9 track, EBCDIC, odd parity, 1600 bpi, 5 files, D=PE, RL=120, MBL = 3000, CV = EB, F=S, LB=KU</p>
<p>8. DENSITY</p> <p><input type="checkbox"/> 200 BPI <input checked="" type="checkbox"/> 1600 BPI</p> <p><input type="checkbox"/> 556 BPI</p> <p><input type="checkbox"/> 800 BPI</p> <p><input type="checkbox"/> _____</p>	<p>12. PHYSICAL BLOCK LENGTH IN BYTES</p> <p>FL=120 MBL=3000 Char.</p> <p>13. LENGTH OF BYTES IN BITS</p>

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALI- BRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Fluorometer Turner Model 111		X			X				
Reversing thermometers		X	manufacturer		X				
Salinometer Univ. Washington		X			X				
Naval Arctic Research Lab.		X			X				

Primary Production and Energy Flow

The program was directed by the late Dr. T. Saunders English and funded by the Office of Naval Research Contract Nonr-477 (37) Project NR 083 12 and Contract N00014-67-0103-0005. Users of the data are requested to acknowledge the agency support.

The methods used by biological oceanographers of the Department of Oceanography, University of Washington, Seattle, from 1966 to 1974 on Fletcher's Ice Island (T-3) drifting in the Arctic Ocean (Fig. 1) are given below. These methods are to compliment the entries in the individual cruise Data Documentation Forms where modifications, if any, are given.

General

The field program was maintained at various intensities for eight years (March 1966 to June 1974), with personnel on T-3 continuously from April 1968 until the island was evacuated in June 1974. During this period, divided into 28 cruises (Table 1), biological and environmental parameters were measured (Table 2). The sampling program was structured to monitor periods of active change in the various parameters. Thus, hydrography and zooplankton sampling was a year round pursuit, field and logistic conditions permitting, whereas chlorophyll a concentrations and primary productivity (^{14}C uptake) were usually measured only during the summer (June to September). Various gear types, methodologies, and sampling strategies were tried and tested throughout the field program.

The oceanographic working area was located on 3-4 m thick sea ice in Colby Bay adjacent to the ice island. All sampling was done from inside a heated building positioned over a hole, ca. 1.5 m on a side, cut in the ice. The hut contained a space heater, oceanographic sampling equipment, and a Rankin winch powered by a 5 hp Wisconsin gasoline engine. The drum on the winch held about 4000 m of 5/32 inch hydrographic wire. The wire ran through a meter wheel attached to a tripod erected over the hole.

Geographic positions were provided by the Lamont-Doherty Geological Observatory, Palisades, NY (Hunkins and Tiemann 1977). Hydrography and biology (chlorophyll a and primary productivity) samples were not always taken from the same bottle cast or on the same day. Each kind of data has a separate sample numbering scheme. As a result, station positions may not always agree between the hydrographic and biological data. See individual cruise Data Documentation

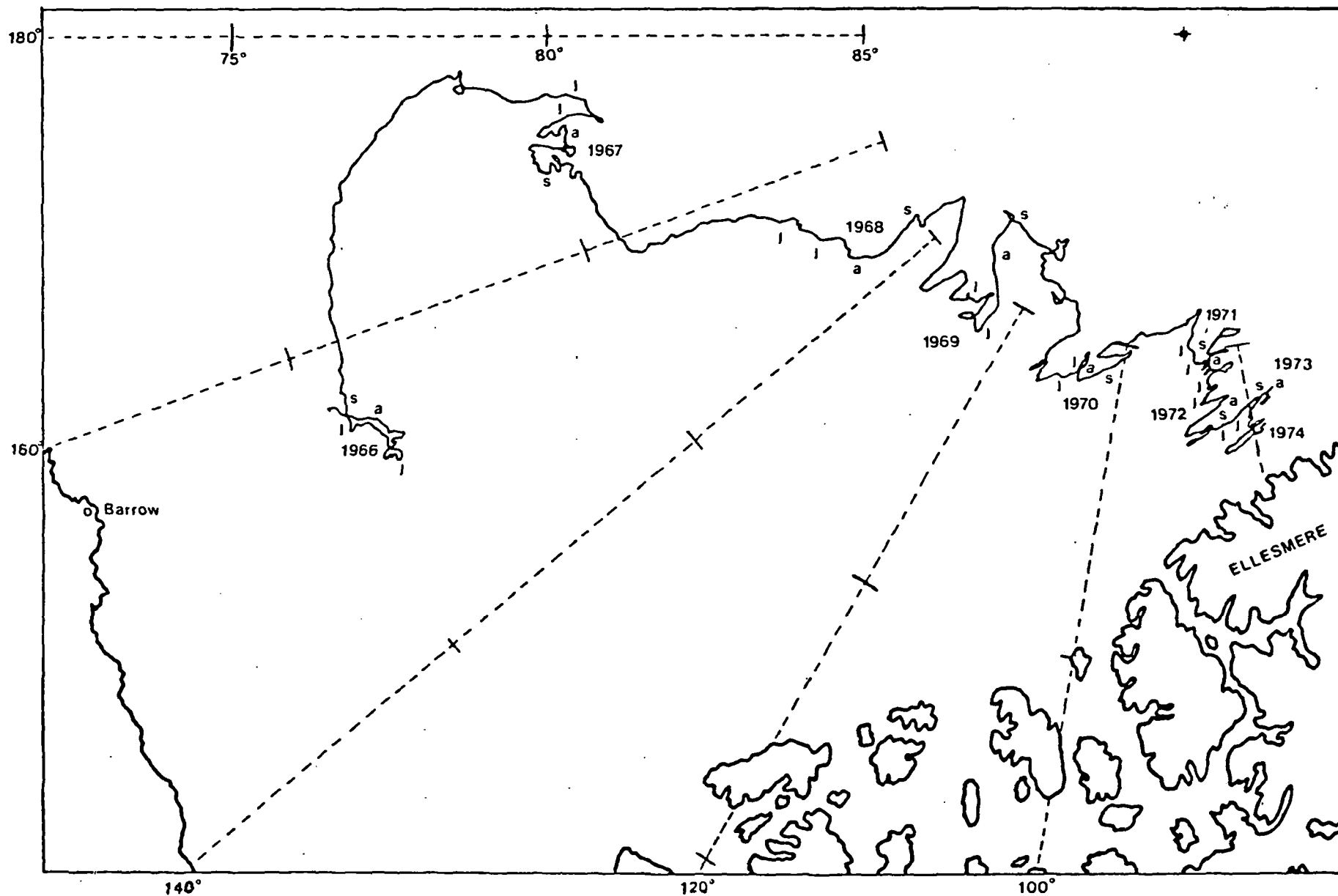


Fig. 1. Drift track of T-3 from June 1966 to April 1974. The months of June, July, August, and September are indicated in small letters for each year.

Table 1. Cruise numbers and dates of T-3 field program

Cruise		Cruise	
Number	Duration	Number	Duration
01	16 Mar 66 - 9 Apr 66	15	5 Oct 70 - 30 Dec 70
02	2 Jun 66 - 18 Oct 66	16	1 Jan 71 - 30 Mar 71
03	1 Feb 67 - 15 Feb 67	17	30 Mar 71 - 30 May 71
04	4 Jun 67 - 11 Sep 67	18	30 May 71 - 1 Oct 71
05	12 Sep 67 - 24 Sep 67	19	1 Oct 71 - 20 Dec 71
06	27 Apr 68 - 9 Jun 68	20	20 Dec 71 - 20 Mar 72
07	10 Jun 68 - 20 Sep 68	21	20 Mar 72 - 31 May 72
08	21 Sep 68 - 31 Jan 69	22	31 May 72 - 29 Sep 72
09	31 Jan 69 - 13 Jun 69	23	29 Sep 72 - 13 Dec 72
10	13 Jun 69 - 3 Oct 69	24	13 Dec 72 - 7 Apr 73
11	4 Oct 69 - 5 Jan 70	25	7 Apr 73 - 28 May 73
12	5 Jan 70 - 23 Mar 70	26	28 May 73 - 19 Oct 73
13	23 Mar 70 - 7 Jun 70	27	31 Oct 73 - 8 Mar 74
14	7 Jun 70 - 5 Oct 70	28	8 Mar 74 - 1 Jun 74

Table 2. Field data collected at T-3, March 1966 to June 1974

Parameter	Total Number of Samples	1966												1967												1968													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354				X																															X	X		
Temperature	5354				X																															X	X		
Dissolved oxygen	5198				X																															X	X		
Nutrients																																							
Nitrate	3611																																						
Silicate	3440																																						
Phosphate	3440																																						
Phytoplankton																																							
Chlorophyll <u>a</u>	8022							X	X									X	X	X	X												X	X	X	X			
Productivity	4978																	X	X	X													X	X	X				
Cell Counts	5838																																	X	X	X	X		
Zooplankton																																							
Acoustic traces	40 mo																																						
Plankton pump	427						X	X	X	X	X		X				X	X	X	X																			
Nets (mesh size μm)																																							
0.5 m ring (215)	38				X	X																																	
1 m closing ring (110)	355																																X	X	X	X	X		
1 m closing ring (215)	318																	X	X	X																			
1 m ² plummet (571)*	56																																						
2 m ² umbrella (223) [†]	9112																			X												X	X	X	X	X	X		
2 m ² umbrella (569)	95																																	X	X				
3 m ² umbrella (300)	104																																X	X	X				

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2. (cont.)

Parameter	Total Number of Samples	1969												1970												1971													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Temperature	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Dissolved oxygen	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Nutrients																																							
Nitrate	3611																	X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X		
Silicate	3440																	X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X		
Phosphate	3440																	X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X		
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X								X	X	X	X					X		X	X	X	X								
Productivity	4978						X	X	X	X								X	X	X	X							X	X	X	X								
Cell Counts	5838				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Zooplankton																																							
Acoustic traces	40 mo																X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
Plankton pump	427																																						
Nets (mesh size μm)																																							
0.5 m ring (215)	38																																						
1 m closing ring (110)	355			X																																			
1 m closing ring (215)	318					X	X																																
1 m ² plummet (571)*	56																																						
2 m ² umbrella (223) †	9112	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2 (cont.)

Parameter	Total Number of Samples	1972												1973												1974												
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
Hydrography																																						
Salinity	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Temperature	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5198	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Nutrients																																						
Nitrate	3611	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																						
Chlorophyll <u>a</u>	8022						X	X	X	X									X	X	X	X																
Productivity	4978						X	X	X	X	X								X	X	X	X																
Cell Counts	5838						X	X	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Zooplankton																																						
Acoustic traces	40 mo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Plankton pump	427																																					
Nets (mesh size μm)																																						
0.5 m ring (215)	38																																					
1 m closing ring (110)	355																																					
1 m closing ring (215)	318																																					
1 m ² plummet (571)*	56					X	X																															
2 m ² umbrella (223) †	9112	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2 m ² umbrella (569)	95																																					
3 m ² umbrella (300)	104																																					

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Forms for kind of sampling bottle used.

Hydrography and Nutrients

Temperature, salinity, oxygen, and nutrient determinations were made on water collected with Van Dorn polyvinylchloride or uncoated Nansen water sampling bottles. The Van Dorn bottles contained surgical tubing which may or may not be toxic to organisms (see Price et al. 1986). In general, the upper 100 m was sampled at 5 m intervals, 125-375 m at 25 m intervals, 400-500 m at 50 m intervals, 600-1000 m at 100 m intervals, and 1000 m to the bottom at 250 m intervals with a 30 m interval between the last bottle and the bottom. Periodically, additional samples were taken at 2 m intervals around the pycnocline (usually 40-60 m). In periods when weekly casts were taken, an alternating pattern of sampling, 0-100 m, 0-500 m, 0-100 m, 0-deep, allowed a more frequent survey of short-term variation in the near-surface stratum without the additional burden of time-consuming deep casts. Because of heat lamps and cables and the accumulation of freshwater in the hydrohale, surface readings would not have been representative, therefore the top bottle of a hydrocast was usually placed 5 m below the water surface.

The highest observed wire angles during these cruises were about 4°. For a 1000 m cast, this would yield a true depth of 998 m at the bottom. Computations of thermometric depths (Wüst 1933) were performed for those observations deeper than 250 m where unprotected thermometers were used for which calibrations were still available (262 depths at 45 stations). With the exception of two casts (Cruise 11, station 1, cast 5, 1400-2000 m and Cruise 13, station 12, cast 5, 500-1300 m), all calculated values were generally within 2-3% of the nominal depths sampled. These two casts were corrected. All other depths reported here are uncorrected, but should be within 2-5% of the true value.

Temperatures were determined from reversing thermometers on each water bottle; protected thermometers were usually deployed in pairs. Bottles were tripped about 5 min after the top bottle reached its intended depth. Thermometers were read using a lighted magnifying glass about 15 min after retrieval. Readings were corrected from the auxiliary thermometers and the thermometer constants by an IBM 1130 program at the Department of Oceanography, University of Washington.

Over 100 reversing thermometers were used during the course of these observations. They were calibrated either by the manufacturers or at various times at the University of Washington. Calibration data available from the

latest date preceding the use of each thermometer on T-3 were used to correct the thermometer readings. The calibrations were usually 0.5-3 yr old when they were applied to these data.

Salinity samples were drawn into 250 ml clear polyethylene bottles, tightly sealed, and allowed to come to room temperature. Determinations were made on T-3 using an Industrial Instruments Model RS-7A (Industrial Instruments Co., Cedar Grove, NJ) or a Beckman Model RS-7B (Beckman Instruments, Inc., Fullerton, CA) portable induction salinometer calibrated against a standard seawater sample obtained from the Laboratoire Hydrographique (Copenhagen, Denmark). Substandards of seawater (ca. 34.9‰ collected from ca. 500 m) were used after each 10 samples and at the end of a run. Salinity was calculated using the tables in the salinometer manual (Industrial Instruments 1964). These values are considered to have an accuracy of ± 0.003 ppt.

Dissolved oxygen was analyzed by a modified Winkler method (Strickland and Parsons 1965). Brown BOD bottles of 250 ml capacity, an automatic 100 ml pipet, an automatic 25 ml burette readable to 0.01 ml, and an electric stirrer were used.

Nutrients were determined by the methods in Strickland and Parsons (1968). The samples were either analyzed immediately after collection or frozen for later analysis either on the ice, or during April and May 1971, at the University of Washington using a Beckman DU spectrophotometer (Beckman Instruments, Inc., Fullerton, CA) with 1 cm cells. After December 1972, nitrate determinations were run on a Brinkman PC/1000 colorimeter (Brinkman Instruments, Westbury, NY) with a fiber optics probe and calibrated against the spectrophotometer. Reagents and standards were prepared from water filtered through an Ion-X-Change column, Grade 1, consisting of a mixed bed non-regenerable resin (Illinois Water Treatment Co.) that produces triple distilled water. Comparisons between reagents and standards made up with this water and with distilled water sent from the Naval Arctic Research Laboratory at Barrow showed these procedures to be adequate. Standards were run with each set of samples and for each nitrate column.

Chlorophyll a

Chlorophyll a was determined according to Strickland and Parsons (1968). In 1968 through 1970, water was filtered through 47 mm 0.45 μ m Millipore filters (Millipore Corporation, Bedford, MA). Suction pressure was less than 250 mm Hg. In 1971 through 1973, Gelman A/E glass fiber filters (approximate

pore size = 1.0 μm) (Gelman Instrument Co., Ann Arbor, MI) were used. MgCO_3 was added to all filters near the end of the filtration. In 1968, samples of about 4 liters of water were analyzed using a Beckman DK spectrophotometer in Seattle and chlorophyll a was calculated using the SCOR-UNESCO equations (Unesco 1966). For 1968 through 1973, samples of about 2 liters of water were filtered and a Turner Model 111 fluorometer (G. K. Turner Associates, Palo Alto, CA) was used for analysis. Fluorometer filters were 5-60 and 2-64. The fluorometer was calibrated using either a Beckman DU spectrophotometer on T-3 or a Beckman DK scanning spectrophotometer in Seattle. For samples analyzed with the fluorometer, chlorophyll a was calculated using equations in Holm-Hansen et al. (1967). Phaeopigments were not determined.

Primary Productivity

Primary productivity was measured during the summers by the radiocarbon technique of Steemann-Nielsen (1952) as detailed by Strickland and Parsons (1968). Two experimental schemes were used:

1. Depth series - paired 130 ml light and dark bottles were filled with water collected from a number of depths and incubated under constant high illumination (for the level of irradiance, see below).

2. Graduated light series - five light and one dark bottle containing water from one depth were incubated under 0, 10, 25, 50, 75, and 100% irradiance provided by glass neutral density filters over the incubation bottles.

For both series, dark bottles were pre-wrapped with black tape and then covered with aluminum foil to insure complete darkness. Depths and frequencies of sampling varied from year to year.

The plastic incubator box was fronted with clear plexiglass and had a wheel that rotated in the vertical plane. The wheel accommodated 12 ground-glass stoppered 130 ml bottles. At various times, because of stripped gears, the wheel did not rotate or was manually turned periodically during incubation. Light, provided by a bank of 12 GE Cool-White fluorescent lamps (General Electric Corporation, Stamford, CT), and amount of radioactivity added varied from year to year. Highest irradiance (= 100%) in the incubator was between 1100 and 1400 ft-c measured with a GE Model No. 214 photometer (General Electric Corporation, Stamford, CT). A pumped water flow-through system maintained ambient incubator temperature near 0°C. Samples were incubated for 6 or 12 hr.

At the end of the incubation, the samples were filtered (suction pressure

less than 250 mm Hg) onto 25 mm, 0.45 μ m Millipore filters, washed with filtered seawater, air-dried, and stored over desiccant until analyzed. Filters were fumed over concentrated HCl and counted three times for 1000 counts, using a gas flow proportional counter (Nuclear Chicago Corporation, Des Plaines, IL). Counting was done either in Seattle using a Nuclear Chicago Model D-47 counter with micromil window, C-110 automatic sample changer, 161-A scaler, and C111B printing timer, or on T-3 using a Nuclear Chicago manual, end-window Model 8770 scaler, Model 3053 sample changer, Model 108 G-M detector, and Model 8420 dual timer.

Carbon uptake was calculated from

$$P = (L-D)(W)(1.05)/(Z)(T)$$

where P is in $\text{mg C m}^{-3} \text{ h}^{-1}$; L-D is the difference between the light and dark bottle in counts per minute corrected for machine background and coincidence; W is the total carbonate in mg C m^{-3} calculated from $W = (810)(S^{\circ}/\text{‰})$ as suggested by Dr. G. C. Anderson, Department of Oceanography, University of Washington; 1.05 is the isotope discrimination factor (Strickland 1960); Z is the total activity in counts per minute added to the sample and corrected for the counter efficiency of about 22.8%; T is the incubation time (6 or 12 hr).

All ^{14}C ampoules used on T-3 were prepared in the Department of Oceanography, University of Washington, from aqueous sodium carbonate obtained from Nuclear Chicago Corporation. All glassware was rinsed with distilled water and autoclaved. The amount of solution to be made was determined by dividing the activity of the stock aqueous sodium carbonate by the desired activity per ml of final solution. Glass distilled water was filtered through 47 mm, 0.45 μ m Millipore filters. The pH was adjusted to 9.5-9.7 with NaOH. The solution was well mixed, and after adding the commercial sodium carbonate, mixed again. Glass ampoules holding 2 or 5 ml of solution were filled by an automatic volume dispenser. The ampoules were sealed using propane torches. The sealed ampoules were placed in large beakers, covered with water to which methylene blue dye was added, and autoclaved for ca. 1 hr at 120°C. After washing away the dye, the ampoules were inspected for any sign of color inside them. Ampoules that were even slightly discolored were discarded. The filled ampoules were color-coded with spray paint and stored.

Several ampoules from the beginning, middle, and end of the filling process were kept separate to be used for standardization. Standardization was done using methods then employed by the Department of Oceanography, University of Washington, where ampoules were either sent to Dr. C. R. Goldman, University of

California, Davis, and analyzed using gas phase (Goldman 1963; Steemann-Nielsen 1974) or, in the Department of Oceanography, University of Washington, were compared to samples obtained from the National Bureau of Standards. From 1970-1973, ampoules were standardized by liquid scintillation techniques and external standards at the Department of Oceanography.

Phytoplankton Cell Counts

Samples for phytoplankton identification and cell counts were usually taken from Nansen bottles during hydrocasts and stored in 250 ml glass jars. They were preserved with 4% formalin, buffered (sodium borate) or unbuffered, for a final strength of approximately 1%. Samples were shipped to Seattle for later analysis. Some samples were collected from a water pumping system during summer 1970 (see below).

Phytoplankton species were enumerated for some of the samples collected in the summers of 1968, 1969, and 1971 with the inverted microscope method (Hasle 1978a, b). Samples were individually counted or samples from two, three, or four days were combined for each depth. The samples combined to make a composite were separated in time by one week or less. After thorough mixing, the samples were poured into 5 and 50 ml Zeiss counting chambers (Carl Zeiss, Oberkochen Würt, FRG) and allowed to settle at least 20 hr before counting. A Zeiss inverted microscope was used for all enumerations. The 5 ml chamber was counted at 390 X using a 25 X objective, 12.5 X oculars, and a magnification factor of the optics carrier of 1.25. The 50 ml chamber was counted at 156 X with a 10 X objective, 12.5 X oculars, and the 1.25 X magnification factor. Cell counts were converted to cells per liter, cell volumes (Larrance 1964), and cell carbon (Mullin et al. 1966). These data are contained in an unpublished manuscript (Walline 1973) available from the School of Oceanography, University of Washington.

Zooplankton

Zooplankton sampling was maintained from March 1966 through April 1974. Gear types, sampling periods, and depth intervals sampled varied between and within years. Regardless of the gear used, all samples were concentrated and preserved in 4% V/V formalin (final concentration) buffered with either sodium acetate or sodium borate.

Initially, samples were taken with an open 0.5 m diameter ring net with 215 μ m mesh gauze. From June 1966 through July 1967, a 7.6 cm centrifugal

pump system with a 10 cm diameter hose intake was lowered. A 25 kg weight at the end of the wire held down the hose intake. Since wire angles were low, the depth of sampling was estimated from the length of the wire. Maximum depth of sampling was about 185 m. Samples of 5 to 18 m³ of water were filtered at a rate of 0.2 to 0.6 m³ per min through a net of 215 µm mesh size. Beginning in early July 1967, a closing 1 m diameter ring net of either 110 or 215 µm mesh was used to sample to 1000 m. This sampling overlapped with pumping stations to assure comparability.

Sampling with a 2 m² closing umbrella net began in September 1967 (Scott 1969; Macaulay and Daly 1987). Mesh size was 223 and 569 µm. This net, with a filtration ratio of 1.25:1, was the principal sampling device throughout the remaining field program though the netting itself was replaced with a high filtration type mesh (4:1 filtration ratio) in March 1972. All subsequent samples were collected with the 4:1 filtration ratio net.

An overlapping sampling scheme was used starting in October 1969. Sampling depths were at 10 m intervals from 300 to 10 m, 100 m intervals from 1000 to 10 m, and 500 m intervals from the bottom to 10 m. The 10 m upper limit was chosen to protect the net during retrieval through the hydrohole. Samples were collected from as deep as 2500 m.

Two other kinds of nets were sometimes employed: a 3 m² closing umbrella net with 300 µm mesh in summer 1968 and a 1 m² plummet net with 571 µm mesh initially in May 1971 and periodically thereafter. The plummet net is a downward fishing net with an opening-closing mechanism activated with a messenger (Macaulay 1978; Macaulay and Daly in prep.).

Sorting, identifying, and counting of some samples were done in Seattle (Table 3). Other samples have been analyzed for some groups of organisms, primarily copepods. These data are available in the School of Oceanography, but obtaining them will require an investigator to visit the University of Washington.

Echo-sounder

Echo-sounding was conducted from April 1970 to April 1974. A modified Ross 200A (100 kHz) echo-sounder and 10° transducer with an impedance matching box scanned depth ranges of 0-50, 50-100, 100-150, and 150-200 fm. The 0-50 fm depth range was emphasized because of interest in the scattering layer often found about 25 fm. The system included the standard Ross 200A transceiver unit, recorder unit, and a Sony TC-5600 stereo tape recorder. During regular

Table 3. List of T-3 zooplankton samples analyzed and used in theses, reports, and publications

Hughes (1968)	399 samples collected with a plankton pump
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
Scott (1969)	523 samples collected with a pump, 1 m closing ring net and 2 m ² umbrella net
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
	04 10 Jul - 6 Sep 1967
	05 13 Sep - 23 Sep 1967
Damkaer (1976)	52 samples collected with a 1 m closing ring net
Cruises:	04 12 Jul - 8 Sep 1967
	06 5 May 1968
	07 10 Jun - 18 Aug 1968
Heron and Damkaer (1976)	2 samples collected with a 1 m closing ring net
Cruises:	07 10 Jun 1968
	12 Jun 1968
Pautzke (1979)	16 samples collected with a 2 m ² umbrella net
Cruises:	14 7 Jun - 5 Oct 1970
	18 30 May - 1 Oct 1971
	22 31 May - 29 Sep 1972
	26 28 May - 19 Oct 1973
Heron, English, and Damkaer (1984)	54 samples collected with a 1 m closing ring net and 3 m ² umbrella net
Cruises:	06 5 May 1968
	07 10 Jun - 20 Sep 1968
	08 21 Sep 1968

operation, echo-sounding was conducted continuously, normally on the 0-50 fm scale. Daily recordings of 15-45 min were made using all depth ranges. Some of these data are available on 1/4 inch magnetic tape, but retrieval will be difficult.

Data Management

The data were available from computer printouts or raw data sheets. The original punched data cards could not be located so the data were re-entered directly to disk files on the University of Washington Cyber 180-855 computer using a Tandy Model DT-1 data terminal. After editing the files to correct data entry errors or to fill in gaps in the data, the files were transferred to a 9-track, EBCDIC-coded magnetic tape for NODC. The resulting tape contains three files of hydrographic data, one file of chlorophyll data, and one file of primary productivity data.

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DATA DOCUMENTATION FORM

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O.M.B. No. 41-R2651
EXPIRES 1-81

(While you are not required to use this form, it is the most desirable mechanism for providing the required ancillary information enabling the NODC and users to obtain the greatest benefit from your data.)

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

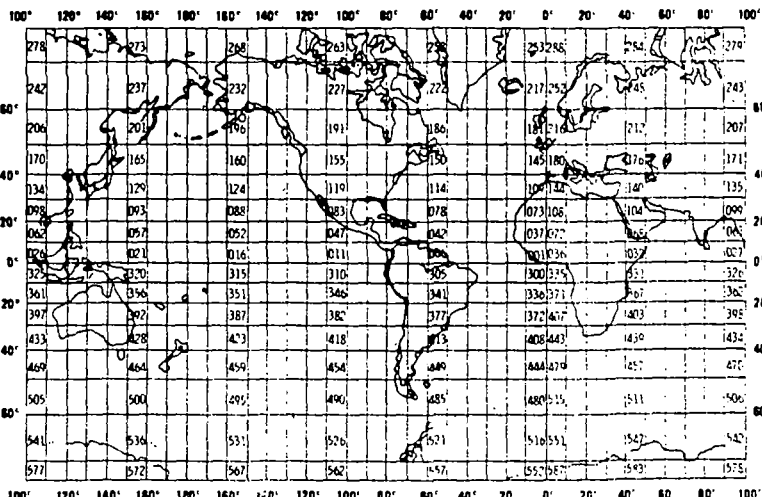
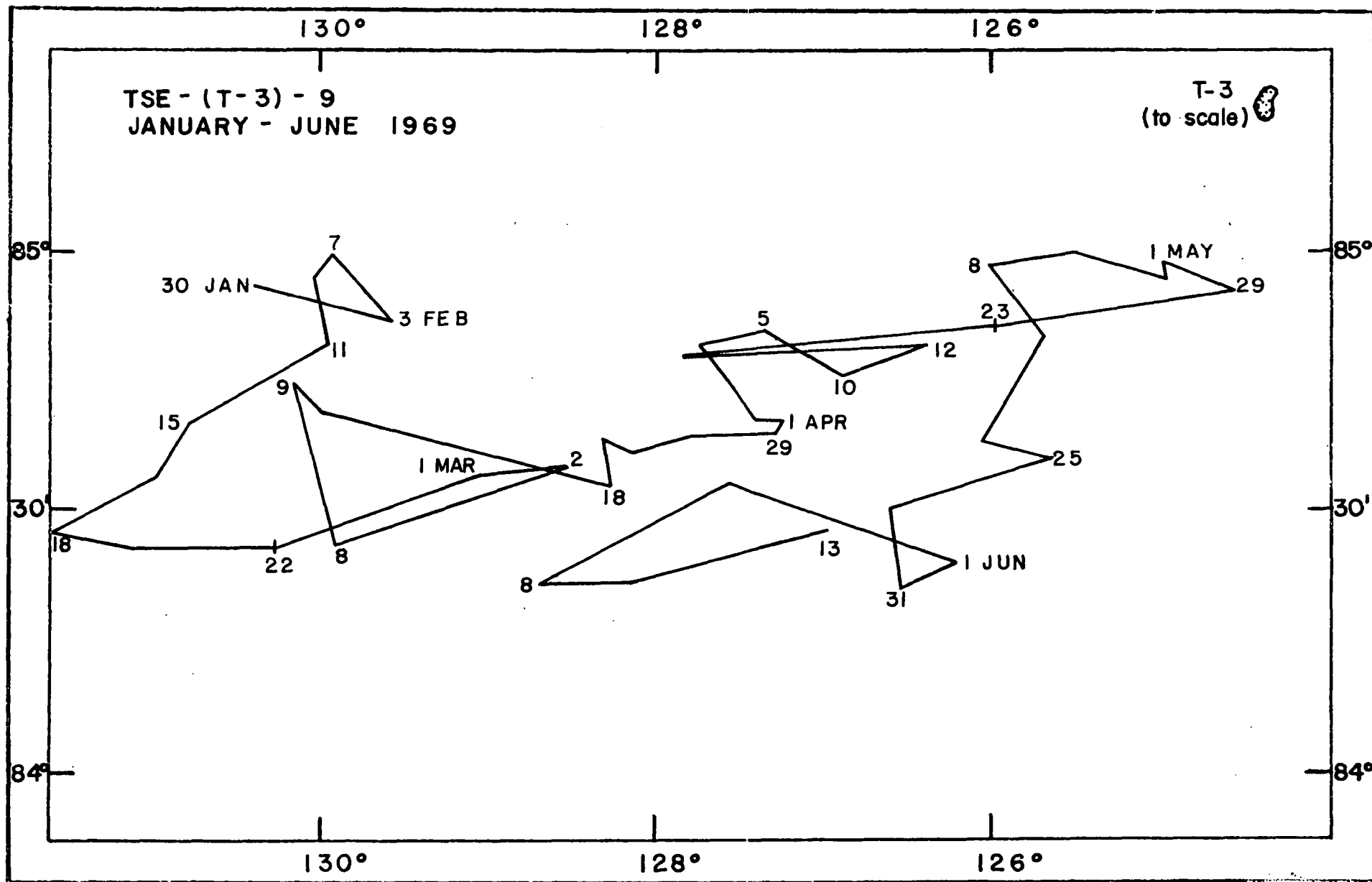
1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED Dr. T. Saunders English School of Oceanography WB-10 University of Washington Seattle, WA 98195			
2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED Primary production and energy flow		3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT TSE-(T-3)-09	
4. PLATFORM NAME(S) Fletcher's Ice Island (T-3)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.) Ice island	6. PLATFORM AND OPERATOR NATIONALITY(IES) PLATFORM OPERATOR USA USA	7. DATES FROM: MO/DAY/YR TO: MO/DAY/YR 01/31/69 06/13/69
8. ARE DATA PROPRIETARY? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR MONTH		11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED. GENERAL AREA 	
9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?) <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> PART (SPECIFY BELOW) Data should be available for international exchange			
10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER (AND ADDRESS IF OTHER THAN IN ITEM-1) Dr. Karl Banse School of Oceanography WB-10 University of Washington Seattle, WA 98195 (206) 543-5079			

FIG. 1



Modifications to the basic program methods

Zooplankton samples were collected with three closing nets:

Dates	Net (m)	Mesh	# Samples	Depth (m)	
		Aperture (μ m)		Min	Max
18 Mar-28 Mar	1 (diam)	110	24	10	2000
10 Apr-28 May	2 (sq)	223	39	10	2000
31 May-09 Jun	1 (diam)	215	31	10	2000
			<hr/> 94		

Depth intervals were 10 m between 10 and 300 m, 20 m between 10 and 200 m, 50 m between 200 and 400 m, 100 m between 10 and 1000 m, and 500 m between 10 and 2000 m.

Phytoplankton cell count samples were collected with Van Dorn bottles at 5, 10, 15, 30, 60, 100, and 200 m on 8 dates between 22 April and 9 June. Three sets of hydrographic observations were obtained with 51 samples each collected for temperature, salinity and dissolved oxygen.

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Water transparency	meters	Secchi Disk	N/A	N/A
Depth of Sample	meters	Wire out	N/A	N/A
Temperature	°C	Reversing thermometers	N/A	N/A
Salinity	‰	Nansen bottles, modified Van Dorn bottles	Salinometer, University of Washington	N/A
Sigma-t	-	"	-	N/A
Dissolved oxygen	ml/l	"	Winkler	N/A
PO ₄	µg-atom/l	"	See Strickland and Parsons (1968)	N/A
NO ₃	"	"	"	N/A
SiO ₄	"	"	"	N/A
Chlorophyll <u>a</u>	mg m ⁻³	Van Dorn bottles	Spectrophotometer, fluorometer (Strickland and Parsons 1963)	N/A
Primary productivity (14C uptake)	mg C m ⁻³ h ⁻¹	"	Strickland and Parsons (1968)	N/A

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

3. ATTRIBUTES AS EXPRESSED IN
- | | | |
|----------------------------------|--------------------------------|--------------------------------|
| <input type="checkbox"/> PL-1 | <input type="checkbox"/> ALGOL | <input type="checkbox"/> COBOL |
| <input type="checkbox"/> FORTRAN | <input type="checkbox"/> _____ | LANGUAGE |

4. RESPONSIBLE COMPUTER SPECIALIST:

NAME AND PHONE NUMBER _____

ADDRESS _____

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

<p>5. RECORDING MODE</p> <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> BCD</td> <td><input type="checkbox"/> BINARY</td> </tr> <tr> <td><input type="checkbox"/> ASCII</td> <td><input checked="" type="checkbox"/> EBCDIC</td> </tr> <tr> <td colspan="2"><input type="checkbox"/> _____</td> </tr> </table>	<input type="checkbox"/> BCD	<input type="checkbox"/> BINARY	<input type="checkbox"/> ASCII	<input checked="" type="checkbox"/> EBCDIC	<input type="checkbox"/> _____		<p>9. LENGTH OF INTER-RECORD GAP (IF KNOWN) <input checked="" type="checkbox"/> 3/4 INCH <input type="checkbox"/> _____</p>		
<input type="checkbox"/> BCD	<input type="checkbox"/> BINARY								
<input type="checkbox"/> ASCII	<input checked="" type="checkbox"/> EBCDIC								
<input type="checkbox"/> _____									
<p>6. NUMBER OF TRACKS (CHANNELS)</p> <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> SEVEN</td> </tr> <tr> <td><input checked="" type="checkbox"/> NINE</td> </tr> <tr> <td><input type="checkbox"/> _____</td> </tr> </table>	<input type="checkbox"/> SEVEN	<input checked="" type="checkbox"/> NINE	<input type="checkbox"/> _____	<p>10. END OF FILE MARK</p> <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> OCTAL 17</td> </tr> <tr> <td><input checked="" type="checkbox"/> Tape Mark</td> </tr> </table>	<input type="checkbox"/> OCTAL 17	<input checked="" type="checkbox"/> Tape Mark			
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<p>7. PARITY</p> <table style="width: 100%; border: none;"> <tr> <td><input checked="" type="checkbox"/> ODD</td> </tr> <tr> <td><input type="checkbox"/> EVEN</td> </tr> </table>	<input checked="" type="checkbox"/> ODD	<input type="checkbox"/> EVEN	<p>11. PASTE-ON-PAPER LABEL DESCRIPTION (INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)</p> <p>Ice Island T-3 hydro, chlorophyll, & Productivity data sets. Specs.- 9 track, EBCDIC, odd parity, 1600 bpi, 5 files, D=PE, RL=120, MBL = 3000, CV = EB, F=S, LB=KU</p>						
<input checked="" type="checkbox"/> ODD									
<input type="checkbox"/> EVEN									
<p>8. DENSITY</p> <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> 200 BPI</td> <td><input checked="" type="checkbox"/> 1600 BPI</td> </tr> <tr> <td><input type="checkbox"/> 556 BPI</td> <td></td> </tr> <tr> <td><input type="checkbox"/> 800 BPI</td> <td></td> </tr> <tr> <td colspan="2"><input type="checkbox"/> _____</td> </tr> </table>	<input type="checkbox"/> 200 BPI	<input checked="" type="checkbox"/> 1600 BPI	<input type="checkbox"/> 556 BPI		<input type="checkbox"/> 800 BPI		<input type="checkbox"/> _____		<p>12. PHYSICAL BLOCK LENGTH IN BYTES</p> <p>FL=120 MBL=3000 Char.</p>
<input type="checkbox"/> 200 BPI	<input checked="" type="checkbox"/> 1600 BPI								
<input type="checkbox"/> 556 BPI									
<input type="checkbox"/> 800 BPI									
<input type="checkbox"/> _____									
	<p>13. LENGTH OF BYTES IN BITS</p>								

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALI- BRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Fluorometer Turner Model 111		X			X				
Reversing thermometers		X	manufacturer		X				
Salinometer Univ. Washington		X			X				
Naval Arctic Research Lab.		X			X				

Primary Production and Energy Flow

The program was directed by the late Dr. T. Saunders English and funded by the Office of Naval Research Contract Nonr-477 (37) Project NR 083 12 and Contract N00014-67-0103-0005. Users of the data are requested to acknowledge the agency support.

The methods used by biological oceanographers of the Department of Oceanography, University of Washington, Seattle, from 1966 to 1974 on Fletcher's Ice Island (T-3) drifting in the Arctic Ocean (Fig. 1) are given below. These methods are to compliment the entries in the individual cruise Data Documentation Forms where modifications, if any, are given.

General

The field program was maintained at various intensities for eight years (March 1966 to June 1974), with personnel on T-3 continuously from April 1968 until the island was evacuated in June 1974. During this period, divided into 28 cruises (Table 1), biological and environmental parameters were measured (Table 2). The sampling program was structured to monitor periods of active change in the various parameters. Thus, hydrography and zooplankton sampling was a year round pursuit, field and logistic conditions permitting, whereas chlorophyll a concentrations and primary productivity (^{14}C uptake) were usually measured only during the summer (June to September). Various gear types, methodologies, and sampling strategies were tried and tested throughout the field program.

The oceanographic working area was located on 3-4 m thick sea ice in Colby Bay adjacent to the ice island. All sampling was done from inside a heated building positioned over a hole, ca. 1.5 m on a side, cut in the ice. The hut contained a space heater, oceanographic sampling equipment, and a Rankin winch powered by a 5 hp Wisconsin gasoline engine. The drum on the winch held about 4000 m of 5/32 inch hydrographic wire. The wire ran through a meter wheel attached to a tripod erected over the hole.

Geographic positions were provided by the Lamont-Doherty Geological Observatory, Palisades, NY (Hunkins and Tiemann 1977). Hydrography and biology (chlorophyll a and primary productivity) samples were not always taken from the same bottle cast or on the same day. Each kind of data has a separate sample numbering scheme. As a result, station positions may not always agree between the hydrographic and biological data. See individual cruise Data Documentation

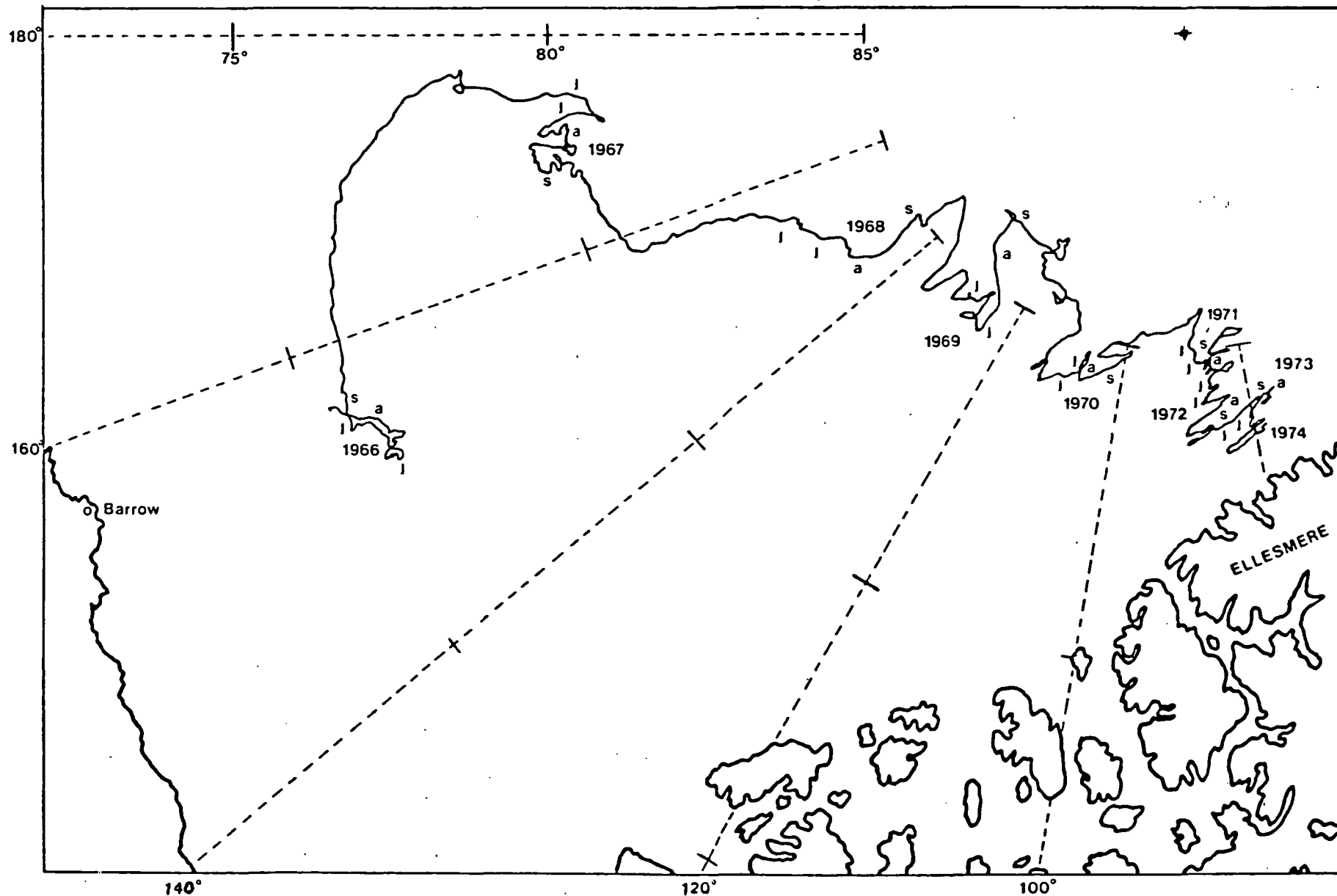


Fig. 1. Drift track of T-3 from June 1966 to April 1974. The months of June, July, August, and September are indicated in small letters for each year.

Table 1. Cruise numbers and dates of T-3 field program

Cruise		Cruise	
Number	Duration	Number	Duration
01	16 Mar 66 - 9 Apr 66	15	5 Oct 70 - 30 Dec 70
02	2 Jun 66 - 18 Oct 66	16	1 Jan 71 - 30 Mar 71
03	1 Feb 67 - 15 Feb 67	17	30 Mar 71 - 30 May 71
04	4 Jun 67 - 11 Sep 67	18	30 May 71 - 1 Oct 71
05	12 Sep 67 - 24 Sep 67	19	1 Oct 71 - 20 Dec 71
06	27 Apr 68 - 9 Jun 68	20	20 Dec 71 - 20 Mar 72
07	10 Jun 68 - 20 Sep 68	21	20 Mar 72 - 31 May 72
08	21 Sep 68 - 31 Jan 69	22	31 May 72 - 29 Sep 72
09	31 Jan 69 - 13 Jun 69	23	29 Sep 72 - 13 Dec 72
10	13 Jun 69 - 3 Oct 69	24	13 Dec 72 - 7 Apr 73
11	4 Oct 69 - 5 Jan 70	25	7 Apr 73 - 28 May 73
12	5 Jan 70 - 23 Mar 70	26	28 May 73 - 19 Oct 73
13	23 Mar 70 - 7 Jun 70	27	31 Oct 73 - 8 Mar 74
14	7 Jun 70 - 5 Oct 70	28	8 Mar 74 - 1 Jun 74

Table 2. Field data collected at T-3, March 1966 to June 1974

Parameter	Total Number of Samples	1966												1967												1968											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Hydrography																																					
Salinity	5354				X																														X	X	
Temperature	5354				X																													X	X		
Dissolved oxygen	5198				X																													X	X		
Nutrients																																					
Nitrate	3611																																				
Silicate	3440																																				
Phosphate	3440																																				
Phytoplankton																																					
Chlorophyll <u>a</u>	8022							X	X							X	X	X	X											X	X	X	X				
Productivity	4978															X	X	X												X	X	X					
Cell Counts	5838																													X	X	X	X				
Zooplankton																																					
Acoustic traces	40 mo																																				
Plankton pump	427						X	X	X	X	X		X			X	X	X	X																		
Nets (mesh size μ m)																																					
0.5 m ring (215)	38			X	X																																
1 m closing ring (110)	355																												X	X	X	X	X				
1 m closing ring (215)	318															X	X	X																			
1 m ² plummet (571)*	56																																				
2 m ² umbrella (223) [†]	9112																	X											X	X	X	X	X	X	X		
2 m ² umbrella (569)	95																														X	X					
3 m ² umbrella (300)	104																													X	X	X					

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2. (cont.)

Parameter	Total Number of Samples	1969												1970												1971													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	
Temperature	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	
Nutrients																																							
Nitrate	3611																X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440																X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440																X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X							X	X	X	X						X		X	X	X	X								
Productivity	4978						X	X	X	X							X	X	X	X								X	X	X	X								
Cell Counts	5838				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X						
Zooplankton																																							
Acoustic traces	40 mo																X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X		
Plankton pump	427																																						
Nets (mesh size μm)																																							
0.5 m ring (215)	38																																						
1 m closing ring (110)	355			X																																			
1 m closing ring (215)	318					X	X																																
1 m ² plummet (571)*	56																																						
2 m ² umbrella (223) [†]	9112	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2 (cont.)

Parameter	Total Number of Samples	1972												1973												1974													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Temperature	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5198	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Nutrients																																							
Nitrate	3611	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X									X	X	X	X																	
Productivity	4978						X	X	X	X	X								X	X	X	X																	
Cell Counts	5838						X	X	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Zooplankton																																							
Acoustic traces	40 mo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Plankton pump	427																																						
Nets (mesh size μm)																																							
0.5 m ring (215)	38																																						
1 m closing ring (110)	355																																						
1 m closing ring (215)	318																																						
1 m ² plummet (571)*	56					X	X																																
2 m ² umbrella (223) †	9112	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Forms for kind of sampling bottle used.

Hydrography and Nutrients

Temperature, salinity, oxygen, and nutrient determinations were made on water collected with Van Dorn polyvinylchloride or uncoated Nansen water sampling bottles. The Van Dorn bottles contained surgical tubing which may or may not be toxic to organisms (see Price et al. 1986). In general, the upper 100 m was sampled at 5 m intervals, 125-375 m at 25 m intervals, 400-500 m at 50 m intervals, 600-1000 m at 100 m intervals, and 1000 m to the bottom at 250 m intervals with a 30 m interval between the last bottle and the bottom. Periodically, additional samples were taken at 2 m intervals around the pycnocline (usually 40-60 m). In periods when weekly casts were taken, an alternating pattern of sampling, 0-100 m, 0-500 m, 0-100 m, 0-deep, allowed a more frequent survey of short-term variation in the near-surface stratum without the additional burden of time-consuming deep casts. Because of heat lamps and cables and the accumulation of freshwater in the hydrohole, surface readings would not have been representative, therefore the top bottle of a hydrocast was usually placed 5 m below the water surface.

The highest observed wire angles during these cruises were about 4°. For a 1000 m cast, this would yield a true depth of 998 m at the bottom. Computations of thermometric depths (Wüst 1933) were performed for those observations deeper than 250 m where unprotected thermometers were used for which calibrations were still available (262 depths at 45 stations). With the exception of two casts (Cruise 11, station 1, cast 5, 1400-2000 m and Cruise 13, station 12, cast 5, 500-1300 m), all calculated values were generally within 2-3% of the nominal depths sampled. These two casts were corrected. All other depths reported here are uncorrected, but should be within 2-5% of the true value.

Temperatures were determined from reversing thermometers on each water bottle; protected thermometers were usually deployed in pairs. Bottles were tripped about 5 min after the top bottle reached its intended depth. Thermometers were read using a lighted magnifying glass about 15 min after retrieval. Readings were corrected from the auxiliary thermometers and the thermometer constants by an IBM 1130 program at the Department of Oceanography, University of Washington.

Over 100 reversing thermometers were used during the course of these observations. They were calibrated either by the manufacturers or at various times at the University of Washington. Calibration data available from the

latest date preceding the use of each thermometer on T-3 were used to correct the thermometer readings. The calibrations were usually 0.5-3 yr old when they were applied to these data.

Salinity samples were drawn into 250 ml clear polyethylene bottles, tightly sealed, and allowed to come to room temperature. Determinations were made on T-3 using an Industrial Instruments Model RS-7A (Industrial Instruments Co., Cedar Grove, NJ) or a Beckman Model RS-7B (Beckman Instruments, Inc., Fullerton, CA) portable induction salinometer calibrated against a standard seawater sample obtained from the Laboratoire Hydrographique (Copenhagen, Denmark). Substandards of seawater (ca. 34.9‰ collected from ca. 500 m) were used after each 10 samples and at the end of a run. Salinity was calculated using the tables in the salinometer manual (Industrial Instruments 1964). These values are considered to have an accuracy of ± 0.003 ppt.

Dissolved oxygen was analyzed by a modified Winkler method (Strickland and Parsons 1965). Brown BOD bottles of 250 ml capacity, an automatic 100 ml pipet, an automatic 25 ml burette readable to 0.01 ml, and an electric stirrer were used.

Nutrients were determined by the methods in Strickland and Parsons (1968). The samples were either analyzed immediately after collection or frozen for later analysis either on the ice, or during April and May 1971, at the University of Washington using a Beckman DU spectrophotometer (Beckman Instruments, Inc., Fullerton, CA) with 1 cm cells. After December 1972, nitrate determinations were run on a Brinkman PC/1000 colorimeter (Brinkman Instruments, Westbury, NY) with a fiber optics probe and calibrated against the spectrophotometer. Reagents and standards were prepared from water filtered through an Ion-X-Change column, Grade 1, consisting of a mixed bed non-regenerable resin (Illinois Water Treatment Co.) that produces triple distilled water. Comparisons between reagents and standards made up with this water and with distilled water sent from the Naval Arctic Research Laboratory at Barrow showed these procedures to be adequate. Standards were run with each set of samples and for each nitrate column.

Chlorophyll a

Chlorophyll a was determined according to Strickland and Parsons (1968). In 1968 through 1970, water was filtered through 47 mm 0.45 μ m Millipore filters (Millipore Corporation, Bedford, MA). Suction pressure was less than 250 mm Hg. In 1971 through 1973, Gelman A/E glass fiber filters (approximate

pore size = 1.0 μm) (Gelman Instrument Co., Ann Arbor, MI) were used. MgCO_3 was added to all filters near the end of the filtration. In 1968, samples of about 4 liters of water were analyzed using a Beckman DK spectrophotometer in Seattle and chlorophyll a was calculated using the SCOR-UNESCO equations (Unesco 1966). For 1968 through 1973, samples of about 2 liters of water were filtered and a Turner Model 111 fluorometer (G. K. Turner Associates, Palo Alto, CA) was used for analysis. Fluorometer filters were 5-60 and 2-64. The fluorometer was calibrated using either a Beckman DU spectrophotometer on T-3 or a Beckman DK scanning spectrophotometer in Seattle. For samples analyzed with the fluorometer, chlorophyll a was calculated using equations in Holm-Hansen et al. (1967). Phaeopigments were not determined.

Primary Productivity

Primary productivity was measured during the summers by the radiocarbon technique of Steemann-Nielsen (1952) as detailed by Strickland and Parsons (1968). Two experimental schemes were used:

1. Depth series - paired 130 ml light and dark bottles were filled with water collected from a number of depths and incubated under constant high illumination (for the level of irradiance, see below).
2. Graduated light series - five light and one dark bottle containing water from one depth were incubated under 0, 10, 25, 50, 75, and 100% irradiance provided by glass neutral density filters over the incubation bottles.

For both series, dark bottles were pre-wrapped with black tape and then covered with aluminum foil to insure complete darkness. Depths and frequencies of sampling varied from year to year.

The plastic incubator box was fronted with clear plexiglass and had a wheel that rotated in the vertical plane. The wheel accommodated 12 ground-glass stoppered 130 ml bottles. At various times, because of stripped gears, the wheel did not rotate or was manually turned periodically during incubation. Light, provided by a bank of 12 GE Cool-White fluorescent lamps (General Electric Corporation, Stamford, CT), and amount of radioactivity added varied from year to year. Highest irradiance (= 100%) in the incubator was between 1100 and 1400 ft-c measured with a GE Model No. 214 photometer (General Electric Corporation, Stamford, CT). A pumped water flow-through system maintained ambient incubator temperature near 0°C. Samples were incubated for 6 or 12 hr.

At the end of the incubation, the samples were filtered (suction pressure

less than 250 mm Hg) onto 25 mm, 0.45 μ m Millipore filters, washed with filtered seawater, air-dried, and stored over desiccant until analyzed. Filters were fumed over concentrated HCl and counted three times for 1000 counts, using a gas flow proportional counter (Nuclear Chicago Corporation, Des Plaines, IL). Counting was done either in Seattle using a Nuclear Chicago Model D-47 counter with micromil window, C-110 automatic sample changer, 161-A scaler, and C111B printing timer, or on T-3 using a Nuclear Chicago manual, end-window Model 8770 scaler, Model 3053 sample changer, Model 108 G-M detector, and Model 8420 dual timer.

Carbon uptake was calculated from

$$P = (L-D)(W)(1.05)/(Z)(T)$$

where P is in $\text{mg C m}^{-3} \text{ h}^{-1}$; L-D is the difference between the light and dark bottle in counts per minute corrected for machine background and coincidence; W is the total carbonate in mg C m^{-3} calculated from $W = (810)(S^{\circ}/\text{‰})$ as suggested by Dr. G. C. Anderson, Department of Oceanography, University of Washington; 1.05 is the isotope discrimination factor (Strickland 1960); Z is the total activity in counts per minute added to the sample and corrected for the counter efficiency of about 22.8%; T is the incubation time (6 or 12 hr).

All ^{14}C ampoules used on T-3 were prepared in the Department of Oceanography, University of Washington, from aqueous sodium carbonate obtained from Nuclear Chicago Corporation. All glassware was rinsed with distilled water and autoclaved. The amount of solution to be made was determined by dividing the activity of the stock aqueous sodium carbonate by the desired activity per ml of final solution. Glass distilled water was filtered through 47 mm, 0.45 μ m Millipore filters. The pH was adjusted to 9.5-9.7 with NaOH. The solution was well mixed, and after adding the commercial sodium carbonate, mixed again. Glass ampoules holding 2 or 5 ml of solution were filled by an automatic volume dispenser. The ampoules were sealed using propane torches. The sealed ampoules were placed in large beakers, covered with water to which methylene blue dye was added, and autoclaved for ca. 1 hr at 120°C. After washing away the dye, the ampoules were inspected for any sign of color inside them. Ampoules that were even slightly discolored were discarded. The filled ampoules were color-coded with spray paint and stored.

Several ampoules from the beginning, middle, and end of the filling process were kept separate to be used for standardization. Standardization was done using methods then employed by the Department of Oceanography, University of Washington, where ampoules were either sent to Dr. C. R. Goldman, University of

California, Davis, and analyzed using gas phase (Goldman 1963; Steemann-Nielsen 1974) or, in the Department of Oceanography, University of Washington, were compared to samples obtained from the National Bureau of Standards. From 1970-1973, ampoules were standardized by liquid scintillation techniques and external standards at the Department of Oceanography.

Phytoplankton Cell Counts

Samples for phytoplankton identification and cell counts were usually taken from Nansen bottles during hydrocasts and stored in 250 ml glass jars. They were preserved with 4% formalin, buffered (sodium borate) or unbuffered, for a final strength of approximately 1%. Samples were shipped to Seattle for later analysis. Some samples were collected from a water pumping system during summer 1970 (see below).

Phytoplankton species were enumerated for some of the samples collected in the summers of 1968, 1969, and 1971 with the inverted microscope method (Hasle 1978a, b). Samples were individually counted or samples from two, three, or four days were combined for each depth. The samples combined to make a composite were separated in time by one week or less. After thorough mixing, the samples were poured into 5 and 50 ml Zeiss counting chambers (Carl Zeiss, Oberkochen Würt, FRG) and allowed to settle at least 20 hr before counting. A Zeiss inverted microscope was used for all enumerations. The 5 ml chamber was counted at 390 X using a 25 X objective, 12.5 X oculars, and a magnification factor of the optics carrier of 1.25. The 50 ml chamber was counted at 156 X with a 10 X objective, 12.5 X oculars, and the 1.25 X magnification factor. Cell counts were converted to cells per liter, cell volumes (Larrance 1964), and cell carbon (Mullin et al. 1966). These data are contained in an unpublished manuscript (Walline 1973) available from the School of Oceanography, University of Washington.

Zooplankton

Zooplankton sampling was maintained from March 1966 through April 1974. Gear types, sampling periods, and depth intervals sampled varied between and within years. Regardless of the gear used, all samples were concentrated and preserved in 4% V/V formalin (final concentration) buffered with either sodium acetate or sodium borate.

Initially, samples were taken with an open 0.5 m diameter ring net with 215 μ m mesh gauze. From June 1966 through July 1967, a 7.6 cm centrifugal

pump system with a 10 cm diameter hose intake was lowered. A 25 kg weight at the end of the wire held down the hose intake. Since wire angles were low, the depth of sampling was estimated from the length of the wire. Maximum depth of sampling was about 185 m. Samples of 5 to 18 m³ of water were filtered at a rate of 0.2 to 0.6 m³ per min through a net of 215 µm mesh size. Beginning in early July 1967, a closing 1 m diameter ring net of either 110 or 215 µm mesh was used to sample to 1000 m. This sampling overlapped with pumping stations to assure comparability.

Sampling with a 2 m² closing umbrella net began in September 1967 (Scott 1969; Macaulay and Daly 1987). Mesh size was 223 and 569 µm. This net, with a filtration ratio of 1.25:1, was the principal sampling device throughout the remaining field program though the netting itself was replaced with a high filtration type mesh (4:1 filtration ratio) in March 1972. All subsequent samples were collected with the 4:1 filtration ratio net.

An overlapping sampling scheme was used starting in October 1969. Sampling depths were at 10 m intervals from 300 to 10 m, 100 m intervals from 1000 to 10 m, and 500 m intervals from the bottom to 10 m. The 10 m upper limit was chosen to protect the net during retrieval through the hydrohole. Samples were collected from as deep as 2500 m.

Two other kinds of nets were sometimes employed: a 3 m² closing umbrella net with 300 µm mesh in summer 1968 and a 1 m² plummet net with 571 µm mesh initially in May 1971 and periodically thereafter. The plummet net is a downward fishing net with an opening-closing mechanism activated with a messenger (Macaulay 1978; Macaulay and Daly in prep.).

Sorting, identifying, and counting of some samples were done in Seattle (Table 3). Other samples have been analyzed for some groups of organisms, primarily copepods. These data are available in the School of Oceanography, but obtaining them will require an investigator to visit the University of Washington.

Echo-sounder

Echo-sounding was conducted from April 1970 to April 1974. A modified Ross 200A (100 kHz) echo-sounder and 10° transducer with an impedance matching box scanned depth ranges of 0-50, 50-100, 100-150, and 150-200 fm. The 0-50 fm depth range was emphasized because of interest in the scattering layer often found about 25 fm. The system included the standard Ross 200A transceiver unit, recorder unit, and a Sony TC-5600 stereo tape recorder. During regular

Table 3. List of T-3 zooplankton samples analyzed and used in theses, reports, and publications

Hughes (1968)	399 samples collected with a plankton pump
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
Scott (1969)	523 samples collected with a pump, 1 m closing ring net and 2 m ² umbrella net
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
	04 10 Jul - 6 Sep 1967
	05 13 Sep - 23 Sep 1967
Damkaer (1976)	52 samples collected with a 1 m closing ring net
Cruises:	04 12 Jul - 8 Sep 1967
	06 5 May 1968
	07 10 Jun - 18 Aug 1968
Heron and Damkaer (1976)	2 samples collected with a 1 m closing ring net
Cruises:	07 10 Jun 1968
	12 Jun 1968
Pautzke (1979)	16 samples collected with a 2 m ² umbrella net
Cruises:	14 7 Jun - 5 Oct 1970
	18 30 May - 1 Oct 1971
	22 31 May - 29 Sep 1972
	26 28 May - 19 Oct 1973
Heron, English, and Damkaer (1984)	54 samples collected with a 1 m closing ring net and 3 m ² umbrella net
Cruises:	06 5 May 1968
	07 10 Jun - 20 Sep 1968
	08 21 Sep 1968

operation, echo-sounding was conducted continuously, normally on the 0-50 fm scale. Daily recordings of 15-45 min were made using all depth ranges. Some of these data are available on 1/4 inch magnetic tape, but retrieval will be difficult.

Data Management

The data were available from computer printouts or raw data sheets. The original punched data cards could not be located so the data were re-entered directly to disk files on the University of Washington Cyber 180-855 computer using a Tandy Model DT-1 data terminal. After editing the files to correct data entry errors or to fill in gaps in the data, the files were transferred to a 9-track, EBCDIC-coded magnetic tape for NODC. The resulting tape contains three files of hydrographic data, one file of chlorophyll data, and one file of primary productivity data.

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DATA DOCUMENTATION FORM

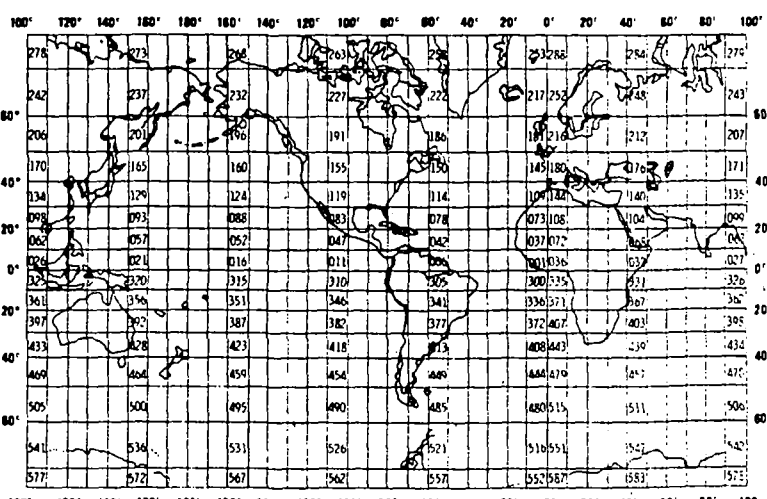
MOAA FORM 24-13
(4-77)U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
WASHINGTON, DC 20235FORM APPROVED
O.M.B. No. 41-R2651
EXPIRES 1-81

(While you are not required to use this form, it is the most desirable mechanism for providing the required ancillary information enabling the NODC and users to obtain the greatest benefit from your data.)

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED Dr. T. Saunders English School of Oceanography WB-10 University of Washington Seattle, WA 98195			
2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED Primary production and energy flow		3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT TSE-(T-3)-10	
4. PLATFORM NAME(S) Fletcher's Ice Island (T-3)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.) Ice island	6. PLATFORM AND OPERATOR NATIONALITY(IES) PLATFORM OPERATOR USA USA	7. DATES FROM: MO/DAY/YR TO: MO/DAY/YR 06/13/69 10/03/69
8. ARE DATA PROPRIETARY? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR ____ MONTH ____		11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED. GENERAL AREA 	
9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?) <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> PART (SPECIFY BELOW) Data should be available for international exchange			
10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER (AND ADDRESS IF OTHER THAN IN ITEM-1) Dr. Karl Banse School of Oceanography WB-10 University of Washington Seattle, WA 98195 (206) 543-5079			

TSE-(T-3)-10
JUNE - OCTOBER 1969

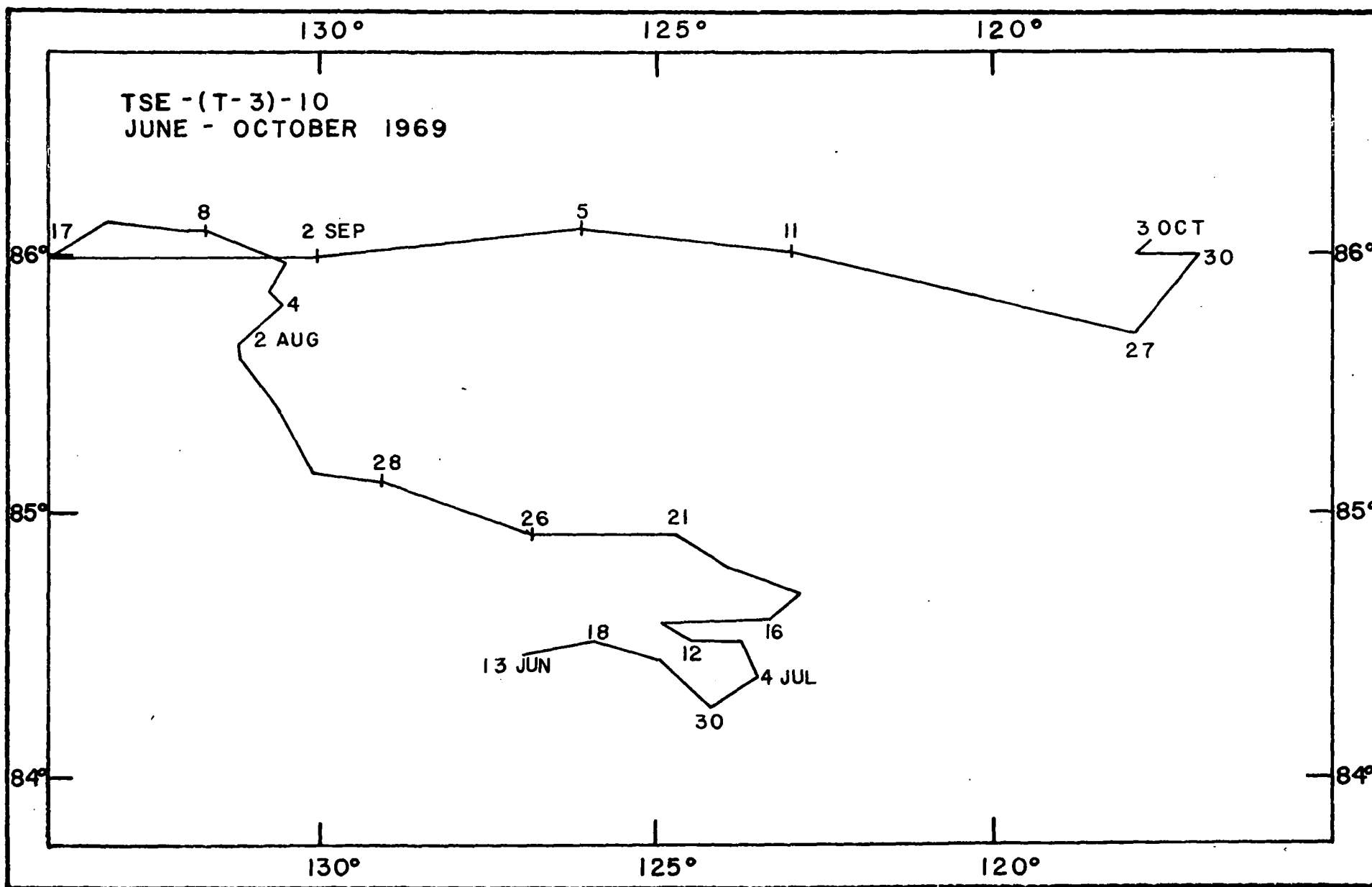


FIG. 1

TSE-(T-3)-10 13 Jun 1969 - 03 Oct 1969

Modifications to the basic program methods

Zooplankton samples (37) were collected with a 2 m² closing umbrella net having a mesh size of 223 μ m over depth intervals of 10 m between 10 and 60 m, 20 m intervals between 60 and 100 m, and 100 m intervals between 200 and 1000 m.

Chlorophyll a samples were taken at 2 m intervals from 2 to 50 m and at 10 m intervals from 50 to 80 m; samples were also taken at 100 and 200 m. 1684 samples were collected at 56 stations. Phytoplankton cell count samples were taken over the same depth intervals at 52 stations for a total of 1612 samples. Primary productivity experiments were run at 27 stations (459 samples). Incubations were done at constant or graded light levels. All phytoplankton samples were collected with Van Dorn bottles.

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Water transparency	meters	Secchi Disk	N/A	N/A
Depth of Sample	meters	Wire out	N/A	N/A
Temperature	°C	Reversing thermometers	N/A	N/A
Salinity	‰	Nansen bottles, modified Van Dorn bottles	Salinometer, University of Washington	N/A
Sigma-t	-	"	-	N/A
Dissolved oxygen	ml/l	"	Winkler	N/A
PO ₄	µg-atom/l	"	See Strickland and Parsons (1968)	N/A
NO ₃	"	"	"	N/A
SiO ₄	"	"	"	N/A
Chlorophyll <u>a</u>	mg m ⁻³	Van Dorn bottles	Spectrophotometer, fluorometer (Strickland and Parsons 1963)	N/A
Primary productivity (14C uptake)	mg C m ⁻³ h ⁻¹	"	Strickland and Parsons (1968)	N/A

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-1 ☐ ALGOL ☐ COBOL
☐ FORTRAN ☐ _____ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:

NAME AND PHONE NUMBER _____

ADDRESS _____

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

<p>5. RECORDING MODE</p> <p><input type="checkbox"/> BCD <input type="checkbox"/> BINARY</p> <p><input type="checkbox"/> ASCII <input checked="" type="checkbox"/> EBCDIC</p> <p><input type="checkbox"/> _____</p>	<p>9. LENGTH OF INTER-RECORD GAP (IF KNOWN) <input checked="" type="checkbox"/> 3/4 INCH <input type="checkbox"/> _____</p>
<p>6. NUMBER OF TRACKS (CHANNELS)</p> <p><input type="checkbox"/> SEVEN</p> <p><input checked="" type="checkbox"/> NINE</p> <p><input type="checkbox"/> _____</p>	<p>10. END OF FILE MARK <input type="checkbox"/> OCTAL 17 <input checked="" type="checkbox"/> Tape Mark</p>
<p>7. PARITY</p> <p><input checked="" type="checkbox"/> ODD</p> <p><input type="checkbox"/> EVEN</p>	<p>11. PASTE-ON-PAPER LABEL DESCRIPTION (INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)</p> <p>Ice Island T-3 hydro, chlorophyll, & Productivity data sets. Specs.- 9 track, EBCDIC, odd parity, 1600 bpi, 5 files, D=PE, RL=120, MBL = 3000, CV = EB, F=S, LB=KU</p>
<p>8. DENSITY</p> <p><input type="checkbox"/> 200 BPI <input checked="" type="checkbox"/> 1600 BPI</p> <p><input type="checkbox"/> 556 BPI</p> <p><input type="checkbox"/> 800 BPI</p> <p><input type="checkbox"/> _____</p>	<p>12. PHYSICAL BLOCK LENGTH IN BYTES FL=120 MBL=3000 Char.</p> <p>13. LENGTH OF BYTES IN BITS</p>

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALI- BRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Fluorometer Turner Model 111		X			X				
Reversing thermometers		X	manufacturer		X				
Salinometer Univ. Washington		X			X				
Naval Arctic Research Lab.		X			X				

Primary Production and Energy Flow

The program was directed by the late Dr. T. Saunders English and funded by the Office of Naval Research Contract Nonr-477 (37) Project NR 083 12 and Contract N00014-67-0103-0005. Users of the data are requested to acknowledge the agency support.

The methods used by biological oceanographers of the Department of Oceanography, University of Washington, Seattle, from 1966 to 1974 on Fletcher's Ice Island (T-3) drifting in the Arctic Ocean (Fig. 1) are given below. These methods are to compliment the entries in the individual cruise Data Documentation Forms where modifications, if any, are given.

General

The field program was maintained at various intensities for eight years (March 1966 to June 1974), with personnel on T-3 continuously from April 1968 until the island was evacuated in June 1974. During this period, divided into 28 cruises (Table 1), biological and environmental parameters were measured (Table 2). The sampling program was structured to monitor periods of active change in the various parameters. Thus, hydrography and zooplankton sampling was a year round pursuit, field and logistic conditions permitting, whereas chlorophyll a concentrations and primary productivity (^{14}C uptake) were usually measured only during the summer (June to September). Various gear types, methodologies, and sampling strategies were tried and tested throughout the field program.

The oceanographic working area was located on 3-4 m thick sea ice in Colby Bay adjacent to the ice island. All sampling was done from inside a heated building positioned over a hole, ca. 1.5 m on a side, cut in the ice. The hut contained a space heater, oceanographic sampling equipment, and a Rankin winch powered by a 5 hp Wisconsin gasoline engine. The drum on the winch held about 4000 m of 5/32 inch hydrographic wire. The wire ran through a meter wheel attached to a tripod erected over the hole.

Geographic positions were provided by the Lamont-Doherty Geological Observatory, Palisades, NY (Hunkins and Tiemann 1977). Hydrography and biology (chlorophyll a and primary productivity) samples were not always taken from the same bottle cast or on the same day. Each kind of data has a separate sample numbering scheme. As a result, station positions may not always agree between the hydrographic and biological data. See individual cruise Data Documentation

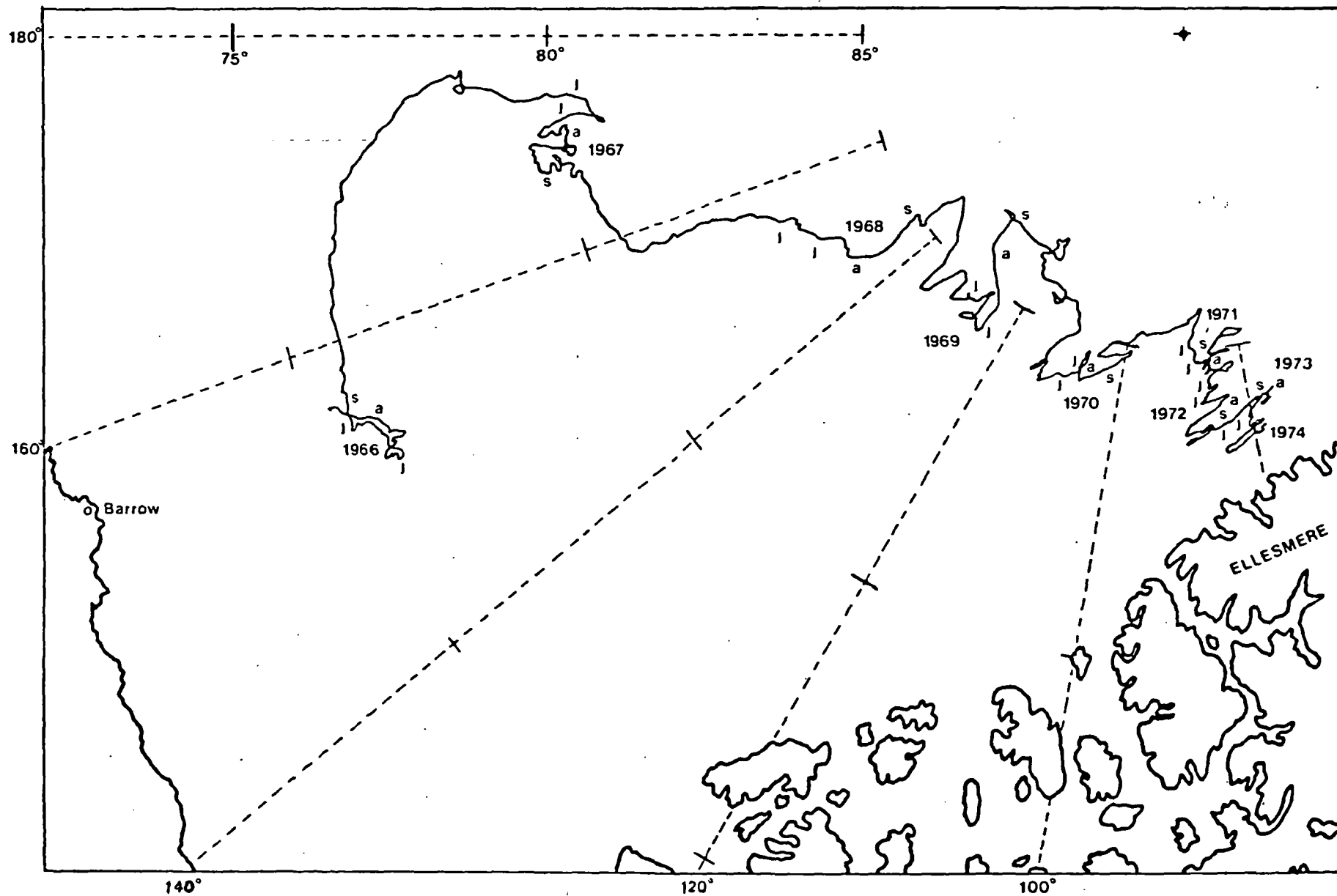


Fig. 1. Drift track of T-3 from June 1966 to April 1974. The months of June, July, August, and September are indicated in small letters for each year.

Table 1. Cruise numbers and dates of T-3 field program

Cruise		Cruise	
Number	Duration	Number	Duration
01	16 Mar 66 - 9 Apr 66	15	5 Oct 70 - 30 Dec 70
02	2 Jun 66 - 18 Oct 66	16	1 Jan 71 - 30 Mar 71
03	1 Feb 67 - 15 Feb 67	17	30 Mar 71 - 30 May 71
04	4 Jun 67 - 11 Sep 67	18	30 May 71 - 1 Oct 71
05	12 Sep 67 - 24 Sep 67	19	1 Oct 71 - 20 Dec 71
06	27 Apr 68 - 9 Jun 68	20	20 Dec 71 - 20 Mar 72
07	10 Jun 68 - 20 Sep 68	21	20 Mar 72 - 31 May 72
08	21 Sep 68 - 31 Jan 69	22	31 May 72 - 29 Sep 72
09	31 Jan 69 - 13 Jun 69	23	29 Sep 72 - 13 Dec 72
10	13 Jun 69 - 3 Oct 69	24	13 Dec 72 - 7 Apr 73
11	4 Oct 69 - 5 Jan 70	25	7 Apr 73 - 28 May 73
12	5 Jan 70 - 23 Mar 70	26	28 May 73 - 19 Oct 73
13	23 Mar 70 - 7 Jun 70	27	31 Oct 73 - 8 Mar 74
14	7 Jun 70 - 5 Oct 70	28	8 Mar 74 - 1 Jun 74

Table 2. Field data collected at T-3, March 1966 to June 1974

Parameter	Total Number of Samples	1966												1967												1968												
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
Hydrography																																						
Salinity	5354				X																															X	X	
Temperature	5354				X																															X	X	
Dissolved oxygen	5198				X																															X	X	
Nutrients																																						
Nitrate	3611																																					
Silicate	3440																																					
Phosphate	3440																																					
Phytoplankton																																						
Chlorophyll <u>a</u>	8022							X	X							X	X	X	X													X	X	X	X			
Productivity	4978															X	X	X														X	X	X				
Cell Counts	5838																															X	X	X	X			
Zooplankton																																						
Acoustic traces	40 mo																																					
Plankton pump	427						X	X	X	X	X		X			X	X	X	X																			
Nets (mesh size μm)																																						
0.5 m ring (215)	38				X	X																																
1 m closing ring (110)	355																															X	X	X	X	X		
1 m closing ring (215)	318															X	X	X																				
1 m ² plummet (571)*	56																																					
2 m ² umbrella (223) [†]	9112																		X												X	X	X	X	X	X	X	
2 m ² umbrella (569)	95																																	X	X			
3 m ² umbrella (300)	104																															X	X	X				

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2. (cont.)

[illegible]

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2 (cont.)

Parameter	Total Number of Samples	1972												1973												1974													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Temperature	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5198	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Nutrients																																							
Nitrate	3611	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X										X	X	X	X																
Productivity	4978						X	X	X	X	X									X	X	X	X																
Cell Counts	5838						X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Zooplankton																																							
Acoustic traces	40 mo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Plankton pump	427																																						
Nets (mesh size μm)																																							
0.5 m ring (215)	38																																						
1 m closing ring (110)	355																																						
1 m closing ring (215)	318																																						
1 m ² plummet (571)*	56						X	X																															
2 m ² umbrella (223) †	9112	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Forms for kind of sampling bottle used.

Hydrography and Nutrients

Temperature, salinity, oxygen, and nutrient determinations were made on water collected with Van Dorn polyvinylchloride or uncoated Nansen water sampling bottles. The Van Dorn bottles contained surgical tubing which may or may not be toxic to organisms (see Price et al. 1986). In general, the upper 100 m was sampled at 5 m intervals, 125-375 m at 25 m intervals, 400-500 m at 50 m intervals, 600-1000 m at 100 m intervals, and 1000 m to the bottom at 250 m intervals with a 30 m interval between the last bottle and the bottom. Periodically, additional samples were taken at 2 m intervals around the pycnocline (usually 40-60 m). In periods when weekly casts were taken, an alternating pattern of sampling, 0-100 m, 0-500 m, 0-100 m, 0-deep, allowed a more frequent survey of short-term variation in the near-surface stratum without the additional burden of time-consuming deep casts. Because of heat lamps and cables and the accumulation of freshwater in the hydrohose, surface readings would not have been representative, therefore the top bottle of a hydrocast was usually placed 5 m below the water surface.

The highest observed wire angles during these cruises were about 4°. For a 1000 m cast, this would yield a true depth of 998 m at the bottom. Computations of thermometric depths (Wüst 1933) were performed for those observations deeper than 250 m where unprotected thermometers were used for which calibrations were still available (262 depths at 45 stations). With the exception of two casts (Cruise 11, station 1, cast 5, 1400-2000 m and Cruise 13, station 12, cast 5, 500-1300 m), all calculated values were generally within 2-3% of the nominal depths sampled. These two casts were corrected. All other depths reported here are uncorrected, but should be within 2-5% of the true value.

Temperatures were determined from reversing thermometers on each water bottle; protected thermometers were usually deployed in pairs. Bottles were tripped about 5 min after the top bottle reached its intended depth. Thermometers were read using a lighted magnifying glass about 15 min after retrieval. Readings were corrected from the auxiliary thermometers and the thermometer constants by an IBM 1130 program at the Department of Oceanography, University of Washington.

Over 100 reversing thermometers were used during the course of these observations. They were calibrated either by the manufacturers or at various times at the University of Washington. Calibration data available from the

latest date preceding the use of each thermometer on T-3 were used to correct the thermometer readings. The calibrations were usually 0.5-3 yr old when they were applied to these data.

Salinity samples were drawn into 250 ml clear polyethylene bottles, tightly sealed, and allowed to come to room temperature. Determinations were made on T-3 using an Industrial Instruments Model RS-7A (Industrial Instruments Co., Cedar Grove, NJ) or a Beckman Model RS-7B (Beckman Instruments, Inc., Fullerton, CA) portable induction salinometer calibrated against a standard seawater sample obtained from the Laboratoire Hydrographique (Copenhagen, Denmark). Substandards of seawater (ca. 34.9‰ collected from ca. 500 m) were used after each 10 samples and at the end of a run. Salinity was calculated using the tables in the salinometer manual (Industrial Instruments 1964). These values are considered to have an accuracy of ± 0.003 ppt.

Dissolved oxygen was analyzed by a modified Winkler method (Strickland and Parsons 1965). Brown BOD bottles of 250 ml capacity, an automatic 100 ml pipet, an automatic 25 ml burette readable to 0.01 ml, and an electric stirrer were used.

Nutrients were determined by the methods in Strickland and Parsons (1968). The samples were either analyzed immediately after collection or frozen for later analysis either on the ice, or during April and May 1971, at the University of Washington using a Beckman DU spectrophotometer (Beckman Instruments, Inc., Fullerton, CA) with 1 cm cells. After December 1972, nitrate determinations were run on a Brinkman PC/1000 colorimeter (Brinkman Instruments, Westbury, NY) with a fiber optics probe and calibrated against the spectrophotometer. Reagents and standards were prepared from water filtered through an Ion-X-Change column, Grade 1, consisting of a mixed bed non-regenerable resin (Illinois Water Treatment Co.) that produces triple distilled water. Comparisons between reagents and standards made up with this water and with distilled water sent from the Naval Arctic Research Laboratory at Barrow showed these procedures to be adequate. Standards were run with each set of samples and for each nitrate column.

Chlorophyll a

Chlorophyll a was determined according to Strickland and Parsons (1968). In 1968 through 1970, water was filtered through 47 mm 0.45 μ m Millipore filters (Millipore Corporation, Bedford, MA). Suction pressure was less than 250 mm Hg. In 1971 through 1973, Gelman A/E glass fiber filters (approximate

pore size = 1.0 μm) (Gelman Instrument Co., Ann Arbor, MI) were used. MgCO_3 was added to all filters near the end of the filtration. In 1968, samples of about 4 liters of water were analyzed using a Beckman DK spectrophotometer in Seattle and chlorophyll a was calculated using the SCOR-UNESCO equations (Unesco 1966). For 1968 through 1973, samples of about 2 liters of water were filtered and a Turner Model 111 fluorometer (G. K. Turner Associates, Palo Alto, CA) was used for analysis. Fluorometer filters were 5-60 and 2-64. The fluorometer was calibrated using either a Beckman DU spectrophotometer on T-3 or a Beckman DK scanning spectrophotometer in Seattle. For samples analyzed with the fluorometer, chlorophyll a was calculated using equations in Holm-Hansen et al. (1967). Phaeopigments were not determined.

Primary Productivity

Primary productivity was measured during the summers by the radiocarbon technique of Steemann-Nielsen (1952) as detailed by Strickland and Parsons (1968). Two experimental schemes were used:

1. Depth series - paired 130 ml light and dark bottles were filled with water collected from a number of depths and incubated under constant high illumination (for the level of irradiance, see below).
2. Graduated light series - five light and one dark bottle containing water from one depth were incubated under 0, 10, 25, 50, 75, and 100% irradiance provided by glass neutral density filters over the incubation bottles.

For both series, dark bottles were pre-wrapped with black tape and then covered with aluminum foil to insure complete darkness. Depths and frequencies of sampling varied from year to year.

The plastic incubator box was fronted with clear plexiglass and had a wheel that rotated in the vertical plane. The wheel accommodated 12 ground-glass stoppered 130 ml bottles. At various times, because of stripped gears, the wheel did not rotate or was manually turned periodically during incubation. Light, provided by a bank of 12 GE Cool-White fluorescent lamps (General Electric Corporation, Stamford, CT), and amount of radioactivity added varied from year to year. Highest irradiance (= 100%) in the incubator was between 1100 and 1400 ft-c measured with a GE Model No. 214 photometer (General Electric Corporation, Stamford, CT). A pumped water flow-through system maintained ambient incubator temperature near 0°C. Samples were incubated for 6 or 12 hr.

At the end of the incubation, the samples were filtered (suction pressure

less than 250 mm Hg) onto 25 mm, 0.45 μ m Millipore filters, washed with filtered seawater, air-dried, and stored over desiccant until analyzed. Filters were fumed over concentrated HCl and counted three times for 1000 counts, using a gas flow proportional counter (Nuclear Chicago Corporation, Des Plaines, IL). Counting was done either in Seattle using a Nuclear Chicago Model D-47 counter with micromil window, C-110 automatic sample changer, 161-A scaler, and C111B printing timer, or on T-3 using a Nuclear Chicago manual, end-window Model 8770 scaler, Model 3053 sample changer, Model 108 G-M detector, and Model 8420 dual timer.

Carbon uptake was calculated from

$$P = (L-D)(W)(1.05)/(Z)(T)$$

where P is in $\text{mg C m}^{-3} \text{ h}^{-1}$; L-D is the difference between the light and dark bottle in counts per minute corrected for machine background and coincidence; W is the total carbonate in mg C m^{-3} calculated from $W = (810)(S^{\circ}/\text{‰})$ as suggested by Dr. G. C. Anderson, Department of Oceanography, University of Washington; 1.05 is the isotope discrimination factor (Strickland 1960); Z is the total activity in counts per minute added to the sample and corrected for the counter efficiency of about 22.8%; T is the incubation time (6 or 12 hr).

All ^{14}C ampoules used on T-3 were prepared in the Department of Oceanography, University of Washington, from aqueous sodium carbonate obtained from Nuclear Chicago Corporation. All glassware was rinsed with distilled water and autoclaved. The amount of solution to be made was determined by dividing the activity of the stock aqueous sodium carbonate by the desired activity per ml of final solution. Glass distilled water was filtered through 47 mm, 0.45 μ m Millipore filters. The pH was adjusted to 9.5-9.7 with NaOH. The solution was well mixed, and after adding the commercial sodium carbonate, mixed again. Glass ampoules holding 2 or 5 ml of solution were filled by an automatic volume dispenser. The ampoules were sealed using propane torches. The sealed ampoules were placed in large beakers, covered with water to which methylene blue dye was added, and autoclaved for ca. 1 hr at 120°C. After washing away the dye, the ampoules were inspected for any sign of color inside them. Ampoules that were even slightly discolored were discarded. The filled ampoules were color-coded with spray paint and stored.

Several ampoules from the beginning, middle, and end of the filling process were kept separate to be used for standardization. Standardization was done using methods then employed by the Department of Oceanography, University of Washington, where ampoules were either sent to Dr. C. R. Goldman, University of

California, Davis, and analyzed using gas phase (Goldman 1963; Steemann-Nielsen 1974) or, in the Department of Oceanography, University of Washington, were compared to samples obtained from the National Bureau of Standards. From 1970-1973, ampoules were standardized by liquid scintillation techniques and external standards at the Department of Oceanography.

Phytoplankton Cell Counts

Samples for phytoplankton identification and cell counts were usually taken from Nansen bottles during hydrocasts and stored in 250 ml glass jars. They were preserved with 4% formalin, buffered (sodium borate) or unbuffered, for a final strength of approximately 1%. Samples were shipped to Seattle for later analysis. Some samples were collected from a water pumping system during summer 1970 (see below).

Phytoplankton species were enumerated for some of the samples collected in the summers of 1968, 1969, and 1971 with the inverted microscope method (Hasle 1978a, b). Samples were individually counted or samples from two, three, or four days were combined for each depth. The samples combined to make a composite were separated in time by one week or less. After thorough mixing, the samples were poured into 5 and 50 ml Zeiss counting chambers (Carl Zeiss, Oberkochen Würt, FRG) and allowed to settle at least 20 hr before counting. A Zeiss inverted microscope was used for all enumerations. The 5 ml chamber was counted at 390 X using a 25 X objective, 12.5 X oculars, and a magnification factor of the optics carrier of 1.25. The 50 ml chamber was counted at 156 X with a 10 X objective, 12.5 X oculars, and the 1.25 X magnification factor. Cell counts were converted to cells per liter, cell volumes (Larrance 1964), and cell carbon (Mullin et al. 1966). These data are contained in an unpublished manuscript (Walline 1973) available from the School of Oceanography, University of Washington.

Zooplankton

Zooplankton sampling was maintained from March 1966 through April 1974. Gear types, sampling periods, and depth intervals sampled varied between and within years. Regardless of the gear used, all samples were concentrated and preserved in 4% V/V formalin (final concentration) buffered with either sodium acetate or sodium borate.

Initially, samples were taken with an open 0.5 m diameter ring net with 215 μ m mesh gauze. From June 1966 through July 1967, a 7.6 cm centrifugal

pump system with a 10 cm diameter hose intake was lowered. A 25 kg weight at the end of the wire held down the hose intake. Since wire angles were low, the depth of sampling was estimated from the length of the wire. Maximum depth of sampling was about 185 m. Samples of 5 to 18 m³ of water were filtered at a rate of 0.2 to 0.6 m³ per min through a net of 215 µm mesh size. Beginning in early July 1967, a closing 1 m diameter ring net of either 110 or 215 µm mesh was used to sample to 1000 m. This sampling overlapped with pumping stations to assure comparability.

Sampling with a 2 m² closing umbrella net began in September 1967 (Scott 1969; Macaulay and Daly 1987). Mesh size was 223 and 569 µm. This net, with a filtration ratio of 1.25:1, was the principal sampling device throughout the remaining field program though the netting itself was replaced with a high filtration type mesh (4:1 filtration ratio) in March 1972. All subsequent samples were collected with the 4:1 filtration ratio net.

An overlapping sampling scheme was used starting in October 1969. Sampling depths were at 10 m intervals from 300 to 10 m, 100 m intervals from 1000 to 10 m, and 500 m intervals from the bottom to 10 m. The 10 m upper limit was chosen to protect the net during retrieval through the hydrohole. Samples were collected from as deep as 2500 m.

Two other kinds of nets were sometimes employed: a 3 m² closing umbrella net with 300 µm mesh in summer 1968 and a 1 m² plummet net with 571 µm mesh initially in May 1971 and periodically thereafter. The plummet net is a downward fishing net with an opening-closing mechanism activated with a messenger (Macaulay 1978; Macaulay and Daly in prep.).

Sorting, identifying, and counting of some samples were done in Seattle (Table 3). Other samples have been analyzed for some groups of organisms, primarily copepods. These data are available in the School of Oceanography, but obtaining them will require an investigator to visit the University of Washington.

Echo-sounder

Echo-sounding was conducted from April 1970 to April 1974. A modified Ross 200A (100 kHz) echo-sounder and 10° transducer with an impedance matching box scanned depth ranges of 0-50, 50-100, 100-150, and 150-200 fm. The 0-50 fm depth range was emphasized because of interest in the scattering layer often found about 25 fm. The system included the standard Ross 200A transceiver unit, recorder unit, and a Sony TC-5600 stereo tape recorder. During regular

Table 3. List of T-3 zooplankton samples analyzed and used in theses, reports, and publications

Hughes (1968)	399 samples collected with a plankton pump
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
Scott (1969)	523 samples collected with a pump, 1 m closing ring net and 2 m ² umbrella net
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
	04 10 Jul - 6 Sep 1967
	05 13 Sep - 23 Sep 1967
Damkaer (1976)	52 samples collected with a 1 m closing ring net
Cruises:	04 12 Jul - 8 Sep 1967
	06 5 May 1968
	07 10 Jun - 18 Aug 1968
Heron and Damkaer (1976)	2 samples collected with a 1 m closing ring net
Cruises:	07 10 Jun 1968
	12 Jun 1968
Pautzke (1979)	16 samples collected with a 2 m ² umbrella net
Cruises:	14 7 Jun - 5 Oct 1970
	18 30 May - 1 Oct 1971
	22 31 May - 29 Sep 1972
	26 28 May - 19 Oct 1973
Heron, English, and Damkaer (1984)	54 samples collected with a 1 m closing ring net and 3 m ² umbrella net
Cruises:	06 5 May 1968
	07 10 Jun - 20 Sep 1968
	08 21 Sep 1968

operation, echo-sounding was conducted continuously, normally on the 0-50 fm scale. Daily recordings of 15-45 min were made using all depth ranges. Some of these data are available on 1/4 inch magnetic tape, but retrieval will be difficult.

Data Management

The data were available from computer printouts or raw data sheets. The original punched data cards could not be located so the data were re-entered directly to disk files on the University of Washington Cyber 180-855 computer using a Tandy Model DT-1 data terminal. After editing the files to correct data entry errors or to fill in gaps in the data, the files were transferred to a 9-track, EBCDIC-coded magnetic tape for NODC. The resulting tape contains three files of hydrographic data, one file of chlorophyll data, and one file of primary productivity data.

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DATA DOCUMENTATION FORM

NOAA FORM 24-13
(4-77)

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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
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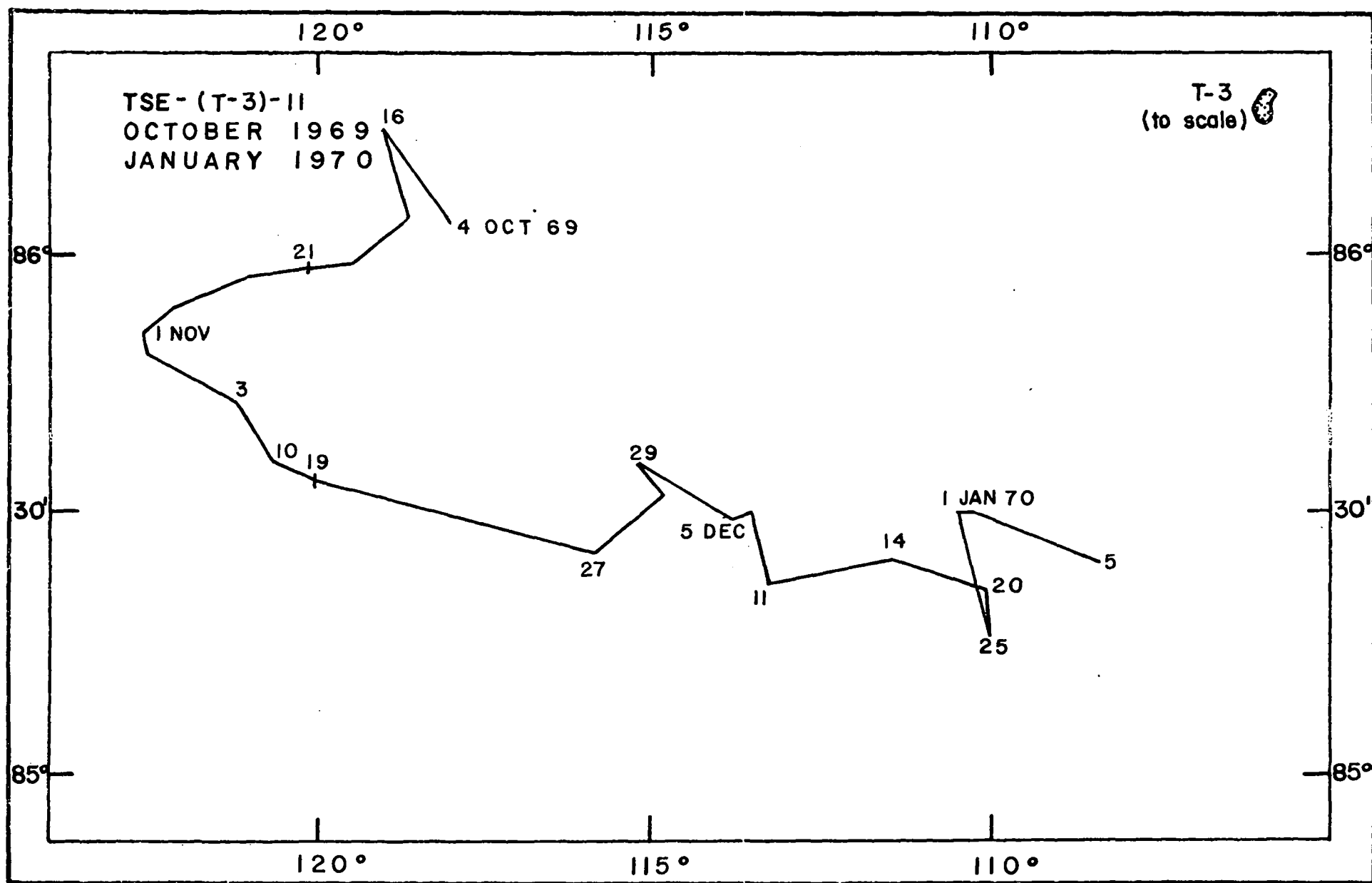
(While you are not required to use this form, it is the most desirable mechanism for providing the required ancillary information enabling the NODC and users to obtain the greatest benefit from your data.)

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED Dr. T. Saunders English School of Oceanography WB-10 University of Washington Seattle, WA 09195			
2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED Primary production and energy flow		3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT TSE-(T-3)-11	
4. PLATFORM NAME(S) Fletcher's Ice Island (T-3)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.) Ice island	6. PLATFORM AND OPERATOR NATIONALITY(IES) PLATFORM OPERATOR USA USA	7. DATES FROM: MO/DAY/YR TO: MO/DAY/YR 10/04/69 01/05/70
8. ARE DATA PROPRIETARY? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR MONTH		11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED. GENERAL AREA	
9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?) <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> PART (SPECIFY BELOW) Data should be available for international exchange			
10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER (AND ADDRESS IF OTHER THAN IN ITEM-1) Dr. Karl Banse School of Oceanography WB-10 University of Washington Seattle, WA 98195 (206) 543-5079			



TSE-(T-3)-11 04 Oct 1969 - 05 Jan 1970

Modifications to the basic program methods

Zooplankton samples were collected using a 2 m² umbrella net, mesh size 223 μ m. Fifty-four (54) samples were collected.

Two hydrographic series were done using Nansen bottles. Samples were collected for temperature, salinity, dissolved oxygen, and phytoplankton cell counts. 108 samples each were collected.

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Water transparency	meters	Secchi Disk	N/A	N/A
Depth of Sample	meters	Wire out	N/A	N/A
Temperature	°C	Reversing thermometers	N/A	N/A
Salinity	‰	Nansen bottles, modified Van Dorn bottles	Salinometer, University of Washington	N/A
Sigma-t	-	"	-	N/A
Dissolved oxygen	ml/l	"	Winkler	N/A
PO ₄	µg-atom/l	"	See Strickland and Parsons (1968)	N/A
NO ₃	"	"	"	N/A
SiO ₄	"	"	"	N/A
Chlorophyll <u>a</u>	mg m ⁻³	Van Dorn bottles	Spectrophotometer, fluoro- meter (Strickland and Parsons 1963)	N/A
Primary productivity (¹⁴ C uptake)	mg C m ⁻³ h ⁻¹	"	Strickland and Parsons (1968)	N/A

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

3. ATTRIBUTES AS EXPRESSED IN
- | | | |
|----------------------------------|--------------------------------|--------------------------------|
| <input type="checkbox"/> PL-1 | <input type="checkbox"/> ALGOL | <input type="checkbox"/> COBOL |
| <input type="checkbox"/> FORTRAN | <input type="checkbox"/> _____ | LANGUAGE |

4. RESPONSIBLE COMPUTER SPECIALIST:

NAME AND PHONE NUMBER _____

ADDRESS _____

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

<p>5. RECORDING MODE</p> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> BCD <input type="checkbox"/> BINARY </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> ASCII <input checked="" type="checkbox"/> EBCDIC </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> _____ </div>	<p>9. LENGTH OF INTER-RECORD GAP (IF KNOWN) <input checked="" type="checkbox"/> 3/4 INCH</p> <div style="border: 1px solid black; height: 20px; margin-top: 5px;"></div>
<p>6. NUMBER OF TRACKS (CHANNELS)</p> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> SEVEN </div> <div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> NINE </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> _____ </div>	<p>10. END OF FILE MARK</p> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> OCTAL 17 </div> <div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> Tape Mark </div>
<p>7. PARITY</p> <div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> ODD </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> EVEN </div>	<p>11. PASTE-ON-PAPER LABEL DESCRIPTION (INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)</p> <p>Ice Island T-3 hydro, chlorophyll, & Productivity data sets. Specs.- 9 track, EBCDIC, odd parity, 1600 bpi, 5 files, D=PE, RL=120, MBL = 3000, CV = EB, F=S, LB=KU</p>
<p>8. DENSITY</p> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> 200 BPI <input checked="" type="checkbox"/> 1600 BPI </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> 556 BPI </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> 800 BPI </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> _____ </div>	<p>12. PHYSICAL BLOCK LENGTH IN BYTES</p> <p>FL=120 MBL=3000 Char.</p> <p>13. LENGTH OF BYTES IN BITS</p>

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALI- BRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Fluorometer Turner Model 111		X			X				
Reversing thermometers		X	manufacturer		X				
Salinometer Univ. Washington		X			X				
Naval Arctic Research Lab.		X			X				

Primary Production and Energy Flow

The program was directed by the late Dr. T. Saunders English and funded by the Office of Naval Research Contract Nonr-477 (37) Project NR 083 12 and Contract N00014-67-0103-0005. Users of the data are requested to acknowledge the agency support.

The methods used by biological oceanographers of the Department of Oceanography, University of Washington, Seattle, from 1966 to 1974 on Fletcher's Ice Island (T-3) drifting in the Arctic Ocean (Fig. 1) are given below. These methods are to compliment the entries in the individual cruise Data Documentation Forms where modifications, if any, are given.

General

The field program was maintained at various intensities for eight years (March 1966 to June 1974), with personnel on T-3 continuously from April 1968 until the island was evacuated in June 1974. During this period, divided into 28 cruises (Table 1), biological and environmental parameters were measured (Table 2). The sampling program was structured to monitor periods of active change in the various parameters. Thus, hydrography and zooplankton sampling was a year round pursuit, field and logistic conditions permitting, whereas chlorophyll a concentrations and primary productivity (^{14}C uptake) were usually measured only during the summer (June to September). Various gear types, methodologies, and sampling strategies were tried and tested throughout the field program.

The oceanographic working area was located on 3-4 m thick sea ice in Colby Bay adjacent to the ice island. All sampling was done from inside a heated building positioned over a hole, ca. 1.5 m on a side, cut in the ice. The hut contained a space heater, oceanographic sampling equipment, and a Rankin winch powered by a 5 hp Wisconsin gasoline engine. The drum on the winch held about 4000 m of 5/32 inch hydrographic wire. The wire ran through a meter wheel attached to a tripod erected over the hole.

Geographic positions were provided by the Lamont-Doherty Geological Observatory, Palisades, NY (Hunkins and Tiemann 1977). Hydrography and biology (chlorophyll a and primary productivity) samples were not always taken from the same bottle cast or on the same day. Each kind of data has a separate sample numbering scheme. As a result, station positions may not always agree between the hydrographic and biological data. See individual cruise Data Documentation

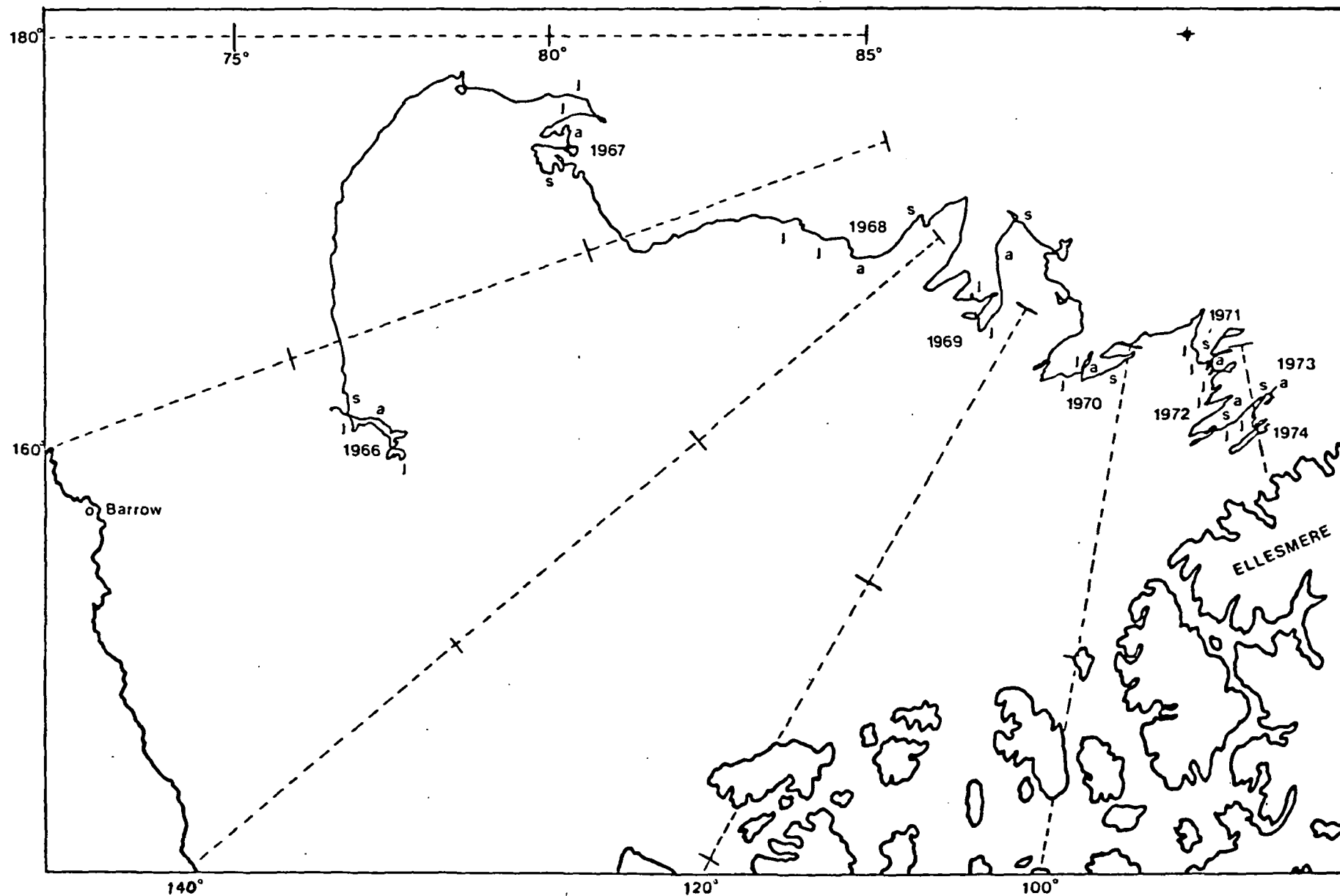


Fig. 1. Drift track of T-3 from June 1966 to April 1974. The months of June, July, August, and September are indicated in small letters for each year.

Table 1. Cruise numbers and dates of T-3 field program

Cruise		Cruise	
Number	Duration	Number	Duration
01	16 Mar 66 - 9 Apr 66	15	5 Oct 70 - 30 Dec 70
02	2 Jun 66 - 18 Oct 66	16	1 Jan 71 - 30 Mar 71
03	1 Feb 67 - 15 Feb 67	17	30 Mar 71 - 30 May 71
04	4 Jun 67 - 11 Sep 67	18	30 May 71 - 1 Oct 71
05	12 Sep 67 - 24 Sep 67	19	1 Oct 71 - 20 Dec 71
06	27 Apr 68 - 9 Jun 68	20	20 Dec 71 - 20 Mar 72
07	10 Jun 68 - 20 Sep 68	21	20 Mar 72 - 31 May 72
08	21 Sep 68 - 31 Jan 69	22	31 May 72 - 29 Sep 72
09	31 Jan 69 - 13 Jun 69	23	29 Sep 72 - 13 Dec 72
10	13 Jun 69 - 3 Oct 69	24	13 Dec 72 - 7 Apr 73
11	4 Oct 69 - 5 Jan 70	25	7 Apr 73 - 28 May 73
12	5 Jan 70 - 23 Mar 70	26	28 May 73 - 19 Oct 73
13	23 Mar 70 - 7 Jun 70	27	31 Oct 73 - 8 Mar 74
14	7 Jun 70 - 5 Oct 70	28	8 Mar 74 - 1 Jun 74

Table 2. Field data collected at T-3, March 1966 to June 1974

Parameter	Total Number of Samples	1966												1967												1968													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354				X																															X	X		
Temperature	5354				X																															X	X		
Dissolved oxygen	5198				X																															X	X		
Nutrients																																							
Nitrate	3611																																						
Silicate	3440																																						
Phosphate	3440																																						
Phytoplankton																																							
Chlorophyll <u>a</u>	8022							X	X									X	X	X	X											X	X	X	X				
Productivity	4978																	X	X	X												X	X	X					
Cell Counts	5838																																X	X	X	X			
Zooplankton																																							
Acoustic traces	40 mo																																						
Plankton pump	427						X	X	X	X	X		X				X	X	X	X																			
Nets (mesh size μ m)																																							
0.5 m ring (215)	38				X	X																																	
1 m closing ring (110)	355																																X	X	X	X	X		
1 m closing ring (215)	318																	X	X	X																			
1 m ² plummet (571)*	56																																						
2 m ² umbrella (223) [†]	9112																			X												X	X	X	X	X	X		
2 m ² umbrella (569)	95																																		X	X			
3 m ² umbrella (300)	104																																X	X	X				

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2. (cont.)

[illegible]

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2 (cont.)

Parameter	Total Number of Samples	1972												1973												1974												
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
Hydrography																																						
Salinity	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Temperature	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5198	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Nutrients																																						
Nitrate	3611	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																						
Chlorophyll <u>a</u>	8022						X	X	X	X										X	X	X	X															
Productivity	4978						X	X	X	X	X									X	X	X	X															
Cell Counts	5838						X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Zooplankton																																						
Acoustic traces	40 mo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Plankton pump	427																																					
Nets (mesh size μ m)																																						
0. 5 m ring (215)	38																																					
1 m closing ring (110)	355																																					
1 m closing ring (215)	318																																					
1 m ² plummet (571)*	56					X	X																															
2 m ² umbrella (223) †	9112	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2 m ² umbrella (569)	95																																					
3 m ² umbrella (300)	104																																					

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Forms for kind of sampling bottle used.

Hydrography and Nutrients

Temperature, salinity, oxygen, and nutrient determinations were made on water collected with Van Dorn polyvinylchloride or uncoated Nansen water sampling bottles. The Van Dorn bottles contained surgical tubing which may or may not be toxic to organisms (see Price et al. 1986). In general, the upper 100 m was sampled at 5 m intervals, 125-375 m at 25 m intervals, 400-500 m at 50 m intervals, 600-1000 m at 100 m intervals, and 1000 m to the bottom at 250 m intervals with a 30 m interval between the last bottle and the bottom. Periodically, additional samples were taken at 2 m intervals around the pycnocline (usually 40-60 m). In periods when weekly casts were taken, an alternating pattern of sampling, 0-100 m, 0-500 m, 0-100 m, 0-deep, allowed a more frequent survey of short-term variation in the near-surface stratum without the additional burden of time-consuming deep casts. Because of heat lamps and cables and the accumulation of freshwater in the hydrohole, surface readings would not have been representative, therefore the top bottle of a hydrocast was usually placed 5 m below the water surface.

The highest observed wire angles during these cruises were about 4°. For a 1000 m cast, this would yield a true depth of 998 m at the bottom. Computations of thermometric depths (Wüst 1933) were performed for those observations deeper than 250 m where unprotected thermometers were used for which calibrations were still available (262 depths at 45 stations). With the exception of two casts (Cruise 11, station 1, cast 5, 1400-2000 m and Cruise 13, station 12, cast 5, 500-1300 m), all calculated values were generally within 2-3% of the nominal depths sampled. These two casts were corrected. All other depths reported here are uncorrected, but should be within 2-5% of the true value.

Temperatures were determined from reversing thermometers on each water bottle; protected thermometers were usually deployed in pairs. Bottles were tripped about 5 min after the top bottle reached its intended depth. Thermometers were read using a lighted magnifying glass about 15 min after retrieval. Readings were corrected from the auxiliary thermometers and the thermometer constants by an IBM 1130 program at the Department of Oceanography, University of Washington.

Over 100 reversing thermometers were used during the course of these observations. They were calibrated either by the manufacturers or at various times at the University of Washington. Calibration data available from the

latest date preceding the use of each thermometer on T-3 were used to correct the thermometer readings. The calibrations were usually 0.5-3 yr old when they were applied to these data.

Salinity samples were drawn into 250 ml clear polyethylene bottles, tightly sealed, and allowed to come to room temperature. Determinations were made on T-3 using an Industrial Instruments Model RS-7A (Industrial Instruments Co., Cedar Grove, NJ) or a Beckman Model RS-7B (Beckman Instruments, Inc., Fullerton, CA) portable induction salinometer calibrated against a standard seawater sample obtained from the Laboratoire Hydrographique (Copenhagen, Denmark). Substandards of seawater (ca. 34.9‰ collected from ca. 500 m) were used after each 10 samples and at the end of a run. Salinity was calculated using the tables in the salinometer manual (Industrial Instruments 1964). These values are considered to have an accuracy of ± 0.003 ppt.

Dissolved oxygen was analyzed by a modified Winkler method (Strickland and Parsons 1965). Brown BOD bottles of 250 ml capacity, an automatic 100 ml pipet, an automatic 25 ml burette readable to 0.01 ml, and an electric stirrer were used.

Nutrients were determined by the methods in Strickland and Parsons (1968). The samples were either analyzed immediately after collection or frozen for later analysis either on the ice, or during April and May 1971, at the University of Washington using a Beckman DU spectrophotometer (Beckman Instruments, Inc., Fullerton, CA) with 1 cm cells. After December 1972, nitrate determinations were run on a Brinkman PC/1000 colorimeter (Brinkman Instruments, Westbury, NY) with a fiber optics probe and calibrated against the spectrophotometer. Reagents and standards were prepared from water filtered through an Ion-X-Change column, Grade 1, consisting of a mixed bed non-regenerable resin (Illinois Water Treatment Co.) that produces triple distilled water. Comparisons between reagents and standards made up with this water and with distilled water sent from the Naval Arctic Research Laboratory at Barrow showed these procedures to be adequate. Standards were run with each set of samples and for each nitrate column.

Chlorophyll a

Chlorophyll a was determined according to Strickland and Parsons (1968). In 1968 through 1970, water was filtered through 47 mm 0.45 μ m Millipore filters (Millipore Corporation, Bedford, MA). Suction pressure was less than 250 mm Hg. In 1971 through 1973, Gelman A/E glass fiber filters (approximate

pore size = 1.0 μm) (Gelman Instrument Co., Ann Arbor, MI) were used. MgCO_3 was added to all filters near the end of the filtration. In 1968, samples of about 4 liters of water were analyzed using a Beckman DK spectrophotometer in Seattle and chlorophyll a was calculated using the SCOR-UNESCO equations (Unesco 1966). For 1968 through 1973, samples of about 2 liters of water were filtered and a Turner Model 111 fluorometer (G. K. Turner Associates, Palo Alto, CA) was used for analysis. Fluorometer filters were 5-60 and 2-64. The fluorometer was calibrated using either a Beckman DU spectrophotometer on T-3 or a Beckman DK scanning spectrophotometer in Seattle. For samples analyzed with the fluorometer, chlorophyll a was calculated using equations in Holm-Hansen et al. (1967). Phaeopigments were not determined.

Primary Productivity

Primary productivity was measured during the summers by the radiocarbon technique of Steemann-Nielsen (1952) as detailed by Strickland and Parsons (1968). Two experimental schemes were used:

1. Depth series - paired 130 ml light and dark bottles were filled with water collected from a number of depths and incubated under constant high illumination (for the level of irradiance, see below).
2. Graduated light series - five light and one dark bottle containing water from one depth were incubated under 0, 10, 25, 50, 75, and 100% irradiance provided by glass neutral density filters over the incubation bottles.

For both series, dark bottles were pre-wrapped with black tape and then covered with aluminum foil to insure complete darkness. Depths and frequencies of sampling varied from year to year.

The plastic incubator box was fronted with clear plexiglass and had a wheel that rotated in the vertical plane. The wheel accommodated 12 ground-glass stoppered 130 ml bottles. At various times, because of stripped gears, the wheel did not rotate or was manually turned periodically during incubation. Light, provided by a bank of 12 GE Cool-White fluorescent lamps (General Electric Corporation, Stamford, CT), and amount of radioactivity added varied from year to year. Highest irradiance (= 100%) in the incubator was between 1100 and 1400 ft-c measured with a GE Model No. 214 photometer (General Electric Corporation, Stamford, CT). A pumped water flow-through system maintained ambient incubator temperature near 0°C. Samples were incubated for 6 or 12 hr.

At the end of the incubation, the samples were filtered (suction pressure

less than 250 mm Hg) onto 25 mm, 0.45 μ m Millipore filters, washed with filtered seawater, air-dried, and stored over desiccant until analyzed. Filters were fumed over concentrated HCl and counted three times for 1000 counts, using a gas flow proportional counter (Nuclear Chicago Corporation, Des Plaines, IL). Counting was done either in Seattle using a Nuclear Chicago Model D-47 counter with micromil window, C-110 automatic sample changer, 161-A scaler, and C111B printing timer, or on T-3 using a Nuclear Chicago manual, end-window Model 8770 scaler, Model 3053 sample changer, Model 108 G-M detector, and Model 8420 dual timer.

Carbon uptake was calculated from

$$P = (L-D)(W)(1.05)/(Z)(T)$$

where P is in $\text{mg C m}^{-3} \text{ h}^{-1}$; L-D is the difference between the light and dark bottle in counts per minute corrected for machine background and coincidence; W is the total carbonate in mg C m^{-3} calculated from $W = (810)(S^{\circ}/\text{‰})$ as suggested by Dr. G. C. Anderson, Department of Oceanography, University of Washington; 1.05 is the isotope discrimination factor (Strickland 1960); Z is the total activity in counts per minute added to the sample and corrected for the counter efficiency of about 22.8%; T is the incubation time (6 or 12 hr).

All ^{14}C ampoules used on T-3 were prepared in the Department of Oceanography, University of Washington, from aqueous sodium carbonate obtained from Nuclear Chicago Corporation. All glassware was rinsed with distilled water and autoclaved. The amount of solution to be made was determined by dividing the activity of the stock aqueous sodium carbonate by the desired activity per ml of final solution. Glass distilled water was filtered through 47 mm, 0.45 μ m Millipore filters. The pH was adjusted to 9.5-9.7 with NaOH. The solution was well mixed, and after adding the commercial sodium carbonate, mixed again. Glass ampoules holding 2 or 5 ml of solution were filled by an automatic volume dispenser. The ampoules were sealed using propane torches. The sealed ampoules were placed in large beakers, covered with water to which methylene blue dye was added, and autoclaved for ca. 1 hr at 120°C. After washing away the dye, the ampoules were inspected for any sign of color inside them. Ampoules that were even slightly discolored were discarded. The filled ampoules were color-coded with spray paint and stored.

Several ampoules from the beginning, middle, and end of the filling process were kept separate to be used for standardization. Standardization was done using methods then employed by the Department of Oceanography, University of Washington, where ampoules were either sent to Dr. C. R. Goldman, University of

California, Davis, and analyzed using gas phase (Goldman 1963; Steemann-Nielsen 1974) or, in the Department of Oceanography, University of Washington, were compared to samples obtained from the National Bureau of Standards. From 1970-1973, ampoules were standardized by liquid scintillation techniques and external standards at the Department of Oceanography.

Phytoplankton Cell Counts

Samples for phytoplankton identification and cell counts were usually taken from Nansen bottles during hydrocasts and stored in 250 ml glass jars. They were preserved with 4% formalin, buffered (sodium borate) or unbuffered, for a final strength of approximately 1%. Samples were shipped to Seattle for later analysis. Some samples were collected from a water pumping system during summer 1970 (see below).

Phytoplankton species were enumerated for some of the samples collected in the summers of 1968, 1969, and 1971 with the inverted microscope method (Hasle 1978a, b). Samples were individually counted or samples from two, three, or four days were combined for each depth. The samples combined to make a composite were separated in time by one week or less. After thorough mixing, the samples were poured into 5 and 50 ml Zeiss counting chambers (Carl Zeiss, Oberkochen Würt, FRG) and allowed to settle at least 20 hr before counting. A Zeiss inverted microscope was used for all enumerations. The 5 ml chamber was counted at 390 X using a 25 X objective, 12.5 X oculars, and a magnification factor of the optics carrier of 1.25. The 50 ml chamber was counted at 156 X with a 10 X objective, 12.5 X oculars, and the 1.25 X magnification factor. Cell counts were converted to cells per liter, cell volumes (Larrance 1964), and cell carbon (Mullin et al. 1966). These data are contained in an unpublished manuscript (Walline 1973) available from the School of Oceanography, University of Washington.

Zooplankton

Zooplankton sampling was maintained from March 1966 through April 1974. Gear types, sampling periods, and depth intervals sampled varied between and within years. Regardless of the gear used, all samples were concentrated and preserved in 4% V/V formalin (final concentration) buffered with either sodium acetate or sodium borate.

Initially, samples were taken with an open 0.5 m diameter ring net with 215 μ m mesh gauze. From June 1966 through July 1967, a 7.6 cm centrifugal

pump system with a 10 cm diameter hose intake was lowered. A 25 kg weight at the end of the wire held down the hose intake. Since wire angles were low, the depth of sampling was estimated from the length of the wire. Maximum depth of sampling was about 185 m. Samples of 5 to 18 m³ of water were filtered at a rate of 0.2 to 0.6 m³ per min through a net of 215 µm mesh size. Beginning in early July 1967, a closing 1 m diameter ring net of either 110 or 215 µm mesh was used to sample to 1000 m. This sampling overlapped with pumping stations to assure comparability.

Sampling with a 2 m² closing umbrella net began in September 1967 (Scott 1969; Macaulay and Daly 1987). Mesh size was 223 and 569 µm. This net, with a filtration ratio of 1.25:1, was the principal sampling device throughout the remaining field program though the netting itself was replaced with a high filtration type mesh (4:1 filtration ratio) in March 1972. All subsequent samples were collected with the 4:1 filtration ratio net.

An overlapping sampling scheme was used starting in October 1969. Sampling depths were at 10 m intervals from 300 to 10 m, 100 m intervals from 1000 to 10 m, and 500 m intervals from the bottom to 10 m. The 10 m upper limit was chosen to protect the net during retrieval through the hydrohole. Samples were collected from as deep as 2500 m.

Two other kinds of nets were sometimes employed: a 3 m² closing umbrella net with 300 µm mesh in summer 1968 and a 1 m² plummet net with 571 µm mesh initially in May 1971 and periodically thereafter. The plummet net is a downward fishing net with an opening-closing mechanism activated with a messenger (Macaulay 1978; Macaulay and Daly in prep.).

Sorting, identifying, and counting of some samples were done in Seattle (Table 3). Other samples have been analyzed for some groups of organisms, primarily copepods. These data are available in the School of Oceanography, but obtaining them will require an investigator to visit the University of Washington.

Echo-sounder

Echo-sounding was conducted from April 1970 to April 1974. A modified Ross 200A (100 kHz) echo-sounder and 10° transducer with an impedance matching box scanned depth ranges of 0-50, 50-100, 100-150, and 150-200 fm. The 0-50 fm depth range was emphasized because of interest in the scattering layer often found about 25 fm. The system included the standard Ross 200A transceiver unit, recorder unit, and a Sony TC-5600 stereo tape recorder. During regular

Table 3. List of T-3 zooplankton samples analyzed and used in theses, reports, and publications

Hughes (1968)	399 samples collected with a plankton pump
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
Scott (1969)	523 samples collected with a pump, 1 m closing ring net and 2 m ² umbrella net
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
	04 10 Jul - 6 Sep 1967
	05 13 Sep - 23 Sep 1967
Damkaer (1976)	52 samples collected with a 1 m closing ring net
Cruises:	04 12 Jul - 8 Sep 1967
	06 5 May 1968
	07 10 Jun - 18 Aug 1968
Heron and Damkaer (1976)	2 samples collected with a 1 m closing ring net
Cruises:	07 10 Jun 1968
	12 Jun 1968
Pautzke (1979)	16 samples collected with a 2 m ² umbrella net
Cruises:	14 7 Jun - 5 Oct 1970
	18 30 May - 1 Oct 1971
	22 31 May - 29 Sep 1972
	26 28 May - 19 Oct 1973
Heron, English, and Damkaer (1984)	54 samples collected with a 1 m closing ring net and 3 m ² umbrella net
Cruises:	06 5 May 1968
	07 10 Jun - 20 Sep 1968
	08 21 Sep 1968

operation, echo-sounding was conducted continuously, normally on the 0-50 fm scale. Daily recordings of 15-45 min were made using all depth ranges. Some of these data are available on 1/4 inch magnetic tape, but retrieval will be difficult.

Data Management

The data were available from computer printouts or raw data sheets. The original punched data cards could not be located so the data were re-entered directly to disk files on the University of Washington Cyber 180-855 computer using a Tandy Model DT-1 data terminal. After editing the files to correct data entry errors or to fill in gaps in the data, the files were transferred to a 9-track, EBCDIC-coded magnetic tape for NODC. The resulting tape contains three files of hydrographic data, one file of chlorophyll data, and one file of primary productivity data.

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DATA DOCUMENTATION FORM

NOAA FORM 24-13
(4-77)U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
WASHINGTON, DC 20235FORM APPROVED
O.M.B. No. 41-R2651
EXPIRES 1-81

(While you are not required to use this form, it is the most desirable mechanism for providing the required ancillary information enabling the NODC and users to obtain the greatest benefit from your data.)

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

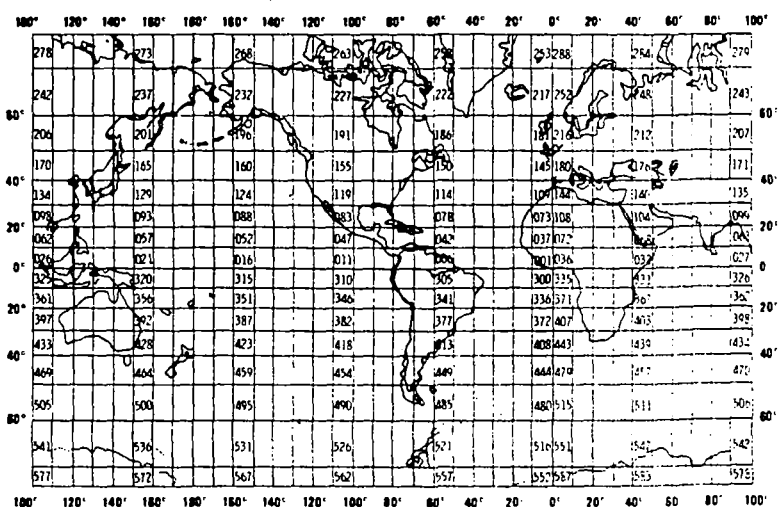
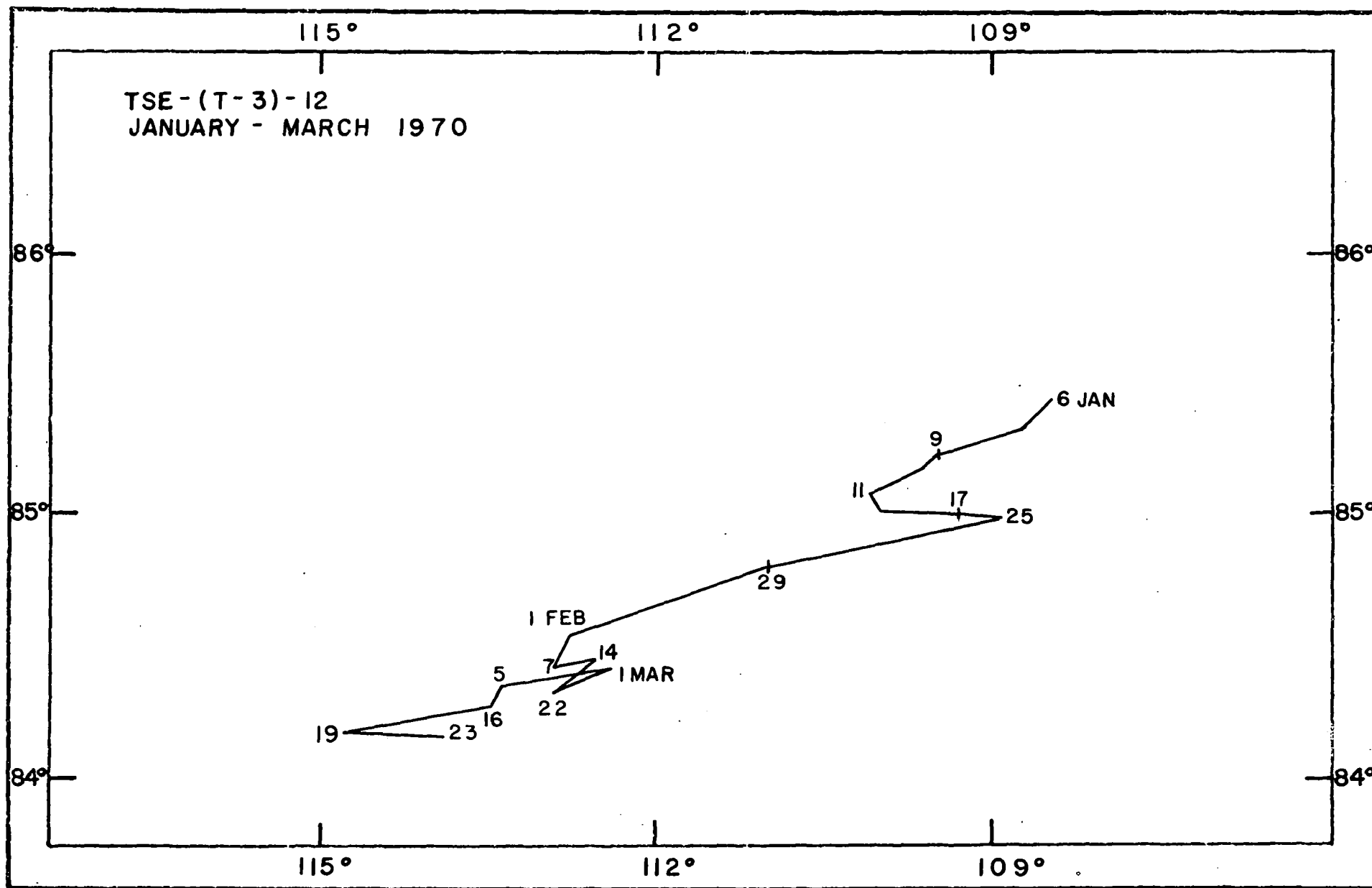
1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED Dr. T. Saunders English School of Oceanography WB-10 University of Washington Seattle, WA 98195			
2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED Primary production and energy flow		3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT TSE-(T-3)-12	
4. PLATFORM NAME(S) Fletcher's Ice Island (T-3)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.) Ice island	6. PLATFORM AND OPERATOR NATIONALITY(IES) PLATFORM OPERATOR USA USA	7. DATES FROM: MO/DAY/YR TO: MO/DAY/YR 01/05/70 03/23/70
8. ARE DATA PROPRIETARY? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR MONTH		11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED. GENERAL AREA 	
9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?) <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> PART (SPECIFY BELOW) Data should be available for international exchange			
10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER (AND ADDRESS IF OTHER THAN IN ITEM-1) Dr. Karl Banse School of Oceanography WB-10 University of Washington Seattle, WA 98195 (206) 543-5079			

FIG. 1



TSE-(T-3)-12 05 Jan 1970 - 23 Mar 1970

Modifications to the basic program methods

628 zooplankton samples were collected with a 2 m² umbrella net with a mesh size of 223 μ m.

Hydrographic stations were taken with Nansen bottles approximately weekly (9 stations, 291 bottles). Salinity, temperature, and dissolved oxygen samples were taken at all stations and phytoplankton cell count samples were taken at 7 stations (242 samples).

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Water transparency	meters	Secchi Disk	N/A	N/A
Depth of Sample	meters	Wire out	N/A	N/A
Temperature	°C	Reversing thermometers	N/A	N/A
Salinity	‰	Nansen bottles, modified Van Dorn bottles	Salinometer, University of Washington	N/A
Sigma-t	-	"	-	N/A
Dissolved oxygen	ml/l	"	Winkler	N/A
PO ₄	µg-atom/l	"	See Strickland and Parsons (1968)	N/A
NO ₃	"	"	"	N/A
SiO ₄	"	"	"	N/A
Chlorophyll <u>a</u>	mg m ⁻³	Van Dorn bottles	Spectrophotometer, fluorometer (Strickland and Parsons 1963)	N/A
Primary productivity (14C uptake)	mg C m ⁻³ h ⁻¹	"	Strickland and Parsons (1968)	N/A

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-1 ☐ ALGOL ☐ COBOL
☐ FORTRAN ☐ _____ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:

NAME AND PHONE NUMBER _____

ADDRESS _____

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

<p>5. RECORDING MODE</p> <p><input type="checkbox"/> BCD <input type="checkbox"/> BINARY</p> <p><input type="checkbox"/> ASCII <input checked="" type="checkbox"/> EBCDIC</p> <p><input type="checkbox"/> _____</p>	<p>9. LENGTH OF INTER-RECORD GAP (IF KNOWN) <input checked="" type="checkbox"/> 3/4 INCH</p> <p><input type="checkbox"/> _____</p>
<p>6. NUMBER OF TRACKS (CHANNELS)</p> <p><input type="checkbox"/> SEVEN</p> <p><input checked="" type="checkbox"/> NINE</p> <p><input type="checkbox"/> _____</p>	<p>10. END OF FILE MARK</p> <p><input type="checkbox"/> OCTAL 17</p> <p><input checked="" type="checkbox"/> Tape Mark</p>
<p>7. PARITY</p> <p><input checked="" type="checkbox"/> ODD</p> <p><input type="checkbox"/> EVEN</p>	<p>11. PASTE-ON-PAPER LABEL DESCRIPTION (INCLUDE ORIGINATOR NAME AND SOME KEY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)</p> <p>Ice Island T-3 hydro, chlorophyll, & Productivity data sets.</p> <p>Specs.- 9 track, EBCDIC, odd parity, 1600 bpi, 5 files, D=PE, RL=120, MBL = 3000, CV = EB, F=S, LB=KU</p>
<p>8. DENSITY</p> <p><input type="checkbox"/> 200 BPI <input checked="" type="checkbox"/> 1600 BPI</p> <p><input type="checkbox"/> 556 BPI</p> <p><input type="checkbox"/> 800 BPI</p> <p><input type="checkbox"/> _____</p>	<p>12. PHYSICAL BLOCK LENGTH IN BYTES</p> <p>FL=120 MBL=3000 Char.</p> <p>13. LENGTH OF BYTES IN BITS</p>

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALI- BRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Fluorometer Turner Model 111		X			X				
Reversing thermometers		X	manufacturer		X				
Salinometer Univ. Washington		X			X				
Naval Arctic Research Lab.		X			X				

Primary Production and Energy Flow

The program was directed by the late Dr. T. Saunders English and funded by the Office of Naval Research Contract Nonr-477 (37) Project NR 083 12 and Contract N00014-67-0103-0005. Users of the data are requested to acknowledge the agency support.

The methods used by biological oceanographers of the Department of Oceanography, University of Washington, Seattle, from 1966 to 1974 on Fletcher's Ice Island (T-3) drifting in the Arctic Ocean (Fig. 1) are given below. These methods are to compliment the entries in the individual cruise Data Documentation Forms where modifications, if any, are given.

General

The field program was maintained at various intensities for eight years (March 1966 to June 1974), with personnel on T-3 continuously from April 1968 until the island was evacuated in June 1974. During this period, divided into 28 cruises (Table 1), biological and environmental parameters were measured (Table 2). The sampling program was structured to monitor periods of active change in the various parameters. Thus, hydrography and zooplankton sampling was a year round pursuit, field and logistic conditions permitting, whereas chlorophyll a concentrations and primary productivity (^{14}C uptake) were usually measured only during the summer (June to September). Various gear types, methodologies, and sampling strategies were tried and tested throughout the field program.

The oceanographic working area was located on 3-4 m thick sea ice in Colby Bay adjacent to the ice island. All sampling was done from inside a heated building positioned over a hole, ca. 1.5 m on a side, cut in the ice. The hut contained a space heater, oceanographic sampling equipment, and a Rankin winch powered by a 5 hp Wisconsin gasoline engine. The drum on the winch held about 4000 m of 5/32 inch hydrographic wire. The wire ran through a meter wheel attached to a tripod erected over the hole.

Geographic positions were provided by the Lamont-Doherty Geological Observatory, Palisades, NY (Hunkins and Tiemann 1977). Hydrography and biology (chlorophyll a and primary productivity) samples were not always taken from the same bottle cast or on the same day. Each kind of data has a separate sample numbering scheme. As a result, station positions may not always agree between the hydrographic and biological data. See individual cruise Data Documentation

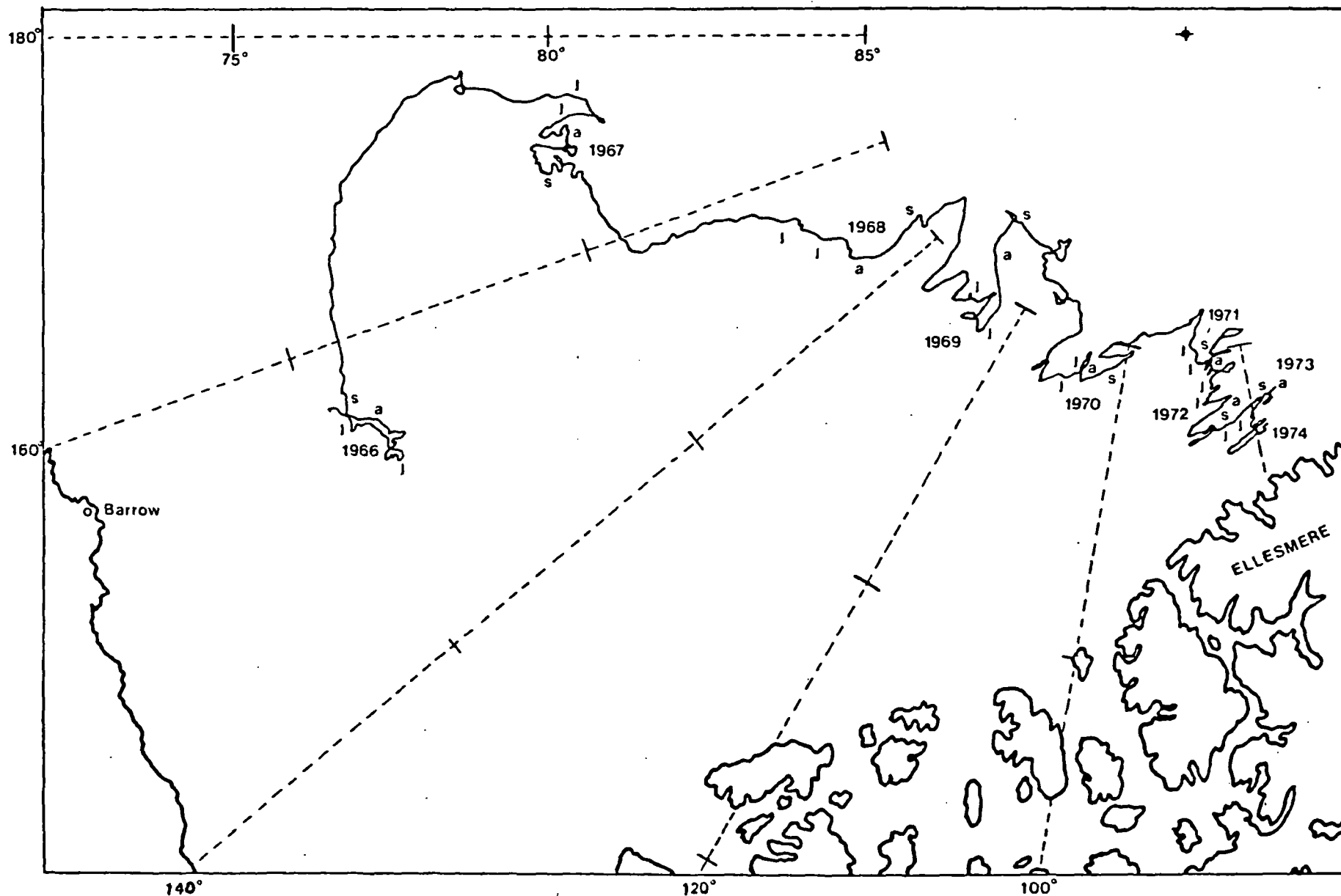


Fig. 1. Drift track of T-3 from June 1966 to April 1974. The months of June, July, August, and September are indicated in small letters for each year.

Table 1. Cruise numbers and dates of T-3 field program

Cruise		Cruise	
Number	Duration	Number	Duration
01	16 Mar 66 - 9 Apr 66	15	5 Oct 70 - 30 Dec 70
02	2 Jun 66 - 18 Oct 66	16	1 Jan 71 - 30 Mar 71
03	1 Feb 67 - 15 Feb 67	17	30 Mar 71 - 30 May 71
04	4 Jun 67 - 11 Sep 67	18	30 May 71 - 1 Oct 71
05	12 Sep 67 - 24 Sep 67	19	1 Oct 71 - 20 Dec 71
06	27 Apr 68 - 9 Jun 68	20	20 Dec 71 - 20 Mar 72
07	10 Jun 68 - 20 Sep 68	21	20 Mar 72 - 31 May 72
08	21 Sep 68 - 31 Jan 69	22	31 May 72 - 29 Sep 72
09	31 Jan 69 - 13 Jun 69	23	29 Sep 72 - 13 Dec 72
10	13 Jun 69 - 3 Oct 69	24	13 Dec 72 - 7 Apr 73
11	4 Oct 69 - 5 Jan 70	25	7 Apr 73 - 28 May 73
12	5 Jan 70 - 23 Mar 70	26	28 May 73 - 19 Oct 73
13	23 Mar 70 - 7 Jun 70	27	31 Oct 73 - 8 Mar 74
14	7 Jun 70 - 5 Oct 70	28	8 Mar 74 - 1 Jun 74

Table 2. Field data collected at T-3, March 1966 to June 1974

Parameter	Total Number of Samples	1966												1967												1968													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354				X																																X	X	
Temperature	5354				X																																X	X	
Dissolved oxygen	5198				X																																X	X	
Nutrients																																							
Nitrate	3611																																						
Silicate	3440																																						
Phosphate	3440																																						
Phytoplankton																																							
Chlorophyll <u>a</u>	8022							X	X									X	X	X	X													X	X	X	X		
Productivity	4978																		X	X	X													X	X	X			
Cell Counts	5838																																		X	X	X	X	
Zooplankton																																							
Acoustic traces	40 mo																																						
Plankton pump	427						X	X	X	X	X		X					X	X	X	X																		
Nets (mesh size μm)																																							
0.5 m ring (215)	38				X	X																																	
1 m closing ring (110)	355																																		X	X	X	X	X
1 m closing ring (215)	318																		X	X	X																		
1 m ² plummet (571)*	56																																						
2 m ² umbrella (223) [†]	9112																				X													X	X	X	X	X	X
2 m ² umbrella (569)	95																																			X	X		
3 m ² umbrella (300)	104																																		X	X	X		

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2. (cont.)

Parameter	Total Number of Samples	1969												1970												1971														
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D			
Hydrography																																								
Salinity	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	
Temperature	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	
Nutrients																																								
Nitrate	3611																	X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440																	X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440																	X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																								
Chlorophyll <u>a</u>	8022						X	X	X	X								X	X	X	X						X		X	X	X	X								
Productivity	4978						X	X	X	X								X	X	X	X								X	X	X	X								
Cell Counts	5838				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X							
Zooplankton																																								
Acoustic traces	40 mo																	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	
Plankton pump	427																																							
Nets (mesh size μm)																																								
0.5 m ring (215)	38																																							
1 m closing ring (110)	355			X																																				
1 m closing ring (215)	318					X	X																																	
1 m ² plummet (571)*	56																																							
2 m ² umbrella (223) †	9112	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2 m ² umbrella (569)	95																																							
3 m ² umbrella (300)	104																																							

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2 (cont.)

Parameter	Total Number of Samples	1972												1973												1974													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Temperature	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5198	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Nutrients																																							
Nitrate	3611	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X																													
Productivity	4978						X	X	X	X	X																												
Cell Counts	5838						X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Zooplankton																																							
Acoustic traces	40 mo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Plankton pump	427																																						
Nets (mesh size μm)																																							
0.5 m ring (215)	38																																						
1 m closing ring (110)	355																																						
1 m closing ring (215)	318																																						
1 m ² plummet (571)*	56					X	X																																
2 m ² umbrella (223) †	9112	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Forms for kind of sampling bottle used.

Hydrography and Nutrients

Temperature, salinity, oxygen, and nutrient determinations were made on water collected with Van Dorn polyvinylchloride or uncoated Nansen water sampling bottles. The Van Dorn bottles contained surgical tubing which may or may not be toxic to organisms (see Price et al. 1986). In general, the upper 100 m was sampled at 5 m intervals, 125-375 m at 25 m intervals, 400-500 m at 50 m intervals, 600-1000 m at 100 m intervals, and 1000 m to the bottom at 250 m intervals with a 30 m interval between the last bottle and the bottom. Periodically, additional samples were taken at 2 m intervals around the pycnocline (usually 40-60 m). In periods when weekly casts were taken, an alternating pattern of sampling, 0-100 m, 0-500 m, 0-100 m, 0-deep, allowed a more frequent survey of short-term variation in the near-surface stratum without the additional burden of time-consuming deep casts. Because of heat lamps and cables and the accumulation of freshwater in the hydrohole, surface readings would not have been representative, therefore the top bottle of a hydrocast was usually placed 5 m below the water surface.

The highest observed wire angles during these cruises were about 4°. For a 1000 m cast, this would yield a true depth of 998 m at the bottom. Computations of thermometric depths (Wüst 1933) were performed for those observations deeper than 250 m where unprotected thermometers were used for which calibrations were still available (262 depths at 45 stations). With the exception of two casts (Cruise 11, station 1, cast 5, 1400-2000 m and Cruise 13, station 12, cast 5, 500-1300 m), all calculated values were generally within 2-3% of the nominal depths sampled. These two casts were corrected. All other depths reported here are uncorrected, but should be within 2-5% of the true value.

Temperatures were determined from reversing thermometers on each water bottle; protected thermometers were usually deployed in pairs. Bottles were tripped about 5 min after the top bottle reached its intended depth. Thermometers were read using a lighted magnifying glass about 15 min after retrieval. Readings were corrected from the auxiliary thermometers and the thermometer constants by an IBM 1130 program at the Department of Oceanography, University of Washington.

Over 100 reversing thermometers were used during the course of these observations. They were calibrated either by the manufacturers or at various times at the University of Washington. Calibration data available from the

latest date preceding the use of each thermometer on T-3 were used to correct the thermometer readings. The calibrations were usually 0.5-3 yr old when they were applied to these data.

Salinity samples were drawn into 250 ml clear polyethylene bottles, tightly sealed, and allowed to come to room temperature. Determinations were made on T-3 using an Industrial Instruments Model RS-7A (Industrial Instruments Co., Cedar Grove, NJ) or a Beckman Model RS-7B (Beckman Instruments, Inc., Fullerton, CA) portable induction salinometer calibrated against a standard seawater sample obtained from the Laboratoire Hydrographique (Copenhagen, Denmark). Substandards of seawater (ca. 34.9‰ collected from ca. 500 m) were used after each 10 samples and at the end of a run. Salinity was calculated using the tables in the salinometer manual (Industrial Instruments 1964). These values are considered to have an accuracy of ± 0.003 ppt.

Dissolved oxygen was analyzed by a modified Winkler method (Strickland and Parsons 1965). Brown BOD bottles of 250 ml capacity, an automatic 100 ml pipet, an automatic 25 ml burette readable to 0.01 ml, and an electric stirrer were used.

Nutrients were determined by the methods in Strickland and Parsons (1968). The samples were either analyzed immediately after collection or frozen for later analysis either on the ice, or during April and May 1971, at the University of Washington using a Beckman DU spectrophotometer (Beckman Instruments, Inc., Fullerton, CA) with 1 cm cells. After December 1972, nitrate determinations were run on a Brinkman PC/1000 colorimeter (Brinkman Instruments, Westbury, NY) with a fiber optics probe and calibrated against the spectrophotometer. Reagents and standards were prepared from water filtered through an Ion-X-Change column, Grade 1, consisting of a mixed bed non-regenerable resin (Illinois Water Treatment Co.) that produces triple distilled water. Comparisons between reagents and standards made up with this water and with distilled water sent from the Naval Arctic Research Laboratory at Barrow showed these procedures to be adequate. Standards were run with each set of samples and for each nitrate column.

Chlorophyll a

Chlorophyll a was determined according to Strickland and Parsons (1968). In 1968 through 1970, water was filtered through 47 mm 0.45 μ m Millipore filters (Millipore Corporation, Bedford, MA). Suction pressure was less than 250 mm Hg. In 1971 through 1973, Gelman A/E glass fiber filters (approximate

pore size = 1.0 μm) (Gelman Instrument Co., Ann Arbor, MI) were used. MgCO_3 was added to all filters near the end of the filtration. In 1968, samples of about 4 liters of water were analyzed using a Beckman DK spectrophotometer in Seattle and chlorophyll a was calculated using the SCOR-UNESCO equations (Unesco 1966). For 1968 through 1973, samples of about 2 liters of water were filtered and a Turner Model 111 fluorometer (G. K. Turner Associates, Palo Alto, CA) was used for analysis. Fluorometer filters were 5-60 and 2-64. The fluorometer was calibrated using either a Beckman DU spectrophotometer on T-3 or a Beckman DK scanning spectrophotometer in Seattle. For samples analyzed with the fluorometer, chlorophyll a was calculated using equations in Holm-Hansen et al. (1967). Phaeopigments were not determined.

Primary Productivity

Primary productivity was measured during the summers by the radiocarbon technique of Steemann-Nielsen (1952) as detailed by Strickland and Parsons (1968). Two experimental schemes were used:

1. Depth series - paired 130 ml light and dark bottles were filled with water collected from a number of depths and incubated under constant high illumination (for the level of irradiance, see below).
2. Graduated light series - five light and one dark bottle containing water from one depth were incubated under 0, 10, 25, 50, 75, and 100% irradiance provided by glass neutral density filters over the incubation bottles.

For both series, dark bottles were pre-wrapped with black tape and then covered with aluminum foil to insure complete darkness. Depths and frequencies of sampling varied from year to year.

The plastic incubator box was fronted with clear plexiglass and had a wheel that rotated in the vertical plane. The wheel accommodated 12 ground-glass stoppered 130 ml bottles. At various times, because of stripped gears, the wheel did not rotate or was manually turned periodically during incubation. Light, provided by a bank of 12 GE Cool-White fluorescent lamps (General Electric Corporation, Stamford, CT), and amount of radioactivity added varied from year to year. Highest irradiance (= 100%) in the incubator was between 1100 and 1400 ft-c measured with a GE Model No. 214 photometer (General Electric Corporation, Stamford, CT). A pumped water flow-through system maintained ambient incubator temperature near 0°C. Samples were incubated for 6 or 12 hr.

At the end of the incubation, the samples were filtered (suction pressure

less than 250 mm Hg) onto 25 mm, 0.45 μ m Millipore filters, washed with filtered seawater, air-dried, and stored over desiccant until analyzed. Filters were fumed over concentrated HCl and counted three times for 1000 counts, using a gas flow proportional counter (Nuclear Chicago Corporation, Des Plaines, IL). Counting was done either in Seattle using a Nuclear Chicago Model D-47 counter with micromil window, C-110 automatic sample changer, 161-A scaler, and C111B printing timer, or on T-3 using a Nuclear Chicago manual, end-window Model 8770 scaler, Model 3053 sample changer, Model 108 G-M detector, and Model 8420 dual timer.

Carbon uptake was calculated from

$$P = (L-D)(W)(1.05)/(Z)(T)$$

where P is in mg C $m^{-3} h^{-1}$; L-D is the difference between the light and dark bottle in counts per minute corrected for machine background and coincidence; W is the total carbonate in mg C m^{-3} calculated from $W = (810)(S^{\circ}/\text{‰})$ as suggested by Dr. G. C. Anderson, Department of Oceanography, University of Washington; 1.05 is the isotope discrimination factor (Strickland 1960); Z is the total activity in counts per minute added to the sample and corrected for the counter efficiency of about 22.8%; T is the incubation time (6 or 12 hr).

All ^{14}C ampoules used on T-3 were prepared in the Department of Oceanography, University of Washington, from aqueous sodium carbonate obtained from Nuclear Chicago Corporation. All glassware was rinsed with distilled water and autoclaved. The amount of solution to be made was determined by dividing the activity of the stock aqueous sodium carbonate by the desired activity per ml of final solution. Glass distilled water was filtered through 47 mm, 0.45 μ m Millipore filters. The pH was adjusted to 9.5-9.7 with NaOH. The solution was well mixed, and after adding the commercial sodium carbonate, mixed again. Glass ampoules holding 2 or 5 ml of solution were filled by an automatic volume dispenser. The ampoules were sealed using propane torches. The sealed ampoules were placed in large beakers, covered with water to which methylene blue dye was added, and autoclaved for ca. 1 hr at 120°C. After washing away the dye, the ampoules were inspected for any sign of color inside them. Ampoules that were even slightly discolored were discarded. The filled ampoules were color-coded with spray paint and stored.

Several ampoules from the beginning, middle, and end of the filling process were kept separate to be used for standardization. Standardization was done using methods then employed by the Department of Oceanography, University of Washington, where ampoules were either sent to Dr. C. R. Goldman, University of

California, Davis, and analyzed using gas phase (Goldman 1963; Steemann-Nielsen 1974) or, in the Department of Oceanography, University of Washington, were compared to samples obtained from the National Bureau of Standards. From 1970-1973, ampoules were standardized by liquid scintillation techniques and external standards at the Department of Oceanography.

Phytoplankton Cell Counts

Samples for phytoplankton identification and cell counts were usually taken from Nansen bottles during hydrocasts and stored in 250 ml glass jars. They were preserved with 4% formalin, buffered (sodium borate) or unbuffered, for a final strength of approximately 1%. Samples were shipped to Seattle for later analysis. Some samples were collected from a water pumping system during summer 1970 (see below).

Phytoplankton species were enumerated for some of the samples collected in the summers of 1968, 1969, and 1971 with the inverted microscope method (Hasle 1978a, b). Samples were individually counted or samples from two, three, or four days were combined for each depth. The samples combined to make a composite were separated in time by one week or less. After thorough mixing, the samples were poured into 5 and 50 ml Zeiss counting chambers (Carl Zeiss, Oberkochen Würt, FRG) and allowed to settle at least 20 hr before counting. A Zeiss inverted microscope was used for all enumerations. The 5 ml chamber was counted at 390 X using a 25 X objective, 12.5 X oculars, and a magnification factor of the optics carrier of 1.25. The 50 ml chamber was counted at 156 X with a 10 X objective, 12.5 X oculars, and the 1.25 X magnification factor. Cell counts were converted to cells per liter, cell volumes (Larrance 1964), and cell carbon (Mullin et al. 1966). These data are contained in an unpublished manuscript (Walline 1973) available from the School of Oceanography, University of Washington.

Zooplankton

Zooplankton sampling was maintained from March 1966 through April 1974. Gear types, sampling periods, and depth intervals sampled varied between and within years. Regardless of the gear used, all samples were concentrated and preserved in 4% V/V formalin (final concentration) buffered with either sodium acetate or sodium borate.

Initially, samples were taken with an open 0.5 m diameter ring net with 215 μ m mesh gauze. From June 1966 through July 1967, a 7.6 cm centrifugal

pump system with a 10 cm diameter hose intake was lowered. A 25 kg weight at the end of the wire held down the hose intake. Since wire angles were low, the depth of sampling was estimated from the length of the wire. Maximum depth of sampling was about 185 m. Samples of 5 to 18 m³ of water were filtered at a rate of 0.2 to 0.6 m³ per min through a net of 215 µm mesh size. Beginning in early July 1967, a closing 1 m diameter ring net of either 110 or 215 µm mesh was used to sample to 1000 m. This sampling overlapped with pumping stations to assure comparability.

Sampling with a 2 m² closing umbrella net began in September 1967 (Scott 1969; Macaulay and Daly 1987). Mesh size was 223 and 569 µm. This net, with a filtration ratio of 1.25:1, was the principal sampling device throughout the remaining field program though the netting itself was replaced with a high filtration type mesh (4:1 filtration ratio) in March 1972. All subsequent samples were collected with the 4:1 filtration ratio net.

An overlapping sampling scheme was used starting in October 1969. Sampling depths were at 10 m intervals from 300 to 10 m, 100 m intervals from 1000 to 10 m, and 500 m intervals from the bottom to 10 m. The 10 m upper limit was chosen to protect the net during retrieval through the hydrohole. Samples were collected from as deep as 2500 m.

Two other kinds of nets were sometimes employed: a 3 m² closing umbrella net with 300 µm mesh in summer 1968 and a 1 m² plummet net with 571 µm mesh initially in May 1971 and periodically thereafter. The plummet net is a downward fishing net with an opening-closing mechanism activated with a messenger (Macaulay 1978; Macaulay and Daly in prep.).

Sorting, identifying, and counting of some samples were done in Seattle (Table 3). Other samples have been analyzed for some groups of organisms, primarily copepods. These data are available in the School of Oceanography, but obtaining them will require an investigator to visit the University of Washington.

Echo-sounder

Echo-sounding was conducted from April 1970 to April 1974. A modified Ross 200A (100 kHz) echo-sounder and 10° transducer with an impedance matching box scanned depth ranges of 0-50, 50-100, 100-150, and 150-200 fm. The 0-50 fm depth range was emphasized because of interest in the scattering layer often found about 25 fm. The system included the standard Ross 200A transceiver unit, recorder unit, and a Sony TC-5600 stereo tape recorder. During regular

Table 3. List of T-3 zooplankton samples analyzed and used in theses, reports, and publications

Hughes (1968)	399 samples collected with a plankton pump
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
Scott (1969)	523 samples collected with a pump, 1 m closing ring net and 2 m ² umbrella net
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
	04 10 Jul - 6 Sep 1967
	05 13 Sep - 23 Sep 1967
Damkaer (1976)	52 samples collected with a 1 m closing ring net
Cruises:	04 12 Jul - 8 Sep 1967
	06 5 May 1968
	07 10 Jun - 18 Aug 1968
Heron and Damkaer (1976)	2 samples collected with a 1 m closing ring net
Cruises:	07 10 Jun 1968
	12 Jun 1968
Pautzke (1979)	16 samples collected with a 2 m ² umbrella net
Cruises:	14 7 Jun - 5 Oct 1970
	18 30 May - 1 Oct 1971
	22 31 May - 29 Sep 1972
	26 28 May - 19 Oct 1973
Heron, English, and Damkaer (1984)	54 samples collected with a 1 m closing ring net and 3 m ² umbrella net
Cruises:	06 5 May 1968
	07 10 Jun - 20 Sep 1968
	08 21 Sep 1968

operation, echo-sounding was conducted continuously, normally on the 0-50 fm scale. Daily recordings of 15-45 min were made using all depth ranges. Some of these data are available on 1/4 inch magnetic tape, but retrieval will be difficult.

Data Management

The data were available from computer printouts or raw data sheets. The original punched data cards could not be located so the data were re-entered directly to disk files on the University of Washington Cyber 180-855 computer using a Tandy Model DT-1 data terminal. After editing the files to correct data entry errors or to fill in gaps in the data, the files were transferred to a 9-track, EBCDIC-coded magnetic tape for NODC. The resulting tape contains three files of hydrographic data, one file of chlorophyll data, and one file of primary productivity data.

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DATA DOCUMENTATION FORM

NOAA FORM 24-13
(4-77)U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
WASHINGTON, DC 20235FORM APPROVED
O.M.B. No. 41-R2651
EXPIRES 1-81

(While you are not required to use this form, it is the most desirable mechanism for providing the required ancillary information enabling the NODC and users to obtain the greatest benefit from your data.)

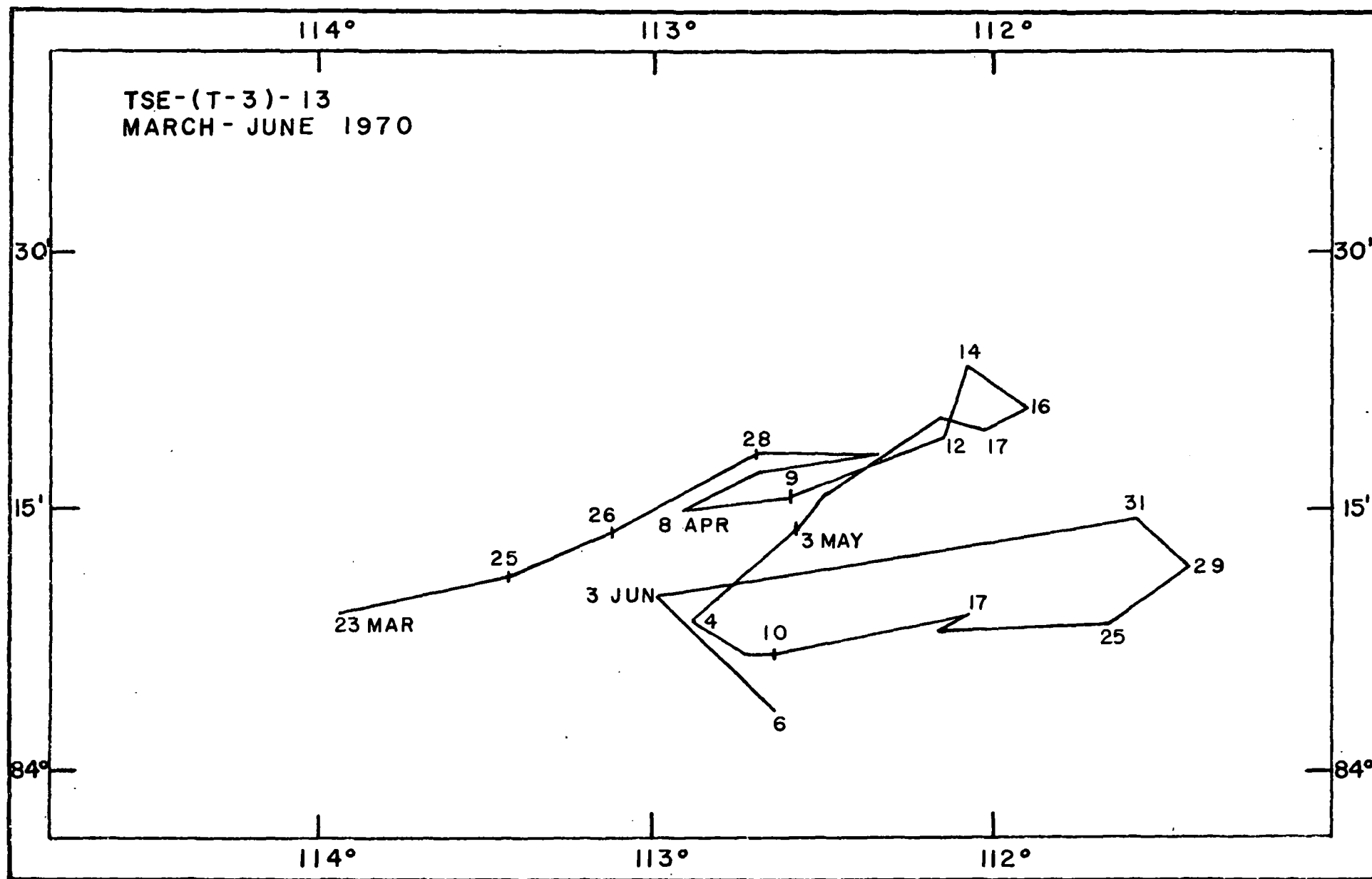
This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED			
Dr. T. Saunders English School of Oceanography WB-10 University of Washington Seattle, WA 98195			
2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED		3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT	
Primary production and energy flow		TSE-(T-3)-13	
4. PLATFORM NAME(S)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.)	6. PLATFORM AND OPERATOR NATIONALITY(IES)	7. DATES
Fletcher's Ice Island (T-3)	Ice island	PLATFORM OPERATOR	FROM: MO/DAY/YR TO: MO/DAY/YR
		USA USA	03/23/70 06/07/70
8. ARE DATA PROPRIETARY? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR MONTH		11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED.	
9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNA- TIONAL EXCHANGE?) <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> PART (SPECIFY BELOW)		GENERAL AREA	
10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELE- PHONE NUMBER (AND ADDRESS IF OTHER THAN IN ITEM-1) Dr. Karl Banse School of Oceanography WB-10 University of Washington Seattle, WA 98195 (206) 543-5079			

FIG. 1



TSE-(T-3)-13 23 Mar 1970 - 07 Jun 1970

Modifications to the basic program methods

541 zooplankton samples were collected with a 2 m² umbrella net, mesh size 223 μ m.

Hydrographic stations (7) were taken with Nansen bottles approximately weekly with samples (205 each) collected for temperature, salinity, dissolved oxygen, and phytoplankton cell counts. Additional hydrographic stations over the range of 40 to 60 m with bottles spaced at 2 m intervals were taken for Lamont-Doherty Geological Observatory. Only temperature and salinity values were measured.

Echo-sounder observations were started during this cruise and were done on an intermittent basis.

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Water transparency	meters	Secchi Disk	N/A	N/A
Depth of Sample	meters	Wire out	N/A	N/A
Temperature	°C	Reversing thermometers	N/A	N/A
Salinity	‰	Nansen bottles, modified Van Dorn bottles	Salinometer, University of Washington	N/A
Sigma-t	-	"	-	N/A
Dissolved oxygen	ml/l	"	Winkler	N/A
PO ₄	µg-atom/l	"	See Strickland and Parsons (1968)	N/A
NO ₃	"	"	"	N/A
SiO ₄	"	"	"	N/A
Chlorophyll <u>a</u>	mg m ⁻³	Van Dorn bottles	Spectrophotometer, fluorometer (Strickland and Parsons 1963)	N/A
Primary productivity (14C uptake)	mg C m ⁻³ h ⁻¹	"	Strickland and Parsons (1968)	N/A

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-1 ☐ ALGOL ☐ COBOL
☐ FORTRAN ☐ _____ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:

NAME AND PHONE NUMBER _____

ADDRESS _____

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

<p>5. RECORDING MODE</p> <p><input type="checkbox"/> BCD <input type="checkbox"/> BINARY</p> <p><input type="checkbox"/> ASCII <input checked="" type="checkbox"/> EBCDIC</p> <p><input type="checkbox"/> _____</p>	<p>9. LENGTH OF INTER-RECORD GAP (IF KNOWN) <input checked="" type="checkbox"/> 3/4 INCH</p> <p><input type="checkbox"/> _____</p>
<p>6. NUMBER OF TRACKS (CHANNELS)</p> <p><input type="checkbox"/> SEVEN</p> <p><input checked="" type="checkbox"/> NINE</p> <p><input type="checkbox"/> _____</p>	<p>10. END OF FILE MARK</p> <p><input type="checkbox"/> OCTAL 17</p> <p><input checked="" type="checkbox"/> Tape Mark</p>
<p>7. PARITY</p> <p><input checked="" type="checkbox"/> ODD</p> <p><input type="checkbox"/> EVEN</p>	<p>11. PASTE-ON-PAPER LABEL DESCRIPTION (INCLUDE ORIGINATOR NAME AND SOME KEY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)</p> <p>Ice Island T-3 hydro, chlorophyll, & Productivity data sets.</p> <p>Specs.- 9 track, EBCDIC, odd parity, 1600 bpi, 5 files, D=PE, RL=120, MBL = 3000, CV = EB, F=S, LB=KU</p>
<p>8. DENSITY</p> <p><input type="checkbox"/> 200 BPI <input checked="" type="checkbox"/> 1600 BPI</p> <p><input type="checkbox"/> 556 BPI</p> <p><input type="checkbox"/> 800 BPI</p> <p><input type="checkbox"/> _____</p>	<p>12. PHYSICAL BLOCK LENGTH IN BYTES</p> <p>FL=120 MBL=3000 Char.</p> <p>13. LENGTH OF BYTES IN BITS</p>

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALI- BRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Fluorometer Turner Model 111		X			X				
Reversing thermometers		X	manufacturer		X				
Salinometer Univ. Washington		X			X				
Naval Arctic Research Lab.		X			X				

Primary Production and Energy Flow

The program was directed by the late Dr. T. Saunders English and funded by the Office of Naval Research Contract Nonr-477 (37) Project NR 083 12 and Contract N00014-67-0103-0005. Users of the data are requested to acknowledge the agency support.

The methods used by biological oceanographers of the Department of Oceanography, University of Washington, Seattle, from 1966 to 1974 on Fletcher's Ice Island (T-3) drifting in the Arctic Ocean (Fig. 1) are given below. These methods are to compliment the entries in the individual cruise Data Documentation Forms where modifications, if any, are given.

General

The field program was maintained at various intensities for eight years (March 1966 to June 1974), with personnel on T-3 continuously from April 1968 until the island was evacuated in June 1974. During this period, divided into 28 cruises (Table 1), biological and environmental parameters were measured (Table 2). The sampling program was structured to monitor periods of active change in the various parameters. Thus, hydrography and zooplankton sampling was a year round pursuit, field and logistic conditions permitting, whereas chlorophyll a concentrations and primary productivity (^{14}C uptake) were usually measured only during the summer (June to September). Various gear types, methodologies, and sampling strategies were tried and tested throughout the field program.

The oceanographic working area was located on 3-4 m thick sea ice in Colby Bay adjacent to the ice island. All sampling was done from inside a heated building positioned over a hole, ca. 1.5 m on a side, cut in the ice. The hut contained a space heater, oceanographic sampling equipment, and a Rankin winch powered by a 5 hp Wisconsin gasoline engine. The drum on the winch held about 4000 m of 5/32 inch hydrographic wire. The wire ran through a meter wheel attached to a tripod erected over the hole.

Geographic positions were provided by the Lamont-Doherty Geological Observatory, Palisades, NY (Hunkins and Tiemann 1977). Hydrography and biology (chlorophyll a and primary productivity) samples were not always taken from the same bottle cast or on the same day. Each kind of data has a separate sample numbering scheme. As a result, station positions may not always agree between the hydrographic and biological data. See individual cruise Data Documentation

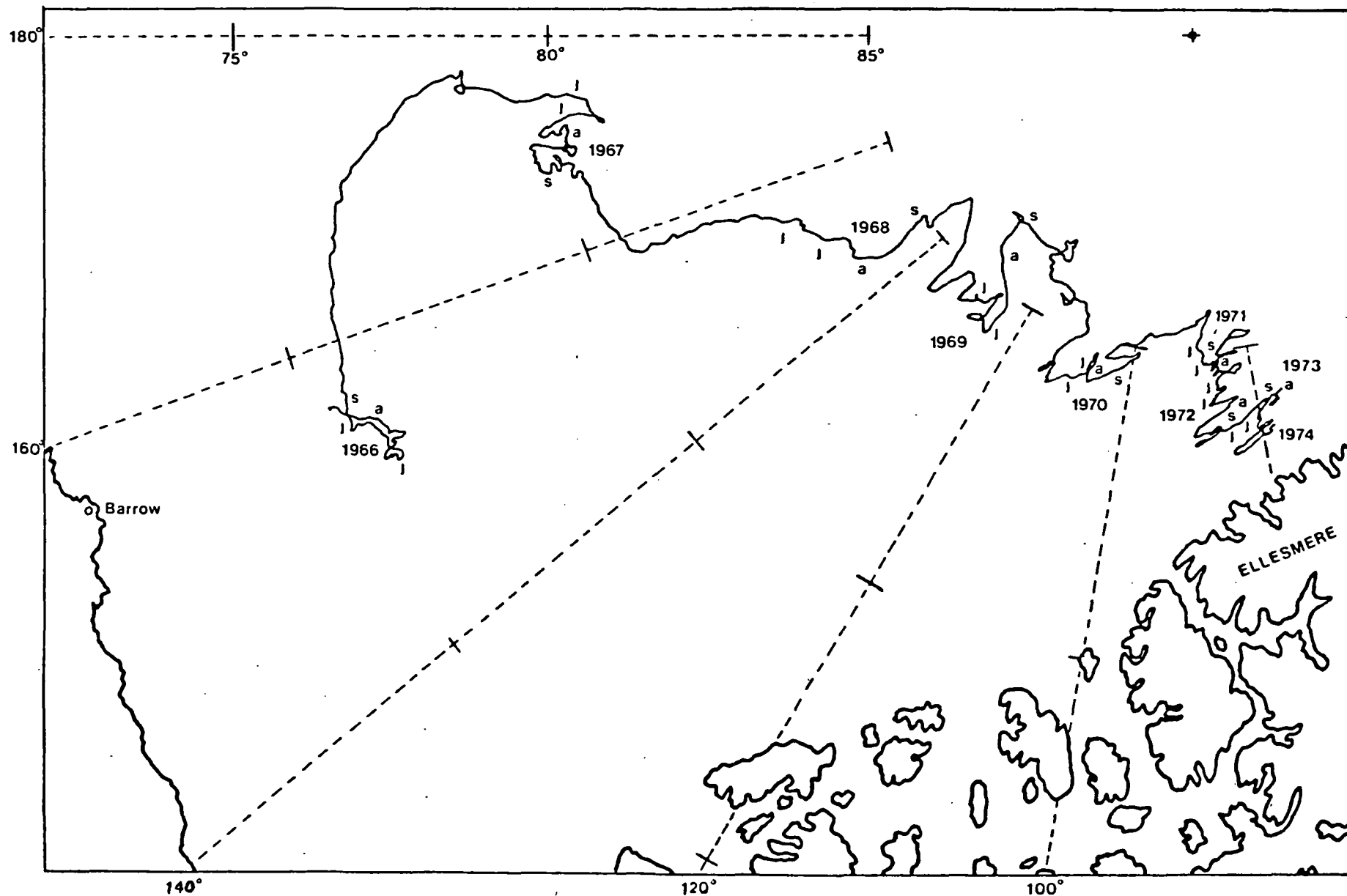


Fig. 1. Drift track of T-3 from June 1966 to April 1974. The months of June, July, August, and September are indicated in small letters for each year.

Table 1. Cruise numbers and dates of T-3 field program

Cruise		Cruise	
Number	Duration	Number	Duration
01	16 Mar 66 - 9 Apr 66	15	5 Oct 70 - 30 Dec 70
02	2 Jun 66 - 18 Oct 66	16	1 Jan 71 - 30 Mar 71
03	1 Feb 67 - 15 Feb 67	17	30 Mar 71 - 30 May 71
04	4 Jun 67 - 11 Sep 67	18	30 May 71 - 1 Oct 71
05	12 Sep 67 - 24 Sep 67	19	1 Oct 71 - 20 Dec 71
06	27 Apr 68 - 9 Jun 68	20	20 Dec 71 - 20 Mar 72
07	10 Jun 68 - 20 Sep 68	21	20 Mar 72 - 31 May 72
08	21 Sep 68 - 31 Jan 69	22	31 May 72 - 29 Sep 72
09	31 Jan 69 - 13 Jun 69	23	29 Sep 72 - 13 Dec 72
10	13 Jun 69 - 3 Oct 69	24	13 Dec 72 - 7 Apr 73
11	4 Oct 69 - 5 Jan 70	25	7 Apr 73 - 28 May 73
12	5 Jan 70 - 23 Mar 70	26	28 May 73 - 19 Oct 73
13	23 Mar 70 - 7 Jun 70	27	31 Oct 73 - 8 Mar 74
14	7 Jun 70 - 5 Oct 70	28	8 Mar 74 - 1 Jun 74

Table 2. Field data collected at T-3, March 1966 to June 1974

Parameter	Total Number of Samples	1966												1967												1968													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354				X																															X	X		
Temperature	5354				X																															X	X		
Dissolved oxygen	5198				X																															X	X		
Nutrients																																							
Nitrate	3611																																						
Silicate	3440																																						
Phosphate	3440																																						
Phytoplankton																																							
Chlorophyll <u>a</u>	8022							X	X									X	X	X	X													X	X	X	X		
Productivity	4978																	X	X	X														X	X	X			
Cell Counts	5838																																		X	X	X	X	
Zooplankton																																							
Acoustic traces	40 mo																																						
Plankton pump	427						X	X	X	X	X		X				X	X	X	X																			
Nets (mesh size μm)																																							
0.5 m ring (215)	38				X	X																																	
1 m closing ring (110)	355																																	X	X	X	X	X	
1 m closing ring (215)	318																	X	X	X																			
1 m ² plummet (571)*	56																																						
2 m ² umbrella (223)†	9112																			X													X	X	X	X	X		
2 m ² umbrella (569)	95																																		X	X			
3 m ² umbrella (300)	104																																	X	X	X			

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2. (cont.)

Parameter	Total Number of Samples	1969												1970												1971													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354				X	X					X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	
Temperature	5354				X	X					X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5354				X	X					X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	
Nutrients																																							
Nitrate	3611																	X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X		
Silicate	3440																	X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X		
Phosphate	3440																	X	X	X	X	X	X				X		X	X	X	X	X	X	X	X	X		
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X								X	X	X	X						X		X	X	X	X							
Productivity	4978						X	X	X	X								X	X	X	X								X	X	X	X							
Cell Counts	5838				X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X						
Zooplankton																																							
Acoustic traces	40 mo																	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X		
Plankton pump	427																																						
Nets (mesh size μ m)																																							
0.5 m ring (215)	38																																						
1 m closing ring (110)	355			X																																			
1 m closing ring (215)	318					X	X																																
1 m ² plummet (571)*	56																																						
2 m ² umbrella (223) [†]	9112	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2 (cont.)

Parameter	Total Number of Samples	1972												1973												1974													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Temperature	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5198	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Nutrients																																							
Nitrate	3611	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X										X	X	X	X																
Productivity	4978						X	X	X	X	X									X	X	X	X																
Cell Counts	5838						X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Zooplankton																																							
Acoustic traces	40 mo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Plankton pump	427																																						
Nets (mesh size μm)																																							
0. 5 m ring (215)	38																																						
1 m closing ring (110)	355																																						
1 m closing ring (215)	318																																						
1 m ² plummet (571)*	56					X	X																																
2 m ² umbrella (223) †	9112	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Forms for kind of sampling bottle used.

Hydrography and Nutrients

Temperature, salinity, oxygen, and nutrient determinations were made on water collected with Van Dorn polyvinylchloride or uncoated Nansen water sampling bottles. The Van Dorn bottles contained surgical tubing which may or may not be toxic to organisms (see Price et al. 1986). In general, the upper 100 m was sampled at 5 m intervals, 125-375 m at 25 m intervals, 400-500 m at 50 m intervals, 600-1000 m at 100 m intervals, and 1000 m to the bottom at 250 m intervals with a 30 m interval between the last bottle and the bottom. Periodically, additional samples were taken at 2 m intervals around the pycnocline (usually 40-60 m). In periods when weekly casts were taken, an alternating pattern of sampling, 0-100 m, 0-500 m, 0-100 m, 0-deep, allowed a more frequent survey of short-term variation in the near-surface stratum without the additional burden of time-consuming deep casts. Because of heat lamps and cables and the accumulation of freshwater in the hydrohole, surface readings would not have been representative, therefore the top bottle of a hydrocast was usually placed 5 m below the water surface.

The highest observed wire angles during these cruises were about 4°. For a 1000 m cast, this would yield a true depth of 998 m at the bottom. Computations of thermometric depths (Wüst 1933) were performed for those observations deeper than 250 m where unprotected thermometers were used for which calibrations were still available (262 depths at 45 stations). With the exception of two casts (Cruise 11, station 1, cast 5, 1400-2000 m and Cruise 13, station 12, cast 5, 500-1300 m), all calculated values were generally within 2-3% of the nominal depths sampled. These two casts were corrected. All other depths reported here are uncorrected, but should be within 2-5% of the true value.

Temperatures were determined from reversing thermometers on each water bottle; protected thermometers were usually deployed in pairs. Bottles were tripped about 5 min after the top bottle reached its intended depth. Thermometers were read using a lighted magnifying glass about 15 min after retrieval. Readings were corrected from the auxiliary thermometers and the thermometer constants by an IBM 1130 program at the Department of Oceanography, University of Washington.

Over 100 reversing thermometers were used during the course of these observations. They were calibrated either by the manufacturers or at various times at the University of Washington. Calibration data available from the

latest date preceding the use of each thermometer on T-3 were used to correct the thermometer readings. The calibrations were usually 0.5-3 yr old when they were applied to these data.

Salinity samples were drawn into 250 ml clear polyethylene bottles, tightly sealed, and allowed to come to room temperature. Determinations were made on T-3 using an Industrial Instruments Model RS-7A (Industrial Instruments Co., Cedar Grove, NJ) or a Beckman Model RS-7B (Beckman Instruments, Inc., Fullerton, CA) portable induction salinometer calibrated against a standard seawater sample obtained from the Laboratoire Hydrographique (Copenhagen, Denmark). Substandards of seawater (ca. 34.9‰ collected from ca. 500 m) were used after each 10 samples and at the end of a run. Salinity was calculated using the tables in the salinometer manual (Industrial Instruments 1964). These values are considered to have an accuracy of ± 0.003 ppt.

Dissolved oxygen was analyzed by a modified Winkler method (Strickland and Parsons 1965). Brown BOD bottles of 250 ml capacity, an automatic 100 ml pipet, an automatic 25 ml burette readable to 0.01 ml, and an electric stirrer were used.

Nutrients were determined by the methods in Strickland and Parsons (1968). The samples were either analyzed immediately after collection or frozen for later analysis either on the ice, or during April and May 1971, at the University of Washington using a Beckman DU spectrophotometer (Beckman Instruments, Inc., Fullerton, CA) with 1 cm cells. After December 1972, nitrate determinations were run on a Brinkman PC/1000 colorimeter (Brinkman Instruments, Westbury, NY) with a fiber optics probe and calibrated against the spectrophotometer. Reagents and standards were prepared from water filtered through an Ion-X-Change column, Grade 1, consisting of a mixed bed non-regenerable resin (Illinois Water Treatment Co.) that produces triple distilled water. Comparisons between reagents and standards made up with this water and with distilled water sent from the Naval Arctic Research Laboratory at Barrow showed these procedures to be adequate. Standards were run with each set of samples and for each nitrate column.

Chlorophyll a

Chlorophyll a was determined according to Strickland and Parsons (1968). In 1968 through 1970, water was filtered through 47 mm 0.45 μ m Millipore filters (Millipore Corporation, Bedford, MA). Suction pressure was less than 250 mm Hg. In 1971 through 1973, Gelman A/E glass fiber filters (approximate

pore size = 1.0 μm) (Gelman Instrument Co., Ann Arbor, MI) were used. MgCO_3 was added to all filters near the end of the filtration. In 1968, samples of about 4 liters of water were analyzed using a Beckman DK spectrophotometer in Seattle and chlorophyll a was calculated using the SCOR-UNESCO equations (Unesco 1966). For 1968 through 1973, samples of about 2 liters of water were filtered and a Turner Model 111 fluorometer (G. K. Turner Associates, Palo Alto, CA) was used for analysis. Fluorometer filters were 5-60 and 2-64. The fluorometer was calibrated using either a Beckman DU spectrophotometer on T-3 or a Beckman DK scanning spectrophotometer in Seattle. For samples analyzed with the fluorometer, chlorophyll a was calculated using equations in Holm-Hansen et al. (1967). Phaeopigments were not determined.

Primary Productivity

Primary productivity was measured during the summers by the radiocarbon technique of Steemann-Nielsen (1952) as detailed by Strickland and Parsons (1968). Two experimental schemes were used:

1. Depth series - paired 130 ml light and dark bottles were filled with water collected from a number of depths and incubated under constant high illumination (for the level of irradiance, see below).
2. Graduated light series - five light and one dark bottle containing water from one depth were incubated under 0, 10, 25, 50, 75, and 100% irradiance provided by glass neutral density filters over the incubation bottles.

For both series, dark bottles were pre-wrapped with black tape and then covered with aluminum foil to insure complete darkness. Depths and frequencies of sampling varied from year to year.

The plastic incubator box was fronted with clear plexiglass and had a wheel that rotated in the vertical plane. The wheel accommodated 12 ground-glass stoppered 130 ml bottles. At various times, because of stripped gears, the wheel did not rotate or was manually turned periodically during incubation. Light, provided by a bank of 12 GE Cool-White fluorescent lamps (General Electric Corporation, Stamford, CT), and amount of radioactivity added varied from year to year. Highest irradiance (= 100%) in the incubator was between 1100 and 1400 ft-c measured with a GE Model No. 214 photometer (General Electric Corporation, Stamford, CT). A pumped water flow-through system maintained ambient incubator temperature near 0°C. Samples were incubated for 6 or 12 hr.

At the end of the incubation, the samples were filtered (suction pressure

less than 250 mm Hg) onto 25 mm, 0.45 μ m Millipore filters, washed with filtered seawater, air-dried, and stored over desiccant until analyzed. Filters were fumed over concentrated HCl and counted three times for 1000 counts, using a gas flow proportional counter (Nuclear Chicago Corporation, Des Plaines, IL). Counting was done either in Seattle using a Nuclear Chicago Model D-47 counter with micromil window, C-110 automatic sample changer, 161-A scaler, and C111B printing timer, or on T-3 using a Nuclear Chicago manual, end-window Model 8770 scaler, Model 3053 sample changer, Model 108 G-M detector, and Model 8420 dual timer.

Carbon uptake was calculated from

$$P = (L-D)(W)(1.05)/(Z)(T)$$

where P is in $\text{mg C m}^{-3} \text{ h}^{-1}$; L-D is the difference between the light and dark bottle in counts per minute corrected for machine background and coincidence; W is the total carbonate in mg C m^{-3} calculated from $W = (810)(S^{\circ}/\text{‰})$ as suggested by Dr. G. C. Anderson, Department of Oceanography, University of Washington; 1.05 is the isotope discrimination factor (Strickland 1960); Z is the total activity in counts per minute added to the sample and corrected for the counter efficiency of about 22.8%; T is the incubation time (6 or 12 hr).

All ^{14}C ampoules used on T-3 were prepared in the Department of Oceanography, University of Washington, from aqueous sodium carbonate obtained from Nuclear Chicago Corporation. All glassware was rinsed with distilled water and autoclaved. The amount of solution to be made was determined by dividing the activity of the stock aqueous sodium carbonate by the desired activity per ml of final solution. Glass distilled water was filtered through 47 mm, 0.45 μ m Millipore filters. The pH was adjusted to 9.5-9.7 with NaOH. The solution was well mixed, and after adding the commercial sodium carbonate, mixed again. Glass ampoules holding 2 or 5 ml of solution were filled by an automatic volume dispenser. The ampoules were sealed using propane torches. The sealed ampoules were placed in large beakers, covered with water to which methylene blue dye was added, and autoclaved for ca. 1 hr at 120°C. After washing away the dye, the ampoules were inspected for any sign of color inside them. Ampoules that were even slightly discolored were discarded. The filled ampoules were color-coded with spray paint and stored.

Several ampoules from the beginning, middle, and end of the filling process were kept separate to be used for standardization. Standardization was done using methods then employed by the Department of Oceanography, University of Washington, where ampoules were either sent to Dr. C. R. Goldman, University of

California, Davis, and analyzed using gas phase (Goldman 1963; Steemann-Nielsen 1974) or, in the Department of Oceanography, University of Washington, were compared to samples obtained from the National Bureau of Standards. From 1970-1973, ampoules were standardized by liquid scintillation techniques and external standards at the Department of Oceanography.

Phytoplankton Cell Counts

Samples for phytoplankton identification and cell counts were usually taken from Nansen bottles during hydrocasts and stored in 250 ml glass jars. They were preserved with 4% formalin, buffered (sodium borate) or unbuffered, for a final strength of approximately 1%. Samples were shipped to Seattle for later analysis. Some samples were collected from a water pumping system during summer 1970 (see below).

Phytoplankton species were enumerated for some of the samples collected in the summers of 1968, 1969, and 1971 with the inverted microscope method (Hasle 1978a, b). Samples were individually counted or samples from two, three, or four days were combined for each depth. The samples combined to make a composite were separated in time by one week or less. After thorough mixing, the samples were poured into 5 and 50 ml Zeiss counting chambers (Carl Zeiss, Oberkochen Würt, FRG) and allowed to settle at least 20 hr before counting. A Zeiss inverted microscope was used for all enumerations. The 5 ml chamber was counted at 390 X using a 25 X objective, 12.5 X oculars, and a magnification factor of the optics carrier of 1.25. The 50 ml chamber was counted at 156 X with a 10 X objective, 12.5 X oculars, and the 1.25 X magnification factor. Cell counts were converted to cells per liter, cell volumes (Larrance 1964), and cell carbon (Mullin et al. 1966). These data are contained in an unpublished manuscript (Walline 1973) available from the School of Oceanography, University of Washington.

Zooplankton

Zooplankton sampling was maintained from March 1966 through April 1974. Gear types, sampling periods, and depth intervals sampled varied between and within years. Regardless of the gear used, all samples were concentrated and preserved in 4% V/V formalin (final concentration) buffered with either sodium acetate or sodium borate.

Initially, samples were taken with an open 0.5 m diameter ring net with 215 μ m mesh gauze. From June 1966 through July 1967, a 7.6 cm centrifugal

pump system with a 10 cm diameter hose intake was lowered. A 25 kg weight at the end of the wire held down the hose intake. Since wire angles were low, the depth of sampling was estimated from the length of the wire. Maximum depth of sampling was about 185 m. Samples of 5 to 18 m³ of water were filtered at a rate of 0.2 to 0.6 m³ per min through a net of 215 µm mesh size. Beginning in early July 1967, a closing 1 m diameter ring net of either 110 or 215 µm mesh was used to sample to 1000 m. This sampling overlapped with pumping stations to assure comparability.

Sampling with a 2 m² closing umbrella net began in September 1967 (Scott 1969; Macaulay and Daly 1987). Mesh size was 223 and 569 µm. This net, with a filtration ratio of 1.25:1, was the principal sampling device throughout the remaining field program though the netting itself was replaced with a high filtration type mesh (4:1 filtration ratio) in March 1972. All subsequent samples were collected with the 4:1 filtration ratio net.

An overlapping sampling scheme was used starting in October 1969. Sampling depths were at 10 m intervals from 300 to 10 m, 100 m intervals from 1000 to 10 m, and 500 m intervals from the bottom to 10 m. The 10 m upper limit was chosen to protect the net during retrieval through the hydrohole. Samples were collected from as deep as 2500 m.

Two other kinds of nets were sometimes employed: a 3 m² closing umbrella net with 300 µm mesh in summer 1968 and a 1 m² plummet net with 571 µm mesh initially in May 1971 and periodically thereafter. The plummet net is a downward fishing net with an opening-closing mechanism activated with a messenger (Macaulay 1978; Macaulay and Daly in prep.).

Sorting, identifying, and counting of some samples were done in Seattle (Table 3). Other samples have been analyzed for some groups of organisms, primarily copepods. These data are available in the School of Oceanography, but obtaining them will require an investigator to visit the University of Washington.

Echo-sounder

Echo-sounding was conducted from April 1970 to April 1974. A modified Ross 200A (100 kHz) echo-sounder and 10° transducer with an impedance matching box scanned depth ranges of 0-50, 50-100, 100-150, and 150-200 fm. The 0-50 fm depth range was emphasized because of interest in the scattering layer often found about 25 fm. The system included the standard Ross 200A transceiver unit, recorder unit, and a Sony TC-5600 stereo tape recorder. During regular

Table 3. List of T-3 zooplankton samples analyzed and used in theses, reports, and publications

Hughes (1968)	399 samples collected with a plankton pump
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
Scott (1969)	523 samples collected with a pump, 1 m closing ring net and 2 m ² umbrella net
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
	04 10 Jul - 6 Sep 1967
	05 13 Sep - 23 Sep 1967
Damkaer (1976)	52 samples collected with a 1 m closing ring net
Cruises:	04 12 Jul - 8 Sep 1967
	06 5 May 1968
	07 10 Jun - 18 Aug 1968
Heron and Damkaer (1976)	2 samples collected with a 1 m closing ring net
Cruises:	07 10 Jun 1968
	12 Jun 1968
Pautzke (1979)	16 samples collected with a 2 m ² umbrella net
Cruises:	14 7 Jun - 5 Oct 1970
	18 30 May - 1 Oct 1971
	22 31 May - 29 Sep 1972
	26 28 May - 19 Oct 1973
Heron, English, and Damkaer (1984)	54 samples collected with a 1 m closing ring net and 3 m ² umbrella net
Cruises:	06 5 May 1968
	07 10 Jun - 20 Sep 1968
	08 21 Sep 1968

operation, echo-sounding was conducted continuously, normally on the 0-50 fm scale. Daily recordings of 15-45 min were made using all depth ranges. Some of these data are available on 1/4 inch magnetic tape, but retrieval will be difficult.

Data Management

The data were available from computer printouts or raw data sheets. The original punched data cards could not be located so the data were re-entered directly to disk files on the University of Washington Cyber 180-855 computer using a Tandy Model DT-1 data terminal. After editing the files to correct data entry errors or to fill in gaps in the data, the files were transferred to a 9-track, EBCDIC-coded magnetic tape for NODC. The resulting tape contains three files of hydrographic data, one file of chlorophyll data, and one file of primary productivity data.

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DATA DOCUMENTATION FORM

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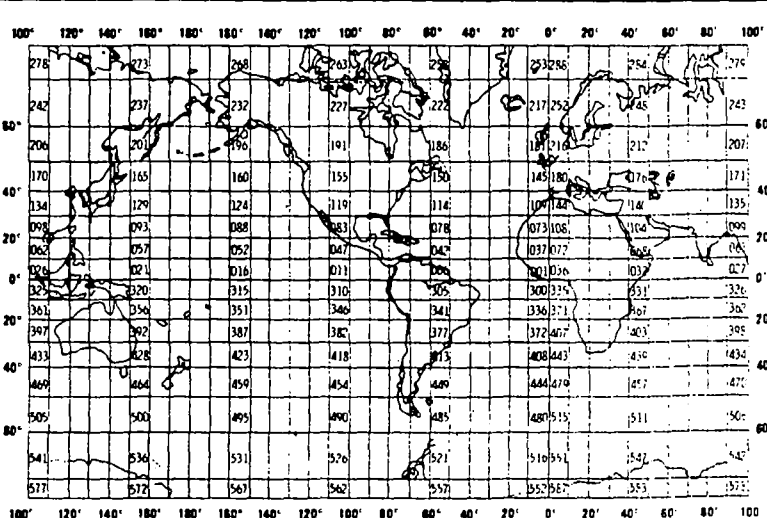
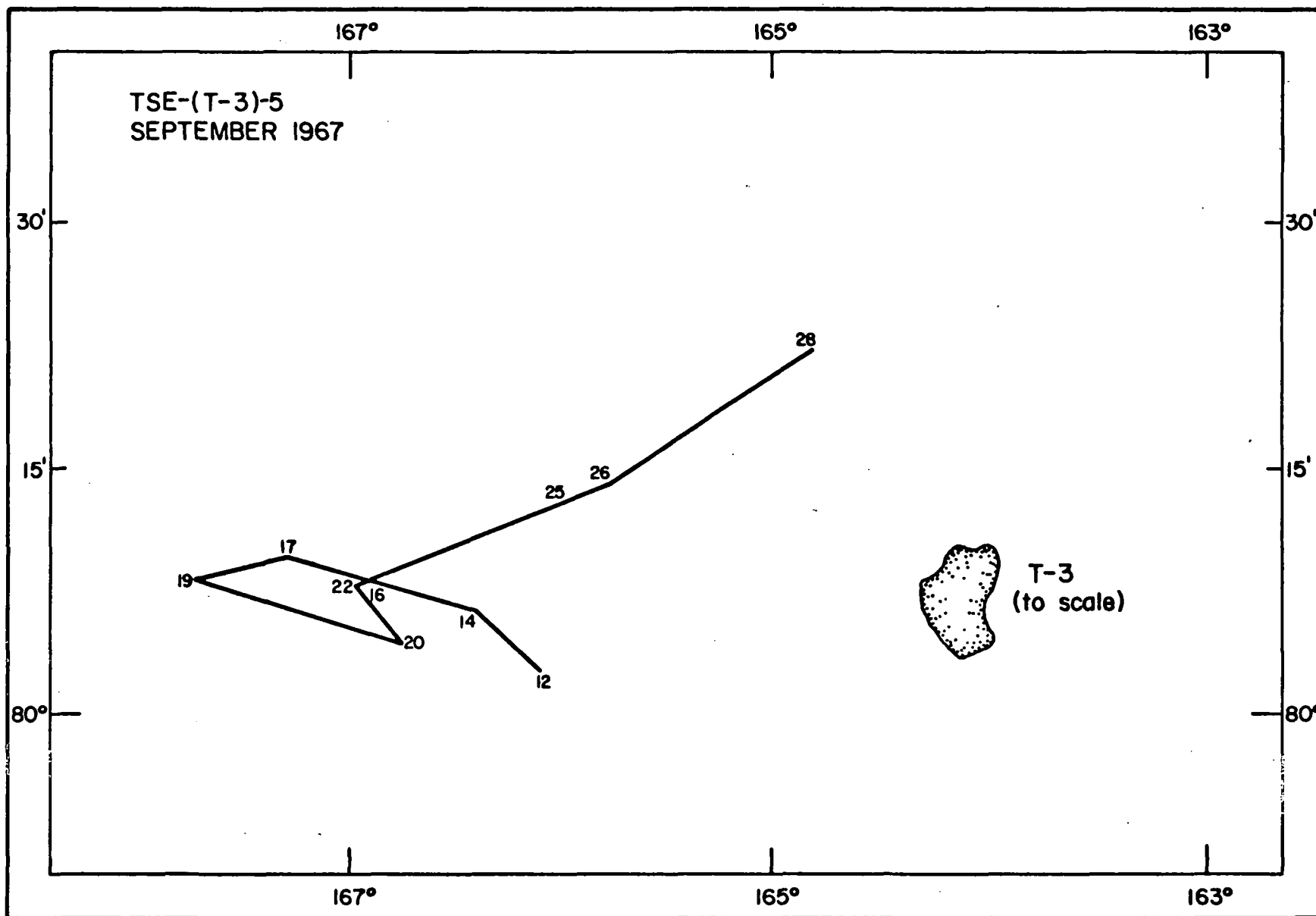
1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED Dr. T. Saunders English School of Oceanography WB-10 University of Washington Seattle, WA 98195			
2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED Primary production and energy flow		3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT TSE-(T-3)-05	
4. PLATFORM NAME(S) Fletcher's Ice Island (T-3)	5. PLATFORM TYPE(S) (E.G., SHIP, BUOY, ETC.) Ice island	6. PLATFORM AND OPERATOR NATIONALITY(IES) PLATFORM OPERATOR USA USA	7. DATES FROM: MO/DAY/YR TO: MO/DAY/YR 09/12/67 09/24/67
8. ARE DATA PROPRIETARY? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR MONTH		11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED. GENERAL AREA	
9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? (I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?) <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> PART (SPECIFY BELOW) Data should be available for international exchange			
10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER (AND ADDRESS IF OTHER THAN IN ITEM-1) Dr. Karl Banse School of Oceanography WB-10 University of Washington Seattle, WA 98195 (206) 543-5079			

FIG. 1



TSE-(T-3)-05 12 Sep 1967 - 24 Sep 1967

Modifications to the basic program methods

Zooplankton samples were collected using a 1 m diameter closing ring net and a 2 m² closing umbrella net, both with 223 μ m mesh. Sampling was done over 20 m depth intervals between 0 and 200 m, 50 m intervals between 200 and 300 m, 100 m intervals between 300 and 1000 m, and 500 m intervals between 1000 and 2000 m. Ninety-three (93) samples were collected: 44 with the 1 m net and 59 with the 2 m² net.

For sample analysis see Scott 1969.

B. SCIENTIFIC CONTENT

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Water transparency	meters	Secchi Disk	N/A	N/A
Depth of Sample	meters	Wire out	N/A	N/A
Temperature	°C	Reversing thermometers	N/A	N/A
Salinity	‰	Nansen bottles, modified Van Dorn bottles	Salinometer, University of Washington	N/A
Sigma-t	-	"	-	N/A
Dissolved oxygen	ml/l	"	Winkler	N/A
PO ₄	µg-atom/l	"	See Strickland and Parsons (1968)	N/A
NO ₃	"	"	"	N/A
SiO ₄	"	"	"	N/A
Chlorophyll <u>a</u>	mg m ⁻³	Van Dorn bottles	Spectrophotometer, fluorometer (Strickland and Parsons 1968)	N/A
Primary productivity (14C uptake)	mg C m ⁻³ h ⁻¹	"	Strickland and Parsons (1968)	N/A

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-1 ☐ ALGOL ☐ COBOL
☐ FORTRAN ☐ _____ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:

NAME AND PHONE NUMBER _____

ADDRESS _____

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

<p>5. RECORDING MODE</p> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> BCD <input type="checkbox"/> BINARY </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> ASCII <input checked="" type="checkbox"/> EBCDIC </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> _____ </div>	<p>9. LENGTH OF INTER-RECORD GAP (IF KNOWN) <input checked="" type="checkbox"/> 3/4 INCH <input type="checkbox"/> _____</p>
<p>6. NUMBER OF TRACKS (CHANNELS)</p> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> SEVEN </div> <div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> NINE </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> _____ </div>	<p>10. END OF FILE MARK</p> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> OCTAL 17 </div> <div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> Tape Mark </div>
<p>7. PARITY</p> <div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> ODD </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> EVEN </div>	<p>11. PASTE-ON-PAPER LABEL DESCRIPTION (INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)</p> <p>Ice Island T-3 hydro, chlorophyll, & Productivity data sets. Specs.- 9 track, EBCDIC, odd parity, 1600 bpi, 5 files, D=PE, RL=120, MBL = 3000, CV = EB, F=S, LB=KU</p>
<p>8. DENSITY</p> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> 200 BPI <input checked="" type="checkbox"/> 1600 BPI </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> 556 BPI </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> 800 BPI </div> <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> _____ </div>	<p>12. PHYSICAL BLOCK LENGTH IN BYTES</p> <p>FL=120 MBL=3000 Char.</p> <p>13. LENGTH OF BYTES IN BITS</p>

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALI- BRATED (✓)
		YOUR ORGANIZATION (✓)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (✓)	BEFORE OR AFTER USE (✓)	BEFORE AND AFTER USE (✓)	ONLY AFTER REPAIR (✓)	ONLY WHEN NEW (✓)	
Fluorometer Turner Model 111		X			X				
Reversing thermometers		X	manufacturer		X				
Salinometer Univ. Washington		X			X				
Naval Arctic Research Lab.		X			X				

Primary Production and Energy Flow

The program was directed by the late Dr. T. Saunders English and funded by the Office of Naval Research Contract Nonr-477 (37) Project NR 083 12 and Contract N00014-67-0103-0005. Users of the data are requested to acknowledge the agency support.

The methods used by biological oceanographers of the Department of Oceanography, University of Washington, Seattle, from 1966 to 1974 on Fletcher's Ice Island (T-3) drifting in the Arctic Ocean (Fig. 1) are given below. These methods are to compliment the entries in the individual cruise Data Documentation Forms where modifications, if any, are given.

General

The field program was maintained at various intensities for eight years (March 1966 to June 1974), with personnel on T-3 continuously from April 1968 until the island was evacuated in June 1974. During this period, divided into 28 cruises (Table 1), biological and environmental parameters were measured (Table 2). The sampling program was structured to monitor periods of active change in the various parameters. Thus, hydrography and zooplankton sampling was a year round pursuit, field and logistic conditions permitting, whereas chlorophyll a concentrations and primary productivity (^{14}C uptake) were usually measured only during the summer (June to September). Various gear types, methodologies, and sampling strategies were tried and tested throughout the field program.

The oceanographic working area was located on 3-4 m thick sea ice in Colby Bay adjacent to the ice island. All sampling was done from inside a heated building positioned over a hole, ca. 1.5 m on a side, cut in the ice. The hut contained a space heater, oceanographic sampling equipment, and a Rankin winch powered by a 5 hp Wisconsin gasoline engine. The drum on the winch held about 4000 m of 5/32 inch hydrographic wire. The wire ran through a meter wheel attached to a tripod erected over the hole.

Geographic positions were provided by the Lamont-Doherty Geological Observatory, Palisades, NY (Hunkins and Tiemann 1977). Hydrography and biology (chlorophyll a and primary productivity) samples were not always taken from the same bottle cast or on the same day. Each kind of data has a separate sample numbering scheme. As a result, station positions may not always agree between the hydrographic and biological data. See individual cruise Data Documentation

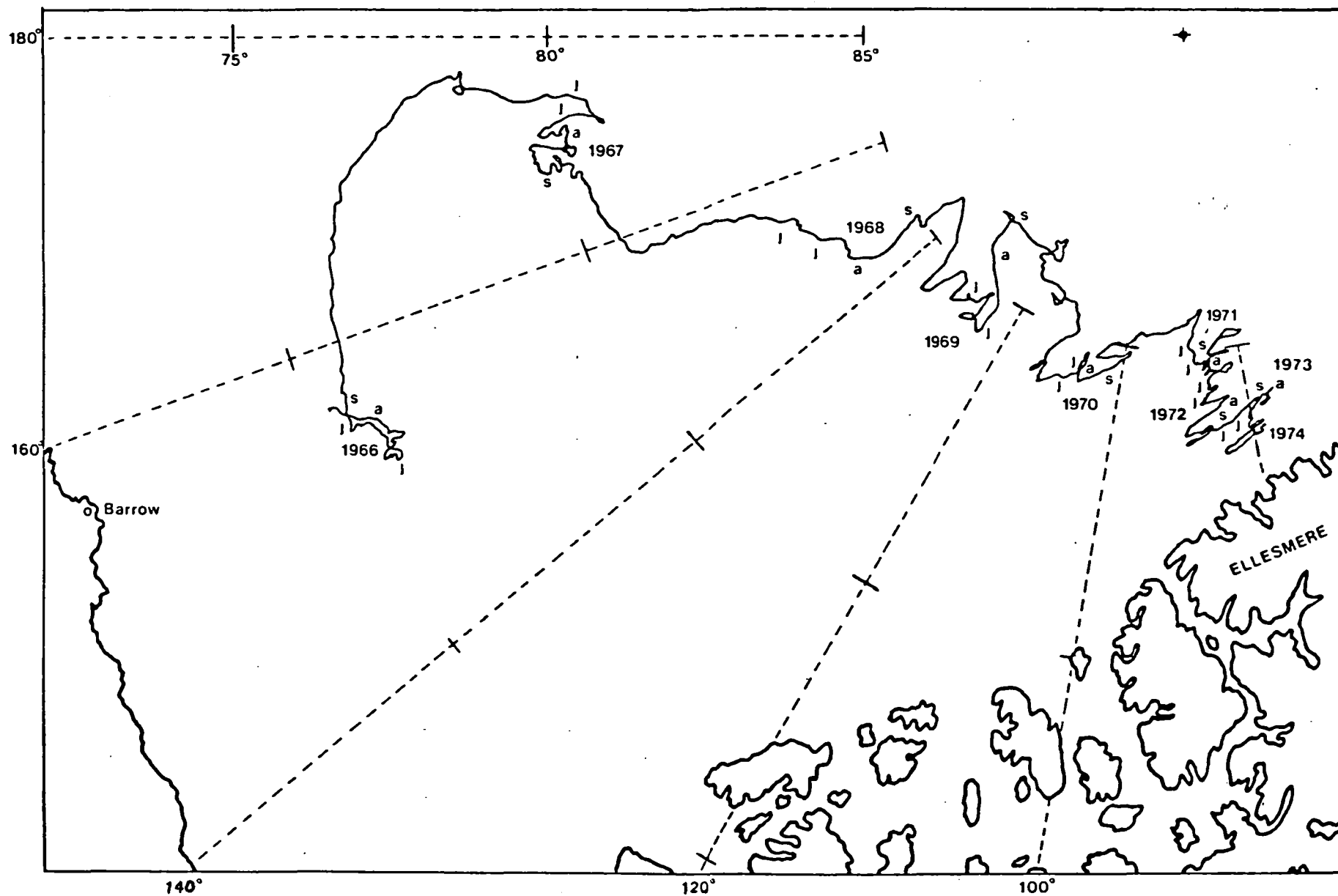


Fig. 1. Drift track of T-3 from June 1966 to April 1974. The months of June, July, August, and September are indicated in small letters for each year.

Table 1. Cruise numbers and dates of T-3 field program

Cruise		Cruise	
Number	Duration	Number	Duration
01	16 Mar 66 - 9 Apr 66	15	5 Oct 70 - 30 Dec 70
02	2 Jun 66 - 18 Oct 66	16	1 Jan 71 - 30 Mar 71
03	1 Feb 67 - 15 Feb 67	17	30 Mar 71 - 30 May 71
04	4 Jun 67 - 11 Sep 67	18	30 May 71 - 1 Oct 71
05	12 Sep 67 - 24 Sep 67	19	1 Oct 71 - 20 Dec 71
06	27 Apr 68 - 9 Jun 68	20	20 Dec 71 - 20 Mar 72
07	10 Jun 68 - 20 Sep 68	21	20 Mar 72 - 31 May 72
08	21 Sep 68 - 31 Jan 69	22	31 May 72 - 29 Sep 72
09	31 Jan 69 - 13 Jun 69	23	29 Sep 72 - 13 Dec 72
10	13 Jun 69 - 3 Oct 69	24	13 Dec 72 - 7 Apr 73
11	4 Oct 69 - 5 Jan 70	25	7 Apr 73 - 28 May 73
12	5 Jan 70 - 23 Mar 70	26	28 May 73 - 19 Oct 73
13	23 Mar 70 - 7 Jun 70	27	31 Oct 73 - 8 Mar 74
14	7 Jun 70 - 5 Oct 70	28	8 Mar 74 - 1 Jun 74

Table 2. Field data collected at T-3, March 1966 to June 1974

Parameter	Total Number of Samples	1966												1967												1968													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354				X																															X	X		
Temperature	5354				X																															X	X		
Dissolved oxygen	5198				X																															X	X		
Nutrients																																							
Nitrate	3611																																						
Silicate	3440																																						
Phosphate	3440																																						
Phytoplankton																																							
Chlorophyll <u>a</u>	8022							X	X							X	X	X	X													X	X	X	X				
Productivity	4978																X	X	X														X	X	X				
Cell Counts	5838																																	X	X	X	X		
Zooplankton																																							
Acoustic traces	40 mo																																						
Plankton pump	427						X	X	X	X	X		X			X	X	X	X																				
Nets (mesh size μ m)																																							
0.5 m ring (215)	38				X	X																																	
1 m closing ring (110)	355																																	X	X	X	X	X	
1 m closing ring (215)	318																X	X	X																				
1 m ² plummet (571)*	56																																						
2 m ² umbrella (223) [†]	9112																			X												X	X	X	X	X	X		
2 m ² umbrella (569)	95																																		X	X			
3 m ² umbrella (300)	104																																	X	X	X			

* A net that catches while descending

[†] A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2. (cont.)

Parameter	Total Number of Samples	1969												1970												1971														
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D			
Hydrography																																								
Salinity	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	
Temperature	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5354				X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	
Nutrients																																								
Nitrate	3611																	X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440																	X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440																	X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																								
Chlorophyll <u>a</u>	8022						X	X	X	X								X	X	X	X					X		X	X	X	X									
Productivity	4978						X	X	X	X								X	X	X	X							X	X	X	X									
Cell Counts	5838				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X							
Zooplankton																																								
Acoustic traces	40 mo																	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	
Plankton pump	427																																							
Nets (mesh size μm)																																								
0.5 m ring (215)	38																																							
1 m closing ring (110)	355			X																																				
1 m closing ring (215)	318					X	X																																	
1 m ² plummet (571)*	56																																							
2 m ² umbrella (223) †	9112	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2 m ² umbrella (569)	95																																							
3 m ² umbrella (300)	104																																							

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Table 2 (cont.)

Parameter	Total Number of Samples	1972												1973												1974													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Hydrography																																							
Salinity	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Temperature	5354	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dissolved oxygen	5198	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Nutrients																																							
Nitrate	3611	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Silicate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phosphate	3440	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phytoplankton																																							
Chlorophyll <u>a</u>	8022						X	X	X	X									X	X	X	X																	
Productivity	4978						X	X	X	X	X								X	X	X	X																	
Cell Counts	5838						X	X	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Zooplankton																																							
Acoustic traces	40 mo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Plankton pump	427																																						
Nets (mesh size μm)																																							
0. 5 m ring (215)	38																																						
1 m closing ring (110)	355																																						
1 m closing ring (215)	318																																						
1 m ² plummet (571)*	56					X	X																																
2 m ² umbrella (223) †	9112	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2 m ² umbrella (569)	95																																						
3 m ² umbrella (300)	104																																						

* A net that catches while descending

† A collapsible net that can be lowered and retrieved through a hole in the ice

Forms for kind of sampling bottle used.

Hydrography and Nutrients

Temperature, salinity, oxygen, and nutrient determinations were made on water collected with Van Dorn polyvinylchloride or uncoated Nansen water sampling bottles. The Van Dorn bottles contained surgical tubing which may or may not be toxic to organisms (see Price et al. 1986). In general, the upper 100 m was sampled at 5 m intervals, 125-375 m at 25 m intervals, 400-500 m at 50 m intervals, 600-1000 m at 100 m intervals, and 1000 m to the bottom at 250 m intervals with a 30 m interval between the last bottle and the bottom. Periodically, additional samples were taken at 2 m intervals around the pycnocline (usually 40-60 m). In periods when weekly casts were taken, an alternating pattern of sampling, 0-100 m, 0-500 m, 0-100 m, 0-deep, allowed a more frequent survey of short-term variation in the near-surface stratum without the additional burden of time-consuming deep casts. Because of heat lamps and cables and the accumulation of freshwater in the hydrohole, surface readings would not have been representative, therefore the top bottle of a hydrocast was usually placed 5 m below the water surface.

The highest observed wire angles during these cruises were about 4°. For a 1000 m cast, this would yield a true depth of 998 m at the bottom. Computations of thermometric depths (Wüst 1933) were performed for those observations deeper than 250 m where unprotected thermometers were used for which calibrations were still available (262 depths at 45 stations). With the exception of two casts (Cruise 11, station 1, cast 5, 1400-2000 m and Cruise 13, station 12, cast 5, 590-1300 m), all calculated values were generally within 2-3% of the nominal depths sampled. These two casts were corrected. All other depths reported here are uncorrected, but should be within 2-5% of the true value.

Temperatures were determined from reversing thermometers on each water bottle; protected thermometers were usually deployed in pairs. Bottles were tripped about 5 min after the top bottle reached its intended depth. Thermometers were read using a lighted magnifying glass about 15 min after retrieval. Readings were corrected from the auxiliary thermometers and the thermometer constants by an IBM 1130 program at the Department of Oceanography, University of Washington.

Over 100 reversing thermometers were used during the course of these observations. They were calibrated either by the manufacturers or at various times at the University of Washington. Calibration data available from the

latest date preceding the use of each thermometer on T-3 were used to correct the thermometer readings. The calibrations were usually 0.5-3 yr old when they were applied to these data.

Salinity samples were drawn into 250 ml clear polyethylene bottles, tightly sealed, and allowed to come to room temperature. Determinations were made on T-3 using an Industrial Instruments Model RS-7A (Industrial Instruments Co., Cedar Grove, NJ) or a Beckman Model RS-7B (Beckman Instruments, Inc., Fullerton, CA) portable induction salinometer calibrated against a standard seawater sample obtained from the Laboratoire Hydrographique (Copenhagen, Denmark). Substandards of seawater (ca. 34.9‰ collected from ca. 500 m) were used after each 10 samples and at the end of a run. Salinity was calculated using the tables in the salinometer manual (Industrial Instruments 1964). These values are considered to have an accuracy of ± 0.003 ppt.

Dissolved oxygen was analyzed by a modified Winkler method (Strickland and Parsons 1965). Brown BOD bottles of 250 ml capacity, an automatic 100 ml pipet, an automatic 25 ml burette readable to 0.01 ml, and an electric stirrer were used.

Nutrients were determined by the methods in Strickland and Parsons (1968). The samples were either analyzed immediately after collection or frozen for later analysis either on the ice, or during April and May 1971, at the University of Washington using a Beckman DU spectrophotometer (Beckman Instruments, Inc., Fullerton, CA) with 1 cm cells. After December 1972, nitrate determinations were run on a Brinkman PC/1000 colorimeter (Brinkman Instruments, Westbury, NY) with a fiber optics probe and calibrated against the spectrophotometer. Reagents and standards were prepared from water filtered through an Ion-X-Change column, Grade 1, consisting of a mixed bed non-regenerable resin (Illinois Water Treatment Co.) that produces triple distilled water. Comparisons between reagents and standards made up with this water and with distilled water sent from the Naval Arctic Research Laboratory at Barrow showed these procedures to be adequate. Standards were run with each set of samples and for each nitrate column.

Chlorophyll a

Chlorophyll a was determined according to Strickland and Parsons (1968). In 1968 through 1970, water was filtered through 47 mm 0.45 μ m Millipore filters (Millipore Corporation, Bedford, MA). Suction pressure was less than 250 mm Hg. In 1971 through 1973, Gelman A/E glass fiber filters (approximate

pore size = 1.0 μm) (Gelman Instrument Co., Ann Arbor, MI) were used. MgCO_3 was added to all filters near the end of the filtration. In 1968, samples of about 4 liters of water were analyzed using a Beckman DK spectrophotometer in Seattle and chlorophyll a was calculated using the SCOR-UNESCO equations (Unesco 1966). For 1968 through 1973, samples of about 2 liters of water were filtered and a Turner Model 111 fluorometer (G. K. Turner Associates, Palo Alto, CA) was used for analysis. Fluorometer filters were 5-60 and 2-64. The fluorometer was calibrated using either a Beckman DU spectrophotometer on T-3 or a Beckman DK scanning spectrophotometer in Seattle. For samples analyzed with the fluorometer, chlorophyll a was calculated using equations in Holm-Hansen et al. (1967). Phaeopigments were not determined.

Primary Productivity

Primary productivity was measured during the summers by the radiocarbon technique of Steemann-Nielsen (1952) as detailed by Strickland and Parsons (1968). Two experimental schemes were used:

1. Depth series - paired 130 ml light and dark bottles were filled with water collected from a number of depths and incubated under constant high illumination (for the level of irradiance, see below).
2. Graduated light series - five light and one dark bottle containing water from one depth were incubated under 0, 10, 25, 50, 75, and 100% irradiance provided by glass neutral density filters over the incubation bottles.

For both series, dark bottles were pre-wrapped with black tape and then covered with aluminum foil to insure complete darkness. Depths and frequencies of sampling varied from year to year.

The plastic incubator box was fronted with clear plexiglass and had a wheel that rotated in the vertical plane. The wheel accommodated 12 ground-glass stoppered 130 ml bottles. At various times, because of stripped gears, the wheel did not rotate or was manually turned periodically during incubation. Light, provided by a bank of 12 GE Cool-White fluorescent lamps (General Electric Corporation, Stamford, CT), and amount of radioactivity added varied from year to year. Highest irradiance (= 100%) in the incubator was between 1100 and 1400 ft-c measured with a GE Model No. 214 photometer (General Electric Corporation, Stamford, CT). A pumped water flow-through system maintained ambient incubator temperature near 0°C. Samples were incubated for 6 or 12 hr.

At the end of the incubation, the samples were filtered (suction pressure

less than 250 mm Hg) onto 25 mm, 0.45 μ m Millipore filters, washed with filtered seawater, air-dried, and stored over desiccant until analyzed. Filters were fumed over concentrated HCl and counted three times for 1000 counts, using a gas flow proportional counter (Nuclear Chicago Corporation, Des Plaines, IL). Counting was done either in Seattle using a Nuclear Chicago Model D-47 counter with micromil window, C-110 automatic sample changer, 161-A scaler, and C111B printing timer, or on T-3 using a Nuclear Chicago manual, end-window Model 8770 scaler, Model 3053 sample changer, Model 108 G-M detector, and Model 8420 dual timer.

Carbon uptake was calculated from

$$P = (L-D)(W)(1.05)/(Z)(T)$$

where P is in $\text{mg C m}^{-3} \text{ h}^{-1}$; L-D is the difference between the light and dark bottle in counts per minute corrected for machine background and coincidence; W is the total carbonate in mg C m^{-3} calculated from $W = (810)(S^{\circ}/\text{‰})$ as suggested by Dr. G. C. Anderson, Department of Oceanography, University of Washington; 1.05 is the isotope discrimination factor (Strickland 1960); Z is the total activity in counts per minute added to the sample and corrected for the counter efficiency of about 22.8%; T is the incubation time (6 or 12 hr).

All ^{14}C ampoules used on T-3 were prepared in the Department of Oceanography, University of Washington, from aqueous sodium carbonate obtained from Nuclear Chicago Corporation. All glassware was rinsed with distilled water and autoclaved. The amount of solution to be made was determined by dividing the activity of the stock aqueous sodium carbonate by the desired activity per ml of final solution. Glass distilled water was filtered through 47 mm, 0.45 μ m Millipore filters. The pH was adjusted to 9.5-9.7 with NaOH. The solution was well mixed, and after adding the commercial sodium carbonate, mixed again. Glass ampoules holding 2 or 5 ml of solution were filled by an automatic volume dispenser. The ampoules were sealed using propane torches. The sealed ampoules were placed in large beakers, covered with water to which methylene blue dye was added, and autoclaved for ca. 1 hr at 120°C. After washing away the dye, the ampoules were inspected for any sign of color inside them. Ampoules that were even slightly discolored were discarded. The filled ampoules were color-coded with spray paint and stored.

Several ampoules from the beginning, middle, and end of the filling process were kept separate to be used for standardization. Standardization was done using methods then employed by the Department of Oceanography, University of Washington, where ampoules were either sent to Dr. C. R. Goldman, University of

California, Davis, and analyzed using gas phase (Goldman 1963; Steemann-Nielsen 1974) or, in the Department of Oceanography, University of Washington, were compared to samples obtained from the National Bureau of Standards. From 1970-1973, ampoules were standardized by liquid scintillation techniques and external standards at the Department of Oceanography.

Phytoplankton Cell Counts

Samples for phytoplankton identification and cell counts were usually taken from Nansen bottles during hydrocasts and stored in 250 ml glass jars. They were preserved with 4% formalin, buffered (sodium borate) or unbuffered, for a final strength of approximately 1%. Samples were shipped to Seattle for later analysis. Some samples were collected from a water pumping system during summer 1970 (see below).

Phytoplankton species were enumerated for some of the samples collected in the summers of 1968, 1969, and 1971 with the inverted microscope method (Hasle 1978a, b). Samples were individually counted or samples from two, three, or four days were combined for each depth. The samples combined to make a composite were separated in time by one week or less. After thorough mixing, the samples were poured into 5 and 50 ml Zeiss counting chambers (Carl Zeiss, Oberkochen Würt, FRG) and allowed to settle at least 20 hr before counting. A Zeiss inverted microscope was used for all enumerations. The 5 ml chamber was counted at 390 X using a 25 X objective, 12.5 X oculars, and a magnification factor of the optics carrier of 1.25. The 50 ml chamber was counted at 156 X with a 10 X objective, 12.5 X oculars, and the 1.25 X magnification factor. Cell counts were converted to cells per liter, cell volumes (Larrance 1964), and cell carbon (Mullin et al. 1966). These data are contained in an unpublished manuscript (Walline 1973) available from the School of Oceanography, University of Washington.

Zooplankton

Zooplankton sampling was maintained from March 1966 through April 1974. Gear types, sampling periods, and depth intervals sampled varied between and within years. Regardless of the gear used, all samples were concentrated and preserved in 4% V/V formalin (final concentration) buffered with either sodium acetate or sodium borate.

Initially, samples were taken with an open 0.5 m diameter ring net with 215 μ m mesh gauze. From June 1966 through July 1967, a 7.6 cm centrifugal

pump system with a 10 cm diameter hose intake was lowered. A 25 kg weight at the end of the wire held down the hose intake. Since wire angles were low, the depth of sampling was estimated from the length of the wire. Maximum depth of sampling was about 185 m. Samples of 5 to 18 m³ of water were filtered at a rate of 0.2 to 0.6 m³ per min through a net of 215 µm mesh size. Beginning in early July 1967, a closing 1 m diameter ring net of either 110 or 215 µm mesh was used to sample to 1000 m. This sampling overlapped with pumping stations to assure comparability.

Sampling with a 2 m² closing umbrella net began in September 1967 (Scott 1969; Macaulay and Daly 1987). Mesh size was 223 and 569 µm. This net, with a filtration ratio of 1.25:1, was the principal sampling device throughout the remaining field program though the netting itself was replaced with a high filtration type mesh (4:1 filtration ratio) in March 1972. All subsequent samples were collected with the 4:1 filtration ratio net.

An overlapping sampling scheme was used starting in October 1969. Sampling depths were at 10 m intervals from 300 to 10 m, 100 m intervals from 1000 to 10 m, and 500 m intervals from the bottom to 10 m. The 10 m upper limit was chosen to protect the net during retrieval through the hydrohole. Samples were collected from as deep as 2500 m.

Two other kinds of nets were sometimes employed: a 3 m² closing umbrella net with 300 µm mesh in summer 1968 and a 1 m² plummet net with 571 µm mesh initially in May 1971 and periodically thereafter. The plummet net is a downward fishing net with an opening-closing mechanism activated with a messenger (Macaulay 1978; Macaulay and Daly in prep.).

Sorting, identifying, and counting of some samples were done in Seattle (Table 3). Other samples have been analyzed for some groups of organisms, primarily copepods. These data are available in the School of Oceanography, but obtaining them will require an investigator to visit the University of Washington.

Echo-sounder

Echo-sounding was conducted from April 1970 to April 1974. A modified Ross 200A (100 kHz) echo-sounder and 10° transducer with an impedance matching box scanned depth ranges of 0-50, 50-100, 100-150, and 150-200 fm. The 0-50 fm depth range was emphasized because of interest in the scattering layer often found about 25 fm. The system included the standard Ross 200A transceiver unit, recorder unit, and a Sony TC-5600 stereo tape recorder. During regular

Table 3. List of T-3 zooplankton samples analyzed and used in theses, reports, and publications

Hughes (1968)	399 samples collected with a plankton pump
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
Scott (1969)	523 samples collected with a pump, 1 m closing ring net and 2 m ² umbrella net
Cruises:	02 22 Jun - 15 Jul 1966
	27 Jul - 25 Aug
	30 Aug - 17 Oct
	03 5 Feb - 14 Feb 1967
	04 10 Jul - 6 Sep 1967
	05 13 Sep - 23 Sep 1967
Damkaer (1976)	52 samples collected with a 1 m closing ring net
Cruises:	04 12 Jul - 8 Sep 1967
	06 5 May 1968
	07 10 Jun - 18 Aug 1968
Heron and Damkaer (1976)	2 samples collected with a 1 m closing ring net
Cruises:	07 10 Jun 1968
	12 Jun 1968
Pautzke (1979)	16 samples collected with a 2 m ² umbrella net
Cruises:	14 7 Jun - 5 Oct 1970
	18 30 May - 1 Oct 1971
	22 31 May - 29 Sep 1972
	26 28 May - 19 Oct 1973
Heron, English, and Damkaer (1984)	54 samples collected with a 1 m closing ring net and 3 m ² umbrella net
Cruises:	06 5 May 1968
	07 10 Jun - 20 Sep 1968
	08 21 Sep 1968

operation, echo-sounding was conducted continuously, normally on the 0-50 fm scale. Daily recordings of 15-45 min were made using all depth ranges. Some of these data are available on 1/4 inch magnetic tape, but retrieval will be difficult.

Data Management

The data were available from computer printouts or raw data sheets. The original punched data cards could not be located so the data were re-entered directly to disk files on the University of Washington Cyber 180-855 computer using a Tandy Model DT-1 data terminal. After editing the files to correct data entry errors or to fill in gaps in the data, the files were transferred to a 9-track, EBCDIC-coded magnetic tape for NODC. The resulting tape contains three files of hydrographic data, one file of chlorophyll data, and one file of primary productivity data.

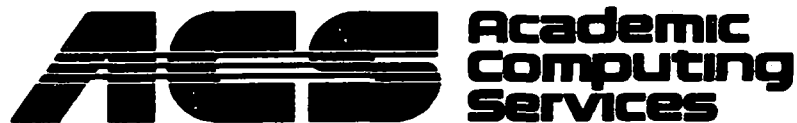
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CRUISE T3-001 STATION 001 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 03 APR 66 BAROM 1022.4 WEATHER 42 WIND SPD 12K
HOUR 04.5 GMT DRY BULB -22.0 VISIBILITY 5 WIND DIR 05
LAT 75-23.1N WET BULB . CLOUD TYPE 1 MARSDEN
LON 156-07.5W REL HUMID CLOUD AMT 2 SOUNDING 2193M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM-ATOMS/L	SIO4	NO3
25	-1.66	30.109	24.23	9.36			
50	-1.37	30.726	24.73	9.25			
75	-1.12	31.647	25.46	8.10			
100	-1.20	32.129	25.86				
150	-1.46	32.739	26.36	6.60			
200	-1.44	33.221	26.75	6.42			
250	-.97	34.085	27.43	6.03			
300	.01	34.545	27.76	6.14			
350	.12	34.731	27.90	6.40			
400	.40	34.830	27.97	6.59			
450	.54	34.849	27.97	6.71			
500	.54	34.856	27.98	6.64			
600	-.41	34.882	28.05	6.70			
700	-.43	34.903	28.07	6.78			
800	-.39	34.890	28.06	6.82			
900	-.30	34.890	28.05	6.92			
1100	-.17	34.893	28.05	6.92			
1300	-.01	34.920	28.06	6.93			
1500	.14	34.930	28.06	6.97			
1700	.26	34.934	28.06	6.95			
1900	.45	34.934	28.05	6.91			
2080	-.42	34.957	28.11	6.57			
2135	-.44	34.964	28.12	6.57			
2145	-.39	34.965	28.12	6.53			
2155	-.45	34.963	28.12	6.50			
2160	-.44	34.962	28.12	6.62			
2165	-.46	34.963	28.12	6.37			
2170	-.45	34.964	28.12	6.63			
2175	-.43	34.964	28.12	6.61			
2180	-.40	34.963	28.12	6.14			

CRUISE	T3-001	STATION	002	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	08 APR 66	BAROM	1049.1	WEATHER	02	WIND SPD 05K
HOUR	18.8 GMT	DRY BULB	-32.0	VISIBILITY	7	WIND DIR 31
LAT	75-17.2N	WET BULB	.	CLOUD TYPE	2	MARSDEN
LON	156-10.0W	REL HUMID		CLOUD AMT	1	SOUNDING 2193M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.62	30.115	24.24	9.25			
10	-1.67	30.186	24.29	9.13			
15	-1.68	30.091	24.22	9.09			
20	-1.69	30.095	24.22	9.08			
25	-1.62	30.095	24.22	9.08			
30	-1.64	30.126	24.25	9.13			
35	-1.60	30.107	24.23	9.13			
40	-1.23	30.850	24.82	9.08			
45	-1.15	31.196	25.10	8.82			
50	-1.20	31.554	25.39	8.19			
55	-1.62	31.757	25.57	7.74			
60	-1.14	31.841	25.62	7.73			
65	-1.14	31.924	25.69	7.31			
70	-1.16	31.946	25.71	7.24			
75		32.009		7.10			
80	-1.22	32.061	25.80	6.97			
85	-1.19	32.109	25.84	6.89			
90	-1.20	32.156	25.88	6.81			

CRUISE	T3-008	STATION	001	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	09 OCT 68	BAROM	1011.2	WEATHER	70	WIND SPD 05K
HOUR	18.5 GMT	DRY BULB	-08.0	VISIBILITY	6	WIND DIR 13
LAT	85-18.4N	WET BULB	-11.0	CLOUD TYPE	6	MARSDEN
LON	143-24.9W	REL HUMID	19	CLOUD AMT	8	SOUNDING 2070M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5		30.360					
10	-1.63	30.350	24.43				
20	-1.54	30.370	24.44				
30	-1.61	30.420	24.48				
40	-1.67	31.040	24.99				
50	-1.66	31.070	25.01				
60	-1.65	31.220	25.13				
70	-1.33	31.790	25.59				
80	-1.34	32.140	25.87				
90	-1.39	32.370	26.06				
100	-1.48	32.550	26.20				
125	-1.48	32.810	26.41				
150	-1.47	33.170	26.71				
175	-1.30	33.710	27.14				
200	-1.01	34.170	27.50				
250		34.500					
300	.08	34.670	27.86				
350	.31	34.760	27.92				
400	.38	34.800	27.94				
500	.41	34.830	27.97				
1000	-.08	34.880	28.03				
1500	-.35	34.900	28.06				
2000	-.41	34.910	28.07				

CRUISE	T3-008	STATION 002	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	19 NOV 68	BAROM	1032.1	WEATHER	00
HOUR	21.5 GMT	DRY BULB	-27.0	VISIBILITY	7
LAT	85-22.6N	WET BULB	-36.0	CLOUD TYPE	MARSDEN
LON	137-09.0W	REL HUMID		CLOUD AMT	0
					SOUNDING 1917M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.66	30.660	24.68				
10	-1.71	30.650	24.67				
20	-1.67	30.650	24.67				
30	-1.68	30.660	24.68				
40	-1.70	31.070	25.01				
50	-1.67	31.210	25.12				
60	-1.65	31.270	25.17				
70	-1.48	31.600	25.44				
80	-1.38	32.150	25.88				
90	-1.43	32.330	26.03				
100	-1.47	32.470	26.14				
125	-1.53	32.800	26.41				
150	-1.54	33.090	26.64				
175	-1.37	33.590	27.04				
200	-1.10	34.100	27.45				
250		34.480					
300		34.710					
350	.26	34.800	27.95				
400	.34	34.830	27.97				
500	.43	34.830	27.97				
1000	-.06	34.870	28.02				
1500	-.35	34.900	28.06				
1900	-.38	34.900	28.06				

CRUISE	T3-009	STATION	001	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	23 APR 69	BAROM	1031.7	WEATHER	03	WIND SPD 10K
HOUR	20.0 GMT	DRY BULB	-32.0	VISIBILITY	7	WIND DIR 21
LAT	84-48.0N	WET BULB	-32.0	CLOUD TYPE	3	MARSDEN
LON	126-28.4W	REL HUMID	99	CLOUD AMT	3	SOUNDING 2144M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
250	-.39	34.512	27.75	6.68			
275	-.20	34.618	27.83	6.46			
300	-.01	34.641	27.84	6.68			
325	.20	34.701	27.87	6.70			
350	.27	34.758	27.92	6.58			
375	.34	34.789	27.94	6.72			
400	.39	34.866	28.00	6.68			
450	.40	34.822	27.96	6.73			
500	.41	34.826	27.96	6.82			
500	.40	34.853	27.99	6.65			
600	.31	34.855	27.99	6.65			
700	.19	34.852	28.00	6.72			
800	.09	34.881	28.03	6.72			
1000	-.07	34.882	28.04	6.26			
1200	-.18	34.908	28.06	6.77			
1500	-.35	34.920	28.08	6.63			
2000	-.39	34.951	28.11	6.26			
2100	-.39	34.953	28.11				

CRUISE	T3-009	STATION 002	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	01 MAY 69	BAROM	1022.7	WEATHER	00
HOUR	22.9 GMT	DRY BULB	-21.0	VISIBILITY	7
LAT	84-58.0N	WET BULB	-21.0	CLOUD TYPE	MARSDEN
LON	124-59.6W	REL HUMID	99	CLOUD AMT	0
					SOUNDING 1745M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
55	-1.59	31.274	25.17	8.77			
60	-1.43	31.564	25.41	7.99			
65	-1.33	31.848	25.63	7.55			
70	-1.32	31.999	25.75	7.30			
75	-1.33	32.008	25.76	7.13			
80	-1.35	32.211	25.93	7.03			
85	-1.40	32.342	26.03	6.89			
90	-1.39	32.372	26.06	6.87			
90	-1.40	32.429	26.10	6.80			
95	-1.44	32.509	26.17	6.76			
100	-1.50			6.75			
125		32.915		6.59			
150	-1.51	33.282	26.80	6.13			
175	-1.26	33.818	27.22	5.99			
200	-1.04	34.247	27.56	6.61			
225	-.66	34.425	27.69	6.80			
250	-.42	34.551	27.78	6.80			

CRUISE	T3-009	STATION	003	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	08 MAY 69	BAROM	1018.1	WEATHER	44	WIND SPD 03K
HOUR	13.5 GMT	DRY BULB	-13.0	VISIBILITY	3	WIND DIR 29
LAT	84-58.0N	WET BULB	-13.0	CLOUD TYPE	6	MARSDEN
LON	126-02.2W	REL HUMID	99	CLOUD AMT	6	SOUNDING 1850M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.67	30.920	24.89	9.51			
10	-1.70	30.995	24.95	9.57			
15	-1.71	30.995	24.95	9.55			
20	-1.72	31.002	24.96	9.51			
25	-1.71	31.006	24.96	9.48			
30	-1.71	31.015	24.97	9.56			
35	-1.73	31.026	24.98	9.55			
40	-1.69	31.035	24.98	9.44			
45	-1.66	31.087	25.02	9.25			
50	-1.62	31.223	25.13	8.93			
55	-1.46	31.485	25.34	8.33			
60	-1.40	31.742	25.55	7.83			
65	-1.32	31.948	25.71	7.45			
70	-1.32	32.075	25.82	7.35			
75	-1.34	32.231	25.94	7.12			
80	-1.35	32.324	26.02	7.07			

CRUISE	T3-011	STATION	001	OBSERVED VALUES		
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	20 OCT 69	BAROM	1020.0	WEATHER	00	WIND SPD 09K
HOUR	18.3 GMT	DRY BULB	-19.0	VISIBILITY	8	WIND DIR 15
LAT	85-58.1N	WET BULB	.	CLOUD TYPE	0	MARSDEN
LON	120-10.0W	REL HUMID		CLOUD AMT	8	SOUNDING 2380M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.66	30.562	24.60	9.46			
10	-1.66	30.564	24.60	9.49			
15	-1.65	30.566	24.60	9.43			
20	-1.66	30.566	24.60	9.36			
25	-1.67	30.556	24.59	9.32			
30	-1.65	30.558	24.60				
35	-1.65	30.557	24.59	9.38			
40	-1.67	30.572	24.61	9.36			
45	-1.59	31.181	25.10	9.10			
50	-1.53	31.498	25.35	8.50			
55	-1.48	31.679	25.50	8.15			
60	-1.42	31.922	25.69	7.77			
65	-1.39	32.162	25.89	6.84			
70	-1.39	32.238	25.95	7.11			
75	-1.38	32.390	26.07	6.90			
80	-1.43	32.461	26.13	6.92			
85	-1.44	32.513	26.17	6.81			
90	-1.44	32.578	26.23	6.75			
95	-1.47	32.697	26.32	6.64			
100	-1.50	32.768	26.38	6.66			
105	-1.54	32.825	26.43	6.59			
110	-1.55	32.876	26.47	6.60			
115	-1.58	32.945	26.53	6.70			
120	-1.57	33.030	26.60	6.66			
125	-1.57	33.066	26.62	6.33			
140	-1.48			6.04			
130	-1.56			6.24			
150	-1.45	33.500	26.97	5.82			
175	-1.26	34.050	27.41	6.21			
200	-.95	34.324	27.62	6.59			
225	-.60	34.452	27.71	6.64			
250	-.31	34.556	27.78	6.58			
275	-.07	34.644	27.84	6.54			
300	.11	34.707	27.88	6.51			
325	.25	34.776	27.93	6.47			
350	.33	34.808	27.95	6.45			
375	.33	34.832	27.97	6.97			
400	.40	34.803	27.95	6.95			
450	.44	34.818	27.96	6.89			
475	.47	34.829	27.96	6.96			
500	.44	34.825	27.96	6.98			
525	.42	34.836	27.97	7.14			
550	.39	34.839	27.97	7.19			
600	.29	34.845	27.99				
700	.17	34.854	28.00				

CRUISE	T3-011	STATION	001	OBSERVED VALUES		
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	20 OCT 69	BAROM	1020.0	WEATHER	00	WIND SPD 09K
HOUR	18.3 GMT	DRY BULB	-19.0	VISIBILITY	8	WIND DIR 15
LAT	85-58.1N	WET BULB	.	CLOUD TYPE	0	MARSDEN
LON	120-10.0W	REL HUMID		CLOUD AMT	8	SOUNDING 2380M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
800	.10	34.869	28.02				
900	.01	34.866	28.02				
1000	-.07	34.887	28.04				
1100	-.15	34.892	28.05	7.01			
1200	-.20	34.905	28.06	7.06			
1254	-.25	34.902	28.06	6.95			
1295	-.27	34.913	28.07	7.01			
1402	-.31	34.920	28.08	7.07			
1502	-.33	34.930	28.09	6.87			
1683	-.35	34.938	28.09	6.87			
1869	-.35	34.944	28.10	6.88			

CRUISE	T3-011	STATION 002	OBSERVED VALUES			
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	31 DEC 69	BAROM	1009.6	WEATHER	00	WIND SPD 08K
HOUR	13.8 GMT	DRY BULB	-50.0	VISIBILITY	7	WIND DIR 10
LAT	85-30.4N	WET BULB	.	CLOUD TYPE		MARSDEN
LON	110-27.0W	REL HUMID		CLOUD AMT	0	SOUNDING 1215M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.69	30.811	24.80	9.43			
10	-1.67	30.797	24.79	9.39			
15	-1.65	30.816	24.80	9.36			
20	-1.67	30.812	24.80	9.33			
25	-1.68	30.801	24.79	9.36			
30	-1.68	30.802	24.79	9.39			
35	-1.67	30.797	24.79	9.30			
40	-1.69	30.800	24.79	9.35			
45	-1.66	30.800	24.79	9.36			
50	-1.51	31.512	25.36	8.45			
55	-1.44	31.819	25.61	7.87			
60	-1.38	32.076	25.82	7.38			
65	-1.36	32.199	25.92	7.23			
70	-1.34	32.299	26.00	7.06			
75	-1.40	32.416	26.09	6.97			
80	-1.42	32.505	26.17	6.84			
85	-1.45	32.588	26.23	6.79			
90	-1.49	32.659	26.29	6.70			
95	-1.53	32.740	26.36	6.65			
100	-1.53	32.792	26.40	6.59			
105	-1.55	32.849	26.45	6.57			
110	-1.57	32.929	26.51	6.54			
115	-1.59	32.991	26.56	6.50			
120	-1.57	33.053	26.61	6.45			
125	-1.54	33.102	26.65	6.36			
130	-1.55	33.205	26.74	6.28			
140	-1.50	33.364	26.86	6.13			
150	-1.42	33.558	27.02	6.08			
160	-1.33	33.813	27.22	6.16			
170	-1.28	34.018	27.39	6.34			
180	-1.18	34.164	27.50	6.57			
190	-1.08	34.269	27.58	6.75			
200	-.90	34.350	27.64	6.79			
225	-.65	34.449	27.71	6.85			
250	-.32	34.552	27.78	6.75			
275	-.05	34.611	27.82	6.69			
300	.08	34.721	27.90	6.60			
325	.23	34.774	27.93	6.68			
350	.28	34.793	27.94	6.68			
375	.35	34.822	27.96	6.69			
400	.39	34.843	27.98	6.69			
425	.44	34.850	27.98	6.80			
450	.46	34.857	27.99	6.74			
475	.46	34.859	27.99	6.80			
500		34.870		6.79			

CRUISE	T3-011	STATION 002	OBSERVED VALUES		
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)			
DATE	31 DEC 69	BAROM	1009.6	WEATHER	00
HOUR	13.8 GMT	DRY BULB	-50.0	VISIBILITY	7
LAT	85-30.4N	WET BULB	.	CLOUD TYPE	MARSDEN
LON	110-27.0W	REL HUMID		CLOUD AMT	0
				SOUNDING	1215M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
550	.36	34.872	28.00	6.87			
600	.29	34.865	28.00	6.83			
700	.17	34.875	28.02	6.72			
800	.08	34.886	28.03	6.80			
900	-.01	34.894	28.04	6.87			
1000	-.06	34.902	28.05	6.71			
1200	-.22	34.920	28.07	6.70			

CRUISE	T3-012	STATION 001	OBSERVED VALUES			
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	17 JAN 70	BAROM	1012.9	WEATHER	00	WIND SPD 11K
HOUR	07.6 GMT	DRY BULB	-52.0	VISIBILITY	7	WIND DIR 30
LAT	84-58.9N	WET BULB	.	CLOUD TYPE		MARSDEN
LON	109-10.0W	REL HUMID		CLOUD AMT	0	SOUNDING 1366M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
10	-1.67	30.899	24.87	9.38			
40	-1.68	30.888	24.86	9.38			
45	-1.64	30.893	24.87	9.38			
50	-1.54	31.471	25.33	8.71			
60	-1.41	31.956	25.72	7.68			
65	-1.44	32.093	25.83	7.41			
70	-1.46	32.265	25.97	7.02			
75	-1.40	32.388	26.07	6.93			
90	-1.52	32.615	26.26	6.67			
105	-1.57	32.826	26.43	6.63			
110	-1.60	32.920	26.51	6.57			
115	-1.56	32.959	26.54	6.55			
120	-1.55	33.023	26.59	6.53			
125	-1.54	33.095	26.65	6.49			
225	-.57	34.491	27.74	6.80			
275	-.07	34.659	27.86	6.76			
300	.10	34.738	27.91	6.73			
325	.24	34.798	27.95				
425	.40	34.848	27.98	6.75			
450	.51	34.865	27.99	6.81			
475	.46	34.864	27.99	6.85			
500	.42	34.871	28.00	6.85			

CRUISE	T3-012	STATION	002	OBSERVED VALUES		
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	25 JAN 70	BAROM	1019.9	WEATHER	00	WIND SPD 03K
HOUR	20.6 GMT	DRY BULB	-53.0	VISIBILITY	7	WIND DIR 28
LAT	85-02.3N	WET BULB	.	CLOUD TYPE		MARSDEN
LON	109-04.0W	REL HUMID		CLOUD AMT	0	SOUNDING 1215M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
10	-1.69	30.883	24.86	9.32			
40	-1.69	30.884	24.86	9.30			
45	-1.54	31.466	25.33	8.59			
50	-1.54	31.609	25.44	8.28			
60	-1.42	31.963	25.73	7.48			
65	-1.37	32.141	25.87	7.22			
70	-1.35	32.299	26.00	7.01			
75	-1.38	32.399	26.08	6.90			
90	-1.47	32.626	26.27	6.73			
105	-1.57	32.806	26.41	6.62			
120	-1.63	32.965	26.54	6.52			
125	-1.58	33.040	26.60	6.43			
150	-1.42			6.05			
180	-1.20	34.120	27.47	6.63			
225	-.53	34.424	27.69	6.69			
275	-.03	34.632	27.83	6.68			
300	.16	34.719	27.89	6.67			
325	.29	34.780	27.93	6.58			
425	.41	34.840	27.97	6.67			
450	.46	34.849	27.98	6.78			
475	.47	34.860	27.99	6.79			
500	.41	34.866	28.00	6.79			

CRUISE	T3-012	STATION	003	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	31 JAN 70	BAROM	1032.7	WEATHER	00	WIND SPD 14K
HOUR	07.1 GMT	DRY BULB	-38.0	VISIBILITY	7	WIND DIR 34
LAT	84-39.3N	WET BULB	.	CLOUD TYPE		MARSDEN
LON	112-23.0W	REL HUMID		CLOUD AMT	0	SOUNDING 1568M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
10	-1.70	31.110	25.04	9.29			
40	-1.69	31.113	25.05	9.26			
45	-1.67	31.094	25.03	9.28			
50	-1.68	31.012	24.96	9.25			
60	-1.36	31.866	25.65	7.61			
65	-1.34	32.076	25.82	7.72			
70	-1.36	32.210	25.93	7.08			
75	-1.35	32.289	25.99	6.99			
90	-1.46	32.622	26.26	6.72			
105	-1.54	32.816	26.42	6.58			
120	-1.67	32.982	26.56	6.41			
125	-1.57	33.075	26.63	6.37			
150	-1.43	33.426	26.91	6.02			
180	-1.13	34.134	27.48	6.26			
225	-.55	34.479	27.73	6.64			
275	-.07	34.673	27.87	6.59			
300	.12	34.746	27.92	6.49			
325	.24	34.751	27.91	6.43			
425	.40	34.861	27.99	6.59			
450	.43	34.868	28.00	6.68			
475	.46	34.856	27.98	6.72			
500	.40	34.872	28.00	6.68			

CRUISE	T3-012	STATION	004	OBSERVED VALUES		
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	07 OCT 70	BAROM	1021.0	WEATHER	00	WIND SPD 04K
HOUR	10.1 GMT	DRY BULB	-43.0	VISIBILITY	7	WIND DIR 33
LAT	84-27.6N	WET BULB	.	CLOUD TYPE		MARSDEN
LON	112-57.0W	REL HUMID		CLOUD AMT	0	SOUNDING 1364M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.58	30.237	24.33	9.07			
10	-1.65	31.029	24.98	9.14			
15	-1.69	31.048	24.99				
20	-1.69	31.073	25.01	9.16			
25	-1.70	31.094	25.03	9.22			
30	-1.69	31.101	25.04	9.25			
35	-1.69	31.113	25.05	9.20			
40	-1.68	31.138	25.07	9.20			
45	-1.70	31.160	25.08	9.28			
50	-1.69	31.188	25.11	9.21			
55	-1.52	31.692	25.51	8.11			
60	-1.44	31.870	25.65	7.65			
65	-1.40	32.136	25.87	7.12			
70		32.252					
75	-1.47	32.370	26.06	6.86			
80	-1.48	32.468	26.14	6.77			
85	-1.45	32.557	26.21	6.69			
90	-1.46	32.627	26.27	6.64			
95	-1.49	32.695	26.32	6.58			
100	-1.53	32.747	26.37	6.56			
105	-1.55	32.807	26.41	6.54			
110	-1.56	32.889	26.48	6.55			
115	-1.55	32.934	26.52	6.49			
120	-1.56	32.996	26.57				
125	-1.56	33.048	26.61	6.19			
130	-1.56	33.102	26.65	5.99			
140	-1.53	33.271	26.79	5.98			
150	-1.44	33.490	26.96	5.84			
160	-1.37	33.722	27.15	6.02			
170	-1.31	33.973	27.35	6.19			
180	-1.25	34.140	27.49	6.41			
190		34.242		6.67			
200	-.97	34.334	27.63	6.68			
210	-.79	34.388	27.67	6.73			
220	-.76	34.438	27.71	6.73			
230	-.56	34.487	27.74	6.65			
240	-.43	34.532	27.77	6.62			
250	-.34	34.573	27.80	6.58			
275	-.09	34.672	27.87	6.56			
300	-.08	34.733	27.92	6.69			
325	.19	34.809	27.96	6.48			
350	.25	34.818	27.97	6.56			
375	.34	34.846	27.98	6.56			
400	.37	34.862	27.99	6.56			
450	.44	34.879	28.00	6.73			

CRUISE	T3-012	STATION 004	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	07 OCT 70	BAROM	1021.0	WEATHER	00
HOUR	10.1 GMT	DRY BULB	-43.0	VISIBILITY	7
LAT	84-27.6N	WET BULB	.	CLOUD TYPE	MARSDEN
LON	112-57.0W	REL HUMID		CLOUD AMT	0
					SOUNDING 1364M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
475	.42	34.878	28.00	6.68			
500	.40	34.882	28.01	6.60			
550	.33	34.884	28.01	6.73			
600	.28	34.890	28.02	6.68			
700	.17	34.890	28.03	6.68			
800	.07	34.890	28.03	6.73			
900	.02	34.890	28.04	6.84			
1000	-.04	34.914	28.06	6.83			
1200	-.24	34.924	28.08	6.77			

CRUISE	T3-012	STATION 005	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	14 FEB 70	BAROM	1032.9	WEATHER	WIND SPD 08K
HOUR	09.5 GMT	DRY BULB	-24.0	VISIBILITY 7	WIND DIR 33
LAT	84-27.3N	WET BULB	-25.0	CLOUD TYPE 3	MARSDEN
LON	112-37.0W	REL HUMID	17	CLOUD AMT 8	SOUNDING 1440M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
10	-1.64	31.049	24.99	9.30			
40	-1.68	31.192	25.11	9.33			
45	-1.67	31.228	25.14				
50	-1.68	31.272	25.17	9.28			
60	-1.48	31.904	25.68	7.72			
65	-1.51	32.044	25.80	7.62			
70	-1.52	32.199	25.92	7.37			
75	-1.54	32.346	26.04	7.06			
90	-1.47	32.640	26.28	6.69			
105	-1.54	32.822	26.43	6.62			
120	-1.56	33.011	26.58	6.45			
125	-1.53	33.072	26.63	6.40			
150	-1.45	33.501	26.97	6.11			
180	-1.25	34.099	27.45	6.45			
225	-.55	34.462	27.72	6.73			
275	-.10	34.660	27.86	6.66			
300	.10	34.730	27.90	6.64			
325	.21	34.790	27.95	6.55			
425	.38	34.859	27.99	6.67			
450	.43	34.876	28.00	6.74			
475	.43	34.886	28.01	6.78			
500	.41	34.883	28.01	6.76			

CRUISE	T3-012	STATION 006	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	22 FEB 70	BAROM	1012.2	WEATHER	WIND SPD 04K
HOUR	10.8 GMT	DRY BULB	-40.0	VISIBILITY 7	WIND DIR 16
LAT	84-22.5N	WET BULB	.	CLOUD TYPE 2	MARSDEN
LON	112-55.0W	REL HUMID		CLOUD AMT 8	SOUNDING 1605M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
10	-1.11	30.980	24.93	9.15			
20	-1.40	30.974	24.93	9.10			
30	-1.66	30.992	24.95	9.15			
40	-1.68	31.074	25.01	9.15			
45	-1.70	31.099	25.03	9.15			
50	-1.62	31.462	25.33	8.58			
55	-1.53	31.740	25.55	7.99			
60	-1.53	31.905	25.68	7.71			
65	-1.47	32.090	25.83	7.47			
70	-1.48	32.241	25.95	7.08			
75	-1.50	32.378	26.07	6.84			
80	-1.47			6.74			
90	-1.52	32.612	26.26	6.61			
100	-1.53	32.750	26.37	6.51			
110	-1.57	32.863	26.46	6.41			
120	-1.61	32.971	26.55	6.40			
130	-1.58	33.138	26.68	6.29			
140	-1.53	33.239	26.76	6.08			
160	-1.38	33.677	27.11	5.97			
180	-1.21	34.052	27.41	6.27			
200	-1.04	34.283	27.59	6.66			
250	-.33	34.541	27.77	6.53			
300		34.692		6.68			
350	.23	34.775	27.93	6.53			
400	.39	34.833	27.97	6.59			
450	.42	34.849	27.98	6.60			
500	.40	34.854	27.99	6.64			

CRUISE T3-012 STATION 007 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 01 MAR 70 BAROM 1028.3 WEATHER 00 WIND SPD 06K
 HOUR 16.7 GMT DRY BULB -52.0 VISIBILITY 7 WIND DIR 09
 LAT 84-23.7N WET BULB . CLOUD TYPE MARSDEN
 LON 112-31.0W REL HUMID CLOUD AMT 0 SOUNDING 1525M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
10	-.85	31.006	24.94	9.17			
20	-1.46	31.073	25.01	9.19			
30	-1.70	31.110	25.04	9.22			
40	-1.70	31.125	25.05	9.20			
45	-1.70	31.227	25.14	9.25			
50	-1.70	31.365	25.25	9.11			
55	-1.55	31.662	25.49	8.23			
60	-1.54	31.840	25.63	7.93			
65		32.027		7.50			
70	-1.54	32.168	25.90	7.32			
75	-1.49	32.312	26.01	6.92			
78	-1.46	32.412	26.09	6.80			
88	-1.51	32.554	26.21	6.74			
98	-1.53	32.718	26.34	6.62			
108	-1.56	32.816	26.42	6.55			
118	-1.60	32.948	26.53	6.48			
128	-1.58	33.067	26.63	6.35			
138	-1.54	33.212	26.74	6.13			
158	-1.40	33.603	27.06	6.00			
178	-1.20	34.064	27.42	6.29			
198	-1.03	34.271	27.58	6.55			
248	-.35	34.552	27.78	6.63			
300	.05	34.695	27.88	6.50			
350	.24	34.801	27.95	6.55			
400	.40	34.853	27.99	6.58			
450	.42	34.864	27.99	6.63			
500	.38	34.868	28.00	6.67			

CRUISE	T3-012	STATION	008	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	15 MAR 70	BAROM	1015.8	WEATHER	00	WIND SPD 18K
HOUR	36.5 GMT	DRY BULB	-57.0	VISIBILITY	2	WIND DIR 01
LAT	84-20.9N	WET BULB	.	CLOUD TYPE		MARSDEN
LON	112-56.0W	REL HUMID		CLOUD AMT	9	SOUNDING 1600M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.71	31.033	24.98	9.29			
10	-1.69	31.052	25.00	9.29			
15	-1.67	31.042	24.99	9.29			
20	-1.68	31.039	24.98	9.29			
25	-1.71	31.039	24.99	9.29			
30	-1.71	31.030	24.98	9.29			
35	-1.71	31.044	24.99	9.29			
40	-1.71	31.043	24.99	9.29			
45	-1.68	31.058	25.00	9.29			
50	-1.70	31.126	25.06	9.29			
55	-1.72	31.345	25.23	9.29			
60	-1.60	31.530	25.38	8.51			
65	-1.45	31.799	25.60	7.95			
70	-1.41	32.117	25.85	7.28			
75	-1.50	32.261	25.97	7.16			
80	-1.52	32.403	26.09	7.05			
85	-1.51	32.470	26.14	6.83			
90	-1.51	32.588	26.24	6.72			
95	-1.52	32.674	26.31	6.61			
100	-1.54	32.726	26.35	6.72			
105	-1.58	32.781	26.39	6.72			
110	-1.60	32.855	26.45	6.72			
115	-1.61	32.881	26.48	6.61			
120	-1.60	32.935	26.52	6.49			
125	-1.57	32.984	26.56	6.49			
130	-1.58	33.012	26.58	6.49			
140	-1.56	33.217	26.75	6.27			
150	-1.47	33.453	26.94	6.16			
160	-1.36	33.673	27.11	6.16			
170	-1.33	33.872	27.27	5.93			
180	-1.27	34.043	27.41	5.82			
190	-1.18	34.178	27.51	6.72			
200	-1.01	34.292	27.60	6.83			
210		34.334		6.83			
220	-.73	34.375	27.66	6.83			
230	-.58	34.435	27.70	6.83			
240	-.44	34.490	27.74	6.72			
250	-.36	34.501	27.74	6.72			
275	-.12	34.615	27.82	6.72			
300	.02	34.682	27.87	6.61			
325	.14	34.758	27.92	6.61			
350	.20	34.781	27.94	6.72			
375	.29	34.799	27.95				
400	.32	34.784	27.93	6.72			
425		34.824		6.72			

CRUISE	T3-012	STATION 008	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	15 MAR 70	BAROM	1015.8	WEATHER	00
HOUR	36.5 GMT	DRY BULB	-57.0	VISIBILITY	2
LAT	84-20.9N	WET BULB	.	CLOUD TYPE	MARSDEN
LON	112-56.0W	REL HUMID		CLOUD AMT	9
					SOUNDING 1600M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
450	.52	34.833	27.96	6.72			
475	.53	34.845	27.97	6.83			
500	.48	34.857	27.98	6.72			
600	.30	34.867	28.00	6.83			
700	.25	34.878	28.01	6.94			
800	.14	34.875	28.02	6.83			
900	.06	34.896	28.04	6.83			
1000	-.02	34.888	28.04	6.94			
1100	-.10	34.879	28.03	6.94			
1200	.20	34.907	28.04	6.94			
1300	.25	34.928	28.05	6.83			
1400	.27	34.930	28.06	6.83			

CRUISE	T3-012	STATION 009	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	22 MAR 70	BAROM	1006.4	WEATHER	10
HOUR	17.1 GMT	DRY BULB	-26.0	VISIBILITY	4
LAT	84-08.2N	WET BULB	-27.0	CLOUD TYPE	2
LON	114-13.0W	REL HUMID		CLOUD AMT	7
					WIND SPD 05K
					WIND DIR 28
					MARSDEN
					SOUNDING 2051M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
10	-1.15	31.037	24.97	9.30			
20	-1.47	31.028	24.97	9.34			
30	-1.58	31.039	24.98	9.31			
40	-1.67	31.040	24.99	9.26			
45	-1.70	31.042	24.99	9.30			
50	-1.70	31.041	24.99	9.30			
55	-1.43	31.760	25.56	8.58			
60	-1.44	31.972	25.74	7.56			
70	-1.46	32.260	25.97	7.11			
80	-1.48	32.480	26.15	6.83			
90	-1.53	32.634	26.27	6.72			
100	-1.51	32.772	26.38	6.73			
110	-1.51	32.910	26.50	6.55			
120	-1.55	33.029	26.59	6.52			
130	-1.55	33.169	26.71	6.27			
140	-1.51	33.357	26.86	6.20			
150	-1.42	33.551	27.01	6.07			
170	-1.20	33.984	27.36	6.34			
180	-1.14	34.146	27.49	6.54			
190	-1.02	34.261	27.58	6.67			
200	-.80	34.325	27.62	6.74			
220	-.54	34.443	27.70	6.69			

CRUISE	T3-013	STATION	010	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	28 MAR 70	BAROM	1022.2	WEATHER	00	WIND SPD 06K
HOUR	06.9 GMT	DRY BULB	-31.0	VISIBILITY	7	WIND DIR 20
LAT	84-18.0N	WET BULB	-32.0	CLOUD TYPE		MARSDEN
LON	112-40.0W	REL HUMID		CLOUD AMT	0	SOUNDING 1790M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
10	-1.49	31.095	25.03	9.52			
20	-1.42	31.094	25.02	9.29			
30	-1.54	31.094	25.03	9.29			
35	-1.65	31.096	25.03	9.29			
40	-1.68	31.087	25.02	9.29			
45	-1.70	31.132	25.06	9.29			
50	-1.68	31.187	25.10	9.29			
55	-1.48	31.609	25.44	8.17			
60	-1.46	31.836	25.63	7.72			
65	-1.43	32.049	25.80	7.50			
70	-1.48	32.107	25.85	7.16			
80	-1.48	32.444	26.12	7.05			
90	-1.50	32.602	26.25	6.83			
100	-1.52	32.712	26.34	6.61			
110	-1.55	32.846	26.45	6.61			
120	-1.60	32.971	26.55	6.49			
130	-1.58	33.099	26.65	6.27			
140	-1.52	33.243	26.77	6.16			
150	-1.47	33.430	26.92	6.05			
175	-1.30	33.957	27.34	6.27			
200	-1.00	34.266	27.58	6.72			
225	-.67	34.391	27.67	6.72			

CRUISE	T3-013	STATION 011	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	04 APR 70	BAROM	1023.8	WEATHER	00
HOUR	07.7 GMT	DRY BULB	-27.0	VISIBILITY	7
LAT	84-17.2N	WET BULB	-29.0	CLOUD TYPE	MARSDEN
LON	112-35.0W	REL HUMID		CLOUD AMT	0
					SOUNDING 1794M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
10	-1.31	31.062	25.00	9.18			
20	-1.46	31.072	25.01	9.29			
30	-1.68	31.113	25.04	7.28			
35	-1.70	31.128	25.06	8.84			
40	-1.70	31.145	25.07	9.63			
45	-1.70	31.212	25.13	9.07			
50	-1.71	31.251	25.16	8.96			
55	-1.66	31.417	25.29	8.84			
60	-1.43	31.813	25.61	7.61			
65	-1.42	31.992	25.75	7.28			
70	-1.48	32.185	25.91	7.16			
80	-1.42	32.427	26.10	6.83			
95	-1.51	32.664	26.30	5.93			
110	-1.54	32.862	26.46				
130	-1.56	33.109	26.66	5.82			
150	-1.46	33.446	26.93	5.93			
170	-1.27	33.898	27.29	5.49			
180	-1.18	34.062	27.42	6.16			
190	-1.10	34.196	27.53	6.49			
200	-.92	34.284	27.59	6.72			
210	-.78	34.350	27.64	6.72			
220	-.65	34.406	27.68	7.05			

CRUISE	T3-013	STATION	012	OBSERVED VALUES		
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	14 APR 70	BAROM	1012.8	WEATHER	10	WIND SPD 06K
HOUR	23.1 GMT	DRY BULB	-17.0	VISIBILITY	7	WIND DIR 19
LAT	84-23.6N	WET BULB	-18.0	CLOUD TYPE	2	MARSDEN
LON	112-06.0W	REL HUMID	51	CLOUD AMT	4	SOUNDING 1377M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
10	-1.62	31.054	25.00	9.29			
20	-1.59	31.048	24.99	9.29			
30	-1.60	31.062	25.00	9.29			
35	-1.68	31.054	25.00				
40	-1.70	31.053	25.00	9.29			
45	-1.71	31.055	25.00	9.40			
50	-1.64	31.326	25.22	8.62			
55	-1.31	31.855	25.64	7.72			
60	-1.37	32.030	25.78	7.39			
65	-1.35	32.079	25.82	7.28			
70	-1.36	32.207	25.92	7.05			
75	-1.37	32.346	26.04	6.94			
80	-1.38	32.439	26.11	6.94			
90	-1.46	32.592	26.24	6.83			
100	-1.51	32.859	26.46	6.61			
110	-1.62	32.740	26.36	6.61			
120	-1.58	32.983	26.56	6.49			
130	-1.56	33.098	26.65	6.49			
140	-1.53	33.232	26.76	6.16			
150	-1.46	33.410	26.90				
160	-1.38	33.667	27.11	6.05			
170	-1.28	33.886	27.28	6.16			
180	-1.24	34.059	27.42	6.49			
190	-1.16	34.220	27.55	6.72			
200	-.96	34.294	27.60	6.72			
210	-.93	34.348	27.64	6.83			
220	-.68	34.411	27.68	6.38			
230	-.57	34.455	27.71	6.72			
240	-.43	34.503	27.75	6.72			
250	-.38	34.550	27.78	6.94			
260	-.22	34.581	27.80				
270	-.15	34.620	27.83	6.61			
275	-.10	34.650	27.85	6.61			
280	-.03	34.659	27.85	6.61			
285	.04	34.687	27.87	6.61			
290	.09	34.695	27.88	6.49			
300	.08	34.729	27.90	6.38			
325	.20	34.788	27.94	6.38			
350	.25	34.816	27.96	6.61			
375	.35	34.831	27.97	6.49			
400	.36	34.858	27.99	6.49			
425	.40	34.854	27.99	6.49			
450	.39	34.861	27.99	6.49			
475	.42	34.876	28.00	6.49			
500	.43	34.877	28.00	6.61			

CRUISE	T3-013	STATION 012	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	14 APR 70	BAROM	1012.8	WEATHER	10
HOUR	23.1 GMT	DRY BULB	-17.0	VISIBILITY	7
LAT	84-23.6N	WET BULB	-18.0	CLOUD TYPE	2
LON	112-06.0W	REL HUMID	51	CLOUD AMT	4
					WIND SPD 06K
					WIND DIR 19
					MARSDEN
					SOUNDING 1377M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
600	.27	34.880	28.01				
700	.17	34.887	28.03	6.72			

CRUISE	T3-013	STATION 013	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	19 APR 70	BAROM	1034.9	WEATHER	00
HOUR	04.0 GMT	DRY BULB	-25.0	VISIBILITY	7
LAT	84-20.9N	WET BULB	-25.0	CLOUD TYPE	MARSDEN
LON	111-58.0W	REL HUMID	99	CLOUD AMT	0
					SOUNDING 1576M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
10		31.056		9.39			
20	-1.12	31.067	25.00	9.21			
30	-1.54	31.078	25.01	9.22			
35	-1.64	31.094	25.03	9.27			
40	-1.67	31.120	25.05	9.25			
42	-1.70	31.134	25.06	9.21			
44	-1.69	31.167	25.09	9.21			
46	-1.70	31.208	25.12	9.21			
48	-1.70	31.252	25.16	9.17			
50	-1.58	31.636	25.47	8.13			
52	-1.48	31.803	25.60	7.88			
54	-1.36	31.825	25.61	7.81			
56	-1.36	31.926	25.70				
58	-1.34	32.002	25.76	7.43			
60	-1.36	32.068	25.81	7.24			
70	-1.36	32.292	25.99	6.97			
80	-1.39	32.469	26.14	6.82			
90	-1.43	32.621	26.26	6.66			
100	-1.52	32.763	26.38	6.58			
150	-1.46	33.490	26.97	6.28			
175	-1.26	34.011	27.38	6.30			
200	-.95	34.322	27.62	6.67			

CRUISE	T3-013	STATION 014	OBSERVED VALUES			
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	26 APR 70	BAROM	1030.5	WEATHER	00	WIND SPD 05K
HOUR	04.3 GMT	DRY BULB	-08.0	VISIBILITY	7	WIND DIR 26
LAT	84-16.5N	WET BULB	-09.0	CLOUD TYPE		MARSDEN
LON	112-29.0W	REL HUMID	73	CLOUD AMT	0	SOUNDING 1738M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
10	-1.66	31.078	25.02	9.18			
20	-1.66	31.088	25.02	7.39			
30	-1.66	31.102	25.04	9.18			
35	-1.70	31.128	25.06	7.50			
40	-1.67	31.140	25.07	9.29			
42	-1.64	31.153	25.08	9.29			
44	-1.62	31.177	25.10	9.07			
46	-1.61	31.407	25.28	8.73			
48	-1.47	31.831	25.62				
50	-1.41	32.017	25.77				
52	-1.34	32.072	25.81	7.16			
54	-1.32	32.123	25.85				
56	-1.32	32.142	25.87	7.16			
58	-1.30	32.183	25.90	7.16			
60	-1.32	32.208	25.92	7.16			
65	-1.32	32.253	25.96	7.05			
70	-1.35	32.307	26.00	6.72			
80	-1.36	32.401	26.08	6.94			
90	-1.43	32.531	26.19	6.83			
100	-1.49	32.653	26.29	6.49			
150	-1.44	33.453	26.93	6.05			
200	-1.04	34.350	27.65	6.72			

CRUISE	T3-013	STATION 015	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	03 MAY 70	BAROM	1021.3	WEATHER	10
HOUR	04.0 GMT	DRY BULB	-05.0	VISIBILITY	7
LAT	84-08.6N	WET BULB	-06.0	CLOUD TYPE	2
LON	112-55.0W	REL HUMID	77	CLOUD AMT	4
					WIND SPD 14K
					WIND DIR 35
					MARSDEN
					SOUNDING 1840M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
10	-1.59	31.082	25.02	8.55			
20	-1.68	31.094	25.03	8.60			
30	-1.66	31.099	25.03	8.50			
35	-1.69	31.113	25.04	8.53			
40	-1.70	31.115	25.05	8.49			
45	-1.68	31.132	25.06	8.51			
50	-1.69	31.168	25.09	8.50			
55	-1.46	31.804	25.60	9.08			
60	-1.42	31.997	25.76	7.86			
65	-1.42	32.153	25.88	7.72			
70	-1.40	32.279	25.98	7.43			
80	-1.48	32.444	26.12	7.18			
90	-1.43	32.605	26.25	7.12			
100	-1.50	32.741	26.36	7.15			
125	-1.56	33.062	26.62	6.76			
150	-1.44	33.466	26.95	6.39			
175	-1.22	33.974	27.35	6.48			
180	-1.18	34.061	27.42	6.33			
185	-1.14	34.141	27.48	6.77			
200	-.90	34.292	27.60	7.21			

CRUISE T3-013 STATION 016 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 10 MAY 70 BAROM 1033.7 WEATHER 10 WIND SPD 10K
HOUR 01.5 GMT DRY BULB -03.0 VISIBILITY 7 WIND DIR 24
LAT 84-07.0N WET BULB . CLOUD TYPE 2 MARSDEN
LON 112-38.0W REL HUMID CLOUD AMT 6 SOUNDING 1852M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM-ATOMS/L	SIO4	NO3
10	-1.32	31.103	25.03	9.18			
20	-1.53	31.149	25.07	8.73			
30	-1.65	31.171	25.09	9.29			
35	-1.70	31.172	25.09	8.84			
40	-1.67	31.183	25.10	9.29			
42	-1.67	31.194	25.11	9.29			
44	-1.70	31.212	25.13	9.29			
46	-1.68	31.222	25.13	9.29			
48	-1.67	31.280	25.18	9.18			
50	-1.57	31.589	25.43	8.28			
52	-1.46	31.715	25.53	7.95			
54	-1.44	31.794	25.59	7.84			
56	-1.41	31.879	25.66	7.61			
58	-1.40	31.966	25.73	7.50			
60	-1.37	32.020	25.77	7.39			
65	-1.42	32.189	25.91	7.16			
70	-1.44	32.310	26.01	6.94			
80	-1.50	32.479	26.15	6.83			
90	-1.53	32.636	26.28	6.72			
100	-1.58	32.791	26.40	6.61			
110	-1.60	32.905	26.49	6.72			
120	-1.56	33.020	26.59	6.38			
130	-1.56	33.043	26.61	6.38			
140	-1.50	33.309	26.82	6.16			
150	-1.41	33.504	26.98	6.05			
160	-1.32	33.750	27.17	6.16			
170	-1.20	33.961	27.34	6.27			
175	-1.13	34.061	27.42	6.38			
180	-1.08	34.123	27.47	6.49			
185	-1.04	34.180	27.51	6.61			
190	-.96	34.204	27.53	6.49			
200	-.78	34.295	27.59	6.61			
250	-.17	34.542	27.77	6.49			
300	.16	34.695	27.87	6.38			
350	.28	34.748	27.91	6.61			
400	.38	34.778	27.93	6.49			
500	.42	34.802	27.94	6.61			
600	.30	34.818	27.96	6.83			
700	.20	34.821	27.97	6.83			
800	.08	34.832	27.99	6.83			
900	-.03	34.841	28.00	6.83			
1000	-.06	34.844	28.00				
1100	-.13	34.853	28.01	6.72			
1200	-.23	34.864	28.03	6.83			
1300	-.23	34.872	28.03	6.61			

CRUISE	T3-013	STATION 016	OBSERVED VALUES			
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	10 MAY 70	BAROM	1033.7	WEATHER	10	WIND SPD 10K
HOUR	01.5 GMT	DRY BULB	-03.0	VISIBILITY	7	WIND DIR 24
LAT	84-07.0N	WET BULB	.	CLOUD TYPE	2	MARSDEN
LON	112-38.0W	REL HUMID		CLOUD AMT	6	SOUNDING 1852M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
1400	-.28	34.871	28.04	6.49			
1500	-.32	34.881	28.05	6.72			
1600	-.36	34.883	28.05	6.72			
1700	-.36	34.885	28.05	6.72			
1800	-.38	34.878	28.05	6.61			

CRUISE	T3-013	STATION	017	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	07 JUN 70	BAROM	1014.3	WEATHER	71	WIND SPD 07K
HOUR	23.5 GMT	DRY BULB	-07.0	VISIBILITY	7	WIND DIR 32
LAT	84-04.3N	WET BULB	-09.0	CLOUD TYPE	0	MARSDEN
LON	112-38.0W	REL HUMID	49	CLOUD AMT	9	SOUNDING 1919M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.67	31.092	25.03	9.27			
10	-1.64	31.085	25.02	9.24			
15	-1.62	31.093	25.03	9.21			
20	-1.65	31.102	25.04	9.27			
25	-1.64	31.129	25.06	9.26			
30	-1.66	31.138	25.06	9.25			
35	-1.65	31.148	25.07	9.26			
40	-1.67	31.161	25.08	9.24			
45	-1.67	31.187	25.10	9.32			
50	-1.50	31.728	25.54	8.08			
55	-1.36	31.969	25.73	7.66			
60	-1.36	32.137	25.87	7.40			
65	-1.36	32.238	25.95	7.12			
70	-1.39	32.362	26.05	7.00			
75	-1.42	32.476	26.14	6.92			
80	-1.42	32.550	26.20	6.88			
85	-1.44	32.606	26.25	6.81			
90	-1.52	32.680	26.31	6.57			
95	-1.56	32.730	26.35	6.71			
100	-1.58	32.789	26.40	6.82			
125	-1.56	33.110	26.66	6.42			
150	-1.40	33.590	27.04	3.50			
175	-1.17	34.123	27.47	6.52			
200	-.74	34.419	27.69	5.64			
225	-.36	34.586	27.81	6.60			
250	-.16	34.708	27.90	3.52			
275	.03	34.799	27.96	6.47			
300	.14	34.883	28.02	2.48			
325	.26	34.930	28.06	6.51			
350	.32	34.976	28.09	3.98			
375	.37	34.997	28.10	6.64			
400	.40	34.906	28.03	6.56			
450	.42	35.002	28.10	6.65			
500	.44	34.995	28.10	6.74			
600	.31	34.998	28.11	6.60			
700	.20	34.996	28.11	6.81			
800	.10	34.988	28.11	4.73			
900	-.01	34.982	28.11	6.86			
1000	-.07	34.972	28.11				
1250	-.16	34.984	28.12	6.73			
1500	-.30	34.978	28.12	6.73			
1750	-.38	34.971	28.12	6.64			

CRUISE T3-013 STATION 018 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 14 JUN 70 BAROM 1003.0 WEATHER 02 WIND SPD 07K
HOUR 23.0 GMT DRY BULB -05.0 VISIBILITY 7 WIND DIR 22
LAT 84-03.1N WET BULB -06.0 CLOUD TYPE 0 MARSDEN
LON 112-52.0W REL HUMID 77 CLOUD AMT 9 SOUNDING 1937M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.64	31.069	25.01	9.64	1.45	6.4	
10	-1.66	31.075	25.01	9.53	1.92	5.5	
15	-1.66	31.078	25.02	9.51	1.12	5.3	
20	-1.68	31.086	25.02	9.28	1.45	5.8	
25	-1.66	31.091	25.03	9.27	1.03	4.8	
30	-1.69	31.095	25.03	9.25	1.12	5.3	
35	-1.69	31.104	25.04	9.32	.70	5.8	
40	-1.62	31.098	25.03	9.31	1.32	5.3	
45	-1.62	31.135	25.06	9.22	1.26	7.4	
50	-1.30	31.706	25.52	8.08	1.45	15.5	
55	-1.36	31.918	25.69	7.68	1.72	22.4	
60	-1.38	32.078	25.82	7.41	2.16	13.2	
65	-1.35	32.183	25.90	7.16	2.05	26.0	
70	-1.41	32.323	26.02	7.06	2.37	27.4	
75	-1.56	32.425	26.11	6.28	1.87	31.0	
80	-1.59	32.507	26.17	6.92	1.99	34.3	
85	-1.48	32.568	26.22	6.52	2.65	34.2	
90	-1.49	32.702	26.33	7.18	2.05	35.7	
95	-1.50	32.764	26.38	6.58	2.27	37.5	
100	-1.55	32.814	26.42	6.72	2.43	38.0	
125	-1.56	33.110	26.66	6.09	2.43	47.0	
150	-1.40	33.589	27.04	6.40	2.48	37.5	
175	-1.16	34.064	27.42	6.29	2.65	24.4	
200		34.355		6.80	1.08	13.1	
225	-.44	34.504	27.75	6.73	1.25	12.8	
250	-.19	34.598	27.81	6.63	1.25	12.8	
275	.06	34.683	27.87	6.61	1.52	12.9	
300	.17	34.738	27.91	6.52	1.40	12.6	
325	.26	34.780	27.94	6.50	1.29	12.8	
350	.32	34.808	27.95	6.60	1.40	11.0	
375	.33	34.816	27.96	6.56	1.08	16.1	
400		34.836		6.63	1.25	11.6	
450	.42	34.859	27.99	6.76	1.21	10.3	
500	-.17	34.487	27.72	6.76	1.03	11.4	

CRUISE	T3-014	STATION	019	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	21 JUN 70	BAROM	992.2	WEATHER	71	WIND SPD 10K
HOUR	23.3 GMT	DRY BULB	000.0	VISIBILITY	7	WIND DIR 22
LAT	84-07.2N	WET BULB	-01.0	CLOUD TYPE	0	MARSDEN
LON	111-54.0W	REL HUMID	82	CLOUD AMT	9	SOUNDING 1855M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.71	31.036	24.98	9.22	1.58	7.6	
10	-1.67	31.026	24.97	9.20	1.27	8.3	
15	-1.68	31.014	24.96	9.05	1.36	4.6	
20	-1.73	31.003	24.96	9.17	1.27	5.5	
25	-1.69	30.994	24.95	8.77	1.28	8.3	
30	-1.73	30.978	24.94	9.14	1.31	4.5	
35	-1.69	30.968	24.93	8.11	1.31	5.7	
40	-1.69	30.967	24.93	9.10	1.46	5.3	
45	-1.60	31.699	25.52	8.61	1.36	8.7	
50	-1.30			7.72	1.79	17.5	
55	-1.35	31.784	25.58	5.79	1.80	21.7	
60	-1.38	31.957	25.72	7.25	1.95	25.3	
65	-1.36	32.107	25.84	6.48	2.35	29.7	
70	-1.44	32.268	25.98	6.88	2.68	29.7	
75		32.369		4.74	2.27	33.8	
80	-1.55	32.460	26.13	6.74	2.24	36.0	
85	-1.50	32.540	26.20	5.28	2.32	36.9	
90	-1.45	32.634	26.27	6.62	2.37	38.0	
95	-1.54	32.700	26.33	6.13	2.48	39.7	
100	-1.60	32.779	26.39	6.70	2.46	39.8	

CRUISE T3-014 STATION 020 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 28 JUN 70 BAROM 1001.2 WEATHER 02 WIND SPD 15K
 HOUR 21.5 GMT DRY BULB 000.0 VISIBILITY 7 WIND DIR 18
 LAT 84-20.3N WET BULB 000.0 CLOUD TYPE 0 MARSDEN
 LON 109-13.0W REL HUMID 99 CLOUD AMT 9 SOUNDING 1432M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.68	31.121	25.05	9.00	1.74	5.2	2.7
10	-1.66	31.134	25.06	9.09	.96	5.8	1.7
15	-1.65	31.182	25.10	8.80	.96	6.8	2.0
20	-1.68	31.331	25.22	9.18	1.34	5.8	2.3
25	-1.67	31.359	25.24	8.01	1.00	8.8	2.7
30	-1.68	31.375	25.26	9.10	.95	7.7	2.9
35		31.383		8.30	.96	6.4	2.4
40	-1.67	31.432	25.30	8.99	1.09	9.3	2.9
45	-1.66	31.306	25.20	8.92	1.09	8.7	3.1
50	-1.60	31.320	25.21	8.99	1.13	8.7	4.1
55	-1.39	31.923	25.69	7.30	1.72	21.3	9.9
60	-1.36	32.124	25.86	7.21	1.84	24.5	12.8
65	-1.37	32.234	25.95	6.94	1.95	27.5	14.3
70	-1.38	32.338	26.03	6.60	1.96	28.8	14.5
75		32.468		5.97	2.06	30.4	15.8
80	-1.43	32.534	26.19	6.78	1.96	31.5	16.6
85	-1.46	32.576	26.23	5.97	1.84	34.2	17.8
90	-1.44	32.629	26.27	6.78	1.97	33.5	16.6
95	-1.46	32.692	26.32	5.86	1.78	34.0	17.3
100	-1.55	32.752	26.37	6.72	2.41	40.0	17.3
125	-1.58	33.049	26.61	5.96	2.25	43.1	20.8
150	-1.42	33.501	26.97	6.07	2.22	41.0	20.2
175	-1.18	34.054	27.41	5.33	1.35	23.5	11.7
200	-.99	34.325	27.63	6.80	1.22	12.4	11.8
225	-.64	34.476	27.73	6.76	.70	13.3	14.5
250	-.32	34.590	27.81	6.76	1.08	12.0	14.0
275	-.08	34.677	27.87	6.43	.88	11.1	15.1
300	.08	34.745	27.92	6.60	1.00	13.3	15.7
325	.18	34.797	27.95	5.66	1.07	10.8	15.8
350	.25	34.834	27.98	6.60	1.24	10.3	14.5
375		34.863		6.22	.97	12.4	16.0
400	.40	34.880	28.01	6.20	1.13	12.0	14.0
450	.42	34.870	28.00	6.71	1.11	10.9	16.4
500	.41	34.901	28.02	6.73	1.01	10.8	14.0

CRUISE T3-014 STATION 021 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 04 JUL 70 BAROM 999.8 WEATHER 01 WIND SPD 03K
HOUR 23.9 GMT DRY BULB 000.0 VISIBILITY 7 WIND DIR 00
LAT 84-24.8N WET BULB 000.0 CLOUD TYPE 6 MARSDEN
LON 107-10.0W REL HUMID 99 CLOUD AMT 9 SOUNDING 1284M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-.64	31.013	24.94	9.35	1.11	3.6	1.6
10	-1.45	31.026	24.97	9.31	.96	4.0	1.0
15	-1.64	31.053	25.00	9.30	1.32	12.4	1.5
20	-1.66	31.055	25.00	9.31	1.15	5.5	1.3
25	-1.67	31.056	25.00	9.32	.55	8.9	.3
30	-1.68	31.063	25.00	9.31	.46	5.5	.6
35	-1.68	31.080	25.02	9.32	.78	4.6	1.4
40	-1.68	31.240	25.15	9.20	.83	7.9	1.7
45	-1.61	31.565	25.41	8.64	1.23	4.6	4.7
50	-1.49	31.797	25.60	8.15	1.11	9.6	7.4
55	-1.50	31.971	25.74	7.11	1.76	16.9	9.0
60	-1.52	32.128	25.86	7.40	1.53	15.3	10.1
65	-1.52	32.292	26.00	6.63	1.64	20.2	12.5
70	-1.52	32.406	26.09	6.85	1.90	21.9	13.4
75	-1.54	32.507	26.17	5.86	1.60	23.7	14.3
80	-1.54	32.541	26.20	6.76	1.65	25.0	13.2
85	-1.56	32.592	26.24	6.74	1.99	27.7	15.1
90	-1.53	32.641	26.28	6.79	1.70	28.5	15.3
95	-1.54	32.682	26.31	5.82	1.85	26.6	15.0
100	-1.58	32.724	26.35	6.80	1.76	28.5	14.6
125	-1.60	33.018	26.59	6.51	1.77	33.8	16.1
150	-1.49	33.428	26.92	6.10	1.99	40.8	18.2
175	-1.28	34.029	27.40	5.58	1.03	21.5	13.0
200	-.97	34.323	27.62	6.80	.85	10.8	10.3
225	-.64	34.464	27.72	6.41	.28	9.6	11.8
250	-.31	34.576	27.80	6.73	.68	9.0	11.6
275	-.06	34.678	27.87	3.94	.29	8.9	12.3
300	.08	34.734	27.91	6.64	.57	9.6	13.4
325	.20	34.795	27.95	6.16	.56	9.0	13.5
350	.26	34.819	27.97	6.63	.74	9.5	13.4
375	.34	34.849	27.99	6.09	.62	9.0	13.7
400	.40	34.867	28.00	6.73	.69	9.5	11.3
450	.41	34.877	28.00	6.76	.65	9.5	14.4
500	.40	34.881	28.01	6.80	.78	7.9	13.6
600	.26	34.895	28.03	6.84	.58	8.3	13.9
700	.16	34.900	28.04	6.89	.90	8.7	12.4
800	.06	34.912	28.05	6.91	.98	8.3	13.9
900	-.01	34.919	28.06	6.97	.69	8.3	14.0
1000	-.10	34.928	28.07	6.96	.85	9.0	13.8

CRUISE T3-014 STATION 022 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 12 JUL 70 BAROM 1013.0 WEATHER 02 WIND SPD 08K
HOUR 21.8 GMT DRY BULB 000.0 VISIBILITY 6 WIND DIR 18
LAT 84-47.4N WET BULB 000.0 CLOUD TYPE 4 MARSDEN
LON 106-28.0W REL HUMID 99 CLOUD AMT 6 SOUNDING 1445M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.46	30.975	24.93	9.36	1.07	5.3	1.4
10	-1.50	31.018	24.96	9.46	1.07	3.5	.0
15	-1.64	31.029	24.98	9.45	1.24	4.4	.2
20	-1.68	31.033	24.98	9.48	1.05	5.3	.3
25	-1.68	31.038	24.98	8.81	1.07	4.0	.5
30	-1.68	31.041	24.99	9.46	1.04	5.0	.4
35	-1.67	31.040	24.99	9.05	1.16	5.1	.5
40	-1.66	31.043	24.99	9.43	1.05	4.0	.5
45	-1.60	31.355	25.24	8.05	1.37	10.7	3.9
50	-1.41	31.850	25.64	8.05	1.51	17.0	6.7
55	-1.40	32.004	25.76	6.81	2.20	18.8	7.3
60	-1.41	32.138	25.87	7.41	2.20	22.8	9.3
65	-1.38	32.259	25.97	6.85	2.03	25.5	11.9
70	-1.39	32.330	26.02	7.07	1.99	26.5	10.9
75	-1.40	32.445	26.12	5.00	2.12	29.2	11.3
80	-1.42	32.524	26.18	7.01	2.15	31.0	14.9
85	-1.41	32.592	26.24	6.38	2.28	32.0	16.6
90	-1.42	32.644	26.28	6.89	2.43	32.7	15.7
95	-1.48	32.713	26.34	5.40	2.29	33.0	15.9
100	-1.51	32.768	26.38	6.91	2.25	34.4	15.2
125	-1.58	33.054	26.62	5.25	2.60	41.5	19.1
150	-1.42	33.516	26.99	6.09	2.77	41.3	17.1
175	-1.21	34.049	27.41	6.33	1.67	21.9	13.8
200	-.90	34.330	27.63	6.78	1.26	11.0	10.6
225	-.60	34.472	27.73	5.24	1.20	10.8	11.7
250	-.30	34.569	27.79	6.83	1.07	8.3	10.8
275	-.10	34.655	27.85	4.88	1.05	9.7	11.2
300	.09	34.728	27.90	6.68	1.22	9.9	13.3
325	.22	34.791	27.95	5.58	1.31	9.0	12.0
350	.28	34.816	27.96	6.72	1.15	10.3	10.2
375	.34	34.842	27.98	2.08	1.12	8.6	14.2
400	.40	34.862	27.99	6.75	1.28	8.4	14.2
450	.42	34.872	28.00	6.83	1.12	10.3	13.3
500	.43	34.882	28.01	6.84	1.18	9.2	15.1

CRUISE	T3-014	STATION 221	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	14 JUL 70	BAROM	1019.0	WEATHER	02
HOUR	07.7 GMT	DRY BULB	-01.0	VISIBILITY	6
LAT	84-47.4N	WET BULB	-01.0	CLOUD TYPE	0
LON	106-28.0W	REL HUMID	99	CLOUD AMT	9
					WIND SPD 07K
					WIND DIR 27
					MARSDEN
					SOUNDING 1445M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.66	31.074	25.01				
42	-1.52	31.077	25.01				
44	-1.66	31.059	25.00				
46	-1.60	31.488	25.35				
48	-1.52	31.824	25.62				
50	-1.44	31.830	25.62				
52	-1.42	31.972	25.74				
54	-1.32	32.043	25.79				
56	-1.38	32.088	25.83				
58	-1.39	32.091	25.83				
60	-1.38	32.136	25.87				

CRUISE T3-014 STATION 023 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 19 JUL 70 BAROM 1028.0 WEATHER 02 WIND SPD 05K
 HOUR 10.6 GMT DRY BULB 000.0 VISIBILITY 6 WIND DIR 09
 LAT 84-42.9N WET BULB 000.0 CLOUD TYPE MARSDEN
 LON 106-27.0W REL HUMID 99 CLOUD AMT 0 SOUNDING 1434M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.59	25.922	20.84	9.61	.97	2.7	1.6
10	-1.44	30.979	24.93	9.58	.99	3.2	.6
15	-1.62	31.007	24.96	9.68	1.10	4.0	1.0
20	-1.66	31.005	24.96	9.55	.97	4.0	1.1
25	-1.62	31.014	24.96	9.37	.91	3.5	1.9
30	-1.66	30.997	24.95	9.55	1.01	3.0	1.3
35	-1.65	31.016	24.97	9.54	1.17	4.0	.8
40	-1.66	31.023	24.97	9.51	1.06	3.2	.8
45	-1.62	31.102	25.03	9.38	1.06	5.3	2.4
50	-1.26	31.784	25.58	8.37	1.37	9.4	6.0
55	-1.46	31.955	25.72	7.85	1.25	16.9	8.1
60	-1.51	32.097	25.84	7.64	1.28	20.8	9.4
65	-1.45	32.232	25.95	7.34	1.36	24.0	11.1
70	-1.40	32.327	26.02	7.17	1.56	25.2	11.8
75	-1.40	32.439	26.11	7.07	1.55	27.5	13.6
80	-1.42	32.526	26.18	6.98	1.59	30.3	13.9
85	-1.44	32.613	26.25	6.94	1.65	31.2	13.4
90	-1.45	32.677	26.31	6.88	1.73	32.6	13.8
95	-1.46	32.744	26.36	6.64	1.85	35.2	13.6
100	-1.49	32.800	26.41	6.75	1.80	33.7	13.2

CRUISE	T3-014	STATION	231	OBSERVED VALUES		
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	20 JUL 70	BAROM	1028.0	WEATHER	02	WIND SPD 05K
HOUR	07.1 GMT	DRY BULB	000.0	VISIBILITY	6	WIND DIR 09
LAT	84-42.9N	WET BULB	000.0	CLOUD TYPE		MARSDEN
LON	106-27.0W	REL HUMID	99	CLOUD AMT	0	SOUNDING 1434M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.61	31.022	24.97				
42	-1.56	31.035	24.98				
44	-1.60	31.069	25.01				
46	-1.65	31.102	25.04				
48	-1.54	31.733	25.54				
50	-1.52	31.834	25.63				
52	-1.45	31.903	25.68				
54	-1.44	31.972	25.74				
56	-1.52	32.021	25.78				
58	-1.47	32.088	25.83				
60	-1.50	32.136	25.87				

CRUISE T3-014 STATION 024 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 26 JUL 70 BAROM 1008.8 WEATHER 02 WIND SPD 05K
HOUR 07.2 GMT DRY BULB 000.0 VISIBILITY 6 WIND DIR 00
LAT 84-33.3N WET BULB 000.0 CLOUD TYPE 4 MARSDEN
LON 106-13.0W REL HUMID 99 CLOUD AMT 6 SOUNDING 1280M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	.44	10.424	.28	9.44	.38	.1	2.3
10	-1.58	30.942	24.90	9.38	.93	3.5	.8
15	-1.64	30.983	24.94	9.34	1.04	4.0	.9
20	-1.63	30.987	24.94	9.32	1.07	3.7	1.1
25	-1.62	30.992	24.95	9.33	1.09	3.5	4.4
30	-1.62	30.996	24.95	9.32	1.04	4.4	1.2
35	-1.62	31.020	24.97	9.33	.87	4.4	1.4
40	-1.64	31.052	24.99	9.23	.95	5.0	1.4
45	-1.60	31.252	25.16	8.94	1.11	6.9	4.1
50	-1.30	31.504	25.35	8.64	1.32	11.0	4.3
55	-1.39	31.892	25.67	7.40	1.57	18.0	8.5
60	-1.38	32.028	25.78	7.38	1.56	20.3	9.8
65	-1.34	32.168	25.89	7.19	1.62	23.5	10.1
70	-1.42	32.278	25.98	7.14	1.59	25.1	11.7
75	-1.40	32.379	26.06	7.01	1.59	26.0	12.4
80	-1.40	32.483	26.15	6.92	1.74	29.8	14.3
85	-1.44	32.560	26.21	6.80	2.42	31.4	15.5
90	-1.40	32.651	26.28	6.80	1.92	33.0	14.8
95	-1.48	32.704	26.33	6.62	1.76	35.0	15.1
100	-1.56	32.764	26.38	6.56	2.19	36.0	15.7
125	-1.58	33.100	26.65	6.35	2.26	43.0	18.0
150	-1.40	33.550	27.01	5.98	1.94	40.5	17.0
175	-1.20	34.095	27.45	6.23	1.47	21.4	13.6
200	-.85	34.352	27.64	6.72	1.17	11.6	11.1
225	-.55	34.477	27.73	6.72	1.02	10.7	12.2
250	-.27	34.586	27.81	6.64	1.26	10.4	12.4
275	-.02	34.685	27.87	6.57	1.13	9.9	12.5
300	.14	34.753	27.92	6.52	1.22	11.3	12.5
325	.25	34.803	27.95	6.55	1.13	9.9	14.0
350	.30	34.809	27.96	6.53	1.04	9.9	13.4
375	.37	34.839	27.98	6.58	1.05	10.4	13.2
400	.42	34.858	27.99	6.63	1.03	9.5	13.3
450	.42	34.865	27.99	6.66	1.11	9.7	14.1
500	.43	34.876	28.00	6.68	.97	9.0	13.6

CRUISE	T3-014	STATION 241	OBSERVED VALUES			
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	27 JUL 70	BAROM	1010.7	WEATHER	02	WIND SPD 06K
HOUR	16.9 GMT	DRY BULB	000.0	VISIBILITY	6	WIND DIR 14
LAT	84-33.3N	WET BULB	-01.0	CLOUD TYPE	6	MARSDEN
LON	106-13.0W	REL HUMID	82	CLOUD AMT	8	SOUNDING 1280M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.62	31.104	25.04				
42	-1.46	31.116	25.04				
44	-1.62	31.188	25.10				
46	-1.62	31.302	25.20				
48	-1.54	31.548	25.39				
50	-1.39	31.693	25.51				
52	-1.45	31.779	25.58				
54	-1.40	31.892	25.67				
56	-1.38	31.947	25.71				
58	-1.37	32.017	25.77				
60	-1.35	32.046	25.79				

CRUISE T3-014 STATION 025 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 02 AUG 70 BAROM 1012.4 WEATHER 02 WIND SPD 08K
HOUR 07.0 GMT DRY BULB 000.0 VISIBILITY 7 WIND DIR 00
LAT 84-40.2N WET BULB -01.0 CLOUD TYPE 0 MARSDEN
LON 105-56.0W REL HUMID 82 CLOUD AMT 8 SOUNDING 1457M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 ATOMS/L	NO3 ATOMS/L
10	-1.52	30.894	24.86	9.46		5.3	.7
15	-1.62	30.954	24.92	9.43		4.5	.8
20	-1.64	30.954	24.92	9.50		6.2	.8
25	-1.63	30.959	24.92	9.45		4.5	.5
30	-1.63	30.966	24.92	9.45		5.5	.8
35	-1.61	30.969	24.93	9.43		6.2	.9
40	-1.63	30.997	24.95	9.40		6.2	.7
45	-1.64	31.046	24.99	9.36		6.4	2.4
50	-1.50	31.515	25.37	8.51		12.7	5.3
55	-1.46	31.903	25.68	7.92		16.4	7.8
60	-1.38	32.059	25.80	7.46		20.1	10.6
65	-1.42	32.208	25.93	7.24		24.0	11.2
70	-1.39	32.298	26.00	7.07		25.5	12.1
75	-1.40	32.399	26.08	6.98		28.8	13.0
80	-1.46	32.514	26.17	6.81		30.3	14.6
85	-1.50	32.602	26.25	6.75		32.6	15.9
90	-1.42	32.655	26.29	6.69		33.2	15.6
95	-1.50	32.736	26.36	6.64		34.1	15.9
100	-1.54	32.801	26.41	6.63		34.4	16.0
125	-1.56	33.086	26.64	6.52		41.3	18.7
150	-1.42	33.522	26.99	6.06		38.8	18.2
175	-1.24	34.063	27.42	6.44		19.4	13.1
200	-.90	34.344	27.64	6.81		11.3	11.1
225	-.60	34.478	27.73	7.06		10.4	12.9
250	-.29	34.576	27.80	6.81		8.3	12.6
275	-.10	34.663	27.86	6.73		9.0	12.6
300	.08	34.737	27.91	6.70		9.7	13.3
325	.22	34.796	27.95	6.68		9.2	13.9
350	.27	34.819	27.97	6.71		10.4	13.6
375	.34	34.839	27.98	6.76		10.4	13.9
400	.40	34.862	27.99			9.7	13.6
450	.40	34.872	28.00	6.78		9.9	15.3
500	.43	34.875	28.00	6.82		8.2	14.0
600	.28	34.884	28.02	6.86		8.9	13.6
700	.18	34.893	28.03	6.90		9.5	13.9
800	.08	34.899	28.04	7.09		9.2	14.0
900	.01	34.902	28.05	7.12		10.3	13.5
1000	-.06	34.912	28.06	6.94		12.5	13.9
1250	-.26	34.930	28.08	6.96		10.8	14.1

CRUISE	T3-014	STATION 251	OBSERVED VALUES			
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	03 AUG 70	BAROM	1012.4	WEATHER	02	WIND SPD 08K
HOUR	16.9 GMT	DRY BULB	000.0	VISIBILITY	6	WIND DIR 00
LAT	84-40.2N	WET BULB	-01.0	CLOUD TYPE	0	MARSDEN
LON	105-56.0W	REL HUMID	82	CLOUD AMT	8	SOUNDING 1457M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.66	31.037	24.98				
42	-1.52	31.062	25.00				
44	-1.64	31.126	25.05				
46	-1.65	31.138	25.06				
48	-1.62	31.203	25.12				
50	-1.59	31.351	25.24				
52	-1.51	31.601	25.44				
54	-1.42	31.828	25.62				
56	-1.40	31.942	25.71				
58	-1.38	31.977	25.74				
60	-1.48	32.014	25.77				

CRUISE T3-014 STATION 026 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 09 AUG 70 BAROM 1022.8 WEATHER 02 WIND SPD 03K
HOUR 07.0 GMT DRY BULB 000.0 VISIBILITY 6 WIND DIR 14
LAT 84-26.6N WET BULB -01.0 CLOUD TYPE 2 MARSDEN
LON 106-59.0W REL HUMID 82 CLOUD AMT 8 SOUNDING 1266M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	2.04	10.348	.29	9.71	.29	.0	1.2
10	-.88	30.887	24.84	9.51	.82	3.5	.5
15	-1.55	30.903	24.87	9.51	.90	3.2	.7
20	-1.62	30.912	24.88	9.49	.89	4.4	.7
25	-1.58	30.913	24.88	9.52	.91	3.2	.4
30	-1.59	30.961	24.92	9.51	.75	3.2	.7
35	-1.59	30.983	24.94	9.45	.76	3.5	1.0
40	-1.62	31.020	24.97	9.45	.75	4.0	1.1
45	-1.63	31.107	25.04	9.35	.96	4.4	2.4
50	-1.50	31.366	25.25	8.85	1.03	8.8	
55	-1.41	31.898	25.68	7.69	1.38	18.3	8.7
60	-1.40	32.058	25.80	7.43	1.54	20.5	9.7
65	-1.44	32.172	25.90	7.37	1.64	22.8	10.8
70	-1.42	32.288	25.99	7.16	1.68	25.1	8.3
75	-1.44	32.421	26.10	6.98	1.68	28.2	13.1
80	-1.48	32.502	26.17	6.96	1.74	29.7	10.6
85	-1.50	32.571	26.22	6.84	1.73	30.5	13.8
90	-1.46	32.634	26.27	6.82	1.92	32.5	14.6
95	-1.54	32.712	26.34	6.78	1.85	34.6	15.3
100	-1.60	32.775	26.39	6.81	1.90	32.5	13.5
125	-1.57	33.084	26.64	6.44	2.00	40.7	18.3
150	-1.44	33.530	27.00	6.15	1.85	39.4	17.2
175	-1.26	34.050	27.41	6.43	1.05	19.2	13.1
200	-.91	34.322	27.62	6.83	.82	9.0	10.4
225	-.60	34.462	27.72	6.83	.75	9.2	12.4
250	-.26	34.564	27.79	6.74	.77	9.5	9.7
275	-.08	34.658	27.85	6.81	.91	9.2	12.4
300	.11	34.730	27.90	6.65	.81	9.5	12.8
325	.20	34.778	27.94	6.65	.94	9.2	13.6
350	.26	34.798	27.95	6.70	.81	8.2	13.5
375	.35	34.828	27.97	6.71	.82	8.6	13.4
400	.40	34.847	27.98	6.74	1.28	8.3	12.5
450	.41	34.859	27.99	6.78	1.00	8.3	14.6
500	.42	34.863	27.99	6.82	1.30	8.2	14.9

CRUISE	T3-014	STATION 261	OBSERVED VALUES			
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	11 AUG 70	BAROM	1024.1	WEATHER	71	WIND SPD 08K
HOUR	13.6 GMT	DRY BULB	000.0	VISIBILITY	6	WIND DIR 14
LAT	84-26.6N	WET BULB	-01.0	CLOUD TYPE	0	MARSDEN
LON	106-59.0W	REL HUMID	82	CLOUD AMT	8	SOUNDING 1266M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.59	31.058	25.00				
42		31.068					
44	-1.60	31.107	25.04				
46	-1.64	31.181	25.10				
48	-1.56	31.315	25.21				
50	-1.53	31.552	25.40				
52	-1.48	31.691	25.51				
54	-1.44	31.812	25.61				
56	-1.40	31.928	25.70				
58	-1.38	31.984	25.74				
60	-1.36	32.055	25.80				

CRUISE	T3-014	STATION	027	OBSERVED VALUES			
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)							
DATE	16 AUG 70	BAROM	1001.9	WEATHER	71	WIND SPD	11K
HOUR	07.0 GMT	DRY BULB	000.0	VISIBILITY	6	WIND DIR	32
LAT	84-14.1N	WET BULB	-01.0	CLOUD TYPE	0	MARSDEN	
LON	106-34.0W	REL HUMID	82	CLOUD AMT	9	SOUNDING	1643M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.49	13.824	2.93	9.64	.42	2.3	1.3
10	-1.56	30.885	24.86	9.53	.71	4.4	.6
15	-1.63	30.919	24.89	9.51	.77	3.5	.8
20	-1.66	30.921	24.89	9.53	.76	3.7	.6
25	-1.62	30.941	24.90	9.53	.70	3.6	.6
30	-1.64	30.940	24.90	9.53	.69	3.5	.8
35	-1.64	30.949	24.91	9.52	.70	3.6	.6
40	-1.62	31.065	25.00	9.42	.82	3.7	1.1
45	-1.68	31.219	25.13	9.41	.87	5.8	2.5
50	-1.62	31.334	25.22	9.38	.89	5.5	2.0
55	-1.60	31.471	25.33	8.96	1.04	8.6	3.3
60	-1.44	31.784	25.58	8.10	1.23	16.9	7.7
65	-1.36	32.018	25.77	7.59	1.38	21.6	10.4
70	-1.37	32.160	25.89	7.34	1.50	24.7	10.9
75	-1.39	32.312	26.01	7.24	1.57	27.2	12.8
80	-1.45	32.388	26.07	7.04	1.72	29.0	12.8
85	-1.47	32.487	26.15	6.94	1.78	31.9	14.0
90	-1.47	32.546	26.20	7.00	1.75	33.0	13.9
95	-1.50	32.620	26.26	6.85	1.79	34.0	14.1
100	-1.56	32.703	26.33	6.82	1.79	35.0	14.8

CRUISE	T3-014	STATION	271	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	17 AUG 70	BAROM	1001.9	WEATHER	71	WIND SPD 11K
HOUR	09.2 GMT	DRY BULB	000.0	VISIBILITY	6	WIND DIR 32
LAT	84-14.1N	WET BULB	-01.0	CLOUD TYPE	0	MARSDEN
LON	106-34.0W	REL HUMID	82	CLOUD AMT	9	SOUNDING 1643M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.64	31.002	24.95				
42	-1.58	31.109	25.04				
44	-1.64	31.222	25.13				
46	-1.66	31.245	25.15				
48	-1.64	31.297	25.19				
50	-1.66	31.329	25.22				
52	-1.64	31.386	25.27				
54	-1.60	31.459	25.32				
56	-1.55	31.505	25.36				
58	-1.52	31.624	25.46				
60	-1.48	31.730	25.54				

CRUISE T3-014 STATION 028 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 23 AUG 70 BAROM 1017.3 WEATHER 10 WIND SPD 08K
HOUR 07.3 GMT DRY BULB -03.0 VISIBILITY 7 WIND DIR 18
LAT 84-15.0N WET BULB -04.0 CLOUD TYPE 0 MARSDEN
LON 106-33.0W REL HUMID 79 CLOUD AMT 6 SOUNDING 1610M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	.26	27.322	21.94	9.59	.79	4.0	1.6
10	-1.48	30.874	24.85	9.55	.78	4.4	.6
15	-1.65	30.910	24.88	9.51	.83	4.5	1.0
20	-1.68	30.923	24.89	9.53	.83	5.0	.7
25	-1.66	30.942	24.91	9.54	.81	3.5	1.2
30	-1.68	30.954	24.92	9.48	1.15	9.2	.9
35	-1.68	30.983	24.94	9.45	.85	4.0	1.1
40	-1.62	31.056	25.00	9.41	1.04	4.5	1.1
45	-1.61	31.293	25.19	9.10	.97	7.5	3.0
50	-1.50	31.531	25.38	8.75	1.15	10.7	4.4
55	-1.48	31.755	25.56	8.26	1.33	15.8	6.8
60	-1.44	32.016	25.77	7.68	1.48	20.3	8.4
65	-1.40	32.188	25.91	7.47	1.60	24.0	11.2
70	-1.43	32.292	25.99	7.17	1.60	27.0	11.9
75	-1.48	32.423	26.10	7.00	1.71	29.8	12.9
80	-1.47	32.503	26.17	6.93	1.87	30.5	13.6
85	-1.50	32.546	26.20	6.96	1.85	31.9	14.9
90	-1.50	32.615	26.26	6.94	1.86	33.5	14.1
95	-1.52	32.679	26.31	6.94	1.89	34.8	14.9
100	-1.57	32.730	26.35	6.86	1.92	35.4	14.3
125	-1.58	32.999	26.57	6.65	1.95	40.5	18.1
150	-1.46	33.408	26.90	6.26	1.91	41.5	19.1
175	-1.26	34.011	27.38	6.52		23.7	14.0
200	-.98	34.318	27.62	6.91	.74	10.7	11.2
225	-.64	34.462	27.72	7.04	.70	9.7	12.0
250	-.28	34.582	27.80	6.91	.72	8.6	12.0
275	-.09	34.667	27.86	6.82	.77	9.9	11.7
300	.08	34.742	27.91	6.76	.73	9.7	13.0
325	.18	34.804	27.96	6.98	.79	10.7	12.0
350	.28	34.823	27.97	6.88	.86	9.2	13.1
375	.32	34.857	27.99	6.88	.77	8.4	12.3
400	.40	34.872	28.00	6.96	.78	8.9	13.1
450	.42	34.894	28.02	6.88	.73	10.4	14.1
500	.42	34.904	28.03	6.94	.81	8.9	13.3

CRUISE	T3-014	STATION 281	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	24 AUG 70	BAROM	1011.0	WEATHER	70
HOUR	08.0 GMT	DRY BULB	-01.0	VISIBILITY	6
LAT	84-15.0N	WET BULB	-02.0	CLOUD TYPE	0
LON	106-33.0W	REL HUMID	81	CLOUD AMT	9
					WIND SPD 14K
					WIND DIR 18
					MARSDEN
					SOUNDING 1610M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.62	31.200	25.11				
42	-1.58	31.237	25.14				
44	-1.63	31.233	25.14				
46	-1.64	31.282	25.18				
48	-1.58	31.428	25.30				
50	-1.56	31.526	25.38				
52	-1.50	31.772	25.58				
54	-1.50	32.038	25.79				
56	-1.50	32.098	25.84				
58	-1.48	32.104	25.84				
60	-1.48	32.156	25.89				

CRUISE T3-014 STATION 029 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 30 AUG 70 BAROM 1002.1 WEATHER 77 WIND SPD 12K
 HOUR 06.8 GMT DRY BULB -04.0 VISIBILITY 7 WIND DIR 09
 LAT 84-24.0N WET BULB -04.0 CLOUD TYPE 0 MARSDEN
 LON 104-22.0W REL HUMID 99 CLOUD AMT 9 SOUNDING 1400M

DEPTH M	TEMP C	SALINITY O/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM-ATOMS/L	SIO4	NO3
5	-1.62	29.397	23.65	9.59	.87	5.0	.7
10	-1.56	30.793	24.78	9.64	.92	5.0	.4
15	-1.66	30.807	24.80	9.63	.85	5.1	.3
20	-1.66	30.820	24.81	9.63	.87	4.5	.3
25	-1.64	30.849	24.83	9.59	.94	5.3	.2
30	-1.63	30.861	24.84	9.61	.87	4.4	.2
35	-1.64	30.923	24.89	9.58	.83	5.0	.5
40	-1.62	31.028	24.98	9.49	.89	5.3	.7
45	-1.60	31.192	25.11	9.26	.96	7.5	2.6
50	-1.54	31.350	25.23	9.04	1.05	8.5	2.9
55	-1.52	31.708	25.52	8.33	1.23	15.3	6.3
60	-1.48	31.879	25.66	7.94	1.34	18.5	7.9
65	-1.40	32.068	25.81	7.35	1.56	22.5	10.7
70	-1.38	32.232	25.94	7.24	1.64	26.5	12.4
75	-1.38	32.333	26.03	7.14	1.68	28.2	13.4
80	-1.40	32.415	26.09	7.04	1.75	30.0	13.8
85	-1.42	32.540	26.19	6.94	1.82	34.1	15.7
90	-1.41	32.610	26.25	6.85	1.85	34.8	14.7
95	-1.47	32.681	26.31	6.81	1.92	35.8	15.2
100	-1.52	32.738	26.36	6.79	1.86	37.6	15.4
125	-1.56	33.037	26.60	6.56	2.10	44.3	18.0
150	-1.48	33.406	26.90	6.15	2.01	44.3	16.8
175	-1.25	33.969	27.35	6.32	1.45	28.0	14.4
200	-.98	34.292	27.60	6.81	.87	13.5	11.0
225	-.68	34.419	27.69	6.91	.75	11.0	11.1
250	-.38	34.537	27.77	6.85	.81	10.3	10.4
275	-.14	34.633	27.84	6.84	.80	9.5	11.6
300	.07	34.716	27.89	6.71	.92	10.7	12.5
325	.22	34.780	27.94	6.79	.83	9.9	12.6
350	.30	34.804	27.95	6.74	.87	10.4	12.7
375	.32	34.835	27.98	6.80	.85	9.2	13.2
400	.40	34.853	27.99	6.79	.87	9.2	13.5
450	.42	34.862	27.99	6.84	.84	10.4	13.8
500	.44	34.876	28.00	6.89	.85	9.5	13.6
600	.28	34.882	28.02	6.92	.92	9.0	13.2
700	.18	34.889	28.03	7.02	.99	9.0	13.9
800	.10	34.897	28.04	7.03	.95	9.7	13.3
900	.04	34.906	28.05	7.09	.93	9.2	13.7
1000	-.08	34.917	28.06	6.99	.95	10.3	13.8
1250	-.24	34.926	28.08	6.99	.97	11.8	14.1

CRUISE	T3-014	STATION 291	OBSERVED VALUES			
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	31 AUG 70	BAROM	1003.1	WEATHER	71	WIND SPD K
HOUR	05.8 GMT	DRY BULB	-03.0	VISIBILITY	7	WIND DIR
LAT	84-24.0N	WET BULB	-04.0	CLOUD TYPE	0	MARSDEN
LON	104-22.0W	REL HUMID	79	CLOUD AMT	9	SOUNDING 1400M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.60	31.084	25.02				
42	-1.48	31.169	25.09				
44	-1.63	31.121	25.05				
46	-1.63	31.230	25.14				
48	-1.59	31.244	25.15				
50	-1.61	31.357	25.24				
52	-1.60	31.403	25.28				
54	-1.60	31.575	25.42				
56	-1.49	31.718	25.53				
58	-1.44	31.860	25.65				
60	-1.41	32.006	25.76				

CRUISE T3-014 STATION 030 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 07 SEP 70 BAROM 1005.1 WEATHER 71 WIND SPD 12K
 HOUR 07.4 GMT DRY BULB -01.0 VISIBILITY 7 WIND DIR 22
 LAT 84-31.3N WET BULB -01.0 CLOUD TYPE 0 MARSDEN
 LON 102-42.0W REL HUMID 99 CLOUD AMT 9 SOUNDING 1742M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM-ATOMS/L	SIO4	NO3
5	-1.36	30.743	24.74	9.61	.74	5.1	.7
10	-1.48	30.878	24.85	9.60	.74	4.4	.9
15	-1.66	30.887	24.86	9.59	.72	4.5	1.2
20	-1.68	30.890	24.86	9.61	.67	4.4	2.0
25	-1.66	30.884	24.86	9.62	.64	4.5	.3
30	-1.66	30.892	24.87	9.63	.65	4.5	.2
35	-1.67	30.894	27.87	9.60	.71	4.4	.2
40	-1.66	30.898	24.87	9.61	.77	4.0	1.1
45	-1.64	30.900	24.87	9.62	.73	6.0	1.6
50	-1.54	31.191	25.11	9.22	.82	8.0	2.1
55	-1.52	31.548	25.39	8.67	.87	11.6	4.6
60	-1.50	31.854	25.64	7.93	1.22	17.6	8.9
65	-1.40	32.064	25.81	7.48	1.35	21.0	10.2
70	-1.39	32.205	25.92	7.19	1.40	24.0	13.4
75	-1.40	32.320	26.02	7.10	1.49	26.0	10.7
80	-1.40	32.426	26.10	7.02	1.68	29.0	14.9
85	-1.43	32.480	26.15	6.97	1.70	30.8	16.6
90	-1.39	32.545	26.20	6.92	1.73	31.4	16.8
95	-1.45	32.619	26.26	6.83	1.70	32.3	17.8
100	-1.50	32.714	26.34	6.78	1.77	33.7	17.0
125	-1.58	33.047	26.61	6.46	1.92	42.3	21.0
150	-1.45	33.506	26.98	6.10	1.88	39.8	19.7
175	-1.32	33.994	27.37	6.45	.92	21.0	14.8
200	-1.00	34.295	27.60	6.88	.67	11.3	12.5
225	-.62	34.446	27.71	6.82	.63	10.7	13.8
250	-.32	34.556	27.78	6.76	.67	9.2	12.0
275	-.13	34.647	27.85	6.38	.66	9.7	13.4
300	.08	34.722	27.90	6.68	.67	10.7	14.8
325	.22	34.778	27.94	6.62	.67	9.2	14.9
350	.30	34.797	27.95	6.58	.70	9.9	15.1
375	.32	34.822	27.97	4.72	.66	9.0	15.2
400	.40	34.835	27.97	6.57	.70	9.2	15.4
450	.40	34.852	27.98	6.90	.67	9.7	15.3
500	.44	34.861	27.99	6.84	.70	9.9	14.3

CRUISE	T3-014	STATION 301	OBSERVED VALUES			
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	08 SEP 70	BAROM	1009.2	WEATHER	02	WIND SPD 11K
HOUR	05.5 GMT	DRY BULB	-05.0	VISIBILITY	7	WIND DIR 18
LAT	84-31.3N	WET BULB	-06.0	CLOUD TYPE	6	MARSDEN
LON	102-42.0W	REL HUMID	77	CLOUD AMT	9	SOUNDING 1742M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.63	30.998	24.95				
42	-1.48	31.113	25.04				
44	-1.62	31.188	25.10				
46	-1.64	31.202	32.12				
48	-1.60	31.243	25.15				
50	-1.62	31.318	25.21				
52	-1.61	31.411	25.28				
54	-1.58	31.432	25.30				
56	-1.56	31.595	25.43				
58	-1.50	31.764	25.57				
60	-1.46	31.924	25.70				

CRUISE	T3-014	STATION	031	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	13 SEP 70	BAROM	1001.0	WEATHER	71	WIND SPD 00K
HOUR	07.5 GMT	DRY BULB	-11.0	VISIBILITY	7	WIND DIR 00
LAT	84-50.5N	WET BULB	-12.0	CLOUD TYPE	6	MARSDEN
LON	099-38.0W	REL HUMID	67	CLOUD AMT	9	SOUNDING 1918M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.16	24.736	19.88	9.65	.83	4.0	1.3
10	-1.12	30.879	24.84	9.48	.78	3.6	.6
15	-1.65	30.892	24.87	9.52	.80	3.5	1.0
20	-1.66	30.894	24.87	9.55	.79	4.4	.9
25	-1.63	30.900	24.87	9.53	.79	4.0	.6
30	-1.66	30.900	24.87	9.56	.81	3.6	.8
35	-1.68	30.904	24.88	9.18	.79	4.5	.8
40	-1.67	30.905	24.88	8.72	.80	3.7	.8
45	-1.64	30.985	24.94	9.50	.82	5.1	1.9
50	-1.53	31.289	25.18	8.99	.95	7.5	3.0
55	-1.45	31.569	25.41	8.41	1.14	12.6	5.3
60	-1.44	31.887	25.67	7.74	1.37	19.4	8.7
65	-1.38	32.089	25.83	7.46	1.48	21.5	10.5
70	-1.38	32.218	25.93	7.25	1.60	25.0	10.7
75	-1.40	32.338	26.03	6.40	1.65	28.0	13.0
80	-1.41	32.459	26.13	6.92	1.72	29.3	13.2
85	-1.42	32.510	26.17	6.83	1.75	31.4	10.8
90	-1.47	32.605	26.25	6.57	1.80	32.3	13.1
95	-1.52	32.686	26.32	6.70	1.89	35.0	15.2
100	-1.51	32.762	26.38	6.69	1.94	36.5	15.2

CRUISE	T3-014	STATION 311	OBSERVED VALUES			
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	14 SEP 70	BAROM	1001.0	WEATHER	71	WIND SPD 00K
HOUR	09.8 GMT	DRY BULB	-11.0	VISIBILITY	7	WIND DIR 00
LAT	84-50.5N	WET BULB	-12.0	CLOUD TYPE	6	MARSDEN
LON	099-38.0W	REL HUMID	67	CLOUD AMT	9	SOUNDING 1918M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.63	30.926	24.89				
42	-1.51	30.926	24.89				
44	-1.67	30.933	24.90				
46	-1.66	30.997	24.95				
48	-1.61	31.172	25.09				
50	-1.62	31.241	25.15				
52	-1.61	31.353	25.24				
54	-1.58	31.480	25.34				
56	-1.51	31.664	25.49				
58	-1.43	31.834	25.62				
60	-1.41	31.920	25.69				

CRUISE	T3-015	STATION 37C	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	01 NOV 70	BAROM	1016.1	WEATHER	WIND SPD 06K
HOUR	23.5 GMT	DRY BULB	-21.0	VISIBILITY 7	WIND DIR 04
LAT	85-05.6N	WET BULB	-21.0	CLOUD TYPE	MARSDEN
LON	098-40.0W	REL HUMID	99	CLOUD AMT 0	SOUNDING 1560M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
500	.44	34.897	28.02	7.09			
600	.28	34.905	28.03	7.15			
700	.18	34.902	28.04	6.97			
800	.06	34.920	28.06	7.04			
900	.00	34.924	28.07	7.22			
1000	-.11	34.937	28.08				
1250	-.24	34.956	28.10				
1500	-.33	34.961	28.11				

CRUISE	T3-015	STATION	372	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	08 NOV 70	BAROM	1018.2	WEATHER		WIND SPD 10K
HOUR	02.0 GMT	DRY BULB	-19.0	VISIBILITY	7	WIND DIR 31
LAT	85-09.0N	WET BULB	-19.0	CLOUD TYPE		MARSDEN
LON	099-12.0W	REL HUMID	99	CLOUD AMT	0	SOUNDING 1445M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.66	31.091	25.03				
42	-1.68	31.094	25.03				
44	-1.66	31.237	25.14				
46	-1.65	31.515	25.37				
48	-1.64	31.551	25.40				
50	-1.63	31.569	25.41				
52	-1.62	31.647	25.48				
54	-1.60	31.739	25.55				
56	-1.57	31.755	25.56				
58	-1.54	31.886	25.67				
60	-1.50	31.973	25.74				

CRUISE	T3-015	STATION	373	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	15 NOV 70	BAROM	1019.8	WEATHER		WIND SPD 00K
HOUR	00.5 GMT	DRY BULB	-27.0	VISIBILITY	7	WIND DIR
LAT	85-05.3N	WET BULB	-27.0	CLOUD TYPE	7	MARSDEN
LON	099-17.0W	REL HUMID	99	CLOUD AMT	8	SOUNDING 2094M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.60	31.096	25.03				
42	-1.60	31.136	25.06				
44	-1.64	31.284	25.18				
46	-1.64	31.490	25.35				
48	-1.65	31.542	25.39				
50	-1.64	31.596	25.44				
52	-1.63	31.654	25.48				
54	-1.62	31.707	25.52				
56	-1.52	31.793	25.59				
58	-1.54	31.876	25.66				
60	-1.52	31.988	25.75				

CRUISE	T3-015	STATION 374	OBSERVED VALUES		
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)			
DATE	24 NOV 70	BAROM	1016.2	WEATHER	WIND SPD 14K
HOUR	01.0 GMT	DRY BULB	-31.0	VISIBILITY 7	WIND DIR 18
LAT	85-16.3N	WET BULB	-31.0	CLOUD TYPE	MARSDEN
LON	098-48.0W	REL HUMID	99	CLOUD AMT 0	SOUNDING 1310M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.67	30.997	24.95				
42	-1.68	31.008	24.96				
44	-1.69	31.005	24.96				
46	-1.69	31.056	25.00				
48	-1.63	31.511	25.37				
50	-1.62	31.643	25.47				
52	-1.58						
54	-1.57						
56	-1.52	31.934	25.71				
58	-1.48	31.994	25.75				
60	-1.46	32.051	25.80				

CRUISE	T3-015	STATION 381	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	29 NOV 70	BAROM	1008.6	WEATHER	WIND SPD 04K
HOUR	06.2 GMT	DRY BULB	-41.0	VISIBILITY 7	WIND DIR 36
LAT	85-19.5N	WET BULB	-41.0	CLOUD TYPE	MARSDEN
LON	097-39.8W	REL HUMID	99	CLOUD AMT 0	SOUNDING 1288M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.66	31.128	25.06				
42	-1.64	31.450	25.32				
44	-1.58	31.634	25.46				
46	-1.58	31.722	25.54				
48	-1.52	31.778	25.58				
50	-1.48	31.834	25.62				
52	-1.48	31.904	25.68				
54	-1.44	31.968	25.73				
56	-1.41	32.023	25.78				
58	-1.41	32.028	25.78				
60	-1.42	32.063	25.81				

CRUISE	T3-015	STATION	038	OBSERVED VALUES		
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	30 NOV 70	BAROM	1014.2	WEATHER	00	WIND SPD 13K
HOUR	01.8 GMT	DRY BULB	-38.0	VISIBILITY	7	WIND DIR 34
LAT	85-15.9N	WET BULB	-38.0	CLOUD TYPE		MARSDEN
LON	097-52.4W	REL HUMID	99	CLOUD AMT	0	SOUNDING 1293M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.67	31.056	25.00	8.82			
10	-1.69	31.085	25.02				
15	-1.68	31.070	25.01	8.83			
20	-1.70	31.069	25.01	8.83			
25	-1.70	31.077	25.02	8.77			
30		31.081		8.80			
35	-1.69	31.076	25.02	8.79			
40	-1.70	31.072	25.01	8.84			
45	-1.58	31.544	25.39	8.32			
50	-1.57	31.736	25.55	7.86			
55	-1.51	31.920	25.70	7.41			
60	-1.49	32.077	25.82	7.06			
65	-1.45	32.198	25.92	6.83			
70	-1.42	32.262	25.97	6.71			
75	-1.45	32.391	26.07	6.58			
80	-1.47	32.481	26.15	6.49			
85	-1.43	32.584	26.23	6.42			
90	-1.47	32.638	26.28	6.37			
95	-1.48	32.731	26.35	6.26			
100	-1.50	32.788	26.40	6.20			
125	-1.57	33.102	26.65	5.93			
150	-1.41	33.573	27.03	5.58			
175	-1.28	34.148	27.49	6.06			
200	-.93	34.351	27.64	6.28			
225	-.53	34.512	27.76	6.19			
250	-.20	34.616	27.83	6.11			
275	-.06	34.693	27.88	5.93			
300	.12	34.763	27.93	6.07			
325	.24	34.836	27.98	6.10			
350	.31	34.841	27.98	6.12			
375	.33	34.874	28.01	6.14			
400	.42	34.874	28.00	6.23			
450	.43	34.895	28.02	6.21			
500	.44	34.807	27.95	6.26			
600	.28	34.910	28.04	6.30			
700	.16	34.882	28.02	6.17			
800	.06	34.921	28.06	6.22			
900	.00	34.928	28.07	6.38			
1000	-.13	34.945	28.09				
1250	-.24	34.951	28.10				

CRUISE	T3-015	STATION	039	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	25 DEC 70	BAROM	1005.5	WEATHER	00	WIND SPD 06K
HOUR	02.9 GMT	DRY BULB	-39.0	VISIBILITY	7	WIND DIR 17
LAT	85-10.3N	WET BULB	-39.0	CLOUD TYPE		MARSDEN
LON	096-51.1W	REL HUMID		CLOUD AMT	0	SOUNDING 1593M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.45	31.124	25.05				
10	-1.65	31.119	25.05				
15	-1.70	31.118	25.05				
20	-1.69	31.111	25.04				
25	-1.68	31.112	25.04				
30	-1.69	31.121	25.05				
35	-1.70	31.121	25.05				
40	-1.74	31.124	25.05				
45	-1.66	31.218	25.13				
50	-1.63	31.642	25.47				
55	-1.57	31.832	25.63				
60	-1.51	32.045	25.80				
65	-1.46	32.200	25.92				
70	-1.43	32.294	26.00				
75	-1.47	32.395	26.08				
80	-1.52	32.496	26.16				
85	-1.48	32.580	26.23	6.19			
90	-1.49	32.656	26.29	6.09			
95	-1.51	32.738	26.36	6.12			
100	-1.53	32.799	26.41	6.09			
125	-1.55	33.114	26.66	5.73			
150	-1.40	33.608	27.06	5.53			
175	-1.29	34.111	27.46	6.00			
200	-.87	34.346	27.64	6.23			
225	-.56	34.478	27.73				
250	-.25	34.580	27.80				
275	-.04	34.666	27.86				
300	.11	34.737	27.91				
325	.29	34.797	27.95	7.79			
350	.35	34.818	27.96				
375	.36	34.835	27.97				
400	.43	34.861	27.99				
450	.47	34.875	28.00	6.26			
500	.46	34.885	28.01	6.18			

CRUISE	T3-016	STATION	001	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	27 MAR 71	BAROM	1009.1	WEATHER	70	WIND SPD 04K
HOUR	16.5 GMT	DRY BULB	-26.0	VISIBILITY	6	WIND DIR 23
LAT	85-23.8N	WET BULB	-26.0	CLOUD TYPE	2	MARSDEN
LON	088-34.0W	REL HUMID		CLOUD AMT	2	SOUNDING 2004M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.73	31.255	25.16	8.25			
10	-1.69	31.255	25.16	8.40			
15	-1.68	31.256	25.16	8.41			
20	-1.69	31.258	25.16	8.40			
25	-1.69	31.266	25.17	8.40			
30	-1.69	31.262	25.17	8.41			
35	-1.69	31.254	25.16	8.39			
40	-1.71	31.352	25.24	8.20			
45	-1.71	31.267	25.17	8.30			
50	-1.53	31.848	25.64	7.34			
55	-1.46	32.096	25.84	6.79			
60	-1.44	32.224	25.94	6.56			
65	-1.55	32.342	26.04	7.59			
70	-1.48	32.436	26.11	6.44			
75	-1.47	32.521	26.18	6.36			
80	-1.46	32.609	26.25	6.39			
85	-1.50	32.697	26.32	6.15			
90	-1.51	32.775	26.39	6.15			
95	-1.51	32.838	26.44	6.10			
100	-1.55	32.878	26.47	5.84			
125	-1.53	33.228	26.75	5.61			
150	-1.35	33.760	27.18	5.55			
175	-1.20	34.185	27.52	6.00			
200	-.76	34.379	27.66	7.95			
250	-.17	34.596	27.81	6.15			
275	.07	34.675	27.86	6.08			
300	.24	34.750	27.91	6.13			
325	.35	34.810	27.95	6.09			
350	.44	34.837	27.97	6.21			
375	.40	34.834	27.97	6.18			
400	.50	34.873	28.00	5.95			
450	.49	34.877	28.00	6.02			
500	.47	34.881	28.00	6.22			
600	.34	34.902	28.03	6.30			
700	.18	34.901	28.04	6.25			
800	.08	34.902	28.05	6.10			
900	.00	34.913	28.06	6.27			
1000	-.10	34.922	28.07	6.30			
1100	-.16	34.936	28.08	6.31			
1200	-.21	34.944	28.09	6.34			
1300	-.25	34.952	28.10	6.28			
1400	-.27	34.943	28.09	6.27			
1600	-.35	34.898	28.06	6.14			
1700	-.35	34.957	28.11	6.15			
1800	-.37	34.955	28.11	6.17			

CRUISE	T3-016	STATION 001	OBSERVED VALUES			
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	27 MAR 71	BAROM	1009.1	WEATHER	70	WIND SPD 04K
HOUR	16.5 GMT	DRY BULB	-26.0	VISIBILITY	6	WIND DIR 23
LAT	85-23.8N	WET BULB	-26.0	CLOUD TYPE	2	MARSDEN
LON	088-34.0W	REL HUMID		CLOUD AMT	2	SOUNDING 2004M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
1900	-.38	34.953	28.11	6.27			
1980	-.37	34.962	28.11	6.20			

CRUISE	T3-017	STATION	001	OBSERVED VALUES		
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	20 APR 71	BAROM	1032.8	WEATHER	45	WIND SPD 05K
HOUR	19.8 GMT	DRY BULB	-19.0	VISIBILITY	8	WIND DIR 13
LAT	85-25.8N	WET BULB	.	CLOUD TYPE	1	MARSDEN
LON	089-10.2W	REL HUMID		CLOUD AMT	9	SOUNDING 1999M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.70	31.289	25.19				
42	-1.68	31.305	25.20				
44	-1.66	31.292	25.19				
46	-1.60	31.311	25.20				
48	-1.52	31.303	25.20				
50	-1.53	31.307	25.20				
52	-1.53	31.308	25.20				
54	-1.51	31.308	25.20				
56	-1.49	31.300	25.19				
58	-1.50	31.304	25.20				
60	-1.48	31.305	25.20				
62	-1.49	31.305	25.20				

CRUISE	T3-017	STATION	002	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	27 APR 71	BAROM	1009.1	WEATHER	00	WIND SPD 07K
HOUR	23.2 GMT	DRY BULB	-08.0	VISIBILITY		WIND DIR 04
LAT	85-38.0N	WET BULB	.	CLOUD TYPE	5	MARSDEN
LON	086-35.4W	REL HUMID		CLOUD AMT	8	SOUNDING 2798M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.70	31.298	25.19	8.36			
10	-1.70	31.289	25.19	8.37			
15	-1.73	31.287	25.19	8.39			
20	-1.72	31.283	25.18	8.25			
25	-1.69	31.279	25.18	8.13			
30	-1.69	31.276	25.18	8.43			
35	-1.69	31.279	25.18	8.49			
40	-1.70	31.315	25.21	8.42			
45	-1.71	31.290	25.19	8.21			
50	-1.68	31.357	25.24	8.42			
55	-1.52	31.984	25.75	6.97			
60	-1.49	32.259	25.97	6.54			
65	-1.49	32.298	26.00	6.54			
70	-1.49	32.386	26.07	6.43			
75	-1.47	32.483	26.15	6.23			
80	-1.54	32.557	26.21	6.13			
85	-1.52	32.645	26.28	6.05			
90	-1.53	32.782	26.39	6.10			
95	-1.53	32.790	26.40	6.05			
100	-1.56	32.835	26.44	5.96			
125	-1.53	33.177	26.71	5.56			
150	-1.33	33.754	27.18	5.50			
175	-1.15	34.208	27.54	5.95			
200	-.73	34.384	27.66	6.12			
225	-.47	34.494	27.74	6.05			
250	-.18	34.587	27.80	6.03			
275	.03	34.668	27.86	5.99			
300	.22	34.734	27.90	5.95			
325	.32	34.792	27.94	5.91			
350	.42	34.817	27.96	6.04			
375	.41	34.817	27.96	6.09			
400	.46	34.837	27.97	6.05			
450	.47	34.846	27.98	6.04			
500	.49	34.855	27.98	6.12			
600	.35	34.863	28.00	6.10			
700	.20	34.863	28.01	6.25			

CRUISE T3-018 STATION 001 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 05 JUN 71 BAROM 1013.3 WEATHER 00 WIND SPD 04K
HOUR 00.5 GMT DRY BULB -04.0 VISIBILITY 7 WIND DIR 32
LAT 85-12.4N WET BULB -05.0 CLOUD TYPE 0 MARSDEN
LON 088-29.0W REL HUMID 78 CLOUD AMT 2 SOUNDING 2029M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.63	31.390	25.27	9.13	1.13	10.0	2.5
10	-1.69	31.382	25.26	9.08	1.05	4.0	1.4
15	-1.72	31.376	25.26	9.21	.95	6.0	1.6
20	-1.70	31.384	25.26	9.13	1.03	5.0	1.7
25	-1.72	31.378	25.26	9.13	.95	6.0	1.6
30	-1.74	31.384	25.27	9.08	1.02	7.0	1.2
35	-1.74	31.384	25.27	9.13	1.01	7.0	1.8
40	-1.74	31.384	25.27	9.11	.97	5.0	1.7
42	-1.63	31.386	25.27				
44	-1.65	31.382	25.26				
45	-1.73	31.405	25.28	9.08	.99	5.0	.7
46	-1.64	31.382	25.26				
48	-1.70	31.383	25.26				
50	-1.68	31.435	25.31	8.97	.98	6.0	1.5
52	-1.62	31.892	25.67				
54	-1.55	32.012	25.77				
55	-1.51	32.014	25.77	7.57	1.42	6.0	9.1
56	-1.55	32.060	25.81				
58	-1.52	32.130	25.87				
60	-1.49	32.171	25.90	7.17	1.56	19.0	10.9
65	-1.50	32.305	26.01	7.09	1.68	22.0	12.1
70	-1.47	32.419	26.10	6.94	1.84	25.0	14.8
75	-1.51	32.503	26.17	6.83	1.83	29.0	13.9
80	-1.50	32.581	26.23	6.83	1.94	28.0	15.5
85	-1.48	32.657	26.29	6.69	1.99	31.0	15.6
90	-1.51	32.724	26.35	6.69	2.04	35.0	17.0
95	-1.53	32.797	26.41	6.61	2.07	36.0	17.3
100	-1.53	32.867	26.46	6.53	2.07	38.0	

CRUISE	T3-018	STATION	002	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	12 JUN 71	BAROM	1032.5	WEATHER	80	WIND SPD 06K
HOUR	22.8 GMT	DRY BULB	000.0	VISIBILITY	6	WIND DIR 13
LAT	85-02.0N	WET BULB	000.0	CLOUD TYPE	7	MARSDEN
LON	089-31.0W	REL HUMID	99	CLOUD AMT	8	SOUNDING 1790M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.69	31.394	25.27	9.24	1.04	6.0	1.8
10	-1.69	31.383	25.26	9.25	1.39	6.0	1.1
15	-1.69	31.387	25.27	9.22	1.26	5.0	.6
20	-1.71	31.391	25.27	9.23	1.49	9.0	.3
25	-1.72	31.393	25.27	9.23	1.00	6.0	2.0
30	-1.72	31.400	25.28	9.23	1.00	6.0	2.2
35	-1.74	31.408	25.28	9.25	.85	6.0	.0
40	-1.70	31.416	25.29	9.23	1.02	8.0	2.6
45	-1.68	31.418	25.29	9.24	1.63	9.0	2.4
50	-1.68	31.430	25.30	9.24	1.11	39.0	1.9
55	-1.60	31.827	25.62	8.05	1.42	15.0	7.3
60	-1.48	32.110	25.85	7.45	1.66	21.0	11.4
65	-1.47	32.230	25.95	7.21	1.76	29.0	12.9
70	-1.47	32.384	26.07	7.04	1.72	28.0	13.8
75	-1.51	32.463	26.13	6.93	1.71	30.0	14.0
80	-1.50	32.582	26.23	6.84	1.95	34.0	16.8
85	-1.51	32.651	26.29	6.74	1.78	35.0	16.0
90	-1.50	32.730	26.35	6.71	1.94	36.0	16.9
95	-1.53	32.784	26.40	6.62	1.99	38.0	17.0
100	-1.54	32.849	26.45	6.63	1.82	37.0	12.0
125	-1.54	33.182	26.72	6.32	2.10	52.0	19.5
150	-1.41	33.729	27.16	6.10	1.30	29.0	11.6
175	-1.23	34.182	27.52	6.60	.89	14.0	10.5
200	-.80	34.362	27.65	6.76	.79	9.0	7.5
225	-.45	34.488	27.74	6.76	.82	8.0	7.8
250	-.17	34.579	27.80	6.74	.66	8.0	8.8
275	.00	34.654	27.85	6.69	.85	8.0	9.3
300	.19	34.732	27.90	6.68	.96	9.0	13.6
325	.32	34.782	27.93	6.68	1.00	9.0	14.6
350	.39	34.804	27.95	6.73	.84	7.0	14.7
375	.33	34.804	27.95	6.74	.89	8.0	14.3
400	.43	34.832	27.97	6.72	.98	9.0	15.1
450	.43	34.836	27.97	6.76	.88	8.0	14.2
500	.46	34.856	27.98	6.78	.87	9.0	14.6

CRUISE	T3-018	STATION 003	OBSERVED VALUES				
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	19 JUN 71	BAROM	1014.7	WEATHER	00	WIND SPD	04K
HOUR	23.2 GMT	DRY BULB	00.0	VISIBILITY	7	WIND DIR	30
LAT	84-58.0N	WET BULB	00.0	CLOUD TYPE		MARSDEN	
LON	088-31.0W	REL HUMID	99	CLOUD AMT	0	SOUNDING	2034M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.66	31.454	25.32	8.99	.86	6.0	2.3
10	-1.67	31.453	25.32	9.03	.98	6.0	2.8
15	-1.71	31.417	25.29	9.03	.99	6.0	2.4
20	-1.70	31.414	25.29	9.05	.99	7.0	2.2
25	-1.72	31.417	25.29	9.04	1.00	6.0	2.2
30	-1.73	31.418	25.29	9.03	.94	6.0	2.2
35	-1.74	31.425	25.30	9.17	.99	7.0	2.2
40	-1.72	31.432	25.30	9.16	.96	6.0	2.2
42	-1.72	31.442	25.31				
44	-1.72	31.449	25.32	9.18	1.02	7.0	2.2
46	-1.70	31.458	25.32				
48	-1.66	31.474	25.34				
50	-1.63	31.601	25.44	8.68	1.44	11.0	4.8
52	-1.56	31.997	25.76				
54	-1.52	32.078	25.82	7.47	1.55	21.0	11.0
56	-1.48	32.188	25.91				
58	-1.45	32.278	25.98				
60	-1.45	32.336	26.03	7.08	1.68	28.0	14.1
65	-1.45	32.436	26.11	6.88	1.76	30.0	14.2
70	-1.48	32.467	26.14	6.88	1.75	30.0	16.1
75	-1.50	32.568	26.22	6.81	1.86	33.0	15.7
80	-1.52	32.622	26.26	6.78	1.94	34.0	16.8
85	-1.55	32.714	26.34	6.70	1.93	36.0	17.4
90	-1.56	32.782	26.39	6.69	1.97	37.0	17.8
95	-1.54	32.803	26.41	6.63	2.02	40.0	17.6
100	-1.55	32.899	26.49	6.55	2.04	41.0	19.0

CRUISE T3-018 STATION 004 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 26 JUN 71 BAROM 1015.5 WEATHER 00 WIND SPD 04K
HOUR 22.5 GMT DRY BULB 00.0 VISIBILITY 6 WIND DIR 06
LAT 84-58.0N WET BULB 00.0 CLOUD TYPE MARSDEN
LON 088-14.0W REL HUMID 99 CLOUD AMT 0 SOUNDING 2042M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.62	30.608	24.63	9.21	1.55	7.0	2.7
10	-1.66	31.385	25.26	9.24	1.09	4.0	1.7
15	-1.69	31.392	25.27	9.22	1.07	5.0	1.6
20	-1.69	31.394	25.27	9.21	1.05	5.0	1.6
25	-1.72	31.396	25.27	9.22	1.01	5.0	1.8
30	-1.72	31.397	25.28	9.24	.96	4.0	1.6
35	-1.73	31.402	25.28	9.21	.97	4.0	1.5
40	-1.71	31.409	25.29	9.20	1.08	4.0	1.4
45	-1.71	31.421	25.29	9.22	.85	3.0	1.1
50	-1.68	31.430	25.30	9.20	1.07	5.0	1.7
55	-1.50	32.056	25.80	7.49	1.58	19.0	10.4
60	-1.47	32.181	25.91	7.29	1.00	18.0	9.6
65	-1.48	32.324	26.02	7.09	1.73	17.0	9.6
70	-1.50	32.416	26.10	6.94	2.15	27.0	13.8
75	-1.51	32.554	26.21	6.85	2.16	30.0	15.1
80	-1.50	32.614	26.26	6.74	2.25	27.0	13.8
85	-1.51	32.685	26.31	6.72	2.20	33.0	16.9
90	-1.50	32.756	26.37	6.66	2.19	35.0	16.9
95	-1.53	32.825	26.43	6.59	2.17	36.0	17.5
100	-1.54	32.864	26.46	6.56	2.03	26.0	13.0
125	-1.55	33.189	26.72	6.20	2.58	42.0	18.9
150	-1.39	33.754	27.18	6.09	1.97	23.0	12.4
175	-1.22	34.179	27.52	6.51	1.21	11.0	10.6
200	-.79	34.377	27.66	6.88	1.20	6.0	9.7
225	-.45	34.495	27.74	6.74	1.06	7.0	12.0
250	-.19	34.591	27.81	6.68	.96	7.0	12.7
275	.02	34.678	27.87	6.65	1.07	7.0	13.5
300	.20	34.748	27.91	6.65	1.17	7.0	14.0
325	.34	34.793	27.94	6.63	1.16	7.0	14.3
350	.39	34.822	27.96	6.71	1.09	7.0	14.0
375	.35	34.826	27.97	6.72	1.49	6.0	13.5
400	.44	34.850	27.98	6.72	1.00	7.0	14.7
450	.45	34.854	27.98	6.73	1.26	6.0	13.9
500	.46	34.864	27.99	6.78	1.24	7.0	14.4
600	.33	34.872	28.01	6.80	1.09	7.0	14.6
700	.19	34.879	28.02	6.85	1.20	7.0	15.1
800	.08	34.883	28.03	6.85	1.23	7.0	14.5
900	-.01	34.890	28.04	6.85	1.35	7.0	14.3
1000	-.10	34.900	28.05	6.85	1.04	7.0	14.9
1250	-.24	34.919	28.07	6.87	1.08	9.0	15.4
1500	-.33	34.930	28.09	6.83	1.02	9.0	13.9
1750	-.40	34.934	28.09	6.75	1.05	12.0	15.9
2000	-.40	34.939	28.10	6.70	1.01	12.0	16.2

CRUISE T3-018 STATION 005 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 03 JUL 71 BAROM 1016.0 WEATHER 00 WIND SPD 01K
 HOUR 22.3 GMT DRY BULB -02.0 VISIBILITY 7 WIND DIR 34
 LAT 84-47.0N WET BULB -02.0 CLOUD TYPE MARSDEN
 LON 088-25.0W REL HUMID 99 CLOUD AMT 0 SOUNDING 1979M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4	SIO4	NO3 MICROGRAM-ATOMS/L
5	-1.59	13.547	2.68	9.12	.68	.0	.7
10	-1.64	31.389	25.27	9.22	.89	5.0	1.9
15	-1.66	31.399	25.28	9.22	.90	4.0	1.6
20	-1.64	31.401	25.28	9.22	1.00	5.0	3.2
25	-1.69	31.400	25.28	9.23	.98	5.0	1.8
30	-1.71	31.409	25.29	9.18	.89	4.0	2.2
35	-1.71	31.415	25.29	9.21	1.05	5.0	1.8
40	-1.70	31.416	25.29	9.22	.89	5.0	2.1
42	-1.66	31.416	25.29				
44	-1.66	31.417	25.29	9.21	1.32	4.0	1.8
46	-1.68	31.416	25.29				
48	-1.68	31.421	25.29				
50	-1.71	31.419	25.29	9.18	1.05	5.0	1.9
52	-1.72	31.424	25.30				
54	-1.71	31.506	25.36	8.92	1.42	6.0	2.6
56	-1.60	31.900	25.68				
58	-1.51	32.079	25.82				
60	-1.39	32.177	25.90	7.31	1.64	20.0	11.9
65	-1.46	32.296	26.00	7.09	1.64	10.0	12.2
70	-1.46	32.424	26.10	6.92	1.80	27.0	14.2
75	-1.47	32.508	26.17	6.80	1.82	28.0	14.8
80	-1.52	32.570	26.22	6.75	1.84	30.0	15.8
85	-1.54	32.656	26.29	6.89	1.88	32.0	16.1
90	-1.53	32.728	26.35	6.64	2.19	33.0	16.7
95	-1.54	32.805	26.41	6.60	2.00	36.0	17.4
100	-1.56	32.852	26.45	6.57	2.08	37.0	18.0

CRUISE T3-018 STATION 006 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 10 JUL 71 BAROM 1004.6 WEATHER 45 WIND SPD 02K
 HOUR 21.9 GMT DRY BULB 00.0 VISIBILITY 3 WIND DIR 29
 LAT 84-42.0N WET BULB 00.0 CLOUD TYPE MARSDEN
 LON 086-48.0W REL HUMID 99 CLOUD AMT 9 SOUNDING 2008M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.52	30.959	24.92	9.31	.89	7.0	2.0
10	-1.62	31.397	25.27	9.30	1.03	7.0	1.9
15	-1.64	31.406	25.28	9.30	.98	7.0	1.6
20	-1.67	31.407	25.28	9.33	.99	7.0	1.7
25	-1.67	31.403	25.28	9.28	.77	7.0	1.6
30	-1.71	31.420	25.29	9.31	.98	7.0	1.7
35	-1.71	31.430	25.30	9.28	1.05	7.0	1.6
40	-1.70	31.456	25.32	9.28	.95	6.0	1.7
45	-1.69	31.504	25.36	9.15	1.07	9.0	2.4
50	-1.64	31.574	25.42	8.92	1.13	10.0	3.6
55	-1.47	32.121	25.86	7.41	1.54	11.0	10.2
60	-1.46	32.268	25.98	7.21	1.73	29.0	12.7
65	-1.47	32.382	26.07	7.00	1.79	33.0	12.4
70	-1.52	32.474	26.14	6.96	1.76	35.0	14.5
75	-1.53	32.560	26.21	6.89	1.88	38.0	15.2
80	-1.50	32.627	26.27	6.82	1.98	39.0	16.0
85	-1.47	32.706	26.33	6.72	1.95	42.0	16.7
90	-1.47	32.765	26.38	6.70	2.04	43.0	17.1
95	-1.49	32.820	26.42	6.62	2.01	44.0	17.3
100	-1.55	32.894	26.48	6.56	2.12	47.0	17.9
125	-1.52	33.233	26.76	6.18	2.21	54.0	18.8
150	-1.37	33.818	27.23	6.14	1.56	36.0	15.8
175	-1.17	34.225	27.55	6.66	.93	14.0	11.8
200	-.73	34.408	27.68	6.81	.90	11.0	11.8
225	-.44	34.508	27.75	6.78	.82	10.0	12.2
250	-.17	34.606	27.82	6.72	.86	10.0	12.7
275	.04	34.685	27.87	6.65	.93	11.0	13.4
300	.19	34.770	27.93	6.63	.98	11.0	14.2
325	.30	34.797	27.95	6.66	.93	11.0	14.4
350	.38	34.817	27.96	6.74	1.07	10.0	14.1
375	.34	34.824	27.97	6.65	.93	10.0	14.5
400	.43	34.847	27.98	6.72	.93	10.0	14.9
450	.44	34.856	27.99	6.74	.93	10.0	14.2
500	.44	34.865	27.99	6.82	.93	10.0	14.4

CRUISE	T3-018	STATION	007	OBSERVED VALUES			
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)							
DATE	17 JUL 71	BAROM	1015.7	WEATHER	00	WIND SPD	04K
HOUR	22.5 GMT	DRY BULB	00.0	VISIBILITY	7	WIND DIR	17
LAT	84-36.0N	WET BULB	-01.0	CLOUD TYPE	0	MARSDEN	
LON	087-30.0W	REL HUMID	82	CLOUD AMT	2	SOUNDING	1913M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-.32	29.076	23.37	9.43	.56	4.0	1.6
10	-1.34	31.363	25.24	9.35	.88	7.0	1.7
15	-1.65	31.372	25.25	9.37	.91	7.0	1.8
20	-1.65	31.366	25.25	9.39	.92	7.0	1.6
25	-1.67	31.372	25.25	9.36	.84	7.0	1.3
30	-1.70	31.385	25.27	9.36	.88	7.0	1.6
35	-1.77	31.411	25.29	9.34	.90	7.0	1.8
40	-1.70	31.431	25.30	9.27	.91	7.0	1.8
42	-1.67	31.437	25.31				
44	-1.66	31.446	25.31	9.28	.97	7.0	2.2
46	-1.67	31.487	25.35				
48	-1.63	31.599	25.44				
50	-1.61	31.730	25.54	8.43	1.23	15.0	5.1
52	-1.57	31.995	25.76				
54	-1.54	32.069	25.82	7.59	1.50	24.0	10.7
56	-1.49	32.152	25.88				
58	-1.47	32.206	25.93				
60	-1.41	32.268	25.97	7.16	1.58	29.0	12.8
65	-1.46	32.372	26.06	7.11	1.67	31.0	13.7
70	-1.46	32.456	26.13	7.02	1.78	33.0	14.3
75	-1.49	32.536	26.19	6.93	1.76	36.0	15.4
80	-1.53	32.615	26.26	6.85	1.83	37.0	16.1
85	-1.55	32.688	26.32	6.79	1.82	39.0	16.1
90	-1.55	32.764	26.38	6.79	2.32	42.0	16.9
95	-1.53	32.818	26.42	6.71	2.69	43.0	17.3
100	-1.56	32.890	26.48	6.66	2.44	45.0	17.2

CRUISE	T3-018	STATION	008	OBSERVED VALUES	
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	24 JUL 71	BAROM	1020.2	WEATHER	00 WIND SPD 04K
HOUR	22.2 GMT	DRY BULB	-01.0	VISIBILITY	7 WIND DIR 05
LAT	84-33.0N	WET BULB	-01.0	CLOUD TYPE	MARSDEN
LON	088-22.0W	REL HUMID	99	CLOUD AMT	0 SOUNDING 1875M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-.47	28.510	22.92	9.53	.64	6.0	.5
10	-1.60	31.328	25.22	9.52	.78	6.0	.1
15	-1.60	31.315	25.21	9.52	.87	7.0	.5
20	-1.59	31.323	25.21	9.52	.86	8.0	.1
25	-1.62	31.332	25.22	9.52	.97	6.0	.3
30	-1.62	31.334	25.22	9.43	.85	6.0	.4
35	-1.64	31.362	25.25	9.40	.87	6.0	1.0
40	-1.70	31.386	25.27	9.28	.91	6.0	1.2
45	-1.69	31.412	25.29	9.27	1.00	7.0	1.5
50	-1.66	31.500	25.36	8.94	.99	8.0	2.5
55	-1.56	31.457	25.32	8.09	1.63	16.0	7.7
60	-1.43	32.222	25.94	7.26	1.65	26.0	12.8
65	-1.45	32.333	26.03	7.08	1.73	28.0	13.1
70	-1.46	32.422	26.10	6.98	1.79	30.0	14.7
75	-1.48	32.505	26.17	6.92	1.96	33.0	15.4
80	-1.52	32.590	26.24	6.79	1.90	34.0	15.8
85	-1.56	32.644	26.28	6.81	1.98	36.0	16.1
90	-1.56	32.738	26.36	6.71	1.98	37.0	17.2
95	-1.54	32.780	26.39	6.65	1.98	39.0	17.3
100	-1.52	32.845	26.44	6.63	2.11	41.0	17.9
125	-1.52	33.228	26.75	6.19	2.32	48.0	18.6
150	-1.30	33.797	27.21	6.13	1.60	33.0	15.7
175	-1.15	34.206	27.54	6.64	.95	13.0	12.0
200	-.74	34.380	27.66	6.75	.81	10.0	12.2
225	-.46	34.506	27.75	6.73	.74	10.0	11.3
250	-.18	34.600	27.81	6.78	.79	9.0	12.4
275	.03	34.677	27.86	6.64	.83	10.0	13.2
300	.18	34.744	27.91	6.57	.90	11.0	13.3
325	.28	34.792	27.94	6.60	.90	10.0	13.7
350	.31	34.813	27.96	6.59	.93	10.0	15.1
375	.36	34.284	27.96	6.71	.88	9.0	14.2
400	.42	34.841	27.97	6.65	.86	10.0	13.6
450	.39	34.851	27.98	6.72	.90	9.0	13.5
500	.44	34.866	27.99	6.73	.94	9.0	14.2
600	.31	34.871	28.01	6.80	1.02	10.0	14.5
700	.16	34.876	28.02	6.80	.99	9.0	14.7
800	.08	34.883	28.03	6.83	.94	9.0	13.8
900	.03	34.890	28.04	6.89	.95	9.0	14.4
1000	-.08	34.895	28.05	6.90	.94	10.0	14.8
1250	-.24	34.918	28.07	6.87	.98	11.0	15.1
1500	-.38	34.928	28.09	6.82	.99	13.0	15.1
1750	-.40	34.938	28.10	6.71	1.01	14.0	16.2

CRUISE T3-018 STATION 009 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 31 JUL 71 BAROM 1008.2 WEATHER 01 WIND SPD 02K
 HOUR 21.4 GMT DRY BULB -01.0 VISIBILITY 7 WIND DIR 06
 LAT 84-42.0N WET BULB -01.0 CLOUD TYPE 0 MARSDEN
 LON 086-37.0W REL HUMID 99 CLOUD AMT 5 SOUNDING 2009M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	.16			9.56	.15	1.0	.5
10	-1.68			9.36	.87	5.0	.4
15	-1.56	31.326	25.22	9.33	.92	5.0	.3
20	-1.62	31.362	25.25	9.39	1.00	6.0	.5
25	-1.63	31.388	25.27	9.32	.93	5.0	.4
30	-1.63	31.418	25.29	9.27	.92	6.0	.5
35	-1.64	31.497	25.36	9.25	.96	7.0	1.1
40	-1.69	31.587	25.43	9.14	.97	6.0	1.6
42	-1.70	31.614	25.45				
44	-1.68	31.635	25.47	9.18	.99	6.0	2.4
46	-1.65	31.649	25.48				
48	-1.65	31.663	25.49				
50	-1.68	31.668	25.49	9.07	1.04	7.0	1.9
52	-1.68	31.692	25.51				
54	-1.69	31.700	25.52	9.07	1.08	7.0	2.3
56	-1.71	31.731	25.55				
58	-1.68	31.815	25.61				
60	-1.61	31.958	25.73	7.94	1.57	16.0	8.6
65	-1.46	32.277	25.98	7.00	1.71	27.0	13.0
70	-1.43	32.399	26.08	6.75	1.80	29.0	14.5
75	-1.45			6.70	1.84	30.0	15.6
80	-1.49	32.572	26.22	6.57	1.91	33.0	16.0
85	-1.50	32.630	26.27	6.51	1.94	34.0	15.3
90	-1.54	32.721	26.34	6.44	2.00	35.0	17.0
95	-1.57	32.805	26.41	6.40	2.10	39.0	17.3
100	-1.57	32.792	26.40	6.34	2.16	39.0	18.1

CRUISE T3-018 STATION 010 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 07 AUG 71 BAROM 995.8 WEATHER 70 WIND SPD 06K
HOUR 21.9 GMT DRY BULB -02.0 VISIBILITY 4 WIND DIR 05
LAT 84-48.0N WET BULB -03.0 CLOUD TYPE 5 MARSDEN
LON 085-28.0W REL HUMID 80 CLOUD AMT 8 SOUNDING 2101M

DEPTH M	TEMP C	SALINITY O/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 ATOMS/L	NO3 ATOMS/L
5	-1.54	30.150	24.26	9.30	.70	5.0	.4
10	-1.53	31.214	25.12	9.34	.87	6.0	.7
15	-1.63	31.245	25.15	9.31	.86	6.0	.7
20	-1.63	31.255	25.16	9.27	.85	5.0	.5
25	-1.64	31.287	25.19	9.28	.89	5.0	.5
30	-1.63	31.295	25.19	9.23	.84	5.0	.6
35	-1.63	31.457	25.32	9.24	.96	5.0	.8
40	-1.66	31.560	25.41	9.22	.94	6.0	1.1
45	-1.69	31.645	25.48	9.14	.98	6.0	.7
50	-1.70	31.690	25.51	9.14	1.36	6.0	1.9
55	-1.68	31.699	25.52	9.05	1.00	7.0	2.0
60	-1.65	31.730	25.54	8.93	1.04	7.0	2.9
65	-1.56	31.925	25.70	8.02	1.34	15.0	7.4
70	-1.46	32.216	25.93	7.08	1.62	24.0	10.8
75	-1.46	32.355	26.05	6.81	1.77	27.0	14.0
80	-1.50	32.460	26.13	6.65	1.79	29.0	15.2
85	-1.52	32.587	26.24	7.30	1.80	33.0	12.7
90	-1.52	32.718	26.34	6.36	1.90	36.0	16.4
95	-1.53	32.768	26.38	6.34	1.92	37.0	17.6
100	-1.56	32.836	26.44	6.37	1.93	39.0	18.0
125	-1.53	33.230	26.76	6.03	2.08	43.0	18.6
150	-1.37	33.816	27.23	6.06	1.58	28.0	18.4
175	-1.19	34.178	27.51	6.41	1.08	14.0	12.5
200	-.75	34.394	27.67	6.64	.78	8.0	11.8
225	-.46	34.518	27.76	6.65	.78	8.0	10.2
250	-.19	34.605	27.82	6.61	.73	8.0	12.4
275	.01	34.675	27.86	6.54	.87	8.0	13.6
300	.18	34.746	27.91	6.56	.83	8.0	13.5
325	.30	34.802	27.95	6.51	.88	8.0	14.0
350	.38	34.829	27.97	6.51	.99	7.0	13.8
375	.39	34.830	27.97	6.59	.91	7.0	13.7
400	.45	34.852	27.98	6.59	.93	8.0	14.3
450	.42	34.869	28.00	6.59	.94	7.0	13.6
500	.47	34.893	28.01	6.66	.92	7.0	13.0

CRUISE	T3-018	STATION 011	OBSERVED VALUES				
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)							
DATE	13 AUG 71	BAROM	1001.4	WEATHER	41	WIND SPD	00K
HOUR	22.3 GMT	DRY BULB	-08.0	VISIBILITY	7	WIND DIR	
LAT	84-43.0N	WET BULB	-09.0	CLOUD TYPE		MARSDEN	
LON	087-35.0W	REL HUMID	73	CLOUD AMT	0	SOUNDING	2002M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.51	30.528	24.57	9.25	.86	5.0	.4
10	-1.53	31.149	25.07	9.17	.80	4.0	1.5
15	-1.59	31.157	25.08	9.21	.95	5.0	.6
20	-1.55	31.165	25.08	9.23	.92	5.0	.5
25	-1.62	31.184	25.10	9.09	.94	4.0	.5
30	-1.66	31.219	25.13	9.07	.91	5.0	.5
35	-1.67	31.252	25.16	9.06	.92	5.0	.7
40	-1.68	31.440	25.31	9.01	.99	5.0	1.2
45	-1.67	31.596	25.44	8.84	1.04	7.0	2.6
50	-1.62	31.732	25.55	8.37	1.14	10.0	5.0
52	-1.60	31.753	25.56				
54	-1.58	31.832	25.63	8.20	1.22	12.0	6.0
56	-1.53	32.055	25.80				
58	-1.50	32.145	25.88				
60	-1.48	32.121	25.86	7.30	1.52	18.0	10.7
62	-1.50	32.259	25.97				
64	-1.51	32.322	26.02	6.93	1.66	24.0	12.9
66	-1.50	32.390	26.08				
68	-1.46	32.436	26.11				
70	-1.45	32.426	26.10	6.83	1.72	27.0	13.9
75	-1.47	32.530	26.19	6.59	1.80	28.0	15.1
80	-1.48	32.594	26.24	6.62	1.87	31.0	16.1
85	-1.52	32.665	26.30	6.44	1.86	34.0	14.9
90	-1.56	32.752	26.37	6.43	1.93	35.0	16.8
95	-1.57	32.812	26.42	6.41	1.95	37.0	17.6
100	-1.56	32.896	26.49	6.35	2.04	39.0	18.0

CRUISE	T3-018	STATION	012	OBSERVED VALUES			
		(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	21 AUG 71	BAROM	1009.6	WEATHER	80	WIND SPD	21K
HOUR	21.9 GMT	DRY BULB	-01.0	VISIBILITY	2	WIND DIR	12
LAT	84-54.0N	WET BULB	.	CLOUD TYPE	7	MARSDEN	
LON	083-59.0W	REL HUMID		CLOUD AMT	8	SOUNDING	2101M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.59	30.120	24.24	9.33	.72	4.0	.0
10	-1.60	31.082	25.02	9.35	.52	4.0	.0
15	-1.65	31.088	25.02	9.35	.72	5.0	.7
20	-1.59	31.085	25.02	9.35	.88	5.0	.1
25	-1.60	31.090	25.02	9.35	.84	5.0	.0
30	-1.63	31.109	25.04	9.36	.81	5.0	.2
35	-1.64	31.187	25.10	9.39	.87	5.0	.0
40	-1.65	31.294	25.19	9.41	.92	5.0	.2
45	-1.68	31.451	25.32	9.34	.92	5.0	.0
50	-1.71	31.713	25.53	9.07	1.10	6.0	2.0
55	-1.63	31.804	25.60	8.69	1.05	9.0	2.5
60	-1.62	31.840	25.63	8.53	1.05	10.0	2.0
65	-1.54	32.048	25.80	7.75	.82	16.0	5.8
70	-1.49	32.258	25.97	7.20	1.57	23.0	8.3
75	-1.47	32.442	26.12	6.80	1.74	28.0	11.2
80	-1.48	32.521	26.18	6.70	1.80	29.0	12.1
85	-1.52	32.604	26.25	6.57	1.86	32.0	10.6
90	-1.53	32.652	26.29	6.51	1.87	33.0	12.8
95	-1.52	32.723	26.35	6.42	1.90	35.0	10.9
100	-1.56	32.874	26.47	6.35	2.02	38.0	15.1
125	-1.54	33.240	26.76	6.07	2.08	42.0	17.4
150	-1.37	33.864	27.27	6.18	1.27	23.0	11.0
175	-1.15	34.240	27.56	6.60	.85	10.0	11.7
200	-.72	34.419	27.69	6.66	.65	7.0	8.4
225	-.35	34.561	27.79	6.51	.68	8.0	10.8
250	-.07	34.671	27.86	6.35	.70	10.0	10.0
275	.10	34.718	27.89	6.33	.87	11.0	12.5
300	.16	34.754	27.92	6.36	.70	9.0	12.8
325	.26	34.802	27.95	6.42	.96	9.0	12.5
350	.31	34.830	27.97	6.44	.65	9.0	10.5
375	.39	34.850	27.98	6.52	.86	7.0	13.7
400	.43	34.861	27.99	6.51	.79	8.0	13.0
450	.46	34.877	28.00	6.60	.88	7.0	13.9
500	.43	34.888	28.01	6.60	.82	7.0	12.2
600	.29	34.900	28.03	6.62	.88	8.0	15.2
700	.17	34.907	28.04	6.64	.84	8.0	14.4
800	.06	34.915	28.05	6.68	.90	8.0	14.0
900	.01	34.915	28.06	6.73	.87	8.0	12.0
1000	-.09	34.924	28.07	6.65	.80	8.0	12.1
1250	-.22	34.943	28.09	6.73	.92	9.0	14.1
1500	-.33	34.955	28.11	6.65	.86	10.0	13.5
1750	-.41	34.962	28.12	6.57	.89	12.0	13.6
2000	-.40	34.962	28.12	6.63	1.05	12.0	15.4

CRUISE	T3-018	STATION	013	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	27 AUG 71	BAROM	1003.0	WEATHER	70	WIND SPD 04K
HOUR	21.9 GMT	DRY BULB	0-0.4	VISIBILITY	5	WIND DIR 18
LAT	84-56.0N	WET BULB	0-0.5	CLOUD TYPE	2	MARSDEN
LON	081-12.0W	REL HUMID	07	CLOUD AMT	8	SOUNDING 1934M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.57	31.163	25.08	9.52	1.10	5.0	1.5
10	-1.66	31.211	25.12	9.52	.82	4.0	.3
15	-1.61	31.233	25.14	9.51	.83	5.0	.4
20	-1.62	31.279	25.18	9.50	.86	5.0	.4
25	-1.67	31.309	25.20	9.52	.87	4.0	.3
30	-1.67	31.322	25.21	9.48	.87	4.0	.3
35	-1.61	31.626	25.46	9.31	.98	6.0	1.2
40	-1.70	31.777	25.58	9.21	1.00	7.0	2.0
45	-1.71	31.810	25.61	9.15	1.01	7.0	1.5
50	-1.69	31.854	25.65	9.06	1.02	8.0	1.7
52	-1.69	31.851	25.64				
54	-1.67	31.847	25.64	9.13	1.03	7.0	2.4
56	-1.69	31.870	25.66				
58	-1.69	31.878	25.66				
60	-1.71	31.878	25.67	9.02	1.04	8.0	1.7
62	-1.69	31.907	25.69				
64	-1.67	31.951	25.72	8.55	1.22	12.0	5.8
66	-1.61	32.060	25.81				
68	-1.54	32.144	25.88				
70	-1.52	32.194	25.92	7.44	1.52	22.0	10.5
75	-1.49	32.369	26.06	7.01	1.68	26.0	12.6
80	-1.48	32.501	26.16	6.79	1.86	30.0	14.7
85	-1.48	32.616	26.26	6.63	1.91	33.0	15.2
90	-1.56	32.728	26.35	6.52	1.98	36.0	16.7
95	-1.56	32.778	26.39	6.46	2.02	37.0	17.2
100	-1.57	32.863	26.46	6.42	2.02	39.0	17.2

CRUISE	T3-018	STATION	014	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	04 SEP 71	BAROM	1002.2	WEATHER	45	WIND SPD 06K
HOUR	22.0 GMT	DRY BULB	-02.0	VISIBILITY	3	WIND DIR 30
LAT	84-53.0N	WET BULB	-03.0	CLOUD TYPE		MARSDEN
LON	085-41.0W	REL HUMID	80	CLOUD AMT	8	SOUNDING 2100M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.68	31.086	25.02	9.31	.72	4.0	.3
10	-1.69	31.073	25.01	9.22	.63	4.0	.2
15	-1.67	31.098	25.03	9.32	.68	4.0	.1
20	-1.65	31.091	25.03	9.34	.79	4.0	.1
25	-1.67	31.103	25.04	9.32	.83	4.0	.1
30	-1.67	31.108	25.04	9.32	.82	4.0	.1
35	-1.66	31.556	25.40	9.14	.88	5.0	1.5
40	-1.71	31.643	25.47	9.13	.90	5.0	1.1
45	-1.71	31.702	25.52	9.09	.88	5.0	.5
50	-1.69	31.729	25.54	9.04	.87	6.0	.8
55	-1.67	31.757	25.57	8.85	1.03	8.0	2.7
60	-1.55	31.968	25.73	7.85	1.22	14.0	4.0
65	-1.49	32.186	25.91	7.24	1.40	21.0	7.3
70	-1.47	32.362	26.05	6.81	1.55	26.0	9.4
75	-1.47	32.458	26.13	6.72	1.67	29.0	10.8
80	-1.51	32.565	26.22	6.53	1.27	31.0	14.3
85	-1.54	32.657	26.29	6.51	1.74	34.0	10.5
90	-1.53	32.756	26.37	6.51	1.87	35.0	12.7
95	-1.53	32.816	26.42	6.36	1.65	36.0	16.8
100	-1.55	32.880	26.47	6.32	1.91	38.0	13.6
125	-1.53	33.251	26.77	6.01	2.00	42.0	17.7
150	-1.37	33.839	27.25	6.13	1.31	25.0	13.7
175	-1.14	34.247	27.57	6.43	.81	11.0	10.7
200	-.72	34.414	27.69	6.59	.71	8.0	9.8
225	-.42	34.534	27.77	6.59	.60	7.0	9.7
250	-.17	34.626	27.83	6.55	.54	6.0	10.0
275	.04	34.699	27.88	6.51	.73	8.0	11.8
300	.18	34.760	27.92	6.44	.79	9.0	12.2
325	.31	34.813	27.96	6.50	.75	8.0	11.8
350	.37	34.831	27.97	6.53	.84	7.0	13.0
375	.38	34.838	27.97	6.55	.78	7.0	10.5
400	.42	34.864	27.99	6.53	.73	7.0	12.1
450	.42	34.866	28.00	6.51	.80	7.0	13.1
500	.47	34.879	28.00	6.64	.80	6.0	12.7

CRUISE T3-018 STATION 015 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 11 SEP 71 BAROM 1027.2 WEATHER 00 WIND SPD 00K
HOUR 22.1 GMT DRY BULB -04.0 VISIBILITY 7 WIND DIR
LAT 84-50.0N WET BULB -04.0 CLOUD TYPE 0 MARSDEN
LON 085-22.0W REL HUMID 99 CLOUD AMT 8 SOUNDING 2101M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.41	31.008	24.95	9.37	.56	5.0	1.2
10	-1.66	31.014	24.96	9.39	.66	4.0	.1
15	-1.66	31.044	24.99	9.40	.74	5.0	.2
20	-1.68	31.106	25.04	9.43	.83	4.0	.1
25	-1.69	31.138	25.07	9.41	.83	4.0	.2
30	-1.68	31.181	25.10	9.45	.85	4.0	.4
35	-1.66	31.507	25.36	9.34	.88	5.0	1.0
40	-1.70	31.679	25.50	9.28	.94	5.0	1.7
42	-1.70	31.701	25.52				
44	-1.69	31.705	25.52	9.21	.88	5.0	.6
46	-1.64	31.728	25.54				
48	-1.62	31.732	25.55				
50	-1.67	31.756	25.57	9.09	.95	6.0	.8
52	-1.66	31.776	25.58				
54	-1.67	31.780	25.58	8.98	.96	7.0	2.2
56	-1.66	31.798	25.60				
58	-1.63	31.942	25.72				
60	-1.59	32.014	25.77	7.94	1.37	15.0	6.8
65	-1.50	32.229	25.95	7.25	1.54	21.0	8.8
70	-1.44	32.395	26.08	6.94	1.62	25.0	11.2
75	-1.47	32.500	26.16	6.82	1.68	27.0	11.7
80	-1.49	32.600	26.25	6.75	1.86	30.0	13.7
85	-1.51	32.652	26.29	6.74	1.78	32.0	10.9
90	-1.54	32.743	26.36	6.53	1.91	33.0	14.3
95	-1.56	32.809	26.42	6.47	1.94	36.0	16.0
100	-1.56	32.893	26.48	6.41	2.00	38.0	16.1

CRUISE T3-018 STATION 016 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 18 SEP 71 BAROM 1005.0 WEATHER 03 WIND SPD 06K
HOUR 03.4 GMT DRY BULB -12.0 VISIBILITY 7 WIND DIR 03
LAT 84-53.0N WET BULB -12.0 CLOUD TYPE 0 MARSDEN
LON 085-58.0W REL HUMID 99 CLOUD AMT 5 SOUNDING 2102M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.67	31.015	24.97	9.26	.33	5.0	.4
10	-1.64	31.012	24.96	9.34	.60	4.0	.0
15	-1.67	31.023	24.97	9.39	.13	4.0	.0
20	-1.59	31.033	24.98	9.39	.72	4.0	.0
25	-1.60	31.051	24.99	9.45	.76	4.0	.0
30	-1.65	31.084	25.02	9.40	.77	4.0	.0
35	-1.64	31.525	25.38	9.16	.82	5.0	.4
40	-1.66	31.591	25.43	9.25	.86	5.0	.2
45	-1.70	31.639	25.47	9.21	.88	5.0	.1
50	-1.70	31.702	25.52	9.12	.82	6.0	.4
55	-1.64	31.847	25.64	8.57	1.07	11.0	2.3
60	-1.51	32.054	25.80	7.58	1.28	13.0	4.6
65	-1.46	32.261	25.97	7.12	1.48	22.0	6.7
70	-1.49	32.374	26.06	7.01	1.56	24.0	7.5
75	-1.48	32.470	26.14	6.85	1.16	27.0	10.2
80	-1.47	32.542	26.20	6.69	1.77	29.0	11.3
85	-1.53	32.645	26.28	6.57	1.79	32.0	7.7
90	-1.55	32.721	26.34	6.53	1.90	33.0	11.7
95	-1.55	32.795	26.40	6.46	1.83	35.0	11.6
100	-1.55	32.865	26.46	6.40	1.87	37.0	13.8
125	-1.50	33.288	26.80	6.09	1.99	41.0	16.6
150	-1.36	33.862	27.26	6.23	1.29	25.0	12.8
175	-1.13	34.239	27.56	6.54	.87	11.0	9.9
200	-.71	34.353	27.64	6.65	.66	8.0	8.7
225	-.42	34.531	27.77	6.72	.62	7.0	8.1
250	-.20	34.627	27.84	6.62	.66	8.0	9.8
275	.04	34.694	27.88	6.55	.61	8.0	10.3
300	.20	34.759	27.92	6.57	.72	7.0	11.3
325	.32	34.810	27.96	6.57	.68	7.0	11.2
350	.34	34.823	27.97	6.57	.77	8.0	11.9
375	.38	34.835	27.97	6.61	.73	7.0	11.7
400	.44	34.861	27.99	6.62	.73	7.0	11.7
450	.45	34.871	28.00	6.62	.72	7.0	11.8
500	.40	34.907	28.03	6.65	.87	6.0	12.3
600	.30	34.885	28.02	6.76	.76	7.0	13.1
700	.18	34.892	28.03	6.76	.86	8.0	12.0
800	.07	34.897	28.04	6.78	.79	7.0	12.2
900	-.01	34.906	28.05	6.81	.66	7.0	9.9
1000	-.09	34.910	28.06	6.83	.83	7.0	12.7
1250	-.22	34.930	28.08	6.81	.82	8.0	12.6
1500	-.33	34.943	28.10	6.76	.86	10.0	13.7
1750	-.41	34.956	28.11	6.69	.81	11.0	14.1
2000	-.40	34.955	28.11	6.62	.83	12.0	13.1

CRUISE	T3-018	STATION 017	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	25 SEP 71	BAROM	1021.0	WEATHER	45
HOUR	19.0 GMT	DRY BULB	-28.0	VISIBILITY	4
LAT	84-53.0N	WET BULB	-36.0	CLOUD TYPE	MARSDEN
LON	085-58.0W	REL HUMID		CLOUD AMT	0
				SOUNDING	2102M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.22	30.952	24.91	9.41			
10	-1.50	30.964	24.92	9.46			
15	-1.64	30.970	24.93	9.45			
20	-1.59	30.982	24.94	9.46			
25	-1.67	31.005	24.96	9.46			
30	-1.70	31.019	24.97	9.45			
35	-1.69	31.137	25.06	9.41			
40	-1.64	31.585	25.43	9.25			
42	-1.64	31.631	25.46				
44	-1.65	31.662	25.49	9.23			
46	-1.66	31.676	25.50				
48	-1.68	31.695	25.52				
50	-1.68	31.721	25.54	9.16			
52	-1.65	31.729	25.54				
54	-1.65	31.766	25.57	8.86			
56	-1.62	31.807	25.61				
58	-1.63	31.872	25.66				
60	-1.60	31.946	25.72	8.18			
65	-1.51	32.170	25.90	7.30			
70	-1.46	32.323	26.02	7.07			
75	-1.46	32.464	26.13	6.89			
80	-1.47	32.545	26.20	6.75			
85	-1.49	32.641	26.28	6.68			
90	-1.54	32.729	26.35	6.61			
95	-1.55	32.774	26.39	6.47			
100	-1.54	32.853	26.45	6.45			

CRUISE	T3-019	STATION	001	OBSERVED VALUES			
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)							
DATE	06 OCT 71	BAROM	1006.6	WEATHER	02	WIND SPD	08K
HOUR	23.5 GMT	DRY BULB	-21.0	VISIBILITY	8	WIND DIR	12
LAT	85-17.0N	WET BULB	.	CLOUD TYPE		MARSDEN	
LON	082-25.0W	REL HUMID		CLOUD AMT	5	SOUNDING	2098M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
10	-1.18	31.200	25.11	8.90	.02	8.0	.2
15	-1.44	31.230	25.14	8.68	1.70	5.0	.3
20	-1.63	31.270	25.17	8.83	2.91	4.0	1.2
25	-1.66	31.250	25.16	8.84	.54	4.0	.0
30	-1.68	31.530	25.38	9.62	.19	7.0	.0
35	-1.67	31.650	25.48	8.91	.79	3.0	.0
40	-1.64	31.910	25.69	8.73	.81	.0	.5
42	-1.64	31.920	25.70	8.68			
44	-1.64	31.990	25.75	8.62	.50	8.0	.0
46	-1.64	32.020	25.78	8.57			
48	-1.66	32.060	25.81	8.50			
50	-1.67	32.090	25.84	8.42	.75	5.0	1.3
52	-1.63	32.120	25.86	8.26			
54	-1.63	32.150	25.88	8.21	.84	12.0	.7
56	-1.63	32.240	25.96	8.03			
58	-1.63	32.270	25.98	7.89			
60	-1.57	32.330	26.03	7.51	.98	22.0	4.8
65	-1.53	32.550	26.21	6.92	.59	21.0	5.2
70	-1.46	32.720	26.34	6.54	1.14	20.0	8.9
75	-1.46	32.840	26.44	6.44	.52	32.0	1.2
80	-1.48	32.920	26.50	6.32	.25	21.0	9.9
85	-1.46	33.000	26.57	6.20	.60	22.0	6.1
90	-1.50	33.070	26.63	6.16	1.29	31.0	15.8
95	-1.54	33.140	26.68	5.57	1.10	33.0	7.9
95	-1.54	33.140	26.68	6.12			
100	-1.54	33.230	26.76	6.13	1.26	35.0	17.1

CRUISE T3-019 STATION 002 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 14 OCT 71 BAROM 1005.6 WEATHER 02 WIND SPD 02K
 HOUR 18.7 GMT DRY BULB -23.0 VISIBILITY 7 WIND DIR 04
 LAT 85-12.4N WET BULB . CLOUD TYPE MARSDEN
 LON 079-05.0W REL HUMID CLOUD AMT 8 SOUNDING 1992M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.65	31.072	25.01	9.20			
10	-1.68	31.059	25.00	9.19			
15	-1.66	31.093	25.03	9.18			
20	-1.67	31.157	25.08	9.16			
25	-1.67	31.157	25.08	9.17			
30	-1.66	31.156	25.08	9.18			
35	-1.67	31.154	25.08	9.20			
40	-1.69	31.359	25.24	9.13			
45	-1.66	31.599	25.44	8.91			
50	-1.63	31.662	25.49	8.83			
55	-1.56	31.902	25.68	8.14			
60	-1.53	32.113	25.85	7.45			
65	-1.52	32.322	26.02	6.95			
70	-1.50	32.427	26.11	6.74			
75	-1.48	32.501	26.16	6.66			
80	-1.50	32.586	26.23	6.60			
85	-1.51	32.670	26.30	6.55			
90	-1.51	32.763	26.38	6.40			
95	-1.54	32.802	26.41	6.35			
100	-1.57	32.859	26.46	6.34			
125	-1.55	33.250	26.77	5.93			
150	-1.35	33.842	27.25	6.03			
175	-1.13	34.216	27.54	6.39			
200	-.75	34.383	27.66	6.57			
225	-.43	34.515	27.76	6.49			
250	-.16	34.621	27.83	6.44			
275	.06	34.681	27.87	6.38			
300	.23	34.749	27.91	6.32			
325	.34	34.798	27.94	6.42			
350	.40	34.821	27.96	6.44			
375	.41	34.823	27.96	6.47			
400	.41	34.830	27.97	6.44			
450	.47	34.851	27.98	6.51			
500	.45	34.854	27.98	6.51			

CRUISE	T3-019	STATION	003	OBSERVED VALUES			
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)							
DATE	01 NOV 71	BAROM	1012.2	WEATHER	02	WIND SPD	03K
HOUR	22.0 GMT	DRY BULB	-31.0	VISIBILITY	7	WIND DIR	03
LAT	85-08.2N	WET BULB	.	CLOUD TYPE		MARSDEN	
LON	083-17.0W	REL HUMID		CLOUD AMT	2	SOUNDING	2093M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.25	31.019	24.96	9.08	.54	4.0	.6
10	-1.65	31.030	24.98	9.22	.64	2.0	.6
15	-1.56	31.033	24.98	9.16	.55	4.0	.5
20	-1.68	31.049	24.99	9.19	.60	2.0	.0
25	-1.70	31.050	24.99	9.22	.62	3.0	.0
30	-1.70	31.038	24.98	9.19	.60	5.0	.1
35	-1.67	31.052	25.00	9.12	.80	2.0	.4
40	-1.67	31.163	25.09	9.08	.67	3.0	.8
42	-1.65	31.279	25.18	9.15			
44	-1.65	31.471	25.33	9.08	.65	3.0	1.4
46	-1.66	31.662	25.49	8.97			
48	-1.66	31.647	25.48	8.84			
50	-1.64	31.703	25.52	8.82	.68	4.0	.6
52	-1.64	31.737	25.55	8.73			
54	.95	31.771	25.48	8.64	.62	7.0	1.9
56	-1.61	31.877	25.66	8.68			
58	-1.62	31.935	25.71	8.10			
60	-1.58	31.996	25.76	7.91	.88	12.0	6.9
65	-1.49	32.204	25.92	7.15	1.06	19.0	10.7
70	-1.47	32.341	26.04	7.09	1.23	25.0	10.4
75	-1.47	32.474	26.14	6.64	1.39	26.0	10.0
80	-1.49	32.584	26.23	6.55	1.43	28.0	13.3
85	-1.51	32.649	26.29	6.46	.83	31.0	5.1
90	-1.53	32.729	26.35	6.40	1.03	33.0	10.6
95	-1.52	32.798	26.41	6.30	1.31	35.0	12.7
100	-1.53	32.850	26.45	6.30	1.51	34.0	12.4

CRUISE	T3-019	STATION 004	OBSERVED VALUES				
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	09 NOV 71	BAROM	1015.4	WEATHER	36	WIND SPD	13K
HOUR	20.5 GMT	DRY BULB	-26.0	VISIBILITY	6	WIND DIR	23
LAT	84-43.4N	WET BULB	.	CLOUD TYPE		MARSDEN	
LON	087-41.0W	REL HUMID		CLOUD AMT	8	SOUNDING	2003M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.02	30.999	24.94	9.46	.34	3.0	.6
10	-1.42	30.983	24.93	9.50	.59	3.0	.8
15	-1.55	30.980	24.94	9.50	.42	3.0	.7
20	-1.70	30.979	24.94	9.48	.60	3.0	.4
25	-1.68	30.980	24.94	9.50	.35	2.0	.4
30	-1.66	30.979	24.94	9.50	.46	3.0	.5
35	-1.67	30.993	24.95	9.50	.43	4.0	.6
40	-1.65	31.602	25.44	9.36	.49	3.0	1.3
45	-1.67	31.683	25.51	9.33	.46	4.0	1.7
50	-1.69	31.737	25.55	9.26	.76	5.0	1.6
55	-1.67	31.776	25.58	9.17	.50	6.0	1.9
60	-1.66	31.814	25.61	9.00	.43	5.0	2.3
65	-1.52	32.509	26.17	7.68	.55	14.0	6.4
70	-1.46	32.275	25.98	7.18	.79	16.0	8.5
75	-1.46	32.421	26.10	6.98	.59	17.0	9.2
80	-1.50	32.530	26.19	6.75	.97	20.0	9.7
85	-1.49	32.570	26.22	6.69	.96	21.0	11.7
90	-1.48	32.699	26.33	6.59	1.16	22.0	11.9
95	-1.52	32.730	26.35	6.57	1.02	24.0	12.0
100	-1.54	32.809	26.42	6.48	.56	21.0	12.3
125	-1.57	33.139	26.68	6.28	.94	23.0	11.7
150	-1.39	33.765	27.19	6.79	.49	19.0	10.9
175	-1.08	34.223	27.55	6.68	.24	5.0	7.4
200	-.73	34.396	27.67	6.76	.27	5.0	8.4
225	-.42	34.495	27.74	6.75	.05	5.0	8.1
250	-.17	34.588	27.80	6.71	.26	4.0	8.1
275	.05	34.670	27.86	6.63	.31	5.0	9.6
300	.20	34.746	27.91	6.53	.46	7.0	10.4
325	.30	34.807	27.95	6.60	.51	5.0	9.8
350	.32	34.816	27.96	6.61	.61	5.0	9.1
375	.37	34.827	27.97	6.70	.27	5.0	9.2
400	.40	34.849	27.98	6.56	.26	4.0	10.2
450	.44	34.863	27.99	6.69	.02	6.0	10.6
500	.47	34.872	28.00	6.72	.05	6.0	10.3
800	.09	34.820	27.98	6.81	.49	6.0	10.5
900	-.02	34.886	28.04	6.87	.58	3.0	10.4
1000	-.09	34.899	28.05	6.89	.29	6.0	10.8
1250	-.27	34.913	28.07	6.78	.38	9.0	11.2
1500	-.33	34.951	28.10	6.73	.14	25.0	11.1
1750	-.37	34.942	28.10	6.69	.63	11.0	13.7
1950	-.38	34.943	28.10	6.73	.41	18.0	10.3

CRUISE T3-019 STATION 005 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 22 NOV 71 BAROM 999.1 WEATHER 00 WIND SPD 00K
 HOUR 01.2 GMT DRY BULB -36.0 VISIBILITY 7 WIND DIR
 LAT 84-36.1N WET BULB . CLOUD TYPE MARSDEN
 LON 084-43.0W REL HUMID CLOUD AMT 0 SOUNDING 1755M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-.26	31.049	24.96	9.81			
10	-1.10	31.052	24.98	9.90			
15	-.92	31.055	24.98	9.86			
20	-1.45	31.546	25.39	9.92			
25	-1.60	31.085	25.02	9.97			
30	-1.62	31.108	25.04	9.86			
35	-1.66	31.131	25.06	9.83			
40	-1.65	31.251	25.16	9.81			
42	-1.65	31.650	25.48	9.67			
44	-1.66						
46	-1.67	31.742	25.55	9.57			
48	-1.67	31.771	25.58	9.53			
50	-1.68	31.808	25.61	9.49			
52	-1.68	31.835	25.63	9.46			
54	-1.66	31.857	25.65	9.41			
56	-1.66	31.879	25.66	9.31			
58	-1.64	31.912	25.69	9.20			
60	-1.64	31.955	25.73	8.68			
65	-1.54	32.186	25.91	7.89			
70	-1.50	32.351	26.04	7.49			
75	-1.49	32.474	26.14	7.19			
80	-1.49	32.578	26.23	7.02			
85	-1.50	32.656	26.29	6.88			
90	-1.52	32.727	26.35	6.81			
95	-1.54	32.796	26.41	6.72			
100	-1.56	32.867	26.46	6.70			

CRUISE T3-019 STATION 006 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 27 NOV 71 BAROM 1015.1 WEATHER 39 WIND SPD 22K
HOUR 02.0 GMT DRY BULB -21.0 VISIBILITY 4 WIND DIR 17
LAT 84-36.6N WET BULB . CLOUD TYPE MARSDEN
LON 084-42.0W REL HUMID CLOUD AMT 9 SOUNDING 1742M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.22	31.085	25.01	9.91			
10	-1.61	31.079	25.02	9.90			
15	-1.65	31.091	25.03	9.90			
20	-1.67	31.096	25.03	9.90			
25	-1.63	31.093	25.03	9.94			
30	-1.66	31.094	25.03	9.94			
35	-1.69	31.089	25.03	9.94			
40	-1.65	31.101	25.03	9.94			
45	-1.68	31.194	25.11	9.94			
50	-1.66	31.679	25.50	9.62			
55	-1.64	31.797	25.60	9.23			
60	-1.56	31.929	25.70	8.67			
65	-1.50	32.171	25.90	7.69			
70	-1.48	32.345	26.04	7.36			
75	-1.46	32.452	26.12	7.19			
80	-1.48	32.560	26.21	7.00			
85	-1.60	32.646	26.29	6.87			
90	-1.51	32.179	25.90	6.88			
95	-1.54	32.799	26.41	6.86			
100	-1.54	32.878	26.47	6.71			
125	-1.54	33.292	26.81	6.56			
150	-1.35	33.857	27.26	6.58			
175	-1.12	34.251	27.57	6.91			
200	-.68	34.428	27.70	7.04			
225	-.35	34.548	27.78	6.95			
250	-.29	34.664	27.87	7.03			
275	-1.10			9.88			
300	-.41	34.737	27.93	6.65			
325	-.52	34.772	27.97	6.61			
350	.29	34.798	27.95	6.83			
375	.37	34.832	27.97	6.89			
400	.42	34.853	27.98	6.86			
425	.44	34.861	27.99	6.92			
450	.46	34.873	28.00	7.03			
475	.46	34.864	27.99	6.97			
500	.47	34.879	28.00	7.04			

CRUISE	T3-019	STATION	007	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	07 DEC 71	BAROM	1013.0	WEATHER	00	WIND SPD 06K
HOUR	00.1 GMT	DRY BULB	-44.0	VISIBILITY	7	WIND DIR 17
LAT	84-37.3N	WET BULB	.	CLOUD TYPE		MARSDEN
LON	082-31.0W	REL HUMID		CLOUD AMT	0	SOUNDING 1685M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.67	31.215	25.13	9.95			
10	-1.73	31.218	25.13	10.01			
15	-1.67	31.203	25.12	10.02			
20	-1.69	31.202	25.12	10.03			
25	-1.71	31.210	25.12	10.03			
30	-1.68	31.211	25.12	10.03			
35	-1.68	31.251	25.16	10.03			
40	-1.68	31.311	25.21	10.03			
42	-1.66	31.489	25.35	9.88			
44	-1.66	31.629	25.46	9.87			
46	-1.67	31.695	25.52	9.72			
48	-1.64	31.725	25.54	9.66			
50	-1.67	31.754	25.56	9.62			
52	-1.65	31.789	25.59	9.49			
54	-1.65	31.831	25.63	9.43			
56	-1.66	31.875	25.66	9.38			
58	-1.63	31.895	25.68	9.13			
60	-1.57	31.965	25.74	8.73			
65	-1.51	32.161	25.89	7.88			
70	-1.48	32.332	26.03	7.50			
75	-1.46	32.477	26.14	7.29			
80	-1.47	32.558	26.21	7.15			
85	-1.52	32.645	26.28	7.05			
90	-1.49	32.719	26.34	6.90			
95	-1.56	32.719	26.34	6.85			
100	-1.56	32.863	26.46	6.83			

CRUISE T3-019 STATION 008 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 09 DEC 71 BAROM 1012.2 WEATHER 00 WIND SPD 09K
HOUR 19.3 GMT DRY BULB -44.0 VISIBILITY 7 WIND DIR 16
LAT 84-37.3N WET BULB . CLOUD TYPE MARSDEN
LON 082-24.0W REL HUMID CLOUD AMT 0 SOUNDING 1684M

DEPTH M	TEMP C	SALINITY O/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.70	31.209	25.12		.51	5.0	.4
10	-1.70	31.214	25.13	8.91	.54	5.0	.5
15	-1.69	31.214	25.13	8.90	.48	5.0	.8
20	-1.69	31.215	25.13	8.88	.55	4.0	.3
25	-1.69	31.224	25.13	8.91	.41	4.0	.2
30	-1.69	31.243	25.15	8.98	.57	5.0	.5
35	-1.68	31.275	25.18		.52	5.0	.6
40	-1.68	31.401	25.28	8.95	.58	4.0	1.2
45	-1.68	31.729	25.54	8.66	.47	6.0	1.7
50	-1.65	31.789	25.59	8.59	.70	6.0	1.9
55	-1.67	31.846	25.64	8.46	.62	7.0	2.1
60	-1.60	31.972	25.74		.51	16.0	2.4
65	-1.57	32.003	25.76	7.62	.62	17.0	6.1
70	-1.52	32.193	25.92	6.98	.62	21.0	5.9
75	-1.47	32.376	26.06	6.61	.40	23.0	10.2
80	-1.47	32.488	26.15		.49	24.0	9.3
90	-1.49	32.615	26.26		.69	26.0	13.8
95	-1.51	32.743	26.36	6.17	.63	27.0	14.1
100	-1.53	32.815	26.42	6.15	.82	27.0	11.6
125	-1.58	33.172	26.71	5.86	.50	28.0	11.1
150	-1.38	33.747	27.17		.45	13.0	12.5
175	-1.15	34.186	27.52	6.19	.22	21.0	9.9
200	-.79	34.379	27.66	6.33	.14	8.0	7.7
225	-.44	34.489	27.74	6.34	.00	7.0	7.8
250	-.21	34.591	27.81	6.34	.60	9.0	9.0
275	.05	34.671	27.86	6.01	.36	6.0	10.6
300	.21	34.750	27.91	6.12	.12	7.0	8.6
325	.31	34.789	27.94	6.11	.28	8.0	9.4
350	.37	34.819	27.96	6.23	.30	7.0	10.7
375	.41	34.815	27.95	6.28	.12	8.0	11.6
400	.44	34.838	27.97	6.22	.25	9.0	8.9
425	.46	34.843	27.97	6.20	.22	8.0	9.1
450	.45	34.855	27.98	6.28	.41	7.0	11.2
475	.44	34.862	27.99	6.26	.14	7.0	11.1
500	.44	34.863	27.99	6.25	.33	7.0	9.5
700		34.881		6.31	.00	9.0	9.3
900		34.871		6.21	.35	7.0	11.3
1100	.46	34.870	28.00	6.30	.07	7.0	11.9
1150	.40	34.872	28.00	6.29	.07	8.0	10.4
1200	.30	34.877	28.01	6.27	.31	7.0	10.6
1250	.23	34.875	28.01	6.43	.46	6.0	12.5
1300	.16	34.881	28.02	6.41	.28	6.0	12.2
1350	.10	34.892	28.03	6.41	.16	7.0	10.1
1400	.05	34.902	28.04	6.29	.10	6.0	10.3
1450	.00	34.906	28.05	6.40	.31	4.0	11.7

CRUISE	T3-019	STATION	008	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	09 DEC 71	BAROM	1012.2	WEATHER	00	WIND SPD 09K
HOUR	19.3 GMT	DRY BULB	-44.0	VISIBILITY	7	WIND DIR 16
LAT	84-37.3N	WET BULB	.	CLOUD TYPE		MARSDEN
LON	082-24.0W	REL HUMID		CLOUD AMT	0	SOUNDING 1684M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
1500	-.04	34.908	28.05	6.52	.41	7.0	13.3
1600	-.15	34.927	28.08	6.59	.50	7.0	11.6

CRUISE	T3-020	STATION 001	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	26 DEC 71	BAROM	1013.2	WEATHER	02
HOUR	19.1 GMT	DRY BULB	-40.0	VISIBILITY	7
LAT	84-37.5N	WET BULB	-40.0	CLOUD TYPE	MARSDEN
LON	082-55.0W	REL HUMID	99	CLOUD AMT	0
					SOUNDING 1969M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.68	31.230	25.14	9.77			
10	-1.71	31.270	25.17	9.85			
20	-1.71	31.260	25.16	9.26			
25	-1.70	31.270	25.17	9.27			
30	-1.69	31.270	25.17	9.26			
35	-1.69	31.290	25.19	9.30			
40	-1.70	31.300	25.20	9.24			
42	-1.69	31.300	25.20				
44	-1.67	31.600	25.44	9.10			
46	-1.69	31.700	25.52				
48	-1.64	31.700	25.52				
50	-1.67	31.750	25.56	9.26			
52	-1.68	31.750	25.56				
54	-1.63	31.820	25.62				
56	-1.67	31.820	25.62				
58	-1.66	31.870	25.66				
60	-1.63	31.910	25.69	8.51			
65	-1.54	32.120	25.86	7.48			
70	-1.48	32.330	26.03	7.06			
75	-1.48	32.470	26.14	6.86			
80	-1.48	32.570	26.22	6.62			
85	-1.51	32.650	26.29	6.26			
90	-1.51	32.720	26.34	6.19			
95	-1.54	32.810	26.42	5.96			
100	-1.56	32.890	26.48	5.93			

CRUISE	T3-020	STATION 002	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	02 JAN 72	BAROM	1028.1	WEATHER	76
HOUR	13.2 GMT	DRY BULB	-42.0	VISIBILITY	8
LAT	84-45.8N	WET BULB	-42.0	CLOUD TYPE	1
LON	081-30.0W	REL HUMID		CLOUD AMT	6
					WIND SPD 07K
					WIND DIR 25
					MARSDEN
					SOUNDING 1997M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.68	31.270	25.17	9.05			
10	-1.70	31.270	25.17	9.50			
15	-1.69	31.270	25.17	9.24			
20	-1.69	31.270	25.17	9.25			
25	-1.69	31.270	25.17	9.23			
30	-1.68	31.240	25.15	9.23			
35	-1.69	31.270	25.17	9.30			
40	-1.70	31.270	25.17	9.30			
45	-1.69	31.520	25.37	9.14			
50	-1.65	31.780	25.58	8.93			
55	-1.66	31.880	25.67	8.64			
60	-1.58	32.030	25.79	7.92			
65	-1.49	32.260	25.97	7.17			
70	-1.48	32.410	26.09	6.88			
75	-1.48	32.520	26.18	6.84			
80	-1.49	32.620	26.26	6.71			
85	-1.50	32.700	26.33	6.57			
90	-1.53	32.750	26.37	6.57			
95	-1.53	32.830	26.43	6.50			
100	-1.55	32.900	26.49	6.46			
125	-1.56	33.310	26.82	5.95			
150	-1.35	33.870	27.27	5.86			
175	-1.09	34.260	27.58	6.49			
200	-.67	34.420	27.69	6.58			
225	-.40	34.520	27.76	6.51			
250	-.14	34.630	27.84	6.48			
275	.05	34.690	27.87	6.49			
300	.21	34.760	27.92	6.41			
325	.32	34.810	27.96	6.42			
350	.37	34.820	27.96	6.43			
375	.39	34.840	27.98	6.42			
400	.45	34.860	27.99	6.52			
425	.45	34.870	28.00	6.49			
450	.44	34.870	28.00	6.52			
475	.45	34.880	28.00	6.55			
500	.42	34.880	28.01	6.57			

CRUISE	T3-020	STATION	003	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	11 JAN 72	BAROM	1006.0	WEATHER	00	WIND SPD 13K
HOUR	23.8 GMT	DRY BULB	-35.0	VISIBILITY	7	WIND DIR 18
LAT	84-30.8N	WET BULB	-35.0	CLOUD TYPE		MARSDEN
LON	086-12.0W	REL HUMID		CLOUD AMT	0	SOUNDING 1733M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.67	31.140	25.07	9.22			
10	-1.71	31.120	25.05	9.18			
15	-1.68	31.120	25.05	9.18			
20	-1.70	31.120	25.05	9.17			
25	-1.69	31.120	25.05	9.18			
30	-1.68	31.130	25.06	9.20			
35	-1.69	31.130	25.06	9.13			
40	-1.69	31.160	25.08	9.14			
42	-1.69	31.170	25.09				
44	-1.68	31.240	25.15	9.16			
46	-1.70	31.470	25.33				
48	-1.65	31.660	25.49				
50	-1.66	31.740	25.55	8.68			
52	-1.66	31.790	25.59				
54	-1.65	31.830	25.63	8.59			
56	-1.67	31.880	25.67				
58	-1.66	31.920	25.70				
60	-1.60	32.000	25.76	7.99			
65	-1.49	32.190	25.91	7.19			
70	-1.49	32.380	26.07	6.77			
75	-1.48	26.750	21.51	6.64			
80	-1.50	32.600	26.25	6.41			
85	-1.53	32.700	26.33	6.39			
90	-1.52	32.780	26.39	6.36			
95	-1.56	32.840	26.44	6.33			
100	-1.58	32.900	26.49	6.30			

CRUISE	T3-020	STATION 004	OBSERVED VALUES			
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	16 JAN 72	BAROM	997.1	WEATHER	02	WIND SPD 10K
HOUR	18.5 GMT	DRY BULB	-36.0	VISIBILITY	7	WIND DIR 00
LAT	84-29.5N	WET BULB	-36.0	CLOUD TYPE	1	MARSDEN
LON	086-05.0W	REL HUMID	99	CLOUD AMT	8	SOUNDING 1750M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.64	31.300	25.20	9.07	.35	6.0	
10	-1.69	31.250	25.16	9.06	.40	4.0	
15	-1.69	31.260	25.16	9.05	.53	5.0	
20	-1.69	31.260	25.16	9.03	.44	5.0	
25	-1.70	31.270	25.17	9.01	.48	3.0	
30	-1.70	31.280	25.18	9.03	.54	5.0	
35	-1.69	31.270	25.17	9.01	.67	9.0	
40	-1.70	31.290	25.19	8.96	.29	6.0	
45	-1.72	31.330	25.22	8.93	.18	6.0	
50	-1.61	31.760	25.57	8.31	.26		
55	-1.59	31.940	25.71	7.86	.50	26.0	
60	-1.56	32.130	25.87	7.23	.53	21.0	
65	-1.48	32.290	25.99	6.72	.77	26.0	
70	-1.50	32.460	26.13		1.00	23.0	
75	-1.49	32.570	26.22	6.36	.98	26.0	
80	-1.49	32.650	26.29	6.28	.92	30.0	
85	-1.49	32.720	26.34	6.23	.96	30.0	
90	-1.52	32.800	26.41	6.11	1.08	48.0	
95	-1.54	32.870	26.46	6.03	.89	29.0	
100	-1.56	32.940	26.52	6.04	1.31	48.0	
125	-1.51	33.380	26.88	5.74	.67	39.0	
150	-1.27	33.900	27.29	6.00	1.01	28.0	
175	-.96	34.280	27.59	6.27	.66	11.0	
200	-.61	34.450	27.71	6.33	.66	7.0	
225	-.34	34.540	27.77	6.23	.31	10.0	
250	-.11	34.650	27.85	6.13	.53	10.0	
275	.07	34.730	27.91	6.10	.42	8.0	
300	.23	34.790	27.94	6.16	.46	9.0	
325	.30	34.820	27.96	6.23	.73	8.0	
350	.35	34.840	27.98	6.19	.42	9.0	
375	.38	34.860	27.99	6.33	.89	9.0	
400	.43	34.870	28.00	6.25	.41	8.0	
425	.44	34.880	28.01	6.23	.38	6.0	
450	.44	34.880	28.01	6.26	.36	8.0	
475		34.890		6.31	.30	6.0	
500	.42	34.890	28.01	6.34	.76	5.0	
600	.32	34.900	28.03	6.41	.41	6.0	
700	.16	34.910	28.05	6.44	.55	6.0	
800	.09	34.910	28.05	6.49	.54	7.0	
900	.01	34.920	28.06	6.47	.53	9.0	
1000	-.06	34.930	28.07	6.54	.43	5.0	
1250	-.15	34.940	28.09	6.54	.48	4.0	
1500	-.43	34.950	28.11	6.48	.41	12.0	

CRUISE	T3-020	STATION	005	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	24 JAN 72	BAROM	1009.2	WEATHER	37	WIND SPD 13K
HOUR	22.7 GMT	DRY BULB	-33.0	VISIBILITY	7	WIND DIR 28
LAT	84-20.4N	WET BULB	-33.0	CLOUD TYPE	5	MARSDEN
LON	086-20.0W	REL HUMID	99	CLOUD AMT	8	SOUNDING 1847M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.65	31.210	25.12	9.23			
10	-1.72	31.200	25.12	9.05			
15	-1.68	31.240	25.15	9.05			
20	-1.71	31.220	25.13	9.01			
25	-1.71	31.270	25.17	9.06			
30	-1.70	31.270	25.17	9.02			
35	-1.70	31.280	25.18	9.03			
40	-1.69	31.300	25.20	9.18			
42	-1.69	31.360	25.24				
44	-1.67	31.560	25.41	8.72			
46	-1.70	31.720	25.54				
48	-1.67	31.780	25.58				
50	-1.68	31.840	25.63	8.57			
52	-1.68	31.870	25.66				
54		31.900		8.46			
56	-1.66	31.920	25.70				
58	-1.63	31.960	25.73				
60	-1.60	32.040	25.79	8.32			
65	-1.51	32.250	25.96				
70	-1.48	32.380	26.07				
75	-1.49	32.270	25.98	6.44			
80	-1.50	32.630	26.27	6.27			
85	-1.55	32.710	26.34	6.22			
90	-1.53	32.810	26.42	6.13			
95	-1.58	32.870	26.47	6.16			
100	-1.56	32.960	26.54	6.06			

CRUISE	T3-020	STATION 006	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	31 JAN 71	BAROM	1020.8	WEATHER	76
HOUR	19.5 GMT	DRY BULB	-42.0	VISIBILITY	8
LAT	84-20.4N	WET BULB	-42.0	CLOUD TYPE	MARSDEN
LON	086-15.0W	REL HUMID		CLOUD AMT	0
					WIND SPD 00K
					WIND DIR
					SOUNDING 1846M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.66	31.340	25.23				
10	-1.70	31.300	25.20	9.19			
15	-1.70	31.300	25.20	9.16			
20	-1.70	31.300	25.20	9.17			
25	-1.69	31.310	25.20	9.03			
30	-1.70	31.320	25.21	9.06			
35	-1.71	31.330	25.22	9.09			
40	-1.70	31.350	25.24				
45	-1.70	31.680	25.50	8.89			
50	-1.66	31.810	25.61	8.63			
55	-1.64	31.900	25.68				
60	-1.53	32.120	25.86	7.30			
65	-1.46	32.270	25.98	6.95			
70	-1.51	32.450	26.12	6.66			
75	-1.49	32.550	26.20	6.50			
80	-1.52	32.640	26.28	6.31			
85	-1.52	32.720	26.34	6.29			
90	-1.53	32.810	26.42	6.23			
95	-1.54	32.890	26.48	6.20			
100	-1.56	32.950	26.53	6.23			
125	-1.49	33.390	26.88	6.05			
150	-1.06	33.880	27.27	6.06			
175	-1.06	34.250	27.57	6.39			
200	-.71	34.410	27.68	6.53			
225	-.38	34.540	27.77	6.44			
250	-.15	34.690	27.88	6.35			
275	.08	34.730	27.90	6.29			
300	.22	34.790	27.95	6.31			
325	.28	34.820	27.97	6.29			
350	.35	34.850	27.99	6.33			
375	.39	34.860	27.99	6.42			
400	.43	34.880	28.01	6.38			
425	.44	34.880	28.01	6.43			
450	.43	34.890	28.01	6.51			
475	.43	34.890	28.01	6.50			
500	.44	34.900	28.02	6.52			

CRUISE	T3-020	STATION 007	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	06 FEB 72	BAROM	1027.7	WEATHER	00
HOUR	22.2 GMT	DRY BULB	-43.0	VISIBILITY	8
LAT	84-20.6N	WET BULB	-43.0	CLOUD TYPE	MARSDEN
LON	086-17.0W	REL HUMID	99	CLOUD AMT	0
					SOUNDING 1845M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.68	31.330	25.22	8.94			
10	-1.73	31.310	25.21	9.21			
15	-1.67	31.310	25.20	9.22			
20	-1.71	31.300	25.20	9.20			
25	-1.72	31.320	25.21	9.20			
30	-1.70	31.340	25.23	9.20			
35	-1.71			9.20			
40	-1.70	31.430	25.30	9.22			
42	-1.70	31.460	25.33				
44	-1.72	31.470	25.33	9.16			
46	-1.70	31.690	25.51				
48	-1.66	31.770	25.58				
50	-1.68	31.810	25.61	8.77			
52	-1.68	31.860	25.65				
54	-1.64	31.890	25.67	8.57			
56	-1.64	31.940	25.71				
58	-1.62	31.990	25.75				
60	-1.52	32.080	25.82	8.93			
65	-1.50	32.270	25.98	6.90			
70	-1.47	32.450	26.12	6.63			
75	-1.48	32.570	26.22	6.51			
80	-1.52	32.650	26.29	6.38			
85	-1.56	32.750	26.37	6.27			
90	-1.54	32.820	26.42	6.27			
95	-1.57	32.910	26.50	6.24			
100	-1.57	32.990	26.56	6.23			

CRUISE	T3-020	STATION	008	OBSERVED VALUES	
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	14 FEB 72	BAROM	1006.4	WEATHER	02 WIND SPD 12K
HOUR	20.0 GMT	DRY BULB	-42.0	VISIBILITY	8 WIND DIR 17
LAT	84-20.5N	WET BULB	-42.0	CLOUD TYPE	0 MARSDEN
LON	086-18.0W	REL HUMID		CLOUD AMT	1 SOUNDING 1844M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.68	31.385	25.27	8.96	.82	5.0	.6
10	-1.71	31.357	25.24	9.11	.83	4.0	.5
15	-1.70	31.357	25.24	9.11	.84	5.0	.6
20	-1.70	31.361	25.25	9.08	.89	4.0	.4
25	-1.68	31.366	25.25	9.04	1.00	1.0	1.0
30	-1.70	31.380	25.26	9.05	.89	5.0	.8
35	-1.70	31.404	25.28	9.07	.96	9.0	.7
40	-1.70	31.432	25.30	9.04	.94	5.0	.8
45	-1.71	32.532	26.20	8.97	.88	6.0	1.7
50	-1.66	31.815	25.61	8.69	.85	6.0	2.1
55	-1.64	31.908	25.69	8.39	.62	10.0	2.7
60	-1.60	32.036	25.79	7.76	.91	17.0	7.3
65	-1.47	32.229	25.94	7.03	1.70	24.0	10.3
70	-1.50	32.383	26.07	6.65	1.70	27.0	11.2
75	-1.49	32.516	26.18	6.48	.97	30.0	12.0
80	-1.50	32.601	26.25	6.37	2.22	34.0	13.3
85	-1.51	32.692	26.32	6.30	2.23	30.0	12.0
90	-1.53	32.772	26.39	6.19	1.96	33.0	14.8
95	-1.55	32.852	26.45	6.11	2.14	39.0	12.7
100	-1.55	32.928	26.51	6.11	2.14	39.0	15.6
125	-1.53	33.325	26.83	5.81	2.20	44.0	13.8
150	-1.27	33.870	27.27	6.02	1.54	22.0	10.2
175	-1.01	34.230	27.55	6.34	1.01	15.0	10.8
200	-.69	34.411	27.68	6.43	.82	8.0	9.0
225	-.36	34.536	27.77	6.35	.56	8.0	10.7
250	-.24	34.630	27.84	6.24	.71	8.0	11.8
275	.09	34.687	27.87	6.23	.85	10.0	12.6
300	.22	34.768	27.93	6.23	.65	5.0	8.0
325	.32	34.806	27.95	6.31	1.08	10.0	13.1
350	.35	34.835	27.97	6.34	.90	8.0	10.1
375	.39	34.851	27.98	6.35	1.00	10.0	12.4
400	.45	34.857	27.99	6.36	1.06	8.0	10.1
425	.43	34.869	28.00	6.40	1.10	9.0	12.7
450	.43	34.918	28.04	6.46	.92	8.0	11.6
475	.44	34.878	28.00	6.41	.85	9.0	14.0
500	.43			6.45	.84	8.0	13.8
600	.21	34.902	28.03	6.46	.77	8.0	10.9
700	.16	34.897	28.03	6.53	.74	6.0	10.5
800	.08	34.915	28.05	6.66	.59	6.0	8.7
900	.00	34.919	28.06	6.54	.54	7.0	11.1
1000	-.09	34.923	28.07	6.48	.30	5.0	8.7
1250	-.22	34.940	28.09	6.55	.47	10.0	11.9
1500	-.35	34.955	28.11	6.54	.67	11.0	12.5
1750	-.37	34.966	28.12	6.50	.47	12.0	13.6

CRUISE	T3-020	STATION	009	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	20 FEB 72	BAROM	1018.0	WEATHER	02	WIND SPD 15K
HOUR	18.0 GMT	DRY BULB	-40.0	VISIBILITY	8	WIND DIR 34
LAT	84-20.6N	WET BULB	-41.0	CLOUD TYPE	0	MARSDEN
LON	086-17.0W	REL HUMID		CLOUD AMT	2	SOUNDING 1846M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-.76	31.388	25.25	9.16			
10	-1.32	31.388	25.26	9.15			
15	-1.64	31.392	25.27	9.14			
20	-1.71	31.390	25.27	9.15			
25	-1.70	31.403	25.28	9.16			
30	-1.70	31.422	25.30	9.15			
35	-1.69	31.428	25.30	9.16			
40	-1.70	31.440	25.31	9.15			
42	-1.70	31.444	25.31				
44	-1.70	31.460	25.33	9.15			
46	-1.70	31.641	25.47				
48	-1.65	31.765	25.57				
50	-1.67	31.828	25.62	8.73			
52	-1.67	31.871	25.66				
54	-1.63	31.888	25.67	8.52			
56	-1.65	31.929	25.71				
58	-1.62	31.978	25.74				
60	-1.58	32.065	25.81	7.72			
65	-1.50	32.245	25.96	7.01			
70	-1.47	32.399	26.08	6.73			
75	-1.47			6.56			
80	-1.48	32.507	26.17	6.48			
85	-1.52	32.677	26.31	6.35			
90	-1.52	32.773	26.39	6.31			
95	-1.55	32.847	26.45	6.28			
100	-1.56	32.916	26.50	6.27			

CRUISE	T3-020	STATION	010	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	27 FEB 72	BAROM	1022.4	WEATHER	37	WIND SPD 18K
HOUR	19.5 GMT	DRY BULB	-27.0	VISIBILITY	7	WIND DIR 35
LAT	84-14.5N	WET BULB	-27.0	CLOUD TYPE	0	MARSDEN
LON	086-47.0W	REL HUMID		CLOUD AMT	6	SOUNDING 1862M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.69	31.409	25.28	9.31			
10	-1.71	31.413	25.29	9.29			
15	-1.70	31.413	25.29	9.29			
20	-1.71	31.407	25.28	9.30			
25	-1.70	31.422	25.30	9.29			
30	-1.70	31.426	25.30	9.26			
35	-1.69	31.438	25.31	9.24			
40	-1.69	31.454	25.32	9.18			
45	-1.72	31.482	25.34	9.19			
50	-1.63	31.594	25.43	8.97			
55	-1.57	31.993	25.76	8.05			
60	-1.50	32.238	25.95	7.07			
65	-1.45	32.362	26.05	6.89			
70	-1.48	32.468	26.14	6.71			
75	-1.48	32.577	26.23	6.53			
80	-1.49	32.625	26.27	6.55			
85	-1.51	32.711	26.34	6.50			
90	-1.52	32.783	26.39	6.51			
95	-1.54	32.850	26.45	6.42			
100	-1.54	32.953	26.53	6.30			
125	-1.53	33.286	26.80	6.13			
150	-1.29	33.890	27.28	6.11			
175	-1.11	34.252	27.57	6.55			
200	-.69	34.422	27.69	6.57			
225	-.37	34.540	27.77	6.58			
250	-.19	34.618	27.83	6.43			
275	.04	34.708	27.89	6.38			
300	.18	34.769	27.93	6.39			
325	.28	34.816	27.96	6.41			
350	.33	34.832	27.97	6.44			
375	.37	34.844	27.98	6.46			
400	.43	34.870	28.00	6.52			
425	.44	34.867	27.99	6.51			
450	.44	34.877	28.00	6.52			
475	.46	34.881	28.00	6.54			
500	.42	34.883	28.01	6.54			

CRUISE	T3-020	STATION 011	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	05 MAR 72	BAROM	1015.8	WEATHER	02
HOUR	19.5 GMT	DRY BULB	-29.0	VISIBILITY	8
LAT	84-14.0N	WET BULB	-29.0	CLOUD TYPE	0
LON	086-54.0W	REL HUMID		CLOUD AMT	2
					WIND SPD 05K
					WIND DIR 35
					MARSDEN
					SOUNDING 1842M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.73	31.405	25.28	9.05			
10	-1.67	31.410	25.29	9.11			
15	-1.70	31.413	25.29	9.10			
20	-1.73	31.419	25.29	9.10			
25	-1.71	31.417	25.29	9.11			
30	-1.70	31.418	25.29	9.09			
35	-1.70	31.423	25.30	9.06			
40	-1.70	31.425	25.30	9.05			
42	-1.69	31.438	25.31				
44	-1.70	31.458	25.32	9.03			
46	-1.72	31.495	25.35				
48	-1.66	31.662	25.49				
50	-1.66	31.760	25.57	8.56			
52	-1.65	31.819	25.62				
54	-1.59	31.894	25.68	8.03			
56	-1.58	31.976	25.74				
58	-1.53	32.073	25.82				
60	-1.52	32.148	25.88	7.10			
65	-1.46	32.329	26.03	6.76			
70	-1.46	32.457	26.13	6.60			
75	-1.49	32.545	26.20	6.51			
80	-1.50	32.644	26.28	6.49			
85	-1.53	32.717	26.34	6.40			
90	-1.53	32.776	26.39	6.33			
95	-1.54	32.870	26.46	6.23			
100	-1.56	32.928	26.51	6.24			

CRUISE T3-020 STATION 012 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 12 MAR 72 BAROM 1005.6 WEATHER 02 WIND SPD 09K
HOUR 19.8 GMT DRY BULB -35.0 VISIBILITY 8 WIND DIR 15
LAT 84-22.8N WET BULB -35.0 CLOUD TYPE 2 MARSDEN
LON 085-25.0W REL HUMID CLOUD AMT 1 SOUNDING 1719M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
0	-1.72	31.289	25.19	9.21			
5	-1.68	31.305	25.20	9.16	.76	4.0	.9
15	-1.70	31.297	25.19	9.19	1.07	5.0	1.2
20	-1.72	31.312	25.21	9.18	.88	3.0	1.1
25	-1.70	31.316	25.21	9.15	1.04	6.0	1.3
30	-1.69	31.330	25.22	9.15	1.10	5.0	1.4
35	-1.70	31.336	25.23	9.16	1.12	6.0	1.6
40	-1.71	31.344	25.23	9.16	1.19	6.0	1.2
45	-1.73	31.385	25.27	9.12	1.09	7.0	1.2
50	-1.65	31.730	25.54	8.63	1.26	9.0	3.1
55	-1.65	31.874	25.66	8.40	1.18	10.0	4.0
60	-1.60	32.009	25.77	7.86	1.31	15.0	7.9
65	-1.70	32.197	25.92	7.24	1.66	23.0	9.3
70	-1.51	32.328	26.03	6.82	1.82	26.0	12.8
75	-1.48	32.501	26.16	6.48	1.91	33.0	12.5
80	-1.49	32.575	26.22	6.35	2.06	32.0	15.0
85	-1.50	32.678	26.31	6.32	2.06	35.0	15.0
90	-1.51	32.746	26.36	6.27	2.21	36.0	16.0
95	-1.54	32.831	26.43	6.28	2.26	42.0	14.2
100	-1.55	32.950	26.53	6.16	2.27	41.0	14.5
125	-1.54	33.349	26.85	5.98	1.91	40.0	16.8
150	-1.04	33.970	27.34	6.05	1.34	23.0	13.6
175	-.97	34.299	27.60	6.39	1.06	14.0	10.3
200	-.61	34.468	27.73	6.48	.71	7.0	11.0
225	-.34	34.583	27.81	6.38	.94	11.0	12.4
250	-.30	34.706	27.90	6.36	1.00	10.0	12.1
275	.12			6.30	1.06	10.0	13.0
300	.24			6.30	1.03	10.0	13.2
325	.29			6.32	1.02	10.0	12.8
350	.37			6.37	1.01	9.0	14.2
375	.40			6.38	1.07	10.0	13.7
400	.45			6.44	1.00	9.0	13.3
425	.45	34.849	27.98	6.48	.76	9.0	13.9
450	.43	34.856	27.99	6.44	.96	9.0	12.7
475	.45	34.860	27.99	6.48	.88	9.0	14.0
500	.42	34.869	28.00	6.47	1.01	8.0	14.1
600	.30	34.878	28.01	6.51	.97	9.0	14.2
700	.19	34.884	28.02	6.49	.90	8.0	14.3
800	.09	34.892	28.03	6.51	.89	9.0	14.1
900	.03	34.907	28.05	6.59	.85	8.0	14.0
1000	-.05	34.918	28.06	6.63	.91	9.0	14.2
1250	-.21	34.937	28.09	6.57	.96	9.0	14.6
1500	-.34	34.950	28.10	6.48	.86	12.0	14.7
1750	-.38	34.969	28.12	6.48	1.01	13.0	14.8

CRUISE	T3-020	STATION 013	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	19 MAR 72	BAROM	1010.8	WEATHER	02
HOUR	19.5 GMT	DRY BULB	-36.0	VISIBILITY	8
LAT	84-20.4N	WET BULB	-36.0	CLOUD TYPE	5
LON	085-20.0W	REL HUMID		CLOUD AMT	3
					WIND SPD 10K
					WIND DIR 32
					MARSDEN
					SOUNDING 1799M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.68	31.423	25.30	9.23			
10	-1.66	31.415	25.29	9.26			
15	-1.68	31.430	25.30	9.22			
20	-1.72	31.415	25.29	9.22			
25	-1.69	31.415	25.29	9.24			
30	-1.71	31.416	25.29	9.19			
35	-1.70	31.421	25.29	9.16			
40	-1.69	31.422	25.30	9.16			
42	-1.68	31.422	25.30				
44	-1.70	31.424	25.30	9.16			
46	-1.73	31.460	25.33				
48	-1.66	31.581	25.42				
50	-1.66	31.780	25.58	8.61			
52	-1.67	31.842	25.64				
54	-1.64	31.909	25.69	8.38			
56	-1.64	31.967	25.74				
58	-1.60	32.008	25.77				
60	-1.60	32.045	25.80	7.74			
65	-1.52	32.234	25.95	7.09			
70	-1.49	32.392	26.08	6.77			
75	-1.51	32.523	26.18	6.63			
80	-1.50	32.630	26.27	6.42			
85	-1.55	32.719	26.34	6.36			
90	-1.53	32.788	26.40	6.37			
95	-1.54	32.859	26.46	6.27			
100	-1.57	32.930	26.51	6.24			

CRUISE T3-021 STATION 001 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 02 APR 72 BAROM 995.3 WEATHER 36 WIND SPD 14K
HOUR 20.3 GMT DRY BULB -29.0 VISIBILITY 7 WIND DIR 20
LAT 84-19.0N WET BULB -29.0 CLOUD TYPE 4 MARSDEN
LON 085-11.0W REL HUMID CLOUD AMT 4 SOUNDING 1800M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.71	31.520	25.38	9.58	.63	8.0	.8
10	-1.73	31.505	25.36	9.58	.56	6.0	.9
15	-1.70	31.496	25.36	9.51	.68	3.0	.7
20	-1.70	31.507	25.36	9.51	.59	3.0	.4
25	-1.71	31.510	25.37	9.48	.55	7.0	1.2
30	-1.70	31.527	25.38	9.47	.66	7.0	1.2
35	-1.70	31.521	25.38	9.48	.53	5.0	1.2
40	-1.70	31.529	25.38	9.47	.68	4.0	.9
45	-1.74	31.537	25.39	9.47	.30	6.0	.5
50	-1.65	31.831	25.63	9.03	.66	5.0	1.3
55	-1.69	31.949	25.72	8.93	.50	4.0	.9
60	-1.60	32.111	25.85	7.97	1.20	15.0	3.3
65	-1.53	32.252	25.96	7.49	1.28	20.0	6.3
70	-1.52	32.401	26.08	7.06	1.83	25.0	8.5
75	-1.48	32.536	26.19	6.72	1.01	23.0	7.8
80	-1.50	32.621	26.26	6.62	1.05	28.0	10.3
85	-1.52	32.722	26.34	6.57	1.30	25.0	8.9
90	-1.52	32.814	26.42	6.16	2.12	30.0	11.8
95	-1.54	32.948	26.53	6.43	1.98	27.0	10.8
100	-1.55	32.888	26.48	6.37	2.00	35.0	13.1
125	-1.53	33.377	26.88	6.12	1.82	32.0	12.6
150	-1.21	33.934	27.32	6.29	1.28	18.0	11.2
175	-.98	34.289	27.60	6.60	1.53	8.0	10.7
200	-.66	34.445	27.71	6.70	1.07	4.0	8.4
225	-.38	34.538	27.77	6.59	1.19	8.0	11.4
250	-.15	34.649	27.85	6.57	.95	9.0	11.1
275	.06	34.720	27.90	6.50	1.10	8.0	10.9
300	.21	34.779	27.94	6.53	.75	8.0	10.1
325	.27	34.820	27.97	6.50	1.05	8.0	11.0
350	.34	34.846	27.98	6.53	1.20	9.0	12.0
375	.37	34.861	27.99	6.60	1.09	7.0	12.1
400	.45	34.877	28.00	6.63	.83	7.0	12.1
425	.44	34.876	28.00	6.59	.57	8.0	11.4
450	.43	34.880	28.01	6.65	.83	5.0	13.5
475	.44	34.883	28.01	6.70	.98	5.0	12.3
500	.42	34.880	28.01	6.70	1.08	7.0	13.4
600	.29	34.900	28.03	6.74	1.10	8.0	12.8
700	.18	34.900	28.04	6.50	1.10	5.0	13.8
900	.00	34.911	28.05	6.76	1.11	7.0	13.3
1000	-.08	34.925	28.07	6.84	.87	8.0	14.1
1250	-.23	34.949	28.10	6.74	1.10	9.0	14.6
1500	-.34	34.954	28.11	6.53	1.04	8.0	14.2
1750	-.38	34.960	28.11	6.65	1.40	11.0	14.1

CRUISE	T3-021	STATION	002	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	03 APR 72	BAROM	995.3	WEATHER	36	WIND SPD 14K
HOUR	21.8 GMT	DRY BULB	-29.0	VISIBILITY	7	WIND DIR 20
LAT	84-19.0N	WET BULB	-29.0	CLOUD TYPE	4	MARSDEN
LON	085-11.0W	REL HUMID		CLOUD AMT	4	SOUNDING 1800M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.77	31.500	25.36				
42	-1.69	31.528	25.38				
44	-1.68	31.618	25.45				
46	-1.71	31.480	25.34				
48	-1.68	31.485	25.35				
50	-1.67	31.487	25.35				
52	-1.67	31.494	25.35				
54	-1.68	31.498	25.36				
56	-1.69	31.511	25.37				
58	-1.63	31.525	25.38				
60	-1.64	31.536	25.39				
62	-1.63	31.598	25.44				

CRUISE	T3-021	STATION	003	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	16 APR 72	BAROM	1012.9	WEATHER	00	WIND SPD 06K
HOUR	19.9 GMT	DRY BULB	-12.0	VISIBILITY	8	WIND DIR 02
LAT	84-23.6N	WET BULB	-13.0	CLOUD TYPE		MARSDEN
LON	084-29.0W	REL HUMID		CLOUD AMT	0	SOUNDING 1770M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.71	31.674	25.50				
42	-1.73	31.687	25.51				
44	-1.71	31.695	25.52				
46	-1.71	31.708	25.53				
48	-1.69	31.650	25.48				
50	-1.68	31.773	25.58				
52	-1.67	31.848	25.64				
54	-1.66	31.912	25.69				
56	-1.69	31.962	25.73				
58	-1.65	31.977	25.74				
60	-1.65	32.016	25.78				
62	-1.64	32.067	25.82				

CRUISE T3-021 STATION 004 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 30 APR 72 BAROM 1027.9 WEATHER 02 WIND SPD 06K
HOUR 18.1 GMT DRY BULB -08.0 VISIBILITY 7 WIND DIR 21
LAT 84-22.6N WET BULB -12.0 CLOUD TYPE 0 MARSDEN
LON 084-29.8W REL HUMID CLOUD AMT 8 SOUNDING 1770M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L		MICROGRAM	-ATOMS/L
5	-1.62	31.648	25.48	9.39	.76	3.0	.9
10	-1.71	31.644	25.48	9.53	1.07	.0	1.4
15	-1.70	31.639	25.47	9.45	.62	10.0	1.3
20	-1.72	31.637	25.47	9.39	.62	.0	1.1
25	-1.71	31.616	25.45	9.45	.22	3.0	1.6
30	-1.70	31.442	25.31	9.45	.42	1.0	1.7
35	-1.71	31.648	25.48	9.51	.76	9.0	1.7
40	-1.72	31.644	25.48	9.43	.90	2.0	1.4
45	-1.74	31.676	25.50	9.32	.06	8.0	2.0
50	-1.68	31.786	25.59	9.11	.33	5.0	2.9
55	-1.68	31.866	25.65	9.64	.40	13.0	3.6
60	-1.66	32.017	25.78	9.20	1.07	12.0	6.4
65	-1.54	32.170	25.90	7.61	.75	22.0	10.3
70	-1.51	32.321	26.02	7.08	1.70	29.0	12.4
75	-1.49	32.451	26.12	6.77	1.30	37.0	13.9
80	-1.50	32.574	26.22	6.65	1.60	30.0	14.7
85	-1.51	32.664	26.30	6.49	1.09	33.0	14.9
90	-1.51	32.735	26.35	6.60	1.23	34.0	15.4
95	-1.53	32.831	26.43	6.53	1.58	45.0	16.6
100	-1.55	32.781	26.39	6.33	1.56	34.0	17.1
125	-1.55	33.287	26.80	6.08	1.84	45.0	16.5
150	-1.34	33.504	26.97	6.11	1.10	23.0	11.5
175	-1.05	34.155	27.49	6.51	.34	19.0	11.5
200	-.68	34.408	27.68	6.54	.18	6.0	10.9
225	-.40	34.531	27.77	6.60	.73	9.0	11.9
250	-.19	34.649	27.85	6.46	.64	6.0	12.5
275	.06	34.713	27.89	6.43	.00	14.0	13.3
300	.15	34.778	27.94	6.30	.19	6.0	13.0
325	.29	34.815	27.96	6.26	.40	7.0	13.7
350	.35	34.777	27.93	6.46	.89	7.0	13.8
375	.40	34.845	27.98	6.56	.50	14.0	13.7
400	.44	34.833	27.97	6.54	.61	3.0	13.5
425	.43	34.866	27.99	6.45	.22	8.0	12.0
450	.44	34.897	28.02	6.59	.56	6.0	14.0
475	.43	34.892	28.02	6.62	.22	13.0	13.9
500	.39	34.883	28.01	6.62	.47	3.0	13.9
600	.28	34.882	28.02	6.68	.12	7.0	13.7
700	.17			6.62	.30	5.0	13.6
800	.06	34.900	28.04	6.64	.52	14.0	13.9
900	.00			6.76	.74	4.0	13.7
1000	-.08	34.870	28.03	6.78	.76	9.0	12.2
1250	-.22	34.928	28.08	6.78	.89	10.0	13.6
1500	-.36	34.936	28.09	6.62	1.03	17.0	14.5
1750	-.39	34.941	28.10	6.62	.97	11.0	15.1

CRUISE	T3-021	STATION	005	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	01 MAY 72	BAROM	1027.9	WEATHER	02	WIND SPD 06K
HOUR	02.7 GMT	DRY BULB	-08.0	VISIBILITY	7	WIND DIR 21
LAT	84-22.6N	WET BULB	-12.0	CLOUD TYPE	0	MARSDEN
LON	084-29.8W	REL HUMID		CLOUD AMT	8	SOUNDING 1770M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.68	31.657	25.49				
42	-1.71	31.346	25.23				
44	-1.71	31.662	25.49				
46	-1.71	31.687	25.51				
48	-1.70	31.713	25.53				
50	-1.67	31.780	25.58				
52	-1.68	31.828	25.62				
54	-1.68	31.858	25.65				
56	-1.70	31.877	25.66				
58	-1.64	31.925	25.70				
60	-1.65	31.979	25.75				
62	-1.62	32.024	25.78				

CRUISE	T3-021	STATION 006	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	22 MAY 72	BAROM	1006.6	WEATHER	02
HOUR	01.5 GMT	DRY BULB	-08.0	VISIBILITY	8
LAT	84-23.6N	WET BULB	.	CLOUD TYPE	0
LON	084-39.0W	REL HUMID		CLOUD AMT	8
					WIND SPD 15K
					WIND DIR 19
					MARSDEN
					SOUNDING 1777M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
40	-1.75	31.626	25.46				
42	-1.72	31.628	25.46				
44	-1.71	31.631	25.46				
46	-1.73	31.643	25.47				
48	-1.70	31.677	25.50				
50	-1.70	31.715	25.53				
52	-1.67	31.765	25.57				
54	-1.66	31.847	25.64				
56	-1.69	31.898	25.68				
58	-1.64	31.925	25.70				
60	-1.63	31.981	25.75				
62	-1.55	32.129	25.87				

CRUISE T3-022 STATION 001 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 04 JUN 72 BAROM 1011.1 WEATHER 02 WIND SPD 18K
HOUR 18.1 GMT DRY BULB -05.0 VISIBILITY 8 WIND DIR 04
LAT 84-12.6N WET BULB . CLOUD TYPE 6 MARSDEN
LON 087-09.0W REL HUMID CLOUD AMT 1 SOUNDING 1836M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.67			9.38	.45	3.7	2.4
10	-1.72			9.46	.42	5.6	2.1
15	-1.71	31.731	25.55	9.42	.55	4.7	2.1
20	-1.72	31.721	25.54	9.38	.61	5.8	1.3
25	-1.75	31.720	25.54	9.41	.35	3.3	1.1
30	-1.70	31.717	25.53	9.43	.27	1.2	1.0
35	-1.73	31.717	25.54	9.45	.52	4.4	2.1
40	-1.75	31.715	25.53	9.48	.39	2.3	1.3
45	-1.77	31.719	25.54	9.46	.58	4.4	2.1
50	-1.70	31.797	25.60	9.21	.59	5.4	2.9
55	-1.66	31.899	25.68	8.73	.63	10.0	4.8
60	-1.60	32.063	25.81	7.94	.84	14.7	8.5
65	-1.52	32.259	25.97	7.16	1.03	20.8	11.5
70	-1.48	32.437	26.11	6.75	1.23	28.2	14.2
75	-1.48	32.520	26.18	6.71	1.21	29.2	14.9
80	-1.51	32.579	26.23	6.30	1.18	30.1	15.3
85	-1.54	32.673	26.31	5.92	1.02	18.7	9.1
90	-1.52	32.742	26.36	6.44	1.21	34.3	16.5
95	-1.56	32.817	26.42	6.41	1.48	34.1	16.6
100		32.876		6.45	1.42	35.2	16.3
125	-1.51	33.338	26.84	6.12	1.07	24.3	11.5
150	-1.32	33.910	27.30	6.22	.89	21.3	8.7
175	-.99	34.266	27.58	6.57	.63	7.4	5.9
200	-.66	34.419	27.69	6.40	.45	4.8	8.7
225	-.34	34.539	27.77		.51	4.6	8.9
250	-.10	34.633	27.84	6.12	.54	3.0	6.9
275	.08	34.702	27.88	6.39	.72	5.9	10.0
300	.20	34.688	27.86	6.46	.68	8.0	14.0
325	.29	34.802	27.95	6.44	.61	8.0	14.1
350	.31	34.807	27.95	6.56	.72	8.0	14.2
375	.35	34.823	27.96	6.67	.71	7.2	13.5
400	.39	34.832	27.97	6.56	.54	8.7	13.2
425	.41	34.858	27.99	5.78	.71	6.7	13.2
450	.42	34.852	27.98	5.87	.79	7.4	13.4
475	.44	34.856	27.99	6.85	.52	8.0	14.0
500	.44	34.857	27.99	6.63	.60	6.5	13.9
600	.29	34.864	28.00	6.22	.63	6.7	13.6
700	.18	34.877	28.02	6.86	.83	7.4	13.7
800	.09	34.896	28.04	6.92	.64	6.9	13.7
900	.00	34.898	28.04	6.91	.49	5.0	11.0
1000	-.08	34.908	28.06	7.03	.50	5.4	10.4
1250	-.25	34.913	28.07	6.87	.73	8.7	14.2
1500	-.36	34.926	28.08	6.86	.76	10.0	14.3
1750	-.40	34.937	28.10	6.78	.52	11.5	12.5

CRUISE T3-022 STATION 002 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 11 JUN 72 BAROM 1020.2 WEATHER 02 WIND SPD 04K
 HOUR 18.3 GMT DRY BULB -05.0 VISIBILITY 7 WIND DIR 23
 LAT 84-13.0N WET BULB . CLOUD TYPE 6 MARSDEN
 LON 086-28.0W REL HUMID CLOUD AMT 8 SOUNDING 1814M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.09	31.708	25.51	9.40	.58	8.6	1.1
10	-1.27	31.689	25.50	9.32	.39	9.0	.1
15	-1.80	31.688	25.51	9.32	.37	6.8	1.2
20	-1.74			9.30		10.6	1.2
25	-1.73	31.691	25.51	9.32	.43	8.4	.5
30	-1.74	31.691	25.51	9.30	.39	7.7	.6
35	-1.72	31.685	25.51	9.22	.45	8.4	.8
40	-1.72	31.685	25.51	9.40	.18	3.7	
42	-1.72	31.692	25.51				
44	-1.72	31.700	25.52	9.33	.34	6.8	.8
46	-1.71	31.820	25.62				
48	-1.65	31.889	25.67				
50	-1.66	31.927	25.70	9.40	.52	11.9	3.9
52	-1.64	31.961	25.73				
54	-1.63	32.006	25.77	8.08	.29	9.5	5.2
56	-1.61	32.043	25.80				
58	-1.59	32.091	25.84				
60	-1.53	32.180	25.91	7.34	.77	21.4	11.4
65	-1.50	32.311	26.01	7.07	.84	25.6	12.9
70	-1.49	32.437	26.11	6.82	.84	28.2	13.6
75	-1.49	32.538	26.20	6.73	.92	26.2	15.2
80	-1.51	32.614	26.26	6.66	1.05	31.5	16.8
85	-1.55	32.693	26.32	6.58	1.01	34.4	16.1
90	-1.52	32.757	26.37	6.48	1.16	33.9	16.9
95	-1.56	32.786	26.40	6.48	.92	33.9	17.4
100	-1.58	32.910	26.50	6.41	1.11	37.5	17.8

CRUISE T3-022 STATION 003 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 18 JUN 72 BAROM 1011.7 WEATHER 02 WIND SPD 03K
HOUR 17.7 GMT DRY BULB -17.0 VISIBILITY 7 WIND DIR 09
LAT 84-09.4N WET BULB . CLOUD TYPE 6 MARSDEN
LON 087-20.0W REL HUMID CLOUD AMT 6 SOUNDING 1889M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM-ATOMS/L	SIO4	NO3
5	-1.62	31.743	25.55	9.43	.51	4.7	1.6
10	-1.71	31.735	25.55	9.57	.27	6.9	2.0
15	-1.71	31.737	25.55	9.53	.46	6.9	1.5
20	-1.71	31.735	25.55	9.52	.40	6.2	1.5
25	-1.71	31.740	25.55	9.56	.23	3.6	2.2
30	-1.72	31.732	25.55	9.55	.19	3.8	1.1
35	-1.72	31.732	25.55	9.52		.5	.6
40	-1.72	31.736	25.55	9.53	.10	1.7	.6
45	-1.76	31.729	25.55	9.53	.16	2.7	.7
50	-1.71	31.735	25.55	9.48	.28	2.1	.7
55	-1.67	31.895	25.68	8.87	.89	4.5	1.4
60	-1.61	32.058	25.81	8.07	1.48	18.0	6.8
65	-1.58	32.194	25.92	7.21	.88	16.6	
70	-1.52			7.12	1.52	11.8	
75	-1.49	32.517	26.18	6.83	1.57	34.6	
80	-1.50	32.600	26.25	6.70	1.32	20.8	
85	-1.52	32.685	26.31	6.59	2.07	36.7	
90	-1.53	32.741	26.36	6.62	1.54	20.1	
95	-1.56	32.804	26.41	6.52	2.11	20.1	
100	-1.56	32.872	26.47	6.50	1.53	20.1	
125	-1.52	33.353	26.86	6.22	1.66	22.0	
150	-1.27	33.902	27.29	6.37	1.62	11.1	
175	-1.02	34.253	27.57	6.67	1.66	5.0	
200	-.66	34.410	27.68	6.79	.86	7.8	
225	-.36	34.536	27.77	6.68	.87	9.2	
250	-.12	34.634	27.84	6.60	1.12	7.6	
275	.08	34.709	27.89	6.51	1.02	11.1	
300	.23	34.776	27.93	6.48	1.21	11.8	
325	.28	34.803	27.95	6.55	1.22	6.4	
350	.33	34.789	27.94	6.57	1.71	8.0	
375	.38	34.835	27.97	6.66	1.14	5.2	
400	.42	34.844	27.98	6.66	1.04	3.1	
425	.43	34.850	27.98	6.70	.96	1.4	
450	.43	34.863	27.99	6.82	1.10	3.6	
475	.43	34.860	27.99	6.79	.91	3.1	
500	.33	34.871	28.00	6.82	.92	2.1	

CRUISE T3-022 STATION 004 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 25 JUN 72 BAROM 1016.5 WEATHER 02 WIND SPD 08K
HOUR 19.3 GMT DRY BULB -10. VISIBILITY 7 WIND DIR 28
LAT 84-05.4N WET BULB . CLOUD TYPE 4 MARSDEN
LON 087-47.0W REL HUMID CLOUD AMT 5 SOUNDING 1590M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.05	31.712	25.52	9.34	.73	5.5	2.9
10	-1.14	31.711	25.52	9.36	.79	8.8	1.6
15	-1.76	31.704	25.52	9.29	.80	.5	1.7
20	-1.70	31.698	25.52	9.34	1.06	8.0	1.6
25	-1.65	31.699	25.52	9.36	.82	5.5	.6
30	-1.68	31.704	25.52	9.29	.68	1.0	1.0
35	-1.72	31.703	25.52	9.34	.80	2.8	.8
40	-1.72	31.702	25.52	9.31	.88	5.8	.5
42	-1.72						
44	-1.71	31.706	25.53	9.24	.90		.7
46	-1.74	31.750	25.56				
48	-1.68	31.800	25.60				
50	-1.70	31.834	25.63	8.94	.84	4.3	2.1
52	-1.71	31.863	25.65				
54	-1.69	31.922	25.70	8.46	1.08	15.8	2.9
56	-1.63	31.989	25.75				
58	-1.58	32.030	25.79				
60	-1.57	32.082	25.83	7.71	1.48	8.5	5.5
65	-1.51	32.286	25.99	7.13	1.70	14.5	
70	-1.49	32.387	26.07	6.87	1.34	32.6	
75	-1.49	32.529	26.19	6.69	1.77	24.3	
80	-1.50	32.630	26.27	6.56	2.00	36.8	
85	-1.55	32.689	26.32	6.48	1.81	43.9	
90	-1.53	32.773	26.39	6.41	2.01	48.9	
95	-1.57	32.829	26.43	6.34	2.00	38.9	
100	-1.58	32.850	26.45	6.27	2.05	39.6	

CRUISE T3-022 STATION 005 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 02 JUL 72 BAROM 1010.3 WEATHER 36 WIND SPD 19K
 HOUR 18.9 GMT DRY BULB 000. VISIBILITY 5 WIND DIR 20
 LAT 84-05.7N WET BULB . CLOUD TYPE 6 MARSDEN
 LON 087-21.0W REL HUMID CLOUD AMT 8 SOUNDING 1588M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.66			9.08	.04	5.9	1.7
10	-1.69			9.17	.50	6.1	1.6
15	-1.71			9.18	.50	5.6	1.7
20	-1.73			9.13	.54	5.6	1.3
25	-1.70			9.19		6.1	1.6
30	-1.73			9.18	.09	5.9	2.3
35	-1.72			9.16	.48	5.6	1.9
40	-1.72			9.11	.07	6.3	1.3
45	-1.72			9.11	.14	5.6	1.6
50	-1.70			9.08	.24	7.4	1.9
55	-1.69			8.72	.11	9.9	3.8
60	-1.63			8.15	.61	13.8	5.8
65	-1.55			7.23	.72	19.6	10.8
70	-1.49			6.94	.92	26.6	12.9
75	-1.49			6.63	1.10	29.3	14.5
80	-1.53			6.46	1.08	32.3	15.3
85	-1.50			6.43	1.08	32.7	16.3
90	-1.54			6.36	1.08	35.9	16.7
95	-1.56			6.34	1.12	35.9	17.0
100	-1.60			6.25	1.15	37.0	17.1
125	-1.51			6.01	1.05	36.1	17.0
150	-1.27			6.08	.80	23.9	14.0
175	-.99			6.40	.76	12.2	11.4
200	-.63			6.40	.29	7.7	11.2
225	-.38			6.37	.41	10.8	12.7
250	-.13			6.43	.42	11.3	13.2
275	.06			6.39	.54	11.1	13.5
300	.16			6.33	.46	11.1	13.9
325	.28	34.805	27.95	6.36	.46	10.6	13.8
350	.35	34.817	27.96	6.39	.50	10.8	14.4
375	.40	34.832	27.97	6.42	.25	9.7	14.2
400	.42	34.849	27.98	6.43	.33	9.7	14.1
425	.42	34.855	27.99	6.48	.37	9.0	14.3
450	.44	34.860	27.99	6.49	.37	8.6	14.3
475	.40	34.861	27.99	6.43	.49	8.3	14.2
500	.42	34.864	27.99	6.50	.42	9.5	14.2
600	.30	34.873	28.01	6.57	.37	9.7	14.5
700	.18	34.874	28.02	6.62	.41	8.8	14.3
800	.08	34.896	28.04	6.65	.44	9.0	14.1
900	.00	34.901	28.05	6.62	.44	9.5	14.0
1000	-.08	34.926	28.07	6.63	.40	8.8	14.3
1250	-.10			6.38	.35	8.8	14.3
1500	-.39			6.57	.24	8.3	13.2

CRUISE T3-022 STATION 006 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 09 JUL 72 BAROM 1011.4 WEATHER 85 WIND SPD 13K
 HOUR 19.4 GMT DRY BULB 000. VISIBILITY 5 WIND DIR 19
 LAT 84-08.7N WET BULB . CLOUD TYPE 6 MARSDEN
 LON 086-33.0W REL HUMID CLOUD AMT 8 SOUNDING 1806M

DEPTH M	TEMP C	SALINITY O/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.28	31.605	25.44	9.44	.05	6.6	1.1
10	-1.70	31.651	25.48	9.43	.27	6.8	.8
15	-1.70	31.647	25.48	9.53	.19	7.3	.6
20	-1.77	31.651	25.48	9.55	.10	7.5	1.1
25	-1.71	31.663	25.49	9.54	.24	7.9	1.0
30	-1.73	31.647	25.48	9.53	.11	7.3	.9
35	-1.71	31.656	25.49	9.53	.08	6.6	1.2
40	-1.71	31.662	25.49	9.53	.26	7.5	1.0
42	-1.72						
44	-1.72	31.670	25.50	9.54	.09	7.5	1.1
46	-1.75	31.676	25.50				
48	-1.71	31.682	25.51				
50	-1.73	31.686	25.51	9.54	.29	7.1	1.3
52	-1.71	31.760	25.57				
54	-1.68	31.885	25.67	8.77	.39	11.0	4.3
56	-1.64						
58	-1.61						
60	-1.61	32.080	25.83	8.02	.51	16.5	8.6
65	-1.52	32.279	25.99	7.29	.66	25.1	12.6
70	-1.51	32.388	26.07	7.05	.43	28.4	12.8
75	-1.50	32.531	26.19	6.81	.88	30.6	15.2
80	-1.51	32.631	26.27	6.67	.70	33.7	16.3
85	-1.54	32.681	26.31	6.64	.88	42.1	16.5
90	-1.53	32.766	26.38	6.58	.63	35.9	17.3
95	-1.57	32.836	25.44	6.52	.87	36.4	18.0
100	-1.57	32.911	26.50	6.47	.94	38.8	18.4

CRUISE T3-022 STATION 007 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 16 JUL 72 BAROM 1005.0 WEATHER 75 WIND SPD 16K
HOUR 18.7 GMT DRY BULB 000. VISIBILITY 4 WIND DIR 21
LAT 84-09.0N WET BULB . CLOUD TYPE 6 MARSDEN
LON 085-48.0W REL HUMID CLOUD AMT 8 SOUNDING 1770M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM-ATOMS/L	SIO4	NO3
5	-1.73	31.692	25.51	9.60	.42	5.8	.8
10	-1.71	31.685	25.51	9.64	.45	9.2	.9
15	-1.70	31.691	25.51	9.62	.58	4.6	.9
20	-1.70	31.680	25.50	9.60	.42	5.1	1.0
25	-1.69	31.677	25.50	9.60	.45	7.6	.8
30	-1.69	31.670	25.50	9.60	.32	5.1	.8
35	-1.69	31.689	25.51	9.60	.40	5.8	.1
40	-1.70	31.701	25.52	8.19	.43	7.1	1.0
45	-1.73	31.700	25.52		.35	5.8	.8
50	-1.69	31.718	25.54	7.96	.37	6.5	1.2
55	-1.69	31.941	25.72	7.98	.54	12.9	4.4
60	-1.64	32.056	25.72	8.06	.66	13.6	6.3
65	-1.54	32.282	25.99	7.34	.82	22.6	10.8
70	-1.50	32.396	26.08	7.04	.83	26.1	11.2
75	-1.49	32.512	26.17	6.82	1.04	26.8	14.1
80	-1.51	32.602	26.25	6.66	.92	31.1	14.3
85	-1.52	32.695	26.32	6.60	1.13	33.9	15.3
90	-1.54	32.788	26.40	6.53	1.23	33.4	16.3
95	-1.54	32.834	26.44	6.53	1.25	36.0	17.1
100	-1.56	32.941	26.52	6.47	1.22	39.2	17.4
125	-1.51	33.375	26.87	6.10	1.17	36.0	15.8
150	-1.36	34.007	27.38	5.47	.75	22.4	13.6
175	-1.02	34.269	27.58	6.64	.46	12.7	11.2
200	-.65	34.228	27.70	6.71	.45	7.8	11.2
225	-.37	34.547	27.78	6.63	.48	8.5	11.3
250	-.13	34.639	27.84	6.54	.50	11.3	12.5
275	.07	34.718	27.90	6.49	.51	9.7	13.3
300	.19	34.775	27.93	6.49	.53	10.6	13.3
325	.29	34.805	27.95	6.50	.81	10.4	13.3
350	.35	34.831	27.97	6.57	.47	8.5	13.4
375	.38	34.850	27.98	6.63	.46	10.1	13.5
400	.41	34.866	28.00	6.64	.37	9.0	13.6
425	.43	34.871	28.00	6.64	.50	7.1	13.7
450	.44	34.889	28.01	6.66	.52	8.3	13.8
475	.43	34.884	28.01	6.71	.66	8.5	13.7
500	.42	34.886	28.01	6.75	.43	7.4	13.4

CRUISE T3-022 STATION 008 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 23 JUL 72 BAROM 1010.3 WEATHER 38 WIND SPD 17K
 HOUR 18.4 GMT DRY BULB 000. VISIBILITY 2 WIND DIR 25
 LAT 84-12.3N WET BULB . CLOUD TYPE 6 MARSDEN
 LON 084-05.0W REL HUMID CLOUD AMT 8 SOUNDING 1765M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-.96	31.595	25.42	9.46	.02	5.9	2.2
10	-1.34	31.592	25.43	9.42	.08	5.9	2.1
15	-1.73	31.594	25.44	9.44	.16	3.8	2.1
20	-1.70	31.595	25.44	9.46		5.7	1.9
25	-1.70	31.613	25.45	9.69	.00	4.5	1.9
30	-1.72	31.602	25.44	9.55	.10	4.5	1.8
35	-1.71	31.597	25.44	9.44	.82	6.6	1.7
40	-1.69	31.618	25.45	9.46	.13	5.0	1.9
42	-1.69	31.711	25.53				
44	-1.69	31.764	25.57	9.30	.14	5.9	2.7
46	-1.70	31.812	25.61				
48	-1.64	31.876	25.66				
50	-1.66	31.876	25.66	8.74	.90	10.2	5.8
52	-1.64	31.917	25.70				
54	-1.64	31.951	25.72	8.49	.69	12.1	6.5
56	-1.58	32.073	25.82				
58	-1.55	32.139	25.87				
60	-1.53	32.165	25.89	7.59	.66	19.9	10.8
65	-1.50	32.296	26.00	7.17	.71	24.4	12.2
70	-1.48	32.399	26.08	7.00	.90	26.8	13.9
75	-1.50	32.531	26.19	6.81	.86	30.1	15.3
80	-1.51	32.592	26.24	6.71	.93	30.5	15.7
85	-1.56	32.715	26.34	6.58	1.17	34.6	18.0
90	-1.53	32.783	26.39	6.51	1.78	36.0	17.0
95	-1.57	32.859	26.46	6.48	1.14	37.9	17.6
100	-1.58	32.923	26.51	6.43	.97	39.8	17.8

CRUISE	T3-022	STATION	009	OBSERVED VALUES			
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	30 JUL 72	BAROM	1020.1	WEATHER	02	WIND SPD	07K
HOUR	18.7 GMT	DRY BULB	-10.	VISIBILITY	8	WIND DIR	03
LAT	84-09.5N	WET BULB	.	CLOUD TYPE	6	MARSDEN	
LON	083-53.0W	REL HUMID		CLOUD AMT	8	SOUNDING	1736M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-.19	5.891	4.68	9.55	.00	2.3	4.9
10	-1.27	31.706	25.52	9.52	.29	6.4	3.2
15	-1.57	31.732	25.54	9.44	.36	6.6	2.7
20	-1.71	31.731	25.55	9.41	.35	6.4	2.5
25	-1.65	31.728	25.54	9.42	.41	6.9	1.7
30	-1.69	31.698	25.52	9.38	.32	5.7	1.5
35	-1.72	31.728	25.54	9.39	.40	6.2	1.7
40	-1.73	31.723	25.54	9.38	.38	6.4	1.6
45	-1.73	31.726	25.54	9.33	.39	6.6	1.8
50	-1.69	31.768	25.58	9.23	.43	8.0	2.3
55	-1.62	32.023	25.78	8.49	.60	13.3	5.8
60	-1.56	32.180	25.91	7.69	.70	23.1	8.7
65	-1.50	32.367	26.06	7.19	.84	25.4	11.1
70	-1.49	32.506	26.17	6.91	.95	29.5	13.6
75	-1.50	32.600	26.25	6.72	.90	31.1	14.5
80	-1.53	32.684	26.31	6.59	.99	31.4	15.4
85	-1.51	32.754	26.37	6.59	.98	34.1	16.6
90	-1.56	32.813	26.42	6.54	1.03	35.0	16.8
95	-1.57	32.874	26.47	6.46	1.06	37.3	17.0
100	-1.58	32.946	26.53	6.36	1.11	37.8	17.8
125	-1.49	33.353	26.85	6.09	1.09	38.3	17.8
150	-1.20	33.897	27.29	6.26	.63	21.5	13.7
175	-.99	34.239	27.56	6.57	.38	11.7	12.3
200	-.64	34.410	27.68	6.64	.39	8.5	11.9
225	-.35	34.511	27.75	6.60	.21	10.1	12.7
250	-.07	34.629	27.83	6.59	.31	13.1	13.4
275	.08	34.707	27.89	6.51	.33	10.3	13.6
300	.21	34.769	27.93	6.45	.32	8.5	14.0
325	.30	34.813	27.96	6.52	.41	11.7	14.5
350	.32	34.794	27.94	6.53	.38	6.9	14.0
375	.36	34.840	27.98	6.59	.46	8.9	14.2
400	.46	34.852	27.98	6.59	.37	10.1	14.2
425	.44	34.861	27.99	6.61	.13	7.8	14.7
450	.45	34.865	27.99	6.65	.41	8.0	14.5
475	.46			6.60	.46	8.3	14.4
500	.44	34.870	28.00	6.67	.36	8.2	14.1
600	.35			6.70	.45	7.1	15.0
700	.23	34.893	28.03	6.73	.48	8.7	14.7
800	.15	34.898	28.04	6.81	.47	8.7	14.5
900	.07	34.899	28.04	6.79	.51	7.6	14.5
1000	-.01	34.916	28.06	6.80	.46	9.2	14.7
1250	-.19	34.927	28.08	6.82	.40	8.9	14.5
1500	-.28	34.938	28.09	6.82	.42	8.7	14.5

CRUISE T3-022 STATION 010 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 06 AUG 72 BAROM 1015.4 WEATHER 45 WIND SPD 07K
 HOUR 17.8 GMT DRY BULB 000. VISIBILITY 3 WIND DIR 20
 LAT 84-09.6N WET BULB . CLOUD TYPE 6 MARSDEN
 LON 083-55.0W REL HUMID CLOUD AMT 9 SOUNDING 1752M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	1.33			8.73	.02	.7	1.6
10	-.94	31.506	25.35	9.27	.43	4.7	1.6
15	-1.64	31.529	25.38	9.28	.22	2.8	1.7
20	-1.63	31.536	25.39	9.09	.40	4.2	1.5
25	-1.66	31.551	25.40	9.07	.44	4.2	1.6
30	-1.68	31.550	25.40	9.29	.36	3.3	1.7
35	-1.68	31.562	25.41	9.02	.41	5.1	1.9
40	-1.68	31.574	25.42	9.03	.48	4.4	1.7
42	-1.69	31.575	25.42				
44	-1.69	31.605	25.44	9.02	.52	4.4	1.8
46	-1.72	31.625	25.46				
48	-1.66	31.698	25.52				
50	-1.66	31.818	25.62	8.49	.52	9.3	4.4
52	-1.64	31.924	25.70				
54	-1.64	31.961	25.73	8.44	.55	11.9	6.2
56	-1.59	32.034	25.79				
58	-1.56	32.097	25.84				
60	-1.54	32.185	25.91	7.15	.81	18.9	10.8
65	-1.50	32.361	26.05	6.71	1.32	26.1	13.1
70	-1.48	32.479	26.15	6.50	.98	28.7	14.7
75	-1.51	32.580	26.23	6.39	1.00	29.4	15.1
80	-1.54	32.658	26.29	6.35	1.05	32.2	15.8
85	-1.56	32.728	26.35	6.28	1.02	33.4	16.5
90	-1.55	32.811	26.42	6.20	1.20	35.5	16.8
95	-1.57	32.871	26.47	6.16	1.13	37.3	17.0
100	-1.59	32.937	26.52	6.13	.89	38.0	17.1

CRUISE T3-022 STATION 011 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 13 AUG 72 BAROM 1000.4 WEATHER 02 WIND SPD 04K
 HOUR 19.1 GMT DRY BULB -10. VISIBILITY 8 WIND DIR 02
 LAT 84-13.5N WET BULB . CLOUD TYPE 6 MARSDEN
 LON 083-00.0W REL HUMID CLOUD AMT 5 SOUNDING 1707M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	.25			9.02	.00	.0	3.9
10	-1.65	31.488	25.35	9.27	.21	4.8	2.4
15	-1.68	31.550	25.40	9.27	.48	4.1	1.9
20	-1.71	31.558	25.41	9.27	.43	4.8	2.3
25	-1.69	31.558	25.41	9.24	.53	5.2	1.8
30	-1.69	31.557	25.40	9.27	.35	3.9	1.6
35	-1.69	31.563	25.41	9.25	.54	4.8	1.6
40	-1.69	31.575	25.42	9.25	.33	5.0	1.7
45	-1.71	31.597	25.44	9.18	.46	5.0	2.0
50	-1.64	31.826	25.62	8.62	.40	8.2	4.5
55	-1.59	32.021	25.78	7.91	.71	15.2	7.9
60	-1.65	32.206	25.93	7.34	.80	20.6	10.7
65	-1.53	32.329	26.03	7.08	.90	21.5	12.2
70	-1.50	32.446	26.12	6.83	.98	26.5	14.6
75	-1.54	32.569	26.22	6.76	1.22	28.0	14.7
80	-1.55	32.643	26.28	6.67	1.01	28.6	15.4
85	-1.52	32.709	26.33	6.53	1.15	30.4	16.3
90	-1.54	32.770	26.38	6.46	1.10	33.6	17.1
95	-1.55	32.853	26.45	6.42	1.37	34.5	16.8
100	-1.56	32.945	26.53	6.33	1.23	34.7	17.6
125	-1.48	33.388	26.88	6.09	1.15	34.1	16.5
150	-1.23	33.944	27.33	6.23	.48	19.1	13.9
175	-.99	34.235	27.55	6.55	.53	9.1	12.0
200	-.65	34.411	27.68	6.62	.34	7.6	10.4
225	-.34	34.540	27.77	6.53	.49	6.9	12.9
250	-.13	34.638	27.84	6.48	.40	6.3	13.5
275	.06	34.707	27.89	6.44	.58	7.6	13.3
300	.20	34.776	27.94	6.38	.38	7.2	14.0
325	.29	34.821	27.97	6.39	.30	6.1	14.3
350	.34	34.819	27.96	6.47	.49	7.2	14.5
375	.38	34.845	27.98	6.08	.59	7.4	14.0
400	.42	34.870	28.00	6.52	.45	6.7	14.3
425	.43	34.862	27.99	6.55	.52	8.0	14.7
450	.43	34.870	28.00	6.59	.42	8.7	14.6
475	.42	34.877	28.00	6.62	.57	7.4	13.9
500	.41	34.876	28.00	6.64	.40	7.4	14.1

CRUISE	T3-022	STATION 012	OBSERVED VALUES				
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	20 AUG 72	BAROM	1016.0	WEATHER	02	WIND SPD	02K
HOUR	17.3 GMT	DRY BULB	000.	VISIBILITY	7	WIND DIR	23
LAT	84-09.2N	WET BULB	.	CLOUD TYPE	6	MARSDEN	
LON	084-05.0W	REL HUMID		CLOUD AMT	2	SOUNDING	1731M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	3.36			9.43	.00	.0	6.8
10	-1.51	31.455	25.32	9.38	.51	2.0	4.6
15	-1.70	31.473	25.34	9.36	.50	2.5	3.6
20	-1.67	31.467	25.33	9.28	.57	1.8	2.8
25	-1.68	31.490	25.35	9.49	.46	1.4	1.7
30	-1.68	31.490	25.35	9.34	.48	2.7	1.6
35	-1.67	31.510	25.37	9.39	.60	2.5	1.8
40	-1.69	31.514	25.37	9.37	.70	2.5	1.8
42	-1.68	31.527	25.38				
44	-1.69	31.524	25.38	9.35	.58	2.7	1.2
46	-1.70	31.533	25.39				
48	-1.68	31.530	25.38				
50	-1.69	31.644	25.48	9.19	.66	3.8	3.1
52	-1.69	31.764	25.57				
54	-1.65	31.919	25.70	8.33	.74	10.2	6.5
56	-1.58	32.018	25.78				
58	-1.56	32.028	25.78				
60	-1.54	32.083	25.83	7.68	.84	15.6	10.4
65	-1.50	32.354	26.05	6.89	1.04	22.1	13.7
70	-1.48	32.448	26.12	6.76	1.18	24.4	15.4
75	-1.49	32.534	26.19	6.67	1.07	28.2	16.3
80	-1.51	32.620	26.26	6.60	1.29	28.2	17.0
85	-1.55	32.666	26.30	6.54	1.17	28.7	17.3
90	-1.51	32.761	26.38	6.45	1.38	30.7	18.4
95	-1.57	32.857	26.46	6.34	1.13	32.3	18.1
100	-1.58	32.925	26.51	6.35	1.40	33.9	18.8

CRUISE T3-022 STATION 013 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 27 AUG 72 BAROM 1020.4 WEATHER 10 WIND SPD 09K
 HOUR 17.6 GMT DRY BULB -02.0 VISIBILITY 4 WIND DIR 04
 LAT 84-05.8N WET BULB . CLOUD TYPE 6 MARSDEN
 LON 084-34.0W REL HUMID CLOUD AMT 8 SOUNDING 1679M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 ATOMS/L	NO3 L
5	-.02			9.23	.00	.0	1.5
10	-1.08	31.464	25.32	9.32	.59	4.4	1.8
15	-1.39	31.482	25.34	9.31	.43	5.7	2.2
20	-1.72	31.487	25.35	9.32	.65	3.5	2.2
25	-1.60	31.493	25.35	9.32	.43	5.0	1.5
30	-1.66	31.491	25.35	9.32	.73	5.7	1.6
35	-1.70	31.518	25.37	9.31	.45	4.4	1.7
40	-1.66	31.526	25.38	9.28		5.2	1.7
45	-1.69	31.586	25.43	9.23	.43	6.1	1.8
50	-1.67	31.783	25.59	8.95	.71	3.9	2.9
55	-1.61	31.976	25.74	8.22	.71	7.9	6.4
60	-1.53	32.156	25.89	7.40	1.09	14.4	9.8
65	-1.49	32.322	26.02	6.90	.97	19.2	12.0
70	-1.49	32.462	26.13	6.71	1.17	24.1	15.1
75	-1.49	32.561	26.21	6.59	.98	29.3	16.4
80	-1.53	32.640	26.28	6.50	1.21	31.1	15.8
85	-1.51	32.725	26.35	6.47	1.16	32.8	16.3
90	-1.55	32.792	26.40	6.37	1.40	35.0	17.9
95	-1.57	32.875	26.47	6.40	1.19	35.0	18.4
100	-1.58	32.915	26.50	6.33	1.35	36.7	17.7
125	-1.48	33.368	26.87	6.04	1.09	37.8	16.8
150	-1.24	33.883	27.28	6.19	.92	35.4	14.8
175	-.96	34.234	27.55	6.49	.65	22.5	12.7
200	-.61	34.404	27.67	6.58	.61	12.0	11.7
225	-.36	34.523	27.76	6.56	.35	7.7	12.7
250	-.08	34.629	27.83	6.50	.57	7.9	14.0
275	.08	34.693	27.87	6.44	.48	9.4	14.3
300	.20	34.764	27.93	6.43	.72	9.4	13.9
325	.28	34.793	27.94	6.47	.63	10.7	13.2
350	.31	34.798	27.95	6.48	.69	9.4	13.6
375	.35	34.824	27.97	6.55	.53	8.1	13.9
400	.42	34.832	27.97	6.51	.62	7.7	14.2
425	.41	34.841	27.98	6.56	.43	8.5	14.0
450	.43	34.851	27.98	6.62	.61	7.2	15.2
475	.44	34.853	27.98	6.46	.52	7.0	15.3
500	.43	34.857	27.99	6.53	.65	7.7	13.9
600	.31	34.865	28.00	6.67	.56	6.6	14.1
700	.19	34.876	28.02	6.74	.88	6.3	15.0
800	.10	34.886	28.03	6.77	.56	7.9	14.7
900	.01	34.890	28.04	6.77	.69	7.2	14.1
1000	-.08	34.903	28.05	6.79	.57	6.8	15.2
1250	-.25	34.910	28.07	6.81	.66	8.1	15.2

CRUISE T3-022 STATION 014 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 03 SEP 72 BAROM 1014.0 WEATHER 10 WIND SPD 12K
 HOUR 18.8 GMT DRY BULB -05.0 VISIBILITY 5 WIND DIR 02
 LAT 84-01.8N WET BULB . CLOUD TYPE 6 MARSDEN
 LON 084-41.0W REL HUMID CLOUD AMT 8 SOUNDING 1685M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	.86			9.81	.12	.0	1.9
10	-.69	31.449	25.29	9.28	.54	3.3	1.5
15	-1.68	31.464	25.33	9.31	.50	3.7	1.7
20	-1.61	31.481	25.34	9.35	.49	2.6	1.7
25	-1.68	31.493	25.35	9.31	.49	3.5	1.5
30	-1.69	31.500	25.36	9.27	.54	3.5	1.5
35	-1.67	31.502	25.36	9.27	.43	3.9	1.6
40	-1.67	31.562	25.41	9.19	.55	4.6	1.8
42	-1.68	31.591	25.43				
44	-1.68	31.625	25.46	9.15	.50	4.8	2.2
46	-1.71	31.679	25.50				
48	-1.66	31.723	25.54				
50	-1.68	31.793	25.60	8.85	.59	7.4	3.6
52	-1.67	31.863	25.65				
54	-1.62	31.989	25.75	8.14	.67	13.4	7.0
56	-1.61	32.049	25.80				
58	-1.57	32.109	25.85				
60	-1.56	32.175	25.90	7.39	.93	19.5	10.4
65	-1.50	32.386	26.07	6.81	.99	24.9	13.4
70	-1.49	32.512	26.17	6.70	1.01	26.9	14.8
75	-1.51	32.558	26.21	6.59	1.11	29.9	15.7
80	-1.52	32.659	26.29	6.49	1.24	31.4	15.1
85	-1.56	32.726	26.35	6.40	1.18	33.2	16.4
90	-1.53	32.790	26.40	6.37	1.24	34.7	16.7
95	-1.57	32.856	26.45	6.31	1.22	36.2	16.9
100	-1.58	32.937	26.52	6.27	1.30	38.2	17.4

CRUISE T3-022 STATION 015 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 10 SEP 72 BAROM 1008.9 WEATHER 02 WIND SPD 11K
HOUR 17.8 GMT DRY BULB -05.0 VISIBILITY 7 WIND DIR 07
LAT 84-01.8N WET BULB . CLOUD TYPE 6 MARSDEN
LON 084-41.0W REL HUMID CLOUD AMT 8 SOUNDING 1685M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM-ATOMS/L	SIO4	NO3
5	.33			10.05			2.3
10	-1.70	31.440	25.31	9.57			1.8
15	-1.70	31.488	25.35	9.54			1.5
20	-1.70	31.492	25.35	9.51			1.2
25	-1.69	31.500	25.36	9.62			1.4
30	-1.69	31.515	25.37	9.47			1.3
35	-1.69			9.54			1.2
40	-1.70	31.516	25.37	9.53			1.4
45	-1.72	31.532	25.38	9.48			1.5
50	-1.65	31.555	25.40	8.96			3.4
55	-1.61	31.973	25.74	8.24			9.6
60	-1.54	32.123	25.86	7.58			10.1
65	-1.55	32.395	26.08	7.07			12.4
70	-1.50	32.481	26.15	6.89			14.3
75	-1.49	32.586	26.23	6.69			14.4
80	-1.44	32.681	26.31	6.63			14.3
85	-1.52	32.714	26.34	6.57			15.4
90	-1.53	32.610	26.25				15.5
95	-1.55	32.887	26.48	6.46			16.2
100	-1.56	32.958	26.54	6.39			16.9
125	-1.49	33.370	26.87	6.16			15.9
150	-1.29	33.884	27.28	6.24			14.0
175	-1.01	34.259	27.57	6.65			11.8
200	-.61	34.442	27.71	6.76			10.4
225	-.42	34.512	27.75	6.69			12.1
250	-.19	34.610	27.82	6.39			12.6
275	.04	34.697	27.88	6.57			12.6
300	.20	34.775	27.93	6.60			13.5
325	.27	34.815	27.96	6.27			13.7
350	.31	34.825	27.97	6.23			13.6
375	.38	34.836	27.97	6.66			13.7
400	.41	34.852	27.98	6.69			13.9
425	.43	34.855	27.99	6.76			13.1
450	.41	34.867	28.00	6.73			14.0
475	.42	34.868	28.00	6.76			13.9
500	.40	34.866	28.00	6.77			13.3

CRUISE T3-022 STATION 016 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 17 SEP 72 BAROM 1012.2 WEATHER 02 WIND SPD 06K
 HOUR 18.7 GMT DRY BULB -07.0 VISIBILITY 6 WIND DIR 02
 LAT 83-46.4N WET BULB . CLOUD TYPE 6 MARSDEN
 LON 089-13.0W REL HUMID CLOUD AMT 8 SOUNDING 1675M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	.34	7.364	5.90	9.26	.29	.0	1.5
10	-.61	31.505	25.33	9.31	.54	2.8	1.6
15	-1.73	31.535	25.39	9.28	.41	1.9	1.4
20	-1.71	31.544	25.39	9.28	.44	2.8	1.7
25	-1.70	31.555	25.40	9.25	.46	2.8	1.6
30	-1.72	31.557	25.41	9.26	.59	2.3	1.7
35	-1.70	31.563	25.41	9.26	.50	3.3	1.4
40	-1.68	31.590	25.43	9.22	.46	3.3	1.8
42	-1.68	31.652	25.48				
44	-1.67	31.747	25.56	9.03	.50	4.0	2.8
46	-1.70	31.784	25.59				
48	-1.64	31.863	25.65				
50	-1.65	31.903	25.68	8.55	.63	8.9	5.2
52	-1.63	31.975	25.74				
54	-1.60	31.995	25.76	8.06	.64	11.9	6.9
56	-1.56	32.072	25.82				
58	-1.52	32.158	25.89				
60	-1.50	32.263	25.97	7.07	.94	19.1	11.7
65	-1.46	32.407	26.09	6.85	.92	21.9	13.6
70	-1.49	32.500	26.16	6.76	1.05	23.8	14.1
75	-1.50	32.599	26.24	6.65	1.10	24.5	14.0
80	-1.53	32.669	26.30	6.56	1.14	24.9	15.7
85	-1.57	32.726	26.35	6.53	1.11	28.7	16.4
90	-1.53	32.819	26.42	6.44	1.14	30.1	16.4
95	-1.56	32.876	26.47	6.40	1.11	32.2	17.2
100	-1.57	32.952	26.53	6.37	1.17	33.1	17.5

CRUISE T3-023 STATION 001 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 04 OCT 72 BAROM 1009.8 WEATHER 76 WIND SPD 04K
HOUR 19.2 GMT DRY BULB -28.0 VISIBILITY 4 WIND DIR 06
LAT 83-35.0N WET BULB . CLOUD TYPE 4 MARSDEN
LON 090-12.0W REL HUMID CLOUD AMT 3 SOUNDING 1450M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.69	31.664	25.49	9.32		6.0	1.1
10	-1.71	31.671	25.50	9.36		6.2	1.2
15	-1.71	31.673	25.50	9.36		7.3	1.0
20	-1.70	31.668	25.49	9.29		5.8	1.0
25	-1.70	31.663	25.49	9.29		7.3	1.5
30	-1.69	31.670	25.50	9.27		7.7	1.5
35	-1.69	31.676	25.50	9.27		6.7	1.8
40	-1.67	31.703	25.52	9.21		9.9	3.0
45	-1.66	31.992	25.76	8.43		12.7	5.0
50	-1.55	32.157	25.89	7.80		15.1	7.7
55	-1.52	32.326	26.02	7.13		18.7	9.5
60	-1.50	32.482	26.15	6.91		22.2	11.8
70	-1.55	32.654	26.29	6.74		25.6	13.1
80	-1.54	32.821	26.43	6.50		29.2	14.8
90	-1.55	32.953	26.53	6.40		28.2	14.7
100	-1.55	33.071	26.63	6.30		32.8	16.1
125	-1.45	33.484	26.96	6.28		31.8	15.9
150	-1.30	34.039	27.41	6.21		19.3	12.6
175	-.93	34.345	27.64	6.53		9.5	10.9
200	-.50	34.501	27.75	6.47		9.9	11.8
250	-.07	34.705	27.89	6.37		9.7	13.0
300	.21	34.817	27.97	6.31			13.3
400	.40	34.887	28.01	6.40		18.1	13.3
500	.42	34.918	28.04	6.61			13.0
600	.32	34.916	28.04	6.61		18.7	13.1
800	.09	34.937	28.07	6.75		12.1	13.0
1000	-.07	34.945	28.09	6.72			13.1
1100	-.13	34.945	28.09	6.68		17.7	13.2
1150	-.18	34.946	28.09	6.66		14.1	13.0
1200	-.20	34.943	28.09	6.76			13.0
1250	-.23	34.947	28.10	6.76		20.0	13.2
1300	-.27	34.946	28.10	6.72		16.5	13.2
1325	-.29	34.943	28.09	6.67		13.3	13.2
1350	-.30	34.940	28.09	6.70		20.8	13.3
1375	-.32	34.937	28.09	6.72		19.7	13.1
1400	-.33	34.937	28.09	6.68		14.3	13.2

CRUISE	T3-023	STATION	002	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	12 OCT 72	BAROM	1001.8	WEATHER	71	WIND SPD 08K
HOUR	19.5 GMT	DRY BULB	-14.0	VISIBILITY	5	WIND DIR 31
LAT	83-34.9N	WET BULB	.	CLOUD TYPE	0	MARSDEN
LON	090-14.0W	REL HUMID		CLOUD AMT	8	SOUNDING 1448M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.68	31.512	25.37	9.22			
10	-1.70	31.590	25.43	9.22			
15	-1.67	31.585	25.43	9.23			
20	-1.70	31.568	25.41	9.21			
25	-1.68	31.572	25.42	9.18			
30	-1.70	31.569	25.41	9.24			
35	-1.69	31.567	25.41	9.23			
40	-1.67	31.751	25.56	8.95			
42	-1.68	31.833	25.63	8.68			
44	-1.62	31.889	25.67	8.50			
46	-1.63	31.934	25.71	8.32			
48	-1.59	31.990	25.75	7.95			
50	-1.56	32.119	25.86	7.49			
52	-1.54	32.154	25.89	7.34			
54	-1.51	32.205	25.93	7.12			
56	-1.49	32.267	25.98	6.96			
58	-1.48	32.349	26.04	6.81			
60	-1.48	32.394	26.08	6.79			
65	-1.48	32.487	26.15	6.69			
70	-1.51	32.576	26.23	6.66			
75	-1.54	32.643	26.28	6.58			
80	-1.52	32.706	26.33	6.52			
90	-1.57	32.835	26.44	6.41			
100	-1.57	32.972	26.55	6.28			

CRUISE	T3-023	STATION	003	OBSERVED VALUES	
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	14 OCT 72	BAROM	996.6	WEATHER	39
HOUR	22.4 GMT	DRY BULB	-20.0	VISIBILITY	1
LAT	83-34.8N	WET BULB	.	CLOUD TYPE	MARSDEN
LON	090-14.0W	REL HUMID		CLOUD AMT	9
					WIND SPD 28K
					WIND DIR 21
					SOUNDING 1488M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
10	-1.71	31.400	25.28	9.16	.41	5.1	1.7
15	-1.67	31.480	25.34	9.19	.41	4.7	1.5
20	-1.70	31.486	25.35	9.22	.43	4.5	1.6
25	-1.70	31.495	25.35	9.22	.43	5.3	1.7
30	-1.69	31.498	25.36	9.14	.43	4.9	1.6
35	-1.69	31.508	25.37	9.16	.43	4.5	1.9
40	-1.71	31.538	25.39	9.16	.43	6.5	1.8
45	-1.73	31.588	25.43	9.14	.38	5.1	1.9
50	-1.63	31.735	25.55	8.80	.51	7.1	3.4
55	-1.58	31.996	25.76	7.79	.78	14.9	7.5
60	-1.51	32.208	25.93	7.14	.77	19.4	10.8
65	-1.49	32.378	26.07	6.80	.86	22.8	13.0
70	-1.50	32.477	26.15	6.65	.94	26.5	13.0
75	-1.50	32.587	26.23	6.57	.97	26.9	14.5
80	-1.52	32.657	26.29	6.54	.99	28.5	15.2
85	-1.55	32.707	26.33	6.53	.99	29.6	13.5
90	-1.56	32.774	26.39	6.46	1.02	32.4	14.6
95	-1.55	32.832	26.43	6.37	1.06	32.6	15.5
100	-1.56	32.903	26.49	6.29	1.09	35.1	16.2
105	-1.58	33.012	26.58	6.20	1.09	36.5	18.6
110	-1.54	33.078	26.63	6.17	1.11	35.1	18.0
115	-1.55	33.141	26.68	6.12	1.06	36.5	18.4
120	-1.53	33.269	26.79	6.01	1.06	38.5	18.1
125	-1.47	33.400	26.89	5.74	.98	34.2	18.7
130	-1.44	33.500	26.97	5.68	.97	34.0	17.2
135	-1.36	33.669	27.11	5.67	.92	32.2	17.1
140	-1.34	33.770	27.19	5.72	.85	26.5	16.4
145	-1.30	33.896	27.29	5.87	.72	22.6	16.0
150	-1.29	33.964	27.34	5.92	.64	20.2	13.5
155	-1.27	34.043	27.41	6.01	.75	15.7	13.7
160	-1.22	34.134	27.48	6.11	.60	14.1	12.5
165	-1.18	34.200	27.53	6.18	.64	13.0	13.1
170	-1.03	34.232	27.55	6.24	.63	9.4	12.0
175	-.99	34.276	27.59	6.31	.60	11.2	12.0
180	-.85	34.320	27.62	6.34	.55	9.8	11.7
185	-.76	34.355	27.64	6.38	.56	7.3	9.9
190	-.71	34.395	27.67	6.37	.56	8.6	9.4
195	-.65	34.433	27.70	6.38	.56	7.1	11.0
200	-.60	34.462	27.72	6.37	.56	7.1	10.0
205	-.54	34.504	27.75	6.35	.56	7.7	12.4
210	-.48	34.504	27.75	6.38	.69	7.5	12.5
215	-.44	34.521	27.76	6.35	.53	6.5	12.1
220	-.39	34.535	27.77	6.24	.55	8.4	12.5
225	-.33	34.554	27.78	6.30	.57	7.5	13.4
230	-.27	34.583	27.80	6.31	.57	8.4	12.7

CRUISE	T3-023	STATION	003	OBSERVED VALUES			
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)					
DATE	14 OCT 72	BAROM	996.6	WEATHER	39	WIND SPD	28K
HOUR	22.4 GMT	DRY BULB	-20.0	VISIBILITY	1	WIND DIR	21
LAT	83-34.8N	WET BULB	.	CLOUD TYPE		MARSDEN	
LON	090-14.0W	REL HUMID		CLOUD AMT	9	SOUNDING	1488M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
235	-.22	34.606	27.82	6.24	.66	10.2	12.1
240	-.20	34.618	27.83	6.33	.66	10.2	10.6
245	-.18	34.626	27.83	6.50	.55	6.9	13.8
250	-.14	34.639	27.84	6.48	.55	6.7	13.1
255	-.07	34.661	27.86	6.49	.59	6.7	13.9
260	-.04	34.662	27.86	6.34	.62	9.0	14.2
265	.01	34.682	27.87	6.39	.62	8.6	14.4
270	.05	34.702	27.88	6.33	.62	9.2	14.4
275	.07	34.708	27.89	6.40	.64	8.2	14.5
280	.10	34.717	27.89	6.36	.50	9.4	14.3
285	.11	34.734	27.91	6.37	.60	8.6	15.0
290	.11	34.744	27.91	6.41	.56	7.1	14.0
295	.14	34.752	27.92	6.39	.57	7.5	14.5
300	.17	34.763	27.93	6.42	.57	7.7	14.7

CRUISE T3-023 STATION 03A OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 18 OCT 72 BAROM 1021.2 WEATHER 00 WIND SPD 00K
 HOUR 18.6 GMT DRY BULB -26.0 VISIBILITY 7 WIND DIR
 LAT 83-34.8N WET BULB . CLOUD TYPE 1 MARSDEN
 LON 090-14.0W REL HUMID CLOUD AMT 1 SOUNDING 1616M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
305	.23	34.783	27.94	6.35		10.5	10.3
310	.24	34.786	27.94	6.35		9.8	11.5
315	.27	34.801	27.95	6.36		12.5	10.4
320	.29	34.806	27.95	6.43		10.5	10.5
325	.29	34.810	27.96	6.43		7.6	11.1
330	.30	34.810	27.96	6.46		11.7	12.1
335	.32	34.815	27.96	6.42		11.0	11.4
340	.31	34.818	27.96	6.40		8.3	11.1
345	.33	34.824	27.97	6.42		12.7	12.9
350	.32	34.825	27.97	6.43		10.5	13.0
355	.32	34.831	27.97	6.44		8.3	13.2
360	.34	34.831	27.97	6.42		11.7	12.8
365	.37	34.830	27.97	6.42		11.2	13.0
370	.35	34.830	27.97	6.46		8.8	13.4
375	.38	34.834	27.97	6.43		12.7	13.1
380	.38	34.833	27.97	6.46		12.5	12.9
385	.39	34.839	27.98	6.48		11.2	13.2
390	.40	34.837	27.97	6.40		14.2	13.4
395	.41	34.843	27.98	6.49		10.8	13.2
400	.42	34.844	27.98	6.49		8.6	13.0
405	.44	34.849	27.98	6.49		11.4	13.1
410	.42	34.849	27.98	6.51		9.9	13.5
415	.42	34.850	27.98	6.54		9.2	13.4
420	.43	34.848	27.98	6.43		10.7	12.9
425	.44	34.848	27.98	6.51		8.6	12.9
430	.42	34.854	27.99	6.56		9.9	13.4
435	.43	34.855	27.99	6.57		10.9	12.8
440	.43	34.854	27.98	6.48		8.9	12.9
445	.44	34.855	27.99	6.52		9.9	13.1
450	.45	34.856	27.99	6.58		10.9	13.2
455	.45	34.865	27.99	6.58		8.9	13.0
460	.45	34.864	27.99	6.57		9.7	13.0
465	.45	34.863	27.99	6.56		10.7	12.6
470	.43	34.864	27.99	6.58		8.4	13.3
475	.43	34.863	27.99	6.60		9.4	13.2
480	.43	34.865	27.99	6.58		10.7	12.6
485	.44	34.865	27.99	6.58		9.7	12.7
490	.42	34.865	27.99	6.58		9.7	13.2
495	.44	34.866	27.99	6.61		10.9	13.1
500	.43	34.866	27.99	6.58		8.6	13.0

CRUISE	T3-023	STATION 004	OBSERVED VALUES		
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)			
DATE	28 OCT 72	BAROM	WEATHER	WIND SPD	K
HOUR	21.8 GMT	DRY BULB	VISIBILITY	WIND DIR	
LAT	83-40.4N	WET BULB	CLOUD TYPE	MARSDEN	
LON	086-14.0W	REL HUMID	CLOUD AMT	SOUNDING	1611M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
150	-1.28	33.998	27.37				
165	-1.06	34.211	27.54				
180	-.82	34.331	27.62				
195	-.63	34.403	27.67				
210	-.47	34.470	27.72				
225	-.28	34.539	27.77				
240	-.15	34.599	27.81				
255	-.02	34.643	27.84				
270	.04	34.677	27.86				
285	.12	34.712	27.89				
300	.21	34.742	27.91				

CRUISE T3-023 STATION 005 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 08 NOV 72 BAROM 1006 2 WEATHER 36 WIND SPD 16K
 HOUR 00.7 GMT DRY BULB -22.0 VISIBILITY 5 WIND DIR 22
 LAT 83-44.0N WET BULB . CLOUD TYPE MARSDEN
 LON 085-48.0W REL HUMID CLOUD AMT 8 SOUNDING 1631M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.71			9.03	.83	2.2	3.2
10	-1.71	31.558	25.41	9.02	.71	3.6	2.4
15	-1.68	31.553	25.40	9.02	.73	3.4	2.6
20	-1.70	31.552	25.40	9.01	.90	4.3	1.8
25	-1.66			8.96	.85	4.7	1.4
30	-1.69	31.584	25.43	8.99	.44	5.2	2.3
35	-1.66	31.577	25.42	9.02	.55	4.5	2.1
40	-1.70	31.591	25.43	9.02	.58	4.9	1.7
42	-1.73	31.609	25.45	9.02	.43	3.4	2.4
44	-1.69	31.611	25.45	9.01	.48	3.1	2.3
46	-1.69	31.635	25.47	9.01	.47	3.8	2.4
48	-1.72	31.641	25.47	9.01	.65	2.9	2.1
50	-1.63	31.912	25.69	8.18	.38	10.3	4.4
52	-1.59	32.076	25.82	7.72	.42	15.9	9.5
54	-1.53	32.152	25.88	7.46	.34	13.7	10.8
56	-1.53	32.251	25.96	7.21	.59	15.9	10.4
58	-1.50	32.344	26.04	6.95	.63	17.0	12.8
60	-1.49	32.391	26.08	6.84	.45	21.5	16.8
65	-1.50	32.504	26.17	6.66	.62	19.0	17.2
70	-1.52	32.594	26.24	6.58	.62	25.3	17.0
75	-1.56	32.679	26.31	6.52		27.1	16.8
80	-1.54	32.730	26.35	6.47	.55	25.5	13.8
90	-1.55	32.861	26.46	6.22	.89	34.5	16.4
100	-1.56	32.989	26.56	6.18	1.08	31.8	17.1

CRUISE T3-023 STATION 006 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 17 NOV 72 BAROM 1029 8 WEATHER 76 WIND SPD 00K
 HOUR 21.5 GMT DRY BULB -50.0 VISIBILITY 6 WIND DIR
 LAT 83-45.3N WET BULB . CLOUD TYPE 1 MARSDEN
 LON 085-58.0W REL HUMID CLOUD AMT 3 SOUNDING 1640M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.70	31.551	25.40	9.53	.84	6.1	1.8
10	-1.71	31.478	25.34	9.32	.77	8.2	2.1
15	-1.65	31.476	25.34	9.31	.62	5.6	2.2
20	-1.72	31.490	25.35	9.19	.67	8.2	2.2
25	-1.70	31.519	25.37	9.15	.80	9.6	2.0
30	-1.71	31.519	25.37	9.16	.79	7.9	2.5
35	-1.71	31.529	25.38	9.16	.79	7.2	1.7
40	-1.71	31.542	25.39	9.16	.84	8.6	1.9
45	-1.71	31.572	25.42	9.06	.70	8.6	3.5
50	-1.59	31.924	25.70	8.07	.95	16.4	6.4
55	-1.54	32.166	25.89	7.34	1.06	22.7	9.1
60	-1.51	32.420	26.10	6.96	1.06	26.4	11.5
70	-1.54	32.520	26.18	6.73	1.37	33.6	13.3
80	-1.56	32.645	26.28	6.64	1.37	36.0	15.7
90	-1.53	32.788	26.40	6.44	1.38	37.1	16.4
100	-1.56	32.930	26.51	6.32	1.38	43.4	16.6
125	-1.44	33.389	26.88	5.93	1.17	40.4	17.3
150	-1.28	33.924	27.31	6.23	.77	12.4	6.5
175	-.93	34.234	27.55	6.57	.66	13.1	8.3
200	-.59	34.364	27.64	6.66	.57	9.8	11.2
250	-.09	34.558	27.77	6.58	.66	9.1	12.3
300	.24	34.718	27.89	6.50	.66	10.3	10.4
400	.41	34.800	27.94	6.57	.72	10.0	14.6
500	.51	34.852	27.98	6.64	.61	7.9	13.2

CRUISE T3-023 STATION 007 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 05 DEC 72 BAROM 1001 6 WEATHER 22 WIND SPD 08K
HOUR 00.4 GMT DRY BULB -21.0 VISIBILITY 6 WIND DIR 30
LAT 83-27.2N WET BULB . CLOUD TYPE 0 MARSDEN
LON 090-11.0W REL HUMID CLOUD AMT 8 SOUNDING 1648M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM-ATOMS/L	SIO4	NO3
5	-1.72			9.32	.58	7.3	1.5
10	-1.70	31.558	25.41	9.35	.57	6.6	1.8
15	-1.68	31.554	25.40	9.32	.48	10.8	1.5
20	-1.72	31.571	25.42	9.43	.49	9.9	1.5
25	-1.70	31.585	25.43	9.38	.49	6.6	2.2
30	-1.71	31.606	25.44	9.40	.63	8.8	1.6
35	-1.70	31.610	25.45	9.35	.70	8.4	1.7
40	-1.72	31.620	25.46	9.36	.52	9.7	1.9
45	-1.74	31.630	25.46	9.32	.62	9.1	2.0
50	-1.51	32.202	25.92	7.42	.95	25.4	6.6
55	-1.48	32.379	26.07	7.04	.95	29.4	6.4
60	-1.49	32.466	26.14	6.94	.87	25.4	10.9
70	-1.54	32.667	26.30	6.78	1.03	30.9	13.8
80	-1.55	32.784	26.40	6.72	1.16	32.1	18.3
90	-1.53	32.930	26.51	6.56	1.14	34.9	18.9
100	-1.55	33.032	26.60	6.42	1.14	42.0	12.1
125	-1.43	33.469	26.95	6.06	1.37	42.2	14.5
150	-1.13	33.996	27.36	6.40	.70	21.0	12.0
175	-.82	34.306	27.60	6.65	.48	16.1	9.3
200	-.54	34.443	27.70	6.75	.37	9.1	9.7
250	-.04	34.644	27.84	6.61	.51	13.0	10.9
300	.22	34.767	27.93	6.56	.63	12.2	11.9
400	.37	34.835	27.97	6.63	.42	10.8	11.2
500	.42	34.864	27.99	6.79	.48	9.5	10.7
600	.31	34.884	28.02	6.85	.40	8.6	12.2
700	.18	34.886	28.02	6.88	.58	9.1	12.2
800	.10	34.888	28.03	6.93		9.1	11.9
900	.12	34.899	28.04	6.79		9.9	10.8
1000	-.06			6.76			10.7
1100	-.13			6.99		10.6	9.5
1200	-.19			6.98		6.6	11.1
1300	-.24	34.907	28.06	6.94		6.4	11.0
1400	-.29	34.910	28.07	6.91		11.1	12.1
1500	-.33	34.918	28.08	6.92		11.1	11.6
1550	-.36			6.92		12.2	12.2
1600	-.39	34.918	28.08	6.85			12.1

CRUISE	T3-024	STATION 001	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	26 DEC 72	BAROM	1004 7	WEATHER	00
HOUR	20.0 GMT	DRY BULB	-41.0	VISIBILITY	7
LAT	83-29.4N	WET BULB	.	CLOUD TYPE	MARSDEN
LON	089-33.0W	REL HUMID		CLOUD AMT	0
					SOUNDING 1600M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.73	31.650	25.48	9.06			
10	-1.74	31.629	25.46	9.07			
15	-1.70	31.647	25.48	9.10			
20	-1.71	31.642	25.47	9.14			
25	-1.72	31.646	25.48	9.11			
30	-1.71	31.648	25.48	9.11			
35	-1.72	31.650	25.48	9.04			
40	-1.73	31.651	25.48	9.04			
45	-1.75	31.655	25.49	9.06			
50	-1.71	31.662	25.49	9.04			
55	-1.53	32.264	25.97	7.14			
60	-1.51	32.415	26.10	6.88			
70	-1.54	32.600	26.25	6.79			
80	-1.55	32.752	26.37	6.55			
90	-1.53	32.898	26.49	6.39			
100	-1.56	33.006	26.58	6.27			
125	-1.43	33.492	26.97	5.96			
150	-1.22	34.018	27.39	6.20			
175	-.83	34.308	27.61	6.53			
200	-.50	34.463	27.72	6.53			
250	-.06	34.659	27.85	6.42			
300	.23	34.778	27.94	6.34			
400	.41	34.861	27.99	6.48			
500	.42	34.881	28.01	6.63			

CRUISE	T3-024	STATION	002	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	06 JAN 73	BAROM	1001 3	WEATHER	39	WIND SPD 18K
HOUR	20.7 GMT	DRY BULB	-20.0	VISIBILITY	4	WIND DIR 19
LAT	83-33.0N	WET BULB	.	CLOUD TYPE	6	MARSDEN
LON	088-35.0W	REL HUMID		CLOUD AMT	8	SOUNDING 1585M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.72	31.779	25.59	8.89			
10	-1.73	31.665	25.49	8.96			
15	-1.72	31.675	25.50	9.05			
20	-1.72	31.674	25.50	9.02			
25	-1.71	31.670	25.50	9.00			
30	-1.71	31.674	25.50	8.96			
35	-1.71	31.682	25.51	8.95			
40	-1.72	31.686	25.51	8.97			
42	-1.75	31.690	25.51	8.97			
44	-1.71	31.693	25.52	8.97			
46	-1.71	31.692	25.51	8.96			
48	-1.74	31.699	25.52	8.91			
50	-1.73	31.704	25.52	8.95			
52	-1.73	31.696	25.52	9.00			
54	-1.64	32.051	25.80	7.87			
56	-1.54	32.153	25.88	7.40			
58	-1.51	32.266	25.98	7.07			
60	-1.50	32.332	26.03	6.94			
65	-1.49	32.442	26.12	6.73			
70	-1.50	32.530	26.19	6.59			
75	-1.54	32.650	26.29	6.42			
80	-1.51	32.732	26.48	6.34			
90	-1.57	33.058	26.62	6.21			
100	-1.57	33.058	26.62	6.16			

CRUISE T3-024 STATION 003 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 14 JAN 73 BAROM 999 9 WEATHER 71 WIND SPD 05K
HOUR 19.5 GMT DRY BULB -33.0 VISIBILITY 7 WIND DIR 35
LAT 83-32.0N WET BULB . CLOUD TYPE 0 MARSDEN
LON 088-31.0W REL HUMID CLOUD AMT 8 SOUNDING 1576M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 ATOMS/L	NO3
5	-1.72			9.42	.43	7.7	1.6
10	-1.74	31.690	25.51	9.05	.55	6.3	1.5
15	-1.72	31.685	25.51	9.09	.63	10.6	1.4
20	-1.72	31.686	25.51	9.14	.70	6.3	1.5
25	-1.72	31.689	25.51	9.07	.31	8.5	2.0
30	-1.72	31.689	25.51	9.03	.51	9.2	2.2
35	-1.72	31.690	25.51	9.05	.48	11.5	2.4
40	-1.73	31.709	25.53	9.05	.62	6.7	2.4
45	-1.76	31.723	25.54	9.08	.68	12.3	1.8
50	-1.69	31.786	25.59	8.92	.75	9.8	2.3
55	-1.56	32.201	25.92	7.34	1.03	29.0	7.3
60	-1.52	32.338	26.03	6.98	1.06	29.4	8.7
70	-1.52	32.614	26.26	6.33	.99	33.5	11.0
80	-1.55	32.739	26.36	6.34			
90	-1.54	33.103	26.65	6.15	1.29	39.6	13.7
100	-1.55	33.300	26.81	6.11	1.34	42.7	12.7
125	-1.41	33.539	27.00	5.85	1.08	37.5	16.0
150	-1.24	34.065	27.42	6.11	.74	19.0	9.7
175	-.81	34.327	27.62	6.36	.55	10.4	12.0
200	-.50	34.461	27.72	6.44	.53	10.2	11.7
250	-.03	34.660	27.85	6.30	.53	11.9	13.4
300	.22	34.772	27.93	6.30	.71	14.2	10.9
400	.40	34.839	27.97	6.44	.62	9.8	14.4
500	.43	34.874	28.00	6.55	.58	8.3	11.9
600	.33	34.885	28.02	6.58	.54	8.3	13.1
700	.19	34.890	28.03	6.63	.55	8.8	12.5
800	.11	34.894	28.04	6.63	.48	5.6	8.4
900	.03	34.902	28.05	6.60	.53	10.4	12.2
1000	-.05	34.907	28.05	6.51	.49	11.3	12.9
1100	-.12	34.895	28.05	6.70	.59	11.7	10.9
1200	-.18	34.912	28.06	6.69	.54	10.0	12.1
1300	-.24	34.930	28.08	6.68	.63	10.6	12.3
1400	-.31	34.917	28.07	6.60	.54	10.6	13.5
1500	-.34	34.937	28.09	6.63	.55	12.3	13.1
1525	-.36	34.938	28.09	6.60	.71	14.2	10.9
1550	-.36	34.938	28.09	6.66	.64	13.5	12.3

CRUISE	T3-024	STATION	004	OBSERVED VALUES		
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	21 JAN 73	BAROM	1013 3	WEATHER	00	WIND SPD 05K
HOUR	19.5 GMT	DRY BULB	-33.0	VISIBILITY	7	WIND DIR 01
LAT	83-31.0N	WET BULB	.	CLOUD TYPE		MARSDEN
LON	088-33.0W	REL HUMID		CLOUD AMT	0	SOUNDING 1595M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.73	31.698	25.52	8.84			
10	-1.73	31.699	25.52	8.93			
15	-1.69	31.698	25.52	9.03			
20	-1.72	31.699	25.52	8.84			
25	-1.72	31.705	25.53	8.93			
30	-1.72	31.717	25.53	8.93			
35	-1.72	31.736	25.55	8.94			
40	-1.73	31.741	25.55	8.93			
42	-1.75	31.740	25.55	8.98			
44	-1.71			8.96			
46	-1.71			8.65			
48	-1.63			7.64			
50	-1.56	32.160	25.89	7.43			
52	-1.55	32.210	25.93	7.32			
54	-1.51	32.266	25.98	7.07			
56	-1.51	32.358	26.05	6.88			
58	-1.50	32.410	26.09	6.77			
60	-1.49	32.419	26.10	6.78			
65	-1.51	32.554	26.21	6.59			
70	-1.51	32.635	26.27	6.50			
75	-1.56	32.715	26.34	6.42			
80	-1.51	32.785	26.40	6.34			
90	-1.57	32.927	26.51	6.22			
100	-1.57	33.106	26.66	6.11			

CRUISE T3-024 STATION 005 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 29 JAN 73 BAROM 1002.3 WEATHER 76 WIND SPD 03K
 HOUR 20.0 GMT DRY BULB -36.0 VISIBILITY 7 WIND DIR 34
 LAT 83-37.1N WET BULB . CLOUD TYPE MARSDEN
 LON 087-30.0W REL HUMID CLOUD AMT 0 SOUNDING 1611M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 ATOMS/L	NO3 ATOMS/L
5	-1.73	31.789	25.59	9.01	.54	8.2	1.1
10	-1.74	31.782	25.59	9.01	.56	8.0	1.2
15	-1.70	31.774	25.58	9.02	.56	8.0	2.1
20	-1.72	31.770	25.58	9.03	.53	8.3	1.2
25	-1.72	31.769	25.58	9.02	.53	7.3	1.5
30	-1.72	31.768	25.58	9.01	.50	8.0	1.6
35	-1.72	31.771	25.58	9.03	.57	9.8	1.8
40	-1.73	31.772	25.58	9.04	.58	7.3	2.1
45	-1.75	31.779	25.59	8.95	.56	7.8	2.4
50	-1.70	31.823	25.62	8.92	.58	11.8	2.6
55	-1.67	31.943	25.72	8.36	.62	13.2	4.8
60	-1.57	32.193	25.92	7.35	.84	25.8	8.0
70	-1.52	32.473	26.14	6.53	.95	32.6	11.0
80	-1.54	32.704	26.33	6.39	1.07	32.3	13.9
90	-1.55	32.882	26.47	6.22	1.11	35.0	15.4
100	-1.56	33.002	26.57	6.13	1.08	45.3	13.5
125	-1.41	33.594	27.05	5.90	.94	36.6	14.2
150	-1.24	34.026	27.39	6.19	.65	20.0	9.1
175	-.85	34.304	27.60	6.48	.43	12.0	9.1
200	-.52	34.446	27.70	6.40	.49		11.2
250	-.06	34.631	27.83	6.30	.41	9.8	11.9
300	.22	34.767	27.93	6.38	.42	17.2	10.8
400	.43	34.846	27.98	6.41	.47	12.0	12.0
500	.41	34.992	28.10	6.48	.47	10.5	9.9

CRUISE T3-024 STATION 006 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 04 FEB 73 BAROM 1021 0 WEATHER 00 WIND SPD 02K
 HOUR 19.3 GMT DRY BULB -45.0 VISIBILITY 7 WIND DIR 22
 LAT 83-37.0N WET BULB . CLOUD TYPE MARSDEN
 LON 087-32.0W REL HUMID CLOUD AMT 0 SOUNDING 1610M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM-ATOMS/L	SIO4	NO3
5	-1.73	31.778	25.58	8.86			
10	-1.74	31.775	25.58	8.82			
15	-1.70	31.786	25.59	8.88			
20	-1.73	31.800	25.60	8.82			
25	-1.72	31.805	25.61	8.81			
30	-1.72	31.814	25.61	8.87			
35	-1.72	31.821	25.62	8.88			
40	-1.73	31.825	25.62	8.90			
42	-1.76	31.836	25.63	8.80			
44	-1.71	31.855	25.65	8.85			
46	-1.74	31.860	25.65	8.88			
48	-1.74	31.871	25.66	8.81			
50	-1.74	31.942	25.72	8.71			
52	-1.73	31.974	25.74	8.62			
54	-1.62	32.009	25.77	7.77			
56	-1.58	32.128	25.87	7.48			
58	-1.56	32.184	25.91	7.24			
60	-1.54	32.251	25.96	7.12			
65	-1.51	32.406	26.09	6.66			
70	-1.51	32.524	26.18	6.48			
75	-1.55	32.600	26.25	6.19			
80	-1.52	32.700	26.33	6.25			
90	-1.57	32.866	26.46	6.17			
100	-1.57	33.025	26.59	6.09			

CRUISE T3-024 STATION 007 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 14 FEB 73 BAROM 1012.6 WEATHER 36 WIND SPD 12K
HOUR 19.5 GMT DRY BULB -32.0 VISIBILITY 7 WIND DIR 22
LAT 83-39.7N WET BULB . CLOUD TYPE 0 MARSDEN
LON 086-35.0W REL HUMID CLOUD AMT 2 SOUNDING 1618M

DEPTH M	TEMP C	SALINITY O/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 ATOMS/L	NO3 ATOMS/L
5	-1.74	31.847	25.64	8.97	.57	9.2	1.6
10	-1.75	31.882	25.67	9.01	.46	9.4	1.8
15	-1.71	31.882	25.67	9.02	.54	9.6	1.9
20	-1.73	31.892	25.68	9.01	.54	10.0	1.9
25	-1.73	31.892	25.68	9.00	.50	8.6	3.1
30	-1.72	31.894	25.68	9.01	.64		2.3
35	-1.72	31.898	25.68	9.00	.54	9.6	2.4
40	-1.74	31.900	25.68	9.00	.60	10.0	2.3
45	-1.76	31.905	25.69	9.00	.51	10.2	2.7
50	-1.72	31.905	25.69	9.01	.52	11.2	2.1
55	-1.75	31.909	25.69	9.00	.58	10.2	2.6
60	-1.73	31.940	25.72	8.84	.65	12.3	2.6
70	-1.56	32.296	26.00	7.11	.97	26.6	8.0
80	-1.56	32.607	26.25	6.66	1.01	35.2	10.4
90	-1.56	32.782	26.39	6.55	1.13	36.6	13.0
100	-1.55	32.967	26.54	6.26	.71	24.8	9.0
125	-1.34	33.435	26.92	6.09	1.13	39.7	11.9
150	-1.26	33.923	27.31	6.10	.94	32.5	13.2
175	-.93	34.245	27.56	6.47	.45	12.3	10.5
200	-.59	34.421	27.69	6.49	.48	11.9	8.7
250	-.07	34.628	27.83	6.36	.47	11.0	9.8
300	.23	34.774	27.93	6.38	.52	12.1	10.0
400	.41	34.820	27.96	6.47	.42	10.8	9.9
500	.43	34.853	27.98	6.56	.47	10.6	9.1
600	.32	34.886	28.02	6.66	.47	9.2	8.2
700	.18	34.887	28.03	6.68	.56	10.0	11.4
800	.09	34.891	28.03	6.68	.51	10.2	10.1
900	.02	34.894	28.04	6.66	.52	9.6	10.5
1000	-.06	34.897	28.05	6.54	.47	9.6	11.8
1100	-.11	34.899	28.05	6.77	.51	9.4	12.7
1200	-.16	34.925	28.07	6.76	.49	10.4	11.1
1300	-.26	34.926	28.08	6.79	.47	10.4	11.2
1400	-.31	34.930	28.09	6.66	.50	12.3	11.8
1500	-.33	34.935	28.09	6.60	.55	13.9	9.2
1525	-.36	34.937	28.09	6.64	.52	14.5	9.2
1550	-.37	34.937	28.09	6.61	.54	7.6	12.2

CRUISE	T3-024	STATION	008	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	21 FEB 73	BAROM	1019 6	WEATHER	76	WIND SPD 06K
HOUR	19.5 GMT	DRY BULB	-43.0	VISIBILITY	7	WIND DIR 26
LAT	83-42.5N	WET BULB	.	CLOUD TYPE	MARSDEN	
LON	085-22.0W	REL HUMID		CLOUD AMT	0	SOUNDING 1598M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.72	31.821	25.62	8.95			
10	-1.75	31.869	25.66	9.00			
15	-1.74	31.876	25.66	9.00			
20	-1.74	31.873	25.66	9.02			
25	-1.73	31.878	25.67	9.02			
30	-1.72	31.886	25.67	8.94			
35	-1.72	31.891	25.68	8.95			
40	-1.73	31.906	25.69	8.93			
42	-1.77	31.914	25.70	8.88			
44	-1.72	31.917	25.70	8.93			
46	-1.74	31.921	25.70	8.92			
48	-1.75	31.935	25.71	8.91			
50	-1.72	31.951	25.72	8.83			
52	-1.72	31.961	25.73	8.74			
54	-1.70	31.982	25.75	8.66			
56	-1.70	31.984	25.75	8.57			
58	-1.67	32.067	25.82	8.37			
60	-1.62	32.117	25.86	7.99			
65	-1.55	32.288	25.99	7.26			
70	-1.56	32.421	26.10	6.99			
75	-1.57	32.564	26.22	6.76			
80	-1.54	32.658	26.29	6.57			
90	-1.56	32.815	26.42	6.40			
100	-1.57	33.020	26.59	6.28			

CRUISE T3-024 STATION 009 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 27 FEB 73 BAROM 1015.2 WEATHER 00 WIND SPD 04K
 HOUR 19.3 GMT DRY BULB -45.0 VISIBILITY 7 WIND DIR 26
 LAT 83-41.7N WET BULB . CLOUD TYPE 1 MARSDEN
 LON 085-26.0W REL HUMID CLOUD AMT 5 SOUNDING 1590M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.72	31.949	25.72		.48	8.5	2.6
10	-1.74	31.945	25.72	8.95	.48	8.5	3.0
15	-1.73	31.945	25.72	8.98	.39	8.7	3.1
20	-1.73	31.951	25.72	8.95	.52	8.9	2.9
25	-1.72	31.955	25.73	8.96	.45	9.3	1.2
30	-1.72	31.965	25.74	8.93	.54	9.7	2.8
35	-1.71	31.971	25.74	8.96	.48	9.9	1.6
40	-1.75	31.993	25.76	8.93	.44	9.5	2.5
45	-1.77	32.004	25.77	8.93	.48	9.7	2.4
50	-1.72	32.014	25.78	8.93	.58	9.5	2.5
55	-1.73	32.020	25.78	8.93	.53	10.1	2.9
60	-1.71	32.083	25.83	8.50	.59	12.5	4.8
70	-1.55	32.490	26.16	6.87	.84	27.1	11.8
80	-1.56	32.716	26.34	6.48	.92	30.1	14.1
90	-1.55	32.892	26.48	6.29	1.03	37.8	12.9
100	-1.55	33.052	26.61	6.19	.93	32.9	12.2
125	-1.36	33.533	27.00	5.99	.88	33.3	14.0
150	-.98	33.994	27.36	6.13	.63	25.3	10.7
175	-.92	34.297	27.60	6.47	.39	12.1	8.4
200	-.59	34.454	27.71	6.56	.38	10.9	10.3
250	-.07	34.660	27.86	6.36	.38	10.9	11.8
300	.21	34.785	27.94	6.29	.48	12.7	11.1
400	.41	34.862	27.99	6.47	.48	10.9	11.4
500	.43	34.882	28.01	6.56	.47	9.3	12.0

CRUISE	T3-024	STATION 010	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	06 MAR 73	BAROM	1021 7	WEATHER	36
HOUR	19.5 GMT	DRY BULB	-41.0	VISIBILITY	6
LAT	83-41.8N	WET BULB	.	CLOUD TYPE	2
LON	085-16.0W	REL HUMID		CLOUD AMT	4
					WIND SPD 14K
					WIND DIR 22
					MARSDEN
					SOUNDING 1591M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.74	31.954	25.73	8.99			
10	-1.75	31.952	25.73	8.98			
15	-1.71	31.957	25.73	9.01			
20	-1.75	31.966	25.74	8.99			
25	-1.73	31.974	25.74	9.00			
30	-1.73	31.983	25.75	9.01			
35	-1.72	31.989	25.76	9.01			
40	-1.73	31.997	25.76	8.99			
42	-1.76	32.006	25.77	8.99			
44	-1.71	32.010	25.77	9.01			
46	-1.73	32.012	25.77	8.99			
48	-1.75	32.016	25.78	8.96			
50	-1.73	32.023	25.78	8.93			
52	-1.74	32.025	25.78	8.90			
54	-1.71	32.037	25.79	8.81			
56	-1.72	32.045	25.80	8.79			
58	-1.70	32.074	25.82	8.63			
60	-1.64	32.184	25.91	8.07			
65	-1.53	32.394	26.08	7.09			
70	-1.55	32.543	26.20	6.86			
75	-1.57	32.666	26.30	6.62			
80	-1.53	32.752	26.37	6.52			
90	-1.56	32.898	26.49	6.36			
100	-1.57	33.027	26.59	6.25			

CRUISE T3-024 STATION 011 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 12 MAR 73 BAROM 1022.2 WEATHER 00 WIND SPD 06K
 HOUR 19.8 GMT DRY BULB -41.0 VISIBILITY 7 WIND DIR 05
 LAT 83-41.0N WET BULB . CLOUD TYPE 1 MARSDEN
 LON 085-20.0W REL HUMID CLOUD AMT 2 SOUNDING 1590M

DEPTH M	TEMP C	SALINITY O/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM-ATOMS/L	SIO4	NO3
5	-1.73	31.995	25.76	8.90	.34	8.4	2.2
10	-1.73	31.972	25.74	8.92	.42	8.7	2.8
15	-1.72	31.951	25.72	8.93	.42	6.5	1.5
20	-1.73	31.965	25.74	8.93	.44	8.2	2.6
25	-1.73	31.973	25.74	8.94	.44	8.4	1.4
30	-1.73	31.973	25.74	8.92	.49	8.7	2.7
35	-1.72	31.987	25.75	8.93	.52	8.0	2.8
40	-1.73	31.988	25.75	8.93	.53	8.7	2.7
45	-1.76	32.000	25.76	8.93	.55	8.9	2.6
50	-1.70	32.010	25.77	8.89	.59	9.9	3.0
55	-1.74	32.026	25.79	8.83	.57	9.7	3.3
60	-1.60	32.201	25.92	8.46	.78	20.5	8.4
70	-1.55	32.542	26.20	6.71	.88	27.9	10.6
80	-1.55	32.732	26.35	6.41	1.06	35.3	12.2
90	-1.53	32.874	25.47	6.29	1.07	37.2	14.4
100	-1.55	33.034	26.60	6.11	1.07	40.7	14.2
125	-1.43	33.490	26.96	5.92	.92	35.0	11.9
150	-1.24	34.034	27.40	6.21	.63	19.2	9.8
175	-.88	34.298	27.60	6.53	.42	10.6	8.6
200	-.56	34.436	27.70	6.53	.42	11.0	9.3
250	-.07	34.644	27.84	6.38	.44	9.3	9.3
300	.20	34.766	27.93	6.37	.48	10.1	11.8
400	.42	34.849	27.98	6.44	.42	9.1	11.1
500	.44	34.875	28.00	6.57	.43	9.5	11.0

CRUISE T3-024 STATION 012 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 20 MAR 73 BAROM 1027 4 WEATHER 00 WIND SPD 00K
 HOUR 20.0 GMT DRY BULB -38.0 VISIBILITY 6 WIND DIR
 LAT 83-42.8N WET BULB . CLOUD TYPE MARSDEN
 LON 085-18.0W REL HUMID CLOUD AMT 0 SOUNDING 1588M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 ATOMS/L	NO3 ATOMS/L
5	-1.71			9.01			
10	-1.75			9.01			
15	-1.71			9.03			
20	-1.74			9.03			
25	-1.74	31.955	25.73	9.02			
30	-1.74	31.955	25.73	9.02			
35	-1.73	31.957	25.73	9.03			
40	-1.74	31.958	25.73	9.02			
42	-1.77	31.961	25.73	9.01			
44	-1.73	31.960	25.73	8.99			
46	-1.74	31.960	25.73	9.00			
48	-1.75	31.968	25.74	8.95			
50	-1.74	31.968	25.74	8.94			
52	-1.74	31.969	25.74	8.91			
54	-1.70	31.982	25.75	8.87			
56	-1.71	32.006	25.77	8.73			
58	-1.68	32.046	25.80	8.38			
60	-1.57	32.180	25.91	7.46			
65	-1.54	32.330	26.03	6.98			
70	-1.52	32.474	26.14	6.69			
75	-1.55	32.584	26.23	6.54			
80	-1.54	32.670	26.30	6.49			
90	-1.57	32.834	26.44	6.38			
100	-1.57	33.001	26.57	6.22			

CRUISE T3-024 STATION 013 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 28 MAR 73 BAROM 1002.4 WEATHER 11 WIND SPD 00K
 HOUR 19.5 GMT DRY BULB -34.0 VISIBILITY 6 WIND DIR
 LAT 83-41.8N WET BULB . CLOUD TYPE MARSDEN
 LON 085-21.0W REL HUMID CLOUD AMT 0 SOUNDING 1590M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.75	31.951	25.72	8.86	.58	6.6	3.1
10	-1.75	31.953	25.73	8.93	.54	6.8	3.4
15	-1.73	31.957	25.73		.58	6.0	3.5
20	-1.74	31.962	25.73	9.04	.54	7.6	3.8
25	-1.73	31.970	25.74	9.06	.42	8.6	3.5
30	-1.73	31.982	25.75	9.07	.45	8.7	3.9
35	-1.73	31.986	25.75	9.06	.48	11.4	4.0
40	-1.73	31.995	25.76	9.05	.41	12.8	4.0
45	-1.77	31.998	25.76	9.07	.48	11.8	3.9
50	-1.72	32.005	25.77	9.07	.43	7.4	4.0
55	-1.75	32.010	25.77	9.03	.58	8.6	4.3
60	-1.61	32.270	25.98	7.43	.78	18.6	12.1
70	-1.53	32.578	26.23	6.77	.89	23.9	15.7
80	-1.56	32.737	26.36	6.57	.90	28.1	16.5
90	-1.54	32.890	26.48	6.46	1.04	31.9	18.4
100	-1.56	33.032	26.60	6.28	.90	36.3	26.6
125	-1.41	33.604	27.06	6.05	.87	31.9	21.7
150	-1.23	34.063	27.42	6.34	.52	18.6	14.6
175	-.82	34.327	27.62	6.60	.43	10.0	13.8
200	-.50	34.458	27.71	6.55	.40	9.8	14.0
250	.00	34.668	27.86	6.30	.43	11.4	16.2
300	.25	34.778	27.93	6.29	.44	10.8	16.3
400	.41	34.839	27.97	6.50	.42	10.8	15.9
500	.42	34.867	28.00	6.53	.45	10.0	16.1

CRUISE T3-025 STATION 001 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 08 APR 73 BAROM 1036.8 WEATHER 00 WIND SPD 00K
 HOUR 23.3 GMT DRY BULB -34.0 VISIBILITY 6 WIND DIR
 LAT 83-41.9N WET BULB . CLOUD TYPE MARSDEN
 LON 085-19.0W REL HUMID CLOUD AMT 0 SOUNDING 1590M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM-ATOMS/L	SIO4	NO3
5	-1.75	32.029	25.79	9.22	.48	9.6	3.4
10	-1.75	32.023	25.78	9.06	.53	11.1	3.6
15	-1.74	32.018	25.78	9.11	.55	10.0	3.6
20	-1.74	32.016	25.78	8.99	.55	9.4	3.8
25	-1.74	32.015	25.78	8.99	.45	9.0	3.4
30	-1.73			9.04	.46	8.4	2.9
35	-1.73	32.017	25.78	9.04	.56	7.4	3.2
40	-1.74			9.04	.45	10.3	3.9
45	-1.77	32.018	25.78	8.96	.52	10.1	3.9
50	-1.72	32.018	25.78	9.04	.52	10.5	3.9
55	-1.74	32.018	25.78	9.04	.55	11.1	4.0
60	-1.62	32.232	25.95	7.61	.76	19.7	10.5
70	-1.56	32.560	26.21	6.80	.93	22.7	12.2
80	-1.57	32.744	26.36	6.62	.92	26.7	12.3
90	-1.54	32.886	26.48	6.41	.98	27.5	12.7
100	-1.55	33.049	26.61	6.28	.92	26.7	12.9
125	-1.40	33.589	27.04	6.10	.86	20.9	11.2
150	-1.21	34.080	27.44	6.40	.55	12.9	10.5
175	-.89	34.317	27.62	6.64	.53	7.0	10.7
200	-.47	34.451	27.71	6.64	.46	9.0	10.8
250	-.01	34.654	27.85	6.38	.46	10.0	10.5
300	.24	34.763	27.92	6.38	.60	11.3	12.3
400	.43	34.842	27.98	6.52	.58	10.7	12.5
500	.44	34.859	27.99	6.66	.52	10.0	12.6
600	.32	34.872	28.01	6.50	.42	8.2	12.0
700	.19	34.864	28.01	6.62	.42	10.0	12.2
800	.11	34.880	28.02	6.72	.56	10.1	12.5
900	.03	34.882	28.03	6.30	.46	8.4	12.5
1000	-.06	34.882	28.03	6.23	.47	8.8	11.8
1100	-.12	34.882	28.04	6.71	.49	9.6	12.1
1200	-.19	34.906	28.06	6.81	.46	10.5	12.3
1300	-.23	34.907	28.06	6.80	.51	12.3	12.9
1400	-.30	34.915	28.07	6.55	.60	11.9	12.4
1500	-.33	34.920	28.08	6.77	.52	11.3	12.6
1525	-.33	34.925	28.08	6.73	.54	12.9	12.9
1155	-.36	34.926	28.09	6.68	.55	13.7	13.1

CRUISE	T3-025	STATION	002	OBSERVED VALUES		
	(T.S.	ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	16 APR 73	BAROM	1023.5	WEATHER	36	WIND SPD 14K
HOUR	20.0 GMT	DRY BULB	-21.0	VISIBILITY	6	WIND DIR 06
LAT	82-41.8N	WET BULB	.	CLOUD TYPE	2	MARSDEN
LON	085-16.0W	REL HUMID		CLOUD AMT	7	SOUNDING 1590M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.72	32.043	25.80	8.94			
10	-1.76	32.042	25.80	9.00			
15	-1.75	32.044	25.80	8.93			
20	-1.72	32.035	25.79	8.91			
25	-1.75			9.00			
30	-1.73	32.042	25.80	8.96			
35	-1.74	32.040	25.80	9.10			
40	-1.74	32.042	25.80	8.96			
42	-1.77	32.044	25.80	9.10			
44	-1.75			8.98			
46	-1.76			8.96			
48	-1.76			8.96			
50	-1.63			8.98			
52	-1.62			8.98			
540	-1.70			8.95			
56	-1.75			8.95			
58	-1.73			8.99			
60	-1.61	32.258	25.97	7.55			
65	-1.54	32.430	26.11	7.04			
70	-1.55	32.556	26.21	6.88			
75	-1.53	32.660	26.29	6.61			
80	-1.56	32.748	26.37	6.57			
90	-1.57	32.899	26.49	6.38			
100	-1.55	33.075	26.63	6.21			

CRUISE T3-025 STATION 003 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 22 APR 73 BAROM 1026.2 WEATHER 00 WIND SPD 09K
HOUR 20.2 GMT DRY BULB -26.0 VISIBILITY 5 WIND DIR 23
LAT 83-42.0N WET BULB . CLOUD TYPE 2 MARSDEN
LON 085-18.0W REL HUMID CLOUD AMT 6 SOUNDING 1590M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.74	32.004	25.77	9.06	.54	8.7	3.0
10	-1.76			9.14	.54	10.5	3.6
15	-1.75	32.008	25.77	9.08	.50	11.3	3.3
20	-1.72	32.023	25.78	9.02	.50	8.3	4.0
25	-1.75	32.020	25.78	9.02	.42	9.8	2.2
30	-1.73			9.08	.62	10.2	4.0
35	-1.76	32.024	25.78	9.08	.48	9.4	3.3
40	-1.74	32.026	25.79	9.08	.48	10.5	4.3
45	-1.76			9.00	.50	11.1	4.2
50	-1.75	32.028	25.79	9.02	.51	11.1	4.5
55	-1.74	32.069	25.82	8.86	.54	14.8	4.9
60	-1.64	32.202	25.93	7.38	.73	23.3	10.7
70	-1.73	32.526	25.19	7.15	.81	26.8	15.5
80	-1.67	32.733	26.36	6.62	.94	33.1	20.0
90	-1.57	32.894	26.49	6.41	.95	37.5	18.8
100	-1.58	33.076	26.63	6.39	.95	33.1	18.8
125	-1.26	33.597	27.05	6.09	.76	31.8	17.6
150	-1.22	34.063	27.42	6.38	.54	17.9	15.9
175	-.75	34.309	27.60	6.62	.41	6.8	13.8
200	-.48	34.457	27.71	6.61	.43	8.3	14.4
250	-.03	34.654	27.85	7.22	.40	9.2	15.7
300	.25	34.768	27.93	6.37	.43	11.6	16.2
400	.40	34.808	27.95	6.54	.48	10.9	15.7
500	.43	34.836	27.97	6.73	.49	10.2	16.3

CRUISE T3-025 STATION 004 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 02 MAY 73 BAROM 1008.3 WEATHER 00 WIND SPD 04K
 HOUR 18.3 GMT DRY BULB -04.0 VISIBILITY 7 WIND DIR 35
 LAT 83-42.4N WET BULB . CLOUD TYPE 2 MARSDEN
 LON 085-36.0W REL HUMID CLOUD AMT 8 SOUNDING 1588M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.73	32.039	25.80	9.28	.35	10.7	3.0
10	-1.75	32.031	25.79	9.05	.37	10.0	3.2
15	-1.75			9.08	.55	10.2	2.6
20	-1.72	32.034	25.79	9.09	.54	9.5	3.5
25	-1.75			9.05	.56	9.3	2.4
30	-1.73	32.031	25.79	9.14	.60	10.7	2.9
35	-1.73	32.060	25.81	9.06	.62	11.6	3.3
40	-1.74	32.074	25.82	9.09	.51	11.2	3.3
42	-1.77	32.074	25.82	9.09	.51	11.4	3.7
44	-1.74	32.072	25.82	9.12	.46	11.2	3.2
46	-1.75			9.11	.61	9.5	3.9
48	-1.76	32.072	25.82		.50	10.5	3.9
50	-1.74	32.074	25.82	9.14	.58	11.6	3.9
52	-1.76	32.079	25.83	9.06	.53	11.6	3.1
54	-1.76	32.082	25.83	9.08	.52	13.0	3.4
56	-1.72	32.107	25.85	9.05	.55	11.2	3.7
58	-1.74			8.93	.48	11.9	4.1
60	-1.71	32.132	25.87	8.86	.55	12.8	4.6
65	-1.67	32.416	26.10	7.16	.83	26.1	11.5
70	-1.56	32.525	26.19	6.98	.81	28.6	12.2
75	-1.56	32.651	26.29	6.69	.94	31.6	15.6
80	-1.56	32.651	26.29	6.69	.94	31.6	15.6
90	-1.57	32.898	26.49	6.38	.92	40.7	16.5
100	-1.55	33.063	26.62	6.50	.94	37.5	16.9

CRUISE T3-025 STATION 005 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 07 MAY 73 BAROM 1026.5 WEATHER 71 WIND SPD 00K
 HOUR 17.8 GMT DRY BULB 000.0 VISIBILITY 2 WIND DIR
 LAT 83-41.3N WET BULB . CLOUD TYPE 0 MARSDEN
 LON 085-28.0W REL HUMID CLOUD AMT 9 SOUNDING 1579M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.69	32.090	25.84	9.15	.52	8.8	3.1
10	-1.73	32.092	25.84	9.11	.56	9.5	3.3
15	-1.74	32.092	25.84	9.12	.56	9.0	3.3
20	-1.72	32.094	25.84	9.07	.51	8.6	3.6
25	-1.75	32.086	25.83	9.05	.46	9.9	1.3
30	-1.72	32.083	25.83	9.05	.54	9.9	2.7
35	-1.73	32.100	25.85	9.02	.55	8.8	3.9
40	-1.75	32.109	25.85	9.07	.54	9.9	2.7
45	-1.76	32.112	25.86	9.06	.53	9.3	2.6
50	-1.74	32.118	25.86	9.08	.54	9.7	3.3
50	-1.74	32.118	25.86	9.08	.54	9.7	3.3
55	-1.76	32.113	25.86	9.09	.54	10.6	3.9
60	-1.69	32.188	25.92		.62	15.7	6.8
70	-1.52	32.559	26.21	6.90	.88	28.2	14.0
80	-1.57	32.737	26.36	6.73	.90	34.0	13.8
90	-1.56	32.922	26.51	6.41	.98	35.2	13.7
100	-1.50	33.087	26.64	6.39	.90	36.5	16.2
125	-1.39	33.592	27.05	6.09	.81	32.6	15.8
150	-1.15	34.062	27.42	6.44	.56	17.3	13.5
175	-.77	34.313	27.61	6.67	.48	8.6	14.2
200	-.50	34.444	27.70	6.63	.42	9.5	12.7
250	-.02	34.637	27.83	6.51	.47	10.2	13.9
300	.24	34.745	27.91	6.43	.46	9.0	14.7
400	.41	34.833	27.97	6.56	.47	9.3	13.9
500	.42	34.860	27.99	6.72	.46	8.1	14.4
600	.34	34.866	28.00	6.70	.40	8.8	17.5
700	.18	34.886	28.02	6.77	.46	8.8	14.5
800	.09	34.889	28.03	6.77	.48	8.6	14.8
900	.02	34.899	28.04	6.44	.48	9.0	15.1
1000	-.06	34.899	28.05	6.46	.48	9.0	14.5
1100	-.14	34.908	28.06	6.85	.48	9.3	14.7
1200	-.19	34.909	28.06	6.89	.54	11.1	14.8
1300	-.25	34.914	28.07	6.88	.58	11.8	14.9
1400	-.32	34.914	28.07	6.52	.50	11.3	15.0
1500	-.36	34.926	28.08	6.78	.50	11.6	15.4
1525	-.36	34.921	28.08	6.66	.50	11.3	15.3
1550	-.37	34.925	28.08		.48	12.0	15.3

CRUISE T3-025 STATION 006 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 14 MAY 73 BAROM 1020.9 WEATHER 00 WIND SPD 00K
 HOUR 19.3 GMT DRY BULB -15.0 VISIBILITY 7 WIND DIR
 LAT 83-41.4N WET BULB . CLOUD TYPE MARSDEN
 LON 085-26.0W REL HUMID CLOUD AMT 0 SOUNDING 1548M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.72	32.079	25.83	9.28	.49	9.9	3.3
10	-1.76	32.079	25.83	9.02	.52	9.9	3.5
15	-1.75				.48	10.6	3.7
20	-1.72	32.076	25.83	9.01	.49	8.4	3.6
25	-1.74	32.079	25.83	9.03	.44	8.9	3.5
30	-1.72	32.082	25.83	9.03	.48	9.4	3.9
35	-1.73			9.05	.42	8.2	3.8
40	-1.74	32.082	25.83	9.08	.44	8.2	3.4
42	-1.76	32.085	25.83	9.08	.51	9.2	3.7
44	-1.75	32.086	25.83	9.08	.51	8.9	3.8
46	-1.77	32.086	25.83	9.08	.53	9.4	4.1
48	-1.77			9.08	.52	10.3	3.9
50	-1.72	32.076	25.83	9.03	.48	10.1	3.9
52	-1.76	32.089	25.84	9.00	.54	10.8	4.1
54	-1.74	32.096	25.84	8.96	.52	12.2	4.4
56	-1.70	32.118	25.86	8.79	.56	12.0	4.8
58	-1.64	32.203	25.93	7.78	.66	19.9	8.3
60	-1.66	32.275	25.99	7.59	.74	23.2	9.2
65	-1.55	32.456	26.13	6.98	.82	27.2	12.4
70	-1.55	32.580	26.23	6.77	.80	29.8	13.9
75	-1.56	32.647	26.28	6.86	.86	33.1	15.1
80	-1.56	32.729	26.35	6.58	.87	33.6	15.5
90	-1.58	32.906	26.50	6.41	.89	36.1	17.3
100	-1.56	33.064	26.62	6.32	.95	3.9	17.5

CRUISE T3-025 STATION 007 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 21 MAY 73 BAROM 1010.6 WEATHER 39 WIND SPD 39K
 HOUR 19.7 GMT DRY BULB -10.0 VISIBILITY 0 WIND DIR 22
 LAT 83-46.2N WET BULB -11.0 CLOUD TYPE 0 MARSDEN
 LON 083-43.0W REL HUMID 69 CLOUD AMT 8 SOUNDING 1583M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.72			9.27	.48	10.1	1.5
10	-1.75			9.08		9.9	2.6
15	-1.74			9.10	.39	10.1	2.1
20	-1.72			9.10	.39	10.8	1.3
25	-1.75			9.09	.32	11.3	.4
30	-1.72			9.09	.41	11.1	1.2
35	-1.73			9.09	.32	9.9	1.2
40	-1.74			9.13	.32	10.1	1.3
45	-1.76			9.10	.43	11.3	1.2
50	-1.75			9.09	.42	10.8	1.9
55	-1.74	32.146	25.88	9.06	.44	11.1	2.9
60	-1.75	32.149	25.89	8.93	.44	11.8	2.6
70	-1.71	32.190	25.92	8.68	.48	13.2	4.2
80	-1.57	32.588	26.24	6.95	.70	31.5	11.7
90	-1.57	32.812	26.42	6.63	.88	35.8	14.9
100	-1.55	32.929	26.51	6.31	.92	38.6	16.0
125	-1.46	33.414	26.90	6.07	.81	39.8	15.2
150	-1.23	33.990	27.36	6.40	.47	20.7	15.1
175	-.94	34.260	27.57	6.69	.34	11.3	10.6
200	-.61	34.411	27.68	6.73	.36	9.9	11.2
250	-.04	34.640	27.84	6.55	.36	10.4	12.0
300	.27	34.772	27.93	6.60	.36	8.9	12.2
400	.43	34.838	27.97	6.68	.42	8.7	11.6
500	.41	34.853	27.99	6.81	.48	8.2	12.5

CRUISE T3-026 STATION 001 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 28 MAY 73 BAROM 1027.5 WEATHER 00 WIND SPD 05K
 HOUR 23.9 GMT DRY BULB -08.0 VISIBILITY 7 WIND DIR 22
 LAT 83-44.9N WET BULB . CLOUD TYPE MARSDEN
 LON 083-42.0W REL HUMID CLOUD AMT 0 SOUNDING 1617M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5		32.062		7.72	.37	9.1	3.1
10		32.098		7.65	.43	9.3	3.1
15	-1.75	32.098	25.84	7.68	.46	8.7	3.3
20	-1.72	32.109	25.85	7.70	.42	9.6	3.4
25	-1.75	32.107	25.85	7.66	.33	9.8	2.6
30	-1.73	32.106	25.85	7.56	.42	9.8	3.1
35	-1.73			7.66	.41	9.6	3.1
40	-1.74	32.103	25.85	7.66	.46	9.3	3.3
42	-1.76	32.106	25.85	7.67	.61	9.3	3.4
44	-1.74	32.105	25.85	7.65	.45	9.1	3.6
46	-1.74	32.108	25.85	7.63	.41	9.3	3.9
48	-1.75	32.101	25.85	7.61	.43	8.9	3.7
50	-1.74	32.109	25.85	7.66	.45	9.3	3.8
52	-1.73	32.102	25.85	7.61	.45	8.9	3.5
54	-1.74	32.103	25.85	7.59	.51	8.7	3.7
56	-1.72	32.102	25.85	7.59	.46	11.5	3.7
58	-1.74	32.114	25.86	7.59	.52	12.1	4.3
60	-1.67	32.170	25.90	7.53	.46	15.7	5.4
65	-1.56	32.415	26.10	6.07	.59	24.4	11.9
70	-1.55	32.563	26.22	5.76	.82	31.4	13.5
75	-1.57	32.622	26.26	5.69	.85	30.3	13.4
80	-1.56	32.713	26.34	5.60	.95	31.0	13.3
90	-1.55	32.871	26.47	5.49	1.01	37.6	16.4
100	-1.57	33.035	26.60	5.40	1.00	37.8	17.5

CRUISE	T3-026	STATION	L01	OBSERVED VALUES	
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	31 MAY 73	BAROM	1025.2	WEATHER	46
HOUR	20.5 GMT	DRY BULB	000.0	VISIBILITY	3
LAT	83-46.5N	WET BULB	.	CLOUD TYPE	6
LON	083-47.0W	REL HUMID		CLOUD AMT	9
				WIND SPD	08K
				WIND DIR	27
				MARSDEN	
				SOUNDING	M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
0	-1.40	32.076	25.82	9.00	.47	10.4	3.8
5	-1.54	32.088	25.83	9.01	.47	11.9	4.0
10	-1.64	32.093	25.84	9.07	.48	10.8	3.8
15	-1.65	32.094	25.84	9.04	.46	10.2	3.5
20	-1.70	32.104	25.85	9.11	.48	10.0	3.6
25	-1.72	32.105	25.85	9.07	.49	12.3	4.0
30	-1.72	32.117	25.86	9.09	.50	10.4	3.6
35	-1.72	32.117	25.86	9.07	.51	8.1	3.6
40	-1.74	32.122	25.86	9.07	.45	11.0	3.4
45	-1.75	32.120	25.86	9.04	.45	11.9	4.0
50	-1.74	32.123	25.86	9.07	.45	11.7	3.6
55	-1.71	32.224	25.95	8.67	.61	18.3	8.0
60	-1.58	32.376	26.07	7.40	.79	23.1	10.4

CRUISE T3-026 STATION 002 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 06 JUN 73 BAROM 1009.2 WEATHER 36 WIND SPD 16K
 HOUR 19.0 GMT DRY BULB -04.0 VISIBILITY 4 WIND DIR 26
 LAT 83-45.4N WET BULB . CLOUD TYPE 6 MARSDEN
 LON 083-50.5W REL HUMID CLOUD AMT 8 SOUNDING 1610M

DEPTH M	TEMP C	SALINITY O/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.71	32.111	25.85	6.76			
10	-1.73	32.088	25.84	7.92			
15	-1.73	32.090	25.84				
20	-1.70	32.088	25.84				
25	-1.73	32.095	25.84				
30	-1.73	32.105	25.85				
35	-1.71	32.122	25.86	7.88			
40	-1.73	32.138	25.88	8.02			
45	-1.75	32.163	25.90	7.96			
50	-1.74	32.167	25.90	8.09			
55	-1.75	32.170	25.90	8.10			
60	-1.73	32.187	25.92	8.02			
70	-1.57	32.548	26.20	6.36			
80	-1.57	32.731	26.35	6.20			
90	-1.65	32.848	26.45	5.77			
100	-1.59	32.972	26.55	5.68			
125	-1.47	33.492	26.97	5.53			
150	-1.23	34.036	27.40	5.66			
175	-.86	34.293	27.60	5.91			
200	-.56	34.410	27.68	6.04			
250	-.21	34.632	27.84	5.91			
300	.20	34.755	27.92	5.82			
400	.42	34.830	27.97	6.00			
500	.42	34.868	28.00	6.10			
600	.32	34.887	28.02	6.14			
800	.07	34.897	28.04	6.13			
1000	-.09	34.906	28.06	6.14			
1200	-.19	34.959	28.10	5.80			
1400	-.32			5.85			
1450	-.33	34.969	28.12	6.11			
1500	-.35	34.969	28.12	6.11			
1510	-.34			6.10			
1520	-.36			5.95			
1530	-.37			6.06			
1540	-.37			6.04			
1550	-.37	34.969	28.12	6.03			

CRUISE T3-026 STATION 003 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 09 JUN 73 BAROM 1007.5 WEATHER 36 WIND SPD 17K
HOUR 14.0 GMT DRY BULB 000.0 VISIBILITY 8 WIND DIR 25
LAT 83-44.5N WET BULB . CLOUD TYPE 0 MARSDEN
LON 083-47.0W REL HUMID CLOUD AMT 1 SOUNDING 1576M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 ATOMS/L	NO3 ATOMS/L
5	-1.72	32.114	25.86	7.88	.50	8.9	2.3
10	-1.76	32.107	25.85	8.01	.50	7.2	
15	-1.75	32.104	25.85	7.87	.56	6.8	.9
20	-1.72	32.107	25.85	7.80	.54	8.7	
25	-1.75	32.112	25.86	7.83	.45	7.4	.3
30	-1.73	32.109	25.85	7.78	.53	8.3	
35	-1.73	32.113	25.86	7.91	.46	8.3	1.1
40	-1.74	32.117	25.86	7.84	.48	5.7	
45	-1.76	32.117	25.86	7.83	.47	13.4	
50	-1.75	32.144	25.88	7.87	.47	9.8	
55	-1.75	32.154	25.89	7.83	.50	8.3	1.3
60	-1.73	32.198	25.92	7.62	.56	13.8	3.0
70	-1.55	32.593	26.24	6.04	.77	32.5	10.8
80	-1.58	32.741	26.36	5.82	.86	29.9	11.6
90	-1.57	32.889	26.48	5.61	.87	34.4	16.7
100	-1.54	33.047	26.61	5.46	1.02	38.0	15.7
125	-1.50	33.556	27.02	5.28	.73	30.3	13.3
150	-1.22	34.070	27.43	5.57	.51	14.2	10.6
175	-.82	34.319	27.61	5.84	.33	9.1	9.5
200	-.51	34.417	27.68	5.82	.37	5.9	10.1
250	-.07	34.663	27.86	5.62	.31	7.4	11.4
300	.23	34.755	27.92	5.64	.59	8.9	12.0
400	.41	34.826	27.96	5.80	.48	6.2	11.8
500	.40			5.86	.41	6.6	11.8
600		34.883		5.45	.43	7.2	12.1
800		34.888		5.28	.44	5.7	12.0
1000	-.07	34.896	28.05	5.45	.34	6.4	11.8
1200	-.21	34.916	28.07	5.23	.43	6.4	11.5
1400	-.31	34.927	28.08		.45	5.7	12.3
1450	-.34	34.922	28.08	5.45	.46	6.4	12.3
1500	-.35	34.926	28.08	5.53	.44	8.3	12.8
1510	-.35	34.927	28.08	5.53	.50	6.8	13.0
1520	-.37	34.922	28.08	5.42	.44	8.5	11.3
1530	-.37	34.930	28.09	5.45	.54	8.3	12.4
1540	-.37			5.74	.40	6.2	13.0
1550	-.38			5.67	.51	7.0	13.0

CRUISE	T3-026	STATION	004	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	13 JUN 73	BAROM	1017.9	WEATHER	36	WIND SPD 17K
HOUR	19.6 GMT	DRY BULB	-03.0	VISIBILITY	5	WIND DIR 24
LAT	83-44.2N	WET BULB	.	CLOUD TYPE	0	MARSDEN
LON	083-42.0W	REL HUMID		CLOUD AMT	8	SOUNDING 1507M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.73	32.121	25.86	7.49	.48	5.5	3.4
10	-1.77	32.112	25.86	7.45	.56	5.5	3.9
15	-1.74	32.110	25.85	7.45	.56	5.5	3.5
20	-1.71	32.111	25.85	7.43	.56	6.4	3.4
25	-1.75	32.111	25.85	7.43	.54	6.0	4.0
30	-1.72	32.113	25.86	7.49	.57	5.1	3.9
35	-1.73	32.109	25.85	7.47	.63	7.3	4.0
40	-1.74	32.119	25.86	7.49	.56	6.9	3.6
42	-1.76	32.118	25.86	7.48	.56	6.0	3.9
44	-1.74	32.116	25.86	7.49	.56	6.2	4.1
46	-1.76	32.116	25.86	7.49	.59	6.4	4.3
48	-1.75	32.120	25.86	7.49	.54	4.9	3.9
50	-1.74	32.123	25.86	7.51	.53	6.9	4.0
52	-1.75	32.122	25.86	7.47	.61	7.5	4.1
54	-1.74	32.134	25.87	7.45	.56	6.6	4.2
56	-1.72	32.143	25.88	7.43	.53	10.8	3.9
58	-1.74	32.160	25.89	7.40	.55	8.4	4.4
60	-1.72	32.173	25.90	7.42	.55	9.9	4.6
65	-1.55	32.416	26.10	6.07	.77	21.9	11.0
70	-1.55	32.529	26.19	5.81	.85	21.0	14.2
75	-1.57	32.622	26.26	5.67	.84	25.0	15.1
80	-1.57	32.719	26.34	5.56	.88	30.3	16.7
90	-1.58	32.875	26.47	5.41	.93	34.0	18.0
100	-1.57	33.046	26.61	5.33	.95	34.7	18.3

CRUISE T3-026 STATION 005 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 20 JUN 73 BAROM 1021.0 WEATHER 00 WIND SPD 03K
HOUR 14.0 GMT DRY BULB -01.0 VISIBILITY 9 WIND DIR 25
LAT 83-46.4N WET BULB . CLOUD TYPE 4 MARSDEN
LON 083-49.0W REL HUMID CLOUD AMT 1 SOUNDING 1525M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.73	32.055	25.81	7.48	.58		7.6
10	-1.75	32.088	25.84	7.48	.58		4.8
15	-1.74	32.090	25.84	7.47	.61		5.4
20	-1.71	32.089	25.84	7.46	.56		6.7
25	-1.74	32.085	25.83	7.46	.60		4.1
30	-1.72	32.093	25.84	7.46	.63		4.1
35	-1.73	32.097	25.84	7.48	.62		4.2
40	-1.73	32.111	25.85	7.46	.63		4.2
45	-1.77	32.112	25.86	7.42	.53		4.2
50	-1.74	32.114	25.86	7.44	.52		4.2
55	-1.75	32.134	25.87	7.46	.54		4.3
60	-1.71	32.233	25.95	7.46	.67		7.5
70	-1.54	32.660	26.29	5.74	.84		14.2
80	-1.58	32.799	26.41	5.56	.90		15.3
90	-1.58	32.940	26.52	5.51	.99		16.7
100	-1.54	33.097	26.65	5.20	.97		15.0
125	-1.65	33.539	27.01	4.88	.79		16.1
150	-1.14	34.086	27.44	5.41	.58		13.1
175	-.80	34.336	27.63	5.63	.49		12.2
200	-.48	34.472	27.72	5.56	.47		13.7
250	-.04	34.667	27.86		.50		13.9
300	.23	34.777	27.93	5.50	.50		14.5
400	.41	34.853	27.99	5.56	.51		14.5
500	.41	34.866	28.00	5.63	.55		14.5

CRUISE T3-026 STATION 006 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 27 JUN 73 BAROM 1009.2 WEATHER 03 WIND SPD 09K
 HOUR 19.0 GMT DRY BULB 000.0 VISIBILITY 6 WIND DIR 22
 LAT 83-47.8N WET BULB . CLOUD TYPE 0 MARSDEN
 LON 083-05.9W REL HUMID CLOUD AMT 7 SOUNDING 1512M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
0	-1.02	31.705	25.51	7.09	.35	7.8	2.8
5	-1.71	32.017	25.78	7.21	.49	7.8	2.9
10	-1.70	32.058	25.81	7.18	.45	8.0	3.2
15	-1.75	32.098	25.84	7.13	.43		2.5
20	-1.74	32.090	25.84	7.13	.39	7.1	3.4
25	-1.71	32.109	25.85	7.14	.37	7.8	3.3
30	-1.75	32.086	25.83	7.20	.27	7.3	3.2
35	-1.71	32.090	25.84	7.19	.32	10.0	3.7
40	-1.73	32.113	25.86	7.13	.49	9.3	3.7
42	-1.73	32.115	25.86	7.16	.32	8.0	3.7
44	-1.77	32.084	25.83	7.13	.42	7.8	3.8
46	-1.74	32.085	25.83	7.13	.39	7.5	
48	-1.75	32.089	25.84	7.16	.39	8.0	3.4
50	-1.75	32.088	25.84	7.13	.44	9.1	3.9
52	-1.74	32.108	25.85	7.07	.43	7.8	3.7
54	-1.70	32.088	25.84	7.18	.41	7.5	3.7
56	-1.73	32.118	25.86	7.13	.48	8.0	3.9
58	-1.71	32.095	25.84	7.19	.49	8.2	4.0
60	-1.66	32.252	25.97	6.37	.63	16.4	8.1
65	-1.56	32.512	26.18	5.54	.78	26.4	12.5
70	-1.58	32.609	26.25	5.38	.78	29.4	13.1
80	-1.58	32.768	26.38	5.27	.84	32.6	14.9
90	-1.59	32.890	26.48	5.20	.88	35.1	16.7
100	-1.57	33.040	26.60	5.09	.94	36.9	18.4

CRUISE T3-026 STATION 007 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 06 JUL 73 BAROM 1014.5 WEATHER 02 WIND SPD 05K
HOUR 07.5 GMT DRY BULB 000.0 VISIBILITY 5 WIND DIR 20
LAT 83-48.8N WET BULB . CLOUD TYPE 0 MARSDEN
LON 083-10.0W REL HUMID CLOUD AMT 8 SOUNDING 1578M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM-ATOMS/L	SIO4	NO3
5	-1.66	24.202	19.45	7.55	.65	3.2	1.9
10	-1.75	32.025	25.78	7.52	.42	5.4	2.4
15	-1.75	32.033	25.79	7.52	.46	5.4	1.8
20	-1.70	32.042	25.80	7.55	.49	5.3	3.6
25	-1.75	32.047	25.80	7.54	.45	5.4	3.3
30	-1.74	32.060	25.81	7.48	.39	5.4	3.3
35	-1.65	32.041	25.80	7.50	.44	5.4	3.9
40	-1.73	32.042	25.80	7.50	.42	5.6	3.2
45	-1.76	32.066	25.82	7.54	.47	5.5	3.6
50	-1.70	32.082	25.83	7.56	.45	5.6	4.1
55	-1.75	32.093	25.84	7.50	.47	6.0	3.6
60	-1.65	32.236	25.95	6.47	.62	14.1	8.2
70	-1.53	32.548	26.20	5.87	.80	22.9	12.0
80	-1.58	32.710	26.34	5.62	.93	27.5	13.7
90	-1.58	32.709	26.34	5.39	.99	30.2	16.7
100	-1.55	32.862	26.46	5.28	.98	32.6	18.0
125	-1.44	33.009	26.58	5.11	.76	25.1	15.8
150	-1.18	33.521	26.98	5.48	.47	11.6	14.4
175	-.82	34.311	27.61	5.75	.38	5.7	14.3
200	-.52	34.447	27.71	5.69	.34	3.5	12.8
250	-.03	34.643	27.84	5.66	.37	5.0	14.0
300	.24	34.765	27.92	5.60	.37	5.0	14.7
400	.42	34.836	27.97	5.60	.39	4.7	14.0
500	.40			5.67	.34	4.5	14.6
600	.30			5.76	.30	4.4	15.0
800	.07			5.91	.39	4.7	14.5
1000	-.07	34.845	28.01	5.85	.38	5.0	14.9
1200	-.20	34.891	28.05	5.67	.36	5.2	14.7
1400	-.30			5.64	.40	5.7	15.4
1450	-.32	34.902	28.06	5.80	.37	4.1	15.5
1500	-.33			5.77	.38	6.5	16.0
1510	-.33			5.77	.29	4.6	15.4
1520	-.35	34.902	28.06	5.92	.38	7.1	15.6
1530	-.35	34.903	28.07	5.76	.32	7.3	16.0
1540	-.36	34.902	28.07	5.76	.43	7.4	15.4
1550	-.37	34.905	28.07	5.77	.39		15.6

CRUISE T3-026 STATION 008 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 12 JUL 73 BAROM 995.9 WEATHER 42 WIND SPD 05K
HOUR 05.1 GMT DRY BULB 000.0 VISIBILITY 7 WIND DIR 12
LAT 83-48.6N WET BULB . CLOUD TYPE 0 MARSDEN
LON 083-19.5W REL HUMID CLOUD AMT 9 SOUNDING 1606M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.07		2.39	9.41	.78	.2	1.0
10	-1.71	31.893	25.68	7.48	.55	8.0	2.5
15	-1.74	31.977	25.75	7.49	.60	7.8	2.9
20	-1.73	31.983	25.75	7.49	.61	7.9	2.9
25	-1.74	31.994	25.76	7.49	.63	8.1	2.7
30	-1.72	31.999	25.76	7.49	.61	7.9	1.6
35	-1.73	32.009	25.77	7.49	.63	7.9	2.6
40	-1.73	32.009	25.77	7.51	.66	8.0	2.8
42	-1.76	32.015	25.78	7.50	.66	8.1	3.5
44	-1.74	32.025	25.78	7.53	.66	7.9	4.1
46	-1.75	32.020	25.78	7.53	.67	7.8	3.6
48	-1.75	32.025	25.78	7.56	.67	8.2	3.5
50	-1.71	32.039	25.80	7.53	.68	8.5	3.5
52	-1.75	32.056	25.81	7.47	.69	8.8	3.6
54	-1.73	32.074	25.82	7.47	.70	8.9	3.8
56	-1.69	32.087	25.83	7.29	.74	10.1	4.8
58	-1.68	32.215	25.94	6.98	.77	13.0	6.1
60	-1.55	32.352	26.05	6.11	.92	20.1	10.4
65	-1.53	32.491	26.16	6.00	.97	24.2	12.4
70	-1.55	32.608	26.25	5.80	.99	30.9	13.7
75	-1.58	32.691	26.32	5.60	1.00	27.6	14.6
80	-1.56	32.773	26.39	5.56	1.04	39.7	16.4
90	-1.57	32.890	26.48	5.51	1.00	31.7	16.9
100	-1.57	33.057	26.62	5.31	1.00	33.8	17.8

CRUISE T3- STATION 009 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 19 JUL 73 BAROM 1009.5 WEATHER 03 WIND SPD 14K
 HOUR 06.1 GMT DRY BULB -01.0 VISIBILITY 9 WIND DIR 08
 LAT 84-05.0N WET BULB . CLOUD TYPE 2 MARSDEN
 LON 079-50.0W REL HUMID CLOUD AMT 2 SOUNDING 1524M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	.04			8.28	.05	.0	.8
10	-1.74	31.967	25.74	7.33	.52	8.3	4.0
15	-1.74	32.049	25.80	7.31	.54	8.3	4.0
20	-1.71	32.046	25.80	7.35	.56	8.4	3.6
25	-1.73	32.004	25.77	7.26	.56	8.5	4.4
30	-1.71	32.064	25.82	7.30	.59	8.6	4.4
35	-1.72	32.089	25.84	7.31	.60	8.6	4.3
40	-1.73	32.120	25.86	7.31	.64	8.9	4.6
45	-1.73	32.150	25.89	7.26	.66	9.3	4.9
50	-1.73	32.173	25.90	7.25	.66	9.4	5.1
55	-1.74	32.180	25.91	7.26	.70	9.7	5.2
60	-1.73	32.189	25.92	7.21	.71	9.8	5.6
70	-1.58	32.581	26.23	5.66	1.01	24.6	13.6
80	-1.61	32.711	26.34	5.49	1.07	28.7	14.9
90	-1.58	32.876	26.47	5.34	1.10	31.5	17.1
100	-1.55	33.009	26.58	5.16	1.14	33.1	18.4
125	-1.38	33.518	26.99	5.02	1.00	27.5	17.5
150	-1.20	33.963	27.34	5.18	.78	16.8	15.3
175	-.88	34.281	27.59	5.37	.69	10.4	15.2
200	-.57	34.432	27.70	5.42	.62	9.2	13.9
250	-.04	34.640	27.84	5.40	.64	7.9	14.4
300	.28	34.768	27.92	5.36	.67	8.6	15.3
400	.45	34.828	27.96	5.43	.67	7.4	15.1
500	.39	34.855	27.99	5.49	.67	7.7	15.6

CRUISE T3-026 STATION 010 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 26 JUL 73 BAROM 1008.1 WEATHER 02 WIND SPD 05K
 HOUR 07.2 GMT DRY BULB -01.0 VISIBILITY 7 WIND DIR 28
 LAT 84-05.0N WET BULB . CLOUD TYPE 0 MARSDEN
 LON 080-10.0W REL HUMID CLOUD AMT 8 SOUNDING 1544M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	2.53			8.64	.00	.0	1.4
10	-1.72			7.67	.06	7.0	2.1
15	-1.74	31.992	25.76	7.66	.45	8.7	1.9
20	-1.73	32.036	25.79	7.61	.45	9.2	1.9
25	-1.74	31.993	25.76	7.63	.41	9.2	2.1
30	-1.72	32.020	25.78	7.64	.45	9.7	2.0
35	-1.72	32.022	25.78	7.67	.45	9.2	1.5
40	-1.72	32.048	25.80	7.61	.46	9.7	2.0
42	-1.75	32.049	25.80	7.63	.47	10.4	1.8
44	-1.73	32.088	25.84	7.67	.49	10.1	1.8
46	-1.74	32.092	25.84	7.62	.47	10.3	2.4
48	-1.74	32.127	25.87	7.59	.51	10.3	2.6
50	-1.70	32.147	25.88	7.63	.51	10.2	2.1
52	-1.74	32.147	25.88	7.59	.53	10.8	2.8
54	-1.73	32.153	25.89	7.65	.54	10.2	2.9
56	-1.72	32.160	25.89	7.54	.56	11.0	3.1
58	-1.73	32.174	25.91	7.56	.64	12.4	2.1
60	-1.69	32.208	25.93	7.52	.65	13.6	3.2
65	-1.66	32.316	26.02	6.96	.68	19.1	4.5
70	-1.62	32.475	26.15	6.31	.76	27.2	5.4
75	-1.60	32.610	26.26	5.90	.82	30.6	6.7
80	-1.59	32.723	26.35	5.97	.88	37.5	7.7
90	-1.59	32.888	26.48	5.75	.96	37.0	11.7
100	-1.57	33.006	26.58	5.54	.95	42.0	10.1

CRUISE T3-026 STATION 011 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 02 AUG 73 BAROM 1009.9 WEATHER 02 WIND SPD 11K
 HOUR 15.3 GMT DRY BULB 000.0 VISIBILITY 6 WIND DIR 20
 LAT 84-09.8N WET BULB . CLOUD TYPE 4 MARSDEN
 LON 077-28.0W REL HUMID CLOUD AMT 2 SOUNDING 1450M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	2.02			8.81	.05	.0	.0
10	-1.67	31.879	25.67	7.49	.38	8.6	1.5
15	-1.70	31.981	25.75	7.51	.42	8.8	1.1
20	-1.71	32.006	25.77	7.43	.41	8.8	.0
25	-1.72	32.023	25.78	7.39	.44	9.6	1.0
30	-1.69	32.050	25.80	7.52	.43	8.7	2.5
35	-1.70	32.070	25.82	7.51	.45	.0	1.5
40	-1.71	32.085	25.83	7.49	.46	8.8	2.2
45	-1.73	32.091	25.84	7.38	.48	9.4	2.0
50	-1.71	32.125	25.87	7.44	.50	8.9	.0
55	-1.73	32.150	25.89	7.44	.49	9.2	1.5
60	-1.74	32.174	25.91	7.43	.49	9.7	1.8
70	-1.68	32.281	25.99	7.06	.56	14.8	.0
80	-1.57	32.671	26.30	5.72	.79	28.9	11.5
90	-1.58	32.854	26.45	5.50	.78	31.8	11.3
100	-1.58	32.968	26.55	5.37	.81	34.9	11.9
125	-1.50	33.414	26.90	5.09	.80	36.2	14.3
150	-1.25	33.973	27.35	5.44	.59	19.4	11.7
175	-1.00	34.458	27.73	5.70	.42	7.0	11.4
200	-.66	34.462	27.72	5.64	.41	8.1	10.8
250	-.07	34.652	27.85	5.51	.47	8.8	10.2
300	.27	34.807	27.96	5.50	.51	9.0	11.5
400	.46	34.906	28.02	5.64	.51	7.4	15.0
500	.39	34.907	28.03	5.65	.51	7.4	10.4
600	.28	34.904	28.03	5.66	.47	6.6	12.4
700	.14			5.66	.53	8.0	13.6
800	.06	34.903	28.05	5.64	.56	8.1	12.0
900	-.01			5.70	.51	8.2	13.9
1000	-.08	34.912	28.06	5.48	.59	8.7	13.4
1100	-.16			5.70	.60	9.2	13.2
1200	-.21	34.923	28.07	5.70	.58	9.2	13.2
1300	-.25	34.928	28.08	5.77	.60	9.9	13.5
1400	-.31	34.926	28.08	5.51	.60	9.2	14.0

CRUISE	T3-026	STATION 012	OBSERVED VALUES				
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	09 AUG 73	BAROM	1008.9	WEATHER	03	WIND SPD	08K
HOUR	11.6 GMT	DRY BULB	-02.0	VISIBILITY	6	WIND DIR	29
LAT	84-12.3N	WET BULB	.	CLOUD TYPE	0	MARSDEN	
LON	076-18.0W	REL HUMID		CLOUD AMT	7	SOUNDING	1385M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	.01			8.91	.06	.6	1.4
10	-1.72	31.966	25.74	7.83	.61	10.2	3.2
15	-1.68	32.013	25.77	7.86	.66	9.7	3.1
20	-1.69			7.85	.45	3.4	1.8
25	-1.71	31.962	25.73	7.78	.68	9.8	3.7
30	-1.68	32.098	25.84	7.83	.82	9.8	3.9
35	-1.69	32.139	25.88	7.73	.81	11.1	2.3
40	-1.70	32.129	25.87	7.71	.86	11.5	4.1
42	-1.71	32.096	25.84	7.79	1.08	10.4	4.2
44	-1.71	32.131	25.87	7.77	.83	9.0	2.7
46	-1.71	32.135	25.87	7.78	.94	10.4	4.3
48	-1.71	32.127	25.87	7.75	1.06	12.0	4.5
50	-1.71	32.131	25.87	7.72	1.08	10.4	4.5
52	-1.71	32.135	25.87	7.69	1.07	10.4	4.6
54	-1.71	32.159	25.89	7.62	1.08	10.6	4.6
56	-1.71			7.53	1.09	10.9	4.8
58	-1.72	32.161	25.89	7.52	1.09	11.0	4.9
60	-1.64			7.19	1.14	10.9	5.0
65	-1.66	32.329	26.03	6.99	1.12	17.7	7.7
70	-1.56	32.634	26.27	6.01	1.33	27.3	11.9
75	-1.59	32.677	26.31	5.91	1.34	30.0	12.2
80	-1.59	32.731	26.35	5.97	1.42	30.9	14.2
90	-1.60	32.862	26.46	5.94	1.44	33.8	16.7
100	-1.59	32.995	26.57	5.64	1.53	39.4	17.2

CRUISE	T3-026	STATION 013	OBSERVED VALUES				
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)							
DATE	16 AUG 73	BAROM	1020.0	WEATHER	02	WIND SPD	03K
HOUR	10.2 GMT	DRY BULB	-02.0	VISIBILITY	7	WIND DIR	34
LAT	84-06.0N	WET BULB	.	CLOUD TYPE	5	MARSDEN	
LON	078-18.0W	REL HUMID		CLOUD AMT	8	SOUNDING	1422M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	.07			8.90	.13	.4	1.0
10	-1.73			7.87	.50	11.8	2.8
15	-1.72			7.48	.59	12.4	2.8
20	-1.72			7.78	.52	10.7	1.6
25	-1.72			7.59	.66	12.4	3.4
30	-1.69			7.54	.61	12.9	3.7
35	-1.70			7.22	.65		4.0
40	-1.73			7.72	.62	13.3	3.9
45	-1.73			7.51	.54		4.1
50	-1.72			7.44	1.11	15.7	4.5
55	-1.73			7.53	1.06		4.9
60	-1.72			6.92	1.08	25.5	5.7
70	-1.60			6.24	1.24	36.9	12.0
80	-1.58			5.80	1.36	34.3	14.4
90	-1.58			5.69	1.52	37.5	14.7
100	-1.57			5.03	1.53	38.0	15.0
125	-1.46			5.19	1.15		15.3
150	-1.12			5.37	.92	20.1	15.6
175	-.89			5.61	.61	13.2	12.8
200	-.63			5.63	.52	10.2	16.7
250	-.09			6.06	.51	10.9	13.7
300	.24			5.50	.47	10.5	14.1
400	.45			5.43	.46	9.2	13.7
500	.36			5.81	.43	9.4	13.7

CRUISE T3-026 STATION 014 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 23 AUG 73 BAROM 1006.3 WEATHER 02 WIND SPD 10K
 HOUR 15.9 GMT DRY BULB -01.0 VISIBILITY 7 WIND DIR 19
 LAT 83-58.3N WET BULB . CLOUD TYPE 0 MARSDEN
 LON 078-17.0W REL HUMID CLOUD AMT 8 SOUNDING 1343M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM-ATOMS/L	SIO4	NO3
5	.09			7.90	.03	.0	1.0
10	-1.72	31.887	25.67	7.13	.48	10.9	3.3
15	-1.72	31.956	25.73	7.00	.52	11.6	2.9
20	-1.71	31.965	25.74	6.87	.48	12.1	2.8
25	-1.71	31.971	25.74	6.83	.46	13.1	3.1
30	-1.68	31.978	25.75	6.94	.49	12.1	3.9
35	-1.71	31.977	25.75	9.63	.56	12.6	4.1
40	-1.72	31.982	25.75	6.95	.51	12.9	3.9
42	-1.72	31.981	25.75	7.01	.52	12.7	3.8
44	-1.73	31.996	25.76	6.96	.50	12.0	4.0
46	-1.74	31.991	25.76	6.97	.49	11.8	4.0
48	-1.75	31.001	25.77	6.95	.51	12.6	4.1
50	-1.71	32.010	25.77	6.95	.51	11.7	4.0
52	-1.74	32.060	25.81	6.91	.52	12.0	4.2
54	-1.72	32.086	25.83	6.91	.61	12.3	1.4
56	-1.69	32.102	25.85	6.85	.62	12.6	4.3
58	-1.73	32.115	25.86	6.82	.55	12.6	4.3
60	-1.73	32.124	25.86	6.84	.56	13.1	2.3
65	-1.68	32.199	25.92	6.84	.60	13.7	
70	-1.67	32.320	26.02	6.34	.67	18.9	
75	-1.61	32.542	26.20	5.59	.79	27.7	5.4
80	-1.59	32.676	26.31	5.36	.90	31.1	5.2
90	-1.62	32.794	26.41	5.21	.94	34.3	11.4
100	-1.59	32.928	26.51	5.05	.98	37.7	10.7

CRUISE T3-026 STATION 015 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 30 AUG 73 BAROM 1011.8 WEATHER 02 WIND SPD 10K
 HOUR 15.3 GMT DRY BULB -04.0 VISIBILITY 9 WIND DIR 07
 LAT 84-06.5N WET BULB . CLOUD TYPE 0 MARSDEN
 LON 076-50.0W REL HUMID CLOUD AMT 6 SOUNDING 1391M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	.01			8.60	.00	.0	.8
10	-1.73	31.753	25.56	7.65	.39	7.0	3.4
15	-1.71	32.003	25.77	7.59	.47	7.3	3.6
20	-1.73	31.981	25.75	7.46	.44	7.2	3.4
25	-1.73	31.980	25.75	7.46	.46	7.2	3.4
30	-1.71	31.980	25.75	7.59	.51	7.2	3.9
35	-1.72	31.984	25.75	7.61	.62	7.2	3.7
40	-1.72	32.005	25.77	7.65	.54	7.2	3.7
45	-1.73	32.033	25.79	7.57	.49	7.3	4.1
50	-1.71	32.104	25.85	7.51	.49	7.6	4.4
55	-1.72	32.132	25.87	7.41	.49	8.1	4.7
60	-1.71	32.159	25.89	7.32	.49	8.9	5.1
70	-1.59	32.487	26.16	6.16	.67	18.0	11.8
80	-1.60	32.741	26.36	5.68	.87	22.5	12.7
90	-1.58	32.830	26.43	5.67	.99	24.7	12.5
100	-1.54	32.947	26.53	5.34	1.31	26.0	15.0
125	-1.48	33.395	26.89	5.08	1.11	25.4	16.1
150	-1.32	33.904	27.30	5.34	.83	15.2	13.4
175	-.95	34.250	27.56	5.62	.53	7.6	12.1
200	-.60	34.414	27.68	5.68	.44	6.5	12.6
250	-.07	34.623	27.83	5.54	.41	6.2	13.5
300	.28	34.775	27.93	5.64	.61	6.0	13.9
400	.45	34.845	27.98	5.75	.44	5.3	14.3
500	.39	34.858	27.99	5.81	.46	5.6	13.9
600	.27	34.864	28.00	5.83	.33	5.3	13.0
700	.14	34.864	28.01	5.88	.36	5.5	12.8
800	.06	34.874	28.02	5.95	.44	5.5	14.6
900	-.01	34.886	28.03		.38	5.5	13.9
1000	-.08	34.895	28.05	5.68	.43	5.7	13.9
1100	-.16			5.86	.39	6.0	14.5
1200	-.22	34.894	28.05	5.85	.41	6.5	13.7
1220	-.23			5.88	.53	6.4	13.6
1240	-.24	34.900	28.06	5.61	.49	6.5	14.8
1260	-.26	34.917	28.07	5.84	.50	6.6	14.2
1280	-.29	34.917	28.07	5.83	.42	6.8	14.0
1300	-.30			5.90	.41	6.9	15.4

CRUISE T3-026 STATION 016 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 06 SEP 73 BAROM 1003.0 WEATHER 10 WIND SPD 11K
 HOUR 11.5 GMT DRY BULB -07.0 VISIBILITY 8 WIND DIR 23
 LAT 84-08.9N WET BULB . CLOUD TYPE 4 MARSDEN
 LON 078-42.0W REL HUMID CLOUD AMT 4 SOUNDING 1480M

DEPTH M	TEMP C	SALINITY O/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 ATOMS/L	NO3
5	.06			8.44	.00	.0	1.1
10	-1.73	31.890	25.68	7.33	.46	6.7	2.7
15	-1.73	31.959	25.73	7.32	.52	6.9	3.4
20	-1.72	31.971	25.74	7.25	.54	7.0	3.2
25	-1.73	31.933	25.71	7.20	.43	7.1	3.0
30	-1.70	31.922	25.70	7.33	.54	6.9	3.1
35	-1.71	31.935	25.71	7.35	.55	7.0	3.7
40	-1.71	32.020	25.78	7.28	.55	6.8	4.0
42	-1.73	32.046	25.80	7.27	.54	7.2	3.4
44	-1.72	32.050	25.80	7.27	.55	7.3	3.7
46	-1.73	32.065	25.82	7.27	.51	7.4	4.0
48	-1.72			7.27	.61	7.6	4.5
50	-1.67			7.21	.61	7.5	4.2
52	-1.61	32.065	25.81	7.19	.65	7.6	4.4
54	-1.69	32.078	25.83	7.21	.65	8.0	4.8
56	-1.72	32.142	25.88	7.08	.65	8.3	5.1
58	-1.72	32.178	25.91	7.08	.58	8.8	4.9
60	-1.70	32.218	25.94	7.06	.62	8.9	5.2
65	-1.68	32.293	26.00	6.79	.69	10.3	7.1
70	-1.63	32.418	26.10	6.28	.81	14.1	9.6
75	-1.63	32.522	26.19	5.86	.94	17.4	12.1
80	-1.58	32.680	26.31	5.67	1.05	20.5	13.4
90	-1.58	32.839	26.44	5.37	1.13	23.3	15.8
100	-1.58	32.984	26.56	5.24	1.17	26.0	18.0

CRUISE T3-026 STATION 017 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 14 SEP 73 BAROM 1023.3 WEATHER 03 WIND SPD 05K
 HOUR 02.0 GMT DRY BULB -11.0 VISIBILITY 7 WIND DIR 08
 LAT 84-04.0N WET BULB . CLOUD TYPE 6 MARSDEN
 LON 079-08.0W REL HUMID CLOUD AMT 7 SOUNDING 1467M

DEPTH M	TEMP C	SALINITY O/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 ATOMS/L	NO3 ATOMS/L
5	.03			8.92	.00	.2	1.0
10	-1.74	31.927	25.71	7.56	.42	10.0	3.6
15	-1.73			7.56	.43	10.1	3.5
20	-1.73	31.922	25.70	7.53	.42	10.8	3.3
25	-1.74	31.950	25.72	7.51	.44	10.6	4.2
30	-1.71	31.956	25.73	7.56	.46	10.6	4.3
35	-1.72	31.966	25.74	7.56	.44	10.7	4.3
40	-1.72	32.000	25.76	7.56	.46	10.6	4.2
45	-1.73	32.030	25.79	7.54	.46	10.6	4.3
50	-1.71	32.131	25.87		.48	11.6	4.9
55	-1.72	32.167	25.90	7.40	.52	12.3	5.2
60	-1.71	32.170	25.90	7.23	.52	14.0	6.2
70	-1.61	32.464	26.14	6.39	.67	28.0	12.0
80	-1.59	32.739	26.36	5.79	.87	29.4	13.1
90	-1.58	32.846	26.45	5.70	.94		15.0
100	-1.56	32.994	26.57	5.45	1.03	36.3	14.8
125	-1.44	33.452	26.93	5.29	.87	31.3	16.9
150	-1.21	33.969	27.35	5.52	.63	18.9	17.5
175	-.93	34.264	27.57	5.71	.40	11.7	13.6
200	-.61	34.419	27.69	5.87	.35	10.5	13.7
250	-.04	34.607	27.81	5.52	.36	10.7	14.9
300	.27	34.751	27.91	5.81	.56	10.0	15.6
400	.41	34.843	27.98	5.66	.44	9.1	14.0
500	.37	34.850	27.99	5.73	.40	9.0	14.4

CRUISE T3-026 STATION 018 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 21 SEP 73 BAROM 1010.0 WEATHER 36 WIND SPD 12K
HOUR 05.0 GMT DRY BULB -15.0 VISIBILITY 7 WIND DIR 25
LAT 83-59.7N WET BULB . CLOUD TYPE 4 MARSDEN
LON 079-50.0W REL HUMID CLOUD AMT 7 SOUNDING 1478M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	.05			8.91	.00	.0	.7
10	-1.70	31.634	25.47	7.65	.45	7.3	3.1
15	-1.83	31.804	25.61	7.57	.51	7.2	2.8
20	-1.68			7.52	.45	7.9	2.8
25	-1.75			7.50	.54	7.7	3.2
30	-1.81	31.917	25.70	7.62	.54	8.5	3.7
35	-1.72	31.937	25.71	7.64	.54	8.3	3.6
40	-1.73			7.65	.54	9.2	3.8
42	-1.73	31.937	25.71	7.62	.45	8.0	3.7
44	-1.74	32.018	25.78	7.62	.46	8.3	3.7
46	-1.74	32.044	25.80	7.61	.47	8.9	3.6
48	-1.73			7.77	.49	8.3	3.8
50	-1.72	32.046	25.80	7.62	.50	9.2	4.0
52	-1.73	32.010	25.77	7.61	.53	9.5	4.0
54	-1.63			7.49	.56	9.6	4.4
56	-1.70	32.360	26.06	7.39	.68	9.6	4.3
58	-1.61			7.35	.63	11.6	5.3
60	-1.69	32.389	26.08	7.33	.67	11.9	5.8
65	-1.66	32.430	26.11	6.97	.69	15.6	6.9
70	-1.63	32.441	26.12	6.46	.78	20.8	9.9
75	-1.59	32.632	26.27	5.88	.91	28.4	13.3
80	-1.58	32.718	26.34	5.86	.96	31.3	12.5
90	-1.60	32.864	26.46	5.69	1.04	35.8	16.7
100	-1.58	32.919	26.51	5.54	1.09	37.7	16.9

CRUISE T3-026 STATION 019 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 29 SEP 73 BAROM 1008.1 WEATHER 10 WIND SPD 02K
HOUR 19.6 GMT DRY BULB -31.0 VISIBILITY 4 WIND DIR 30
LAT 84-01.5N WET BULB . CLOUD TYPE 0 MARSDEN
LON 079-35.0W REL HUMID CLOUD AMT 2 SOUNDING 1487M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM-ATOMS/L	SIO4	NO3
5	-.02		.63	9.15	.00	.0	1.1
10	-1.74	31.908	25.69	7.59	.45	7.5	3.6
15	-1.72	31.877	25.66	7.54	.46	7.6	3.5
20	-1.73	31.943	25.72	7.56	.43	7.9	3.5
25	-1.74	31.940	25.72	7.55	.43	8.0	3.8
30	-1.71	31.943	25.72	7.52	.49	7.7	4.5
35	-1.72	31.945	25.72	7.56	.48	7.7	4.1
40	-1.72	31.947	25.72	7.56	.52	7.7	4.3
45	-1.73	31.972	25.74	7.60	.46	8.0	4.2
50	-1.72	32.040	25.80	7.48	.43	8.4	4.7
55	-1.72	32.129	25.87	7.43	.45	8.8	4.8
60	-1.71	32.205	25.93	7.52	.50	10.9	6.0
70	-1.61	32.439	26.12	6.33	.63	20.6	11.4
80	-1.58	32.729	26.35	5.75	.79	28.2	16.2
90	-1.59	32.870	26.47	5.57	1.02	31.4	15.3
100	-1.56	33.008	26.58	5.26	.98	33.9	18.5
125	-1.45	33.444	26.93	5.13	.73	30.5	15.7
150	-1.26	33.965	27.34	5.64	.45	17.2	14.8
175	-.87	34.280	27.59	5.58	.35	9.9	13.5
200	-.60	34.419	27.69	5.70	.29	7.5	13.7
250	-.06	34.635	27.84	5.38	.38	8.5	14.1
300	.19	34.745	27.91	5.76	.38	8.9	14.4
400	.48	34.843	27.97	5.70	.32	6.7	13.7
500	.35	34.853	27.99	5.70	.37	7.2	14.6

CRUISE T3-027 STATION 001 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 26 NOV 73 BAROM 1033.9 WEATHER 00 WIND SPD 10K
HOUR 21.8 GMT DRY BULB -37.4 VISIBILITY 8 WIND DIR 04
LAT 83-49.0N WET BULB . CLOUD TYPE MARSDEN
LON 078-52.0W REL HUMID CLOUD AMT 0 SOUNDING 1263M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	.13	2.200		9.95	.43	.0	1.5
10	-1.80	32.026		7.43	.80	10.5	4.0
15	-1.78			7.33	.80	10.3	3.2
20		32.124		7.33	.74	10.9	3.5
25	-1.78			7.13	.61	8.5	4.6
30	-1.75	32.098		7.40	.74	11.1	5.0
35	-1.75			7.42	.76	11.0	4.5
40	-1.77			7.66	.63	11.0	4.4
45	-1.78	32.145		7.30	.80	11.4	4.3
50	-1.75	32.142		7.35	.64	11.3	4.5
55	-1.78	32.128		7.40	.72	11.8	4.6
60	-1.73			7.25	.67	10.8	5.0
70	-1.62	32.614		6.06	.86	23.3	9.5
80	-1.64	32.791		5.73	.85	29.0	13.7
90	-1.60	32.906		5.60	1.17	31.4	13.7
100		33.049		5.26	1.20	21.5	16.3
125	-1.44	33.522		5.02	1.04	29.6	14.7
150	-1.15	33.997		5.46	.80	17.2	13.3
175	-.93	34.305		5.69	.31	10.4	12.4
200	-.59	34.492		5.75	.23	8.9	13.0
250	-.05	34.659		5.34	.22	10.3	13.3
300	.20	34.788		5.66	.25	9.4	13.8
400	.40	34.855		5.75	.22	8.0	12.5
500	.39	34.883		5.86	.27	7.5	13.1
600	.22	34.880			.31	7.6	13.5
700	.12	34.885		5.85	.63	7.7	13.7
800	.04	34.885		5.86	.38	8.0	13.7
900	-.02	34.899		5.82	.38	8.0	14.3
1000	-.10	34.904		5.48	.38	8.0	13.8
1100	-.18			5.91	.32	8.1	14.3
1200	-.24			5.91		8.2	14.4

CRUISE T3-027 STATION 002 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 03 DEC 73 BAROM 1023.4 WEATHER 45 WIND SPD 04K
HOUR 23.8 GMT DRY BULB -25.1 VISIBILITY 3 WIND DIR 01
LAT 83-35.6N WET BULB . CLOUD TYPE MARSDEN
LON 083-44.0W REL HUMID CLOUD AMT 9 SOUNDING 1270M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
10	-1.70	31.938		8.38		12.7	
15	-1.70	31.977		8.39	.68	9.6	
20	-1.72	31.966		8.39	.51	9.6	
25	-1.74	31.935		8.09	.47	9.6	
30	-1.75	31.915		8.63	.47	9.5	
35	-1.74	31.976		8.39	.71	15.6	
40	-1.76	31.973		8.38	1.59	9.1	
45	-1.73	31.972		8.38	.68	6.8	
50	-1.74	31.954		8.16	.34	17.0	
55	-1.72	32.004		8.32	.83	17.9	
60	-1.66	32.214		7.81	.49	14.0	
65	-1.62	32.358		7.24	.53	15.2	
70	-1.56	32.514		6.70	.66	13.7	
75	-1.54	32.654		6.43	.41	23.2	
80	-1.55	32.718		6.37	1.24	20.0	
85	-1.58	32.744					
90	-1.58	32.818		6.10			
95	-1.56	32.911					
100	-1.59	32.958		6.07	1.75	30.7	
110	-1.50	33.159					
120	-1.43	33.369					
130	-1.30	33.590					
140	-1.26	33.772					
150	-1.16	33.949		6.00	.81	17.2	
160	-1.02	34.118					
170	-.90	34.227					
180	-.78	34.312					
190	-.49	34.377					
200	-.37	34.428		5.97	1.51	11.0	
220	-.17	34.523					
240	-.04	34.634					
260	.10	34.688					
280	.20	34.741					
300	.26	34.762		6.18	1.24	4.9	
320	.34	34.795					
340	.53	34.818					
360	.47	34.821					
380	.46	34.821					
400	.47	34.844		6.31	.42	5.8	
420	.44	34.844					
440	.44	34.853					
460	.44	34.851					
480	.40	34.844					
500	.39	34.854		6.36	.36	5.6	
520	.37	34.866					

CRUISE	T3-027	STATION 002	OBSERVED VALUES				
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	03 DEC 73	BAROM	1023.4	WEATHER	45	WIND SPD	04K
HOUR	23.8 GMT	DRY BULB	-25.1	VISIBILITY	3	WIND DIR	01
LAT	83-35.6N	WET BULB	.	CLOUD TYPE		MARSDEN	
LON	083-44.0W	REL HUMID		CLOUD AMT	9	SOUNDING	1270M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L			MICROGRAM-ATOMS/L
540	.32	34.859					
560	.30	34.867					
580	.28	34.871					
600	.26	34.863		6.41	.32	6.4	
650	.22	34.866					
700	.17	34.873		6.43	.42	4.7	
700	.14	34.868		6.52		3.8	
750	.11	34.881					
800	.06	34.883		6.57	.64	4.9	
850	.00	34.890					
900	-.04	34.901		6.28		4.8	
950	-.08	34.889					
1000	-.13	34.904		6.53		5.2	
1050	-.16	34.880					
1100	-.19	34.915		6.21		8.2	
1150	-.22	34.924					
1200	-.24	34.927		6.43		7.1	

CRUISE	T3-027	STATION	003	OBSERVED VALUES			
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)							
DATE	08 DEC 73	BAROM	1012.9	WEATHER	73	WIND SPD	02K
HOUR	23.9 GMT	DRY BULB	-20.6	VISIBILITY	7	WIND DIR	03
LAT	83-24.8N	WET BULB	.	CLOUD TYPE	2	MARSDEN	
LON	085-27.0W	REL HUMID		CLOUD AMT	8	SOUNDING	1225M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
10	-1.73	31.802		7.76			
15	-1.72	31.934		7.59			
20	-1.73	31.957		7.64			
25	-1.74	31.963		7.66			
30	-1.74	31.966		7.59			
35	-1.75	31.966		7.47			
40	-1.75	31.968		7.20			
45	-1.75	31.975		7.52			
50	-1.75	31.975		7.58			
55	-1.74	32.033		7.34			
60	-1.72	32.152		7.30			
65	-1.68	32.283					
70	-1.65	32.403		6.20			
75	-1.59	32.602					
80	-1.58	32.695		5.83			
85	-1.59	32.781					
90	-1.57	32.832		5.56			
95	-1.59	32.913					
100	-1.57	32.997		5.51			
110	-1.56	33.174					
120	-1.45	33.357					
130	-1.41	33.572					
140	-1.32	33.781					
150	-1.16	33.979		5.56			
160	-1.05	34.124					
170	-1.04	34.211					
180	-.79	34.293					
190	-.68	34.354					
200	-.56	34.409		5.59			
220	-.35	34.501					
240	-.15	34.570					
260	.00	34.656					
280	.14	34.712					
300	.21	34.748		5.54			
320	.26	34.775					
340	.27	34.785					
360	.36	34.813					
380	.38	34.819					
400	.47	34.834		5.83			
420	.36	34.832					
440	.41	34.829					
460	.36	34.831					
480	.34	34.839					
500	.31	34.849		5.88			
520	.30	34.855					

CRUISE	T3-027	STATION	003	OBSERVED VALUES		
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	08 DEC 73	BAROM	1012.9	WEATHER	73	WIND SPD 02K
HOUR	23.9 GMT	DRY BULB	-20.6	VISIBILITY	7	WIND DIR 03
LAT	83-24.8N	WET BULB	.	CLOUD TYPE	2	MARSDEN
LON	085-27.0W	REL HUMID		CLOUD AMT	8	SOUNDING 1225M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
540	.28	34.856					
560	.25	34.853					
580	.23	34.834					
600	.21	34.846		5.89			
650	.16	34.867					
700	.16	34.871					
750	.13	34.877					
800	.05	34.878					
850	.00	34.883					
900	-.04	34.882					
950	-.10	34.886					
1000	-.12	34.890					
1050	-.15	34.895					
1100	-.20	34.896					
1150	-.22	34.903					
1200	-.25	34.908					

CRUISE	T3-027	STATION	004	OBSERVED VALUES		
		(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	30 DEC 73	BAROM	1024.3	WEATHER	00	WIND SPD 07K
HOUR	00.4 GMT	DRY BULB	-47.2	VISIBILITY	8	WIND DIR 36
LAT	83-28.7N	WET BULB	.	CLOUD TYPE		MARSDEN
LON	083-31.0W	REL HUMID		CLOUD AMT	0	SOUNDING 0857M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	.30	1.352		10.60	.00	.7	
10	-1.73	32.054		8.66	.52	13.8	
15	-1.76	32.153		8.27	.66	13.6	
20	-1.77	32.157		8.15	.56	13.5	
25	-1.72	32.154		8.20	.49	12.2	
30	-1.74			8.16	.60	13.7	
35	-1.73			8.16	.71	13.8	
40	-1.75	32.162		8.11	.64	12.6	
45	-1.80	32.171		7.95	.55	16.0	
50	-1.76			8.11	.55	13.8	
55	-1.75			8.08	.46	13.8	
60	-1.79			8.13	.53	13.7	
70	-1.74			8.07	.53	15.3	
80	-1.62	32.531		6.94	.68	28.4	
90	-1.59	32.767		6.31	1.06	28.4	
100	-1.59	32.961		5.62	1.33	32.0	
125	-1.37	33.535		5.92	1.14	31.7	
150	-.98	33.879		5.89	.75	23.1	
175	-.85	34.217		6.07	.55	15.3	
200	-.59	34.392		6.15	.44	12.6	
250	-.04	34.624		5.48	.41	11.9	
300	.18	34.731		6.05	.41	11.3	
400	.36	34.831		6.06	.32	11.1	
500	.26	34.842		6.28	.54	10.2	
600	.17	34.856		6.11	.41	9.4	
700	.01	34.856		6.41	.41	9.2	
800	-.07	34.862		6.49	.69	9.2	

CRUISE	T3-027	STATION 005	OBSERVED VALUES		
	(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)				
DATE	20 JAN 74	BAROM	1013.6	WEATHER	71
HOUR	07.4 GMT	DRY BULB	-27.6	VISIBILITY	8
LAT	83-28.6N	WET BULB	.	CLOUD TYPE	MARSDEN
LON	083-30.0W	REL HUMID		CLOUD AMT	0
					SOUNDING 0839M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5				8.15			
10	-1.75			7.72			
15	-1.76			8.05			
20	-1.77			7.90			
25	-1.73			7.93			
30	-1.74			7.98			
35	-1.75			7.98			
40	-1.76			7.98			
45	-1.77			7.90			
50	-1.76			7.98			
55	-1.76			7.98			
60	-1.79			7.98			
70	-1.62			7.39			
80	-1.58			6.33			
90	-1.60			6.07			
100	-1.59			5.70			
125	-1.32			5.69			
150	-1.03			5.87			
175	-.70			6.03			
200	-.49			6.14			
250	-.02			5.76			
300	.18			6.09			
400	.36			6.20			
500	.26			6.27			
600	.20			6.34			
700	.14			6.36			
800	.06			6.21			
805	.02						
810	.05						
815	.04						
820	.03						
825	.02						
830	-.01						

CRUISE T3-027 STATION 006 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 31 JAN 74 BAROM 1014.2 WEATHER 00 WIND SPD 07K
 HOUR 00.6 GMT DRY BULB -22.7 VISIBILITY 9 WIND DIR 11
 LAT 83-29.4N WET BULB . CLOUD TYPE MARSDEN
 LON 083-26.0W REL HUMID CLOUD AMT 0 SOUNDING 0767M

DEPTH M	TEMP C	SALINITY O/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.73	32.095		8.19	.56	13.2	
10	-1.76	32.105		8.16	.57	12.5	
15	-1.76	32.108		8.19	.51	11.5	
20	-1.76	32.109		8.20	.28	14.1	
25	-1.76	32.107		7.52	.42	14.2	
30	-1.75	32.115		7.85	.30	13.2	
35	-1.73	32.114		8.15	.33	13.0	
40	-1.72	32.118		8.17	.45	11.6	
45	-1.75	32.115		8.13	.43	12.9	
50	-1.70	32.117		7.61	.46	12.2	
55	-1.71	32.119		8.13	.44	11.9	
60	-1.74	32.126		8.13	.43	11.0	
65	-1.71	32.283					
70	-1.69	32.354		7.52	.68	16.2	
80	-1.59	32.658		6.76	.91	28.1	
90	-1.60	32.794		6.36	1.11	30.7	
100	-1.54	32.960		5.92	1.05	34.9	
125	-1.34	33.459		5.93	1.02	29.3	
150	-1.22	33.908		6.01	.58	17.4	
175	-.79	34.269		6.16	.33	11.1	
200	-.50	34.429		6.19	.41	10.6	
250	-.01	34.645		6.15	.38	9.7	
300	.22	34.780		6.26	.36	9.9	
400	.34	34.845		6.04	.28	9.6	
500	.32	34.871		6.40	.35	7.5	
600	.17	34.876		6.43	.31	8.1	
700	.01	34.896		6.47	.33	7.3	

CRUISE T3-027 STATION 007 OBSERVED VALUES
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
DATE 12 FEB 74 BAROM 1019.0 WEATHER 01 WIND SPD 12K
HOUR 18.2 GMT DRY BULB -30.8 VISIBILITY 8 WIND DIR 01
LAT 83-27.1N WET BULB . CLOUD TYPE 7 MARSDEN
LON 084-09.0W REL HUMID CLOUD AMT 3 SOUNDING 1007M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-.01	2.724		11.58	.00	4.5	3.7
10	-1.77	32.092		8.08	1.14	15.5	5.9
15	-1.78	32.121		8.08	1.11	15.0	5.1
20	-1.78	32.124		7.62	.98	15.0	6.3
25	-1.78	32.127		7.62	1.04	15.4	5.3
30	-1.78	32.138		8.08	1.00	15.5	5.2
35	-1.74	32.139		8.08	1.11	15.3	5.3
40	-1.76	32.141		8.00	1.11	15.6	5.3
45	-1.75	32.137		7.73	1.20	15.1	5.3
50	-1.76	32.135		8.01	1.20	15.2	5.4
55	-1.76			8.05	.98	15.3	5.2
60	-1.74	32.145		8.10	.98	15.1	5.1
70	-1.66	32.347		7.51	.98	19.7	8.2
80	-1.60	32.656		6.39	1.52	32.2	13.5
90	-1.62	32.807		6.23	2.04	36.7	14.6
100	-1.60	32.970		5.64	1.95	38.7	16.5
125	-1.39	33.427		5.57	1.64	32.2	15.2
150	-1.23	33.872		5.89	1.00	24.1	12.9
175	-.83	34.199		6.03	.80	17.1	12.4
200	-.70	34.358		6.06	.73	13.1	12.3
250	-.04	34.599		6.16	.66	13.1	13.1
300	.16	34.630		6.10	.54	12.0	13.6
400	.42	34.828		6.10	.66	10.9	14.3
500	.44			5.86	.59	10.3	13.6
600	.18	34.864		6.01	.61	10.4	13.8
700	.13	34.880		6.38	.50	10.6	14.3
800	-.01	34.885		6.14	.66	10.3	13.7
900	-.05	34.894		6.39	.64	10.5	14.3
1000	-.12	34.897		6.41	.80	11.1	13.7

CRUISE T3-027 STATION 008 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 01 MAR 74 BAROM 1011.2 WEATHER 36 WIND SPD 21K
 HOUR 01.2 GMT DRY BULB -29.0 VISIBILITY 2 WIND DIR 22
 LAT 83-38.0N WET BULB . CLOUD TYPE MARSDEN
 LON 081-57.0W REL HUMID CLOUD AMT 9 SOUNDING 0483M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-0.01	3.271		13.04			
10	-1.74	31.951		8.49			
15	-1.75	31.992		8.46			
20	-1.75	31.961		8.31			
25	-1.75	31.986		8.26			
30	-1.74	31.988		8.49			
35	-1.72	31.989		8.43			
40	-1.73	31.990		8.29			
45	-1.72	31.998		8.42			
50	-1.76	32.002		8.49			
55	-1.73	32.021		8.50			
60	-1.71	32.187		8.25			
70	-1.66	32.400		7.55			
80	-1.61	32.664		6.83			
90	-1.60	32.810		6.41			
100	-1.58	32.988		6.13			
125	-1.42	33.461		5.98			
150	-1.02	33.959		6.05			
175	-.76	34.215		6.28			
200	-.43	34.426		6.13			
250	.03	34.669		6.28			
300	.13	34.759		6.38			
400	.32	34.853		6.56			

CRUISE T3-028 STATION 001 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 15 MAR 74 BAROM 1013.8 WEATHER 02 WIND SPD 06K
 HOUR 23.4 GMT DRY BULB -40.9 VISIBILITY 8 WIND DIR 01
 LAT 83-45.3N WET BULB . CLOUD TYPE 5 MARSDEN
 LON 079-19.0W REL HUMID CLOUD AMT 1 SOUNDING 1048M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	.56	19.067		9.84			
10	-1.71	31.839		8.84			
15	-1.74	31.858		8.77			
20	-1.72	31.861		8.66			
25	-1.71	31.888		8.61			
30	-1.76	31.899		8.71			
35	-1.71	31.908		8.72			
40	-1.73	31.916		8.68			
45	-1.74	31.919		8.60			
50	-1.72	31.928		8.69			
55	-1.73	31.935		8.69			
60	-1.72	32.164		8.39			
70	-1.69	32.354		8.21			
80	-1.60	32.646		6.83			
90	-1.59	32.781		6.56			
100	-1.56	32.909		6.37			
125	-1.46	33.329		5.83			
150	-1.35	33.901		6.14			
175	-1.05	34.244		6.69			
200	-.71	34.402		6.71			
250	-.13	34.612		6.55			
300	.21	34.750		6.47			
400	.47	34.847		6.58			
500	.31	34.875		6.72			
600	.15	34.885		6.76			
700	.04	34.892		6.60			
800	-.02	34.890		6.77			
900	-.12	34.889		6.79			
1000	-.18	34.912		6.82			

CRUISE	T3-028	STATION 002	OBSERVED VALUES			
(T.S. ENGLISH; UNIVERSITY OF WASHINGTON)						
DATE	25 MAR 74	BAROM	1010.8	WEATHER	22	WIND SPD 13K
HOUR	19.9 GMT	DRY BULB	-30.6	VISIBILITY	6	WIND DIR 23
LAT	83-44.9N	WET BULB	.	CLOUD TYPE	5	MARSDEN
LON	079-28.0W	REL HUMID		CLOUD AMT	1	SOUNDING 0972M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	0/00		ML/L	MICROGRAM-ATOMS/L		
5	-0.71	12.381		9.93			
10	-1.74	31.818		8.95			
15	-1.75	31.871		8.92			
20	-1.73	31.872		8.84			
25	-1.75	31.894		8.85			
30	-1.75	31.900		8.91			
35	-1.74	31.916		8.91			
40	-1.75	31.918		8.89			
42	-1.75	31.922		8.86			
44	-1.75	31.930		8.82			
46	-1.75			8.82			
48	-1.75			8.82			
50	-1.71			8.82			
52	-1.73	31.928		8.80			
54	-1.76	31.932		8.78			
56	-1.73	31.932		8.73			
58	-1.75	31.939		8.75			
60	-1.75	31.972		8.76			
65	-1.67	32.272		7.94			
70	-1.73	32.453		7.39			
75	-1.61	32.571		6.83			
80	-1.61	32.710		6.83			
90	-1.59	32.840		6.61			
100	-1.60	32.969		6.46			

CRUISE T3-028 STATION 003 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 07 APR 74 BAROM 1038.2 WEATHER 03 WIND SPD 03K
 HOUR 21.8 GMT DRY BULB -36.6 VISIBILITY 8 WIND DIR 25
 LAT 83-44.5N WET BULB . CLOUD TYPE 1 MARSDEN
 LON 079-28.0W REL HUMID CLOUD AMT 1 SOUNDING 0971M

DEPTH	TEMP	SALINITY	SIGMAT	OXYGEN	PO4	SIO4	NO3
M	C	O/00		ML/L	MICROGRAM-ATOMS/L		
5	-1.57	31.266		8.68	.88	16.5	3.1
10	-1.75	31.759		8.64	.95	16.8	4.1
15	-1.75	31.827		8.54	1.05	16.0	4.2
20	-1.76	31.815		8.49	.89	16.3	4.1
25	-1.74	31.849		8.41	.85	16.4	3.8
30	-1.74	31.826		8.50	.91	15.9	3.0
35	-1.75	31.842		8.50	.89	16.0	3.3
40	-1.78	31.845		8.44	.80	15.9	3.4
45	-1.74	31.862		8.42	.92	15.6	2.9
50	-1.76	31.848		8.56	.78	16.1	3.3
55	-1.77	31.866		8.50	.82	17.4	3.4
60	-1.69	32.146		7.91	.91	23.0	6.6
70	-1.61	32.529		6.78	1.06	33.5	12.0
80	-1.60	32.752		6.46	1.14	38.4	14.1
90	-1.59	32.864		6.28	1.23	40.9	15.4
100	-1.60	32.996		6.09	1.48	43.6	16.0
125	-1.49	33.473		5.81	1.06	38.0	13.4
150	-1.35	34.005		6.08	.75	20.8	11.6
175	-1.04	34.263		6.42	.74	11.8	9.9
200	-.52	34.426		6.23	.71	13.9	11.0
250	-.03	34.640		6.26	.69	12.3	12.3
300	.24	34.759		6.06	.74	10.7	11.8
400	.43	34.841		6.20	.62	9.4	12.6
500	.32	34.875		6.26	.71	8.7	11.4

CRUISE T3-028 STATION 004 OBSERVED VALUES
 (T.S. ENGLISH; UNIVERSITY OF WASHINGTON)
 DATE 22 APR 74 BAROM 1010.4 WEATHER 03 WIND SPD 08K
 HOUR 22.2 GMT DRY BULB -31.6 VISIBILITY 7 WIND DIR 36
 LAT 83-45.4N WET BULB . CLOUD TYPE 2 MARSDEN
 LON 079-30.0W REL HUMID CLOUD AMT 6 SOUNDING 0972M

DEPTH M	TEMP C	SALINITY 0/00	SIGMAT	OXYGEN ML/L	PO4 MICROGRAM	SIO4 -ATOMS/L	NO3
5	-1.66	31.783			.81	12.0	4.3
10	-1.77	31.812			.84	11.6	4.6
15	-1.77	31.820			.88	11.7	4.6
20	-1.76	31.824			.85	11.6	4.3
25	-1.74	31.827			.86	12.5	4.4
30	-1.74	31.831			.86	11.6	4.5
35	-1.76	31.826			.92	11.6	4.7
40	-1.78	31.830			.85	11.6	4.6
45	-1.75	31.836			.87	12.0	4.7
50	-1.75	31.833			.85	11.6	4.6
55	-1.74	31.843			.92	14.6	7.0
60	-1.75	32.218			.87	14.0	7.1
70	-1.63	32.524			1.15	27.8	13.6
80	-1.58	32.760			1.27	31.8	17.5
90	-1.57	32.875			1.32	33.6	17.1
100	-1.57	33.019			1.44	42.4	19.1
125	-1.45	33.524			1.16	30.6	17.5
150	-1.24	34.026			.89	16.0	13.1
175	-.87	34.282			.81	11.2	13.1
200	-.71	34.424			.68	7.7	12.3
250	-.46				.91	11.6	
300	.12	34.724			.79	9.4	
400	.35	34.850			.69	7.6	14.6
500	.22	34.878			.72	7.9	15.5
600	.08	34.891			.71	7.2	14.4
700	.00	34.892			.68	7.4	17.5
800	-.10	34.891			.72	7.6	15.5
900	-.15	34.902			.71	7.7	14.6
910	.08	34.886			.67	7.2	15.6
920	.10	34.882			.72	7.2	17.9
930	.05	34.881			.84	7.4	14.8
940	.07	34.884			.94	8.1	15.6
950	.06	34.881			.89	7.5	15.0
960	.06	34.883			.76	8.1	14.8

*** END OF LISTING *** 71434 ' FILE = HCOG