

UNIVERSITY OF WASHINGTON DEPARTMENT OF OCEANOGRAPHY

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Technical Report No. 134

PHYSICAL, CHEMICAL, AND BIOLOGICAL DATA
FROM THE NORTHEAST PACIFIC OCEAN:
COLUMBIA RIVER EFFLUENT AREA, JANUARY-JUNE 1963

Volume II

CNAV Oshawa Cruise Oshawa-1: 12-26 March
Brown Bear Cruise 320: 28 March - 10 April

Prepared by
C. M. LOVE
With the Data Analysis Staff

Scientific Program
Under the general direction of
Clifford A. Barnes

U.S. Atomic Energy Commission
Contract No. AT(45-1)-1725
RLO-1725-33

Office of Naval Research
Contracts Nonr-477(10)
and Nonr-477(37)
Project NR 083 012

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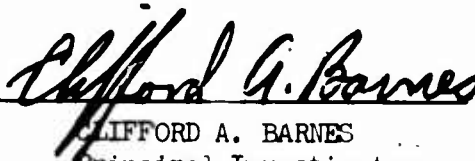
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Reference M65-56
March 1966



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INTRODUCTION

This report constitutes Volume II of Technical Report No. 134 and contains data from Cruise Oshawa-1, 12-26 March 1963, and Brown Bear Cruise 320, 28 March - 10 April 1963. A discussion of the objectives of these cruises and the scientific program of which they were a part will be found in Volume I, together with descriptions of the observations made, the methods of collecting samples and the methods of determination of properties. A list of the personnel engaged in collecting and preparing the data and a bibliography will also be found in Volume I.

The cruise tracks and station locations for cruises Oshawa-1 and Brown Bear 320 will be found in Figures 1 and 2 of this volume.

EXPLANATION OF DATA TABLES

The information in the data tables was transcribed directly from IBM cards using an IBM 1401 Data Processing System. A blank space in the tables or headings indicates that no observation was taken. The original data and the interpolated and computed values punched on the cards are in most cases recorded or coded in accordance with the procedures used by the National Oceanographic Data Center; however, some weather information is coded with U.S. Navy Hydrographic Office codes. The codes used to describe weather and sea conditions, etc., will be found in NODC Publication M-2 (National Oceanographic Data Center, 1964) or in H.O. Publication No. 606-c (U.S. Navy Hydrographic Office, 1956) and H.O. Publication No. 607 (U.S. Navy Hydrographic Office, 1955a). (See References in Volume I.) Some changes were made in the card format, but these do not affect the arrangement of the data in this report. Abbreviations and column headings are described below and, where necessary, the NODC or Hydrographic Office numerical codes have been reproduced to aid in interpreting the data.

Abbreviations and Headings Used in Data Tables

DATE	For Observed Values the date given is Greenwich day/month/year. For Biological Data the date given is local (ship's time, +8 zone) day/month/year.
HR (Hour)	Greenwich mean time to the nearest tenth of an hour of the messenger drop on the first cast.
LAT (Latitude and LONG (Longitude)	In degrees and minutes; or in degrees, minutes, and tenths of minutes on some stations.

SNDG (Depth of water)	Depth of water in meters at the station as determined by the ship's echo sounder. This depth was generally recorded immediately after the ship arrived on station.
WEA (Weather)	State of the weather. One of two possible codes was used for reporting present weather. A two-digit number in this space indicates use of WMO Code 4677, shown on page 9 ; one number preceded by an X indicates use of WMO Code 4501, shown on page 11. The X has no significance except to indicate which code was used.
WIND VEL <u> </u> DIR <u> </u> (Wind velocity and direction)	Wind velocity in knots. Wind direction, see code, page 8 .
BAROM (Barometric pressure)	To obtain the barometric pressure in millibars, add 900 if this number is above 50; add 1000 if below 50.
TEMP DRY <u> </u> WET <u> </u> (Air temperature, dry, wet bulb)	In degrees Celsius
RELHU (Relative Humidity)	Expressed in per cent.
WTRCLR (Water color)	Expressed according to the Forel-Ule scale. See code, page 10.
SECD1 (Water transparency)	Depth in meters to which a 12-inch (30.5 cm) Secchi disk could be seen on daylight stations.
SEA <u> </u> DIR <u> </u> (Sea state and direction)	State of the sea, see code, page 8 . Direction from which sea was coming, see code, page 8 .
SWELL <u> </u> DIR <u> </u> (Swell amount and direction)	Height and wave length of swell, see code, page 8 . Direction from which swell was coming, see code, page 8 .
DOM WAVE DIR <u> </u> HT <u> </u> PER <u> </u> (Dominant wave direction, height, and period)	Dominant wave characteristics (National Oceanographic Data Center, 1964) were reported on some cruises instead of sea and swell. Direction from which waves were coming, see code, page 8 . Height of waves, see code, page 8 . Period of waves, see code, page 11.

CLOUD TYPE <u> </u> AMT (Cloud type and amount)	Cloud type, see code, page 7 . Amount of cloud cover, see code, page 7 .
VIS (Visibility)	Range of visibility. See code, page 7 .
WIRE ANGLE(S)	In degrees. Wire angles are tabulated only for those casts whose numbers appear in the "Cast" column at the left of the page, i.e., casts from which data were obtained. The first number is the wire angle for Cast 1, or the lowest numbered cast appearing, the second for Cast 2, etc. Dashes (- -) indicate the wire angle was not recorded for that cast.
CST (Cast)	Cast number.
DEPTH	Depth in meters from which sample was obtained.
TEMP (Temperature)	In degrees Celsius.
SAL (Salinity)	In parts per thousand (‰).
SIGMA-T (σ_t)	An expression for the density of sea water at atmospheric pressure, having the indicated temperature and salinity. To convert sigma-t values to density, divide by 1000 and add 1; thus sigma-t 22.42 = density 1.02242.
OXYGEN (Dissolved Oxygen)	
ML/L	In milliliters per liter
MGA/L	In milligram-atoms per liter
AOU (Apparent oxygen utilization)	In milligram-atoms per liter
SATN (Saturation)	Per cent of oxygen saturation
PHOS (Phosphate-phosphorus)	In microgram-atoms per liter ($\mu\text{g-at/l}$)
NITR (Nitrate-nitrogen)	In microgram-atoms per liter ($\mu\text{g-at/l}$)
SIL (Silicate-silicon)	In microgram-atoms per liter ($\mu\text{g-at/l}$)
CHL-A (Chlorophyll <u>a</u>)	In milligrams per cubic meter

PRODUCTIVITY, LAB-I (Incubator productivity)	Expressed as milligrams carbon assimilated per cubic meter per hour.
PRODUCTIVITY, DECK-I (Simulated <u>in situ</u> productivity)	Expressed as milligrams carbon assimilated per cubic meter per day.
LIGHT SAT	Data from light saturation experiments. Refer to text, page 6 of Volume I.
PROD (Productivity)	Productivity of sample receiving the indicated amount of illumination. Expressed as milligrams of carbon assimilated per cubic meter per hour.
FILT (Filter)	Indicates the per cent of total incubator illumination transmitted to the sample through a neutral density filter. The total incubator illumination in units of lux is listed at the bottom of the Biological Data section.
IRRAD (Irradiance)	Per cent of surface solar radiation reaching the indicated depth.
OXY (Dissolved oxygen)	Units are indicated in the column heading. In the Biological Data section oxygen is reported in milligram-atoms per liter. In the Interpolated and Computed Values oxygen is reported in milliliters per liter.
WATER COLUMN VALUES	Integrated values over the water column from the surface to the bottom of the euphotic zone for CPL-A, LAB-I, and DECK-I. The values at 100 meters and below are not included in this integration because they are below the euphotic zone.
MESSENGER TIME	Messenger time (ship's time, +8 zone) of the productivity cast.
INCOMING SOLAR RADIATION - AM ____ PM ____	Expressed in calories per square centimeter. The AM value is the integrated value of incoming radiation from sunrise to ship's noon; PM represents from ship's noon to sunset.
ZOOPLANKTON	Indicates that zooplankton samples were collected at this station. The information following indicates the type of sampler or net used, the type of tow made, the times of the tow, and the depths sampled, as follows:

(CLARKE-BUMPUS)	Clarke-Bumpus sampler
(HALF-METER NET)	Half-meter net
(MIDWATER TRAWL)	Midwater trawl
HORIZ	Horizontal tow
VERT	Vertical tow
OBL	Oblique tow
STEP	Stepped tow
TIME (from - to)	Ship's time (+8 zone) of the tow
DEPTHS	Depths sampled

Example: Station 318-6

ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0154-0204 DEPTHS 100, 70
 0232-0243 30, 0

means that two horizontal tows using Clarke-Bumpus were made. The first tow began at 0154 ship's time, lasted until 0204 and sampled at 70 and 100 meters (two samplers on the wire). The second tow sampled at the surface and 30 meters and lasted from 0232 to 0243 ship's time.

LIGHT SATURATION INCUBATOR ILLU- MINATION	Total incubator illumination for light saturation experiments. Expressed in lux.
SP VOL ANOMALY (Specific volume anomaly, $10^5 \delta$)	The anomaly of specific volume at the indicated temperature, salinity, and pressure compared to a standard water of 0°C temperature and 35 ‰ salinity, at the same pressure. Tabular values multiplied by 10^{-5} will give the anomaly in units of cubic centimeters per gram.
GEOPOT ANOMALY (Geo- potential anomaly, $\Sigma \Delta D$)	Geopotential anomaly in dynamic meters of the layer of water between the surface and the indicated depth.
POT ENERGY (Potential energy anomaly)	Potential energy anomaly in units of 10^8 ergs per square centimeter of the layer of water between the surface and the indicated depth.

VAR RATIO (Variance ratio)

The ratio of the variance of the interpolation polynomial to the variance of the measurement. The value of the variance ratio is an indication of the adequacy of the vertical spacing of the observed values upon which the interpolation is based. See page 7 of Volume I. Values close to 1 indicate optimum spacing. Values greater than 3 indicate that the vertical spacing is inadequate to represent faithfully the distribution of properties in this region of the curve. In the case of missing values, where different combinations of observed values may be used to interpolate at the same depth, the variance ratio which indicates the worst spacing has been printed. Values greater than 100 have been printed as 99.99. If the observed depth corresponds to a desired standard depth, no interpolation is made and the variance ratio is not computed.

E(T) (Temperature interpolation error)

Interpolation error, in degrees Celsius, of the temperature value at this depth. For a discussion of the interpolation error, see page 7 of Volume I. If the observed depth corresponds to a desired standard depth, the interpolation error will be zero.

E(S) (Salinity interpolation error)

Interpolation error, in parts per thousand, of the salinity value at this depth. See comments under E(T) above.

E(O) (Oxygen interpolation error)

Interpolation error, in milliliters per liter, of the oxygen value at this depth. See comments under E(T) above.

*

Indicates a questionable value. See page 8 of Volume I.

†

Indicates a hand-interpolated value. See page 8 of Volume I.

Codes Used for Reporting Observations

Taken from National Oceanographic Data Center Publication M-2, "Processing Physical and Chemical Data from Oceanographic Stations," or U.S. Navy Hydrographic Office Publication No. 606-c, "Hydrographic Office Observers Manual. Bathythermograph Observations," or U.S. Navy Hydrographic Office Publication No. 607, "Instruction Manual for Oceanographic Observations."

Cloud Type (taken from NODC Publication M-2) WMO Code 0500

Code

0	Cirrus	Ci
1	Cirrocumulus	Cc
2	Cirrostratus	Cs
3	Alto cumulus	Ac
4	Altostratus	As
5	Nimbostratus	Ns
6	Stratocumulus	Sc
7	Stratus	St
8	Cumulus	Cu
9	Cumulonimbus	Cb
x	Cloud not visible owing to darkness, fog, duststorm, sandstorm, or other analogous phenomena	

Amount of Cloud Cover (taken from NODC Publication M-2) WMO Code 2700

Code

0	0	0
1	1 okta or less, but not zero	1/10 or less, but not zero
2	2 oktas	2/10 - 3/10
3	3 oktas	4/10
4	4 oktas	5/10
5	5 oktas	6/10
6	6 oktas	7/10 - 8/10
7	7 oktas or more, but not 8 oktas	9/10 or more, but not 10/10
8	8 oktas	10/10
9	Sky obscured, or cloud amount cannot be estimated	

Visibility (taken from NODC Publication M-2) WMO Code 4300

Code

0	Less than 50 metres (less than 55 yards)	
1	50-200 metres	(approx. 55-220 yards)
2	200-500 metres	(approx. 220-550 yards)
3	500-1,000 metres	(approx. 550 yards-5/8 n.m.)
4	1- 2 km	(approx. 5/8-1 n.m.)
5	2- 4 km	(approx. 1- 2 n.m.)
6	4-10 km	(approx. 2- 6 n.m.)
7	10-20 km	(approx. 6-12 n.m.)
8	20-50 km	(approx. 12-30 n.m.)
9	50 km or more	(30 n.m. or more)

Direction (taken from NODC Publication M-2)
Compass Direction from which Wind, Sea, or Swell is coming

Code

00 Calm, or no value
01 to 36 Each value represents 1/10 of the true direction in degrees, measured clockwise from the north, with 36 representing true north.

State of the Sea - Wind Waves (taken from NODC Publication M-2)

WMO Code 3700

Code	Description	Height (Feet)
0	Calm (Glassy)	0
1	Calm (Rippled)	0 - 1/3
2	Smooth (Wavelets)	1/3 - 1 2/3
3	Slight	1 2/3 - 4
4	Moderate	4 - 8
5	Rough	8 - 13
6	Very Rough	13 - 20
7	High	20 - 30
8	Very High	30 - 45
9	Phenomenal	over 45

Swell Conditions (taken from H.O. 606-c or H.O. 607)

Code	Approx. Height in Feet	Description		Approx. Length in Feet
0	0	No swell		0
1 2	1 - 6	Low swell	Short or average Long	0 - 600 Above 600
3 4 5	6 - 12	Moderate	Short Average Long	0 - 300 300 - 600 Above 600
6 7 8	Greater than 12	High	Short Average Long	0 - 300 300 - 600 Above 600
9	---	Confused		

NUMERICAL WEATHER CODES—PRESENT WEATHER

00	Cloud amount (NOT observed) during past hour	01	Clouds generally increasing or decreasing during past hour	02	Mass of sky or layer unchanged during past hour	03	Clouds generally increasing or decreasing during past hour	04	Visibility reduced by fog or mist during past hour	05	Mass increased during past hour	06	Mass increased during past hour	07	Dust or sand raised by wind during past hour	08	Sea surface (NOT observed) during past hour	09	Disturbance or storm during past hour
10	Light fog	11	Fog or mist increasing or decreasing during past hour	12	Mass of sky or layer increasing or decreasing during past hour	13	Lightning or thunder during past hour	14	Visibility reduced by fog or mist during past hour	15	Mass decreasing during past hour	16	Mass decreasing during past hour	17	Thunder heard during past hour	18	Sea surface (NOT observed) during past hour	19	Disturbance or storm during past hour
20	Drizzle (NOT observed) during past hour	21	Drizzle (NOT observed) increasing or decreasing during past hour	22	Drizzle (NOT observed) increasing or decreasing during past hour	23	Thunder or lightning during past hour	24	Visibility reduced by fog or mist during past hour	25	Mass of sky or layer decreasing during past hour	26	Mass of sky or layer decreasing during past hour	27	Thunder heard during past hour	28	Sea surface (NOT observed) during past hour	29	Disturbance or storm during past hour
30	Light rain	31	Light rain increasing or decreasing during past hour	32	Light rain increasing or decreasing during past hour	33	Thunder or lightning during past hour	34	Visibility reduced by fog or mist during past hour	35	Mass of sky or layer decreasing during past hour	36	Mass of sky or layer decreasing during past hour	37	Thunder heard during past hour	38	Sea surface (NOT observed) during past hour	39	Disturbance or storm during past hour
40	Fog or mist during past hour	41	Fog or mist increasing or decreasing during past hour	42	Fog or mist increasing or decreasing during past hour	43	Fog or mist increasing or decreasing during past hour	44	Visibility reduced by fog or mist during past hour	45	Mass of sky or layer decreasing during past hour	46	Mass of sky or layer decreasing during past hour	47	Thunder heard during past hour	48	Sea surface (NOT observed) during past hour	49	Disturbance or storm during past hour
50	Light rain during past hour	51	Light rain increasing or decreasing during past hour	52	Light rain increasing or decreasing during past hour	53	Thunder or lightning during past hour	54	Visibility reduced by fog or mist during past hour	55	Mass of sky or layer decreasing during past hour	56	Mass of sky or layer decreasing during past hour	57	Thunder heard during past hour	58	Sea surface (NOT observed) during past hour	59	Disturbance or storm during past hour
60	Light rain during past hour	61	Light rain increasing or decreasing during past hour	62	Light rain increasing or decreasing during past hour	63	Thunder or lightning during past hour	64	Visibility reduced by fog or mist during past hour	65	Mass of sky or layer decreasing during past hour	66	Mass of sky or layer decreasing during past hour	67	Thunder heard during past hour	68	Sea surface (NOT observed) during past hour	69	Disturbance or storm during past hour
70	Light rain during past hour	71	Light rain increasing or decreasing during past hour	72	Light rain increasing or decreasing during past hour	73	Thunder or lightning during past hour	74	Visibility reduced by fog or mist during past hour	75	Mass of sky or layer decreasing during past hour	76	Mass of sky or layer decreasing during past hour	77	Thunder heard during past hour	78	Sea surface (NOT observed) during past hour	79	Disturbance or storm during past hour
80	Light rain during past hour	81	Light rain increasing or decreasing during past hour	82	Light rain increasing or decreasing during past hour	83	Thunder or lightning during past hour	84	Visibility reduced by fog or mist during past hour	85	Mass of sky or layer decreasing during past hour	86	Mass of sky or layer decreasing during past hour	87	Thunder heard during past hour	88	Sea surface (NOT observed) during past hour	89	Disturbance or storm during past hour
90	Light rain during past hour	91	Light rain increasing or decreasing during past hour	92	Light rain increasing or decreasing during past hour	93	Thunder or lightning during past hour	94	Visibility reduced by fog or mist during past hour	95	Mass of sky or layer decreasing during past hour	96	Mass of sky or layer decreasing during past hour	97	Thunder heard during past hour	98	Sea surface (NOT observed) during past hour	99	Disturbance or storm during past hour

This code will be found in NODC Publ. M-2. WMO Code 4677

Water Color (taken from NODC Publication M-2)

Forel-Ule scale and conversions from per cent yellow and per cent brown scales

Per Cent Yellow	Per Cent Brown	Forel-Ule Scale	Code
0		I	01
2		II	02
5		III	03
9		IV	04
14		V	05
20		VI	06
27		VII	07
35		VIII	08
44		IX	09
54		X	10
65	0	XI	11
	2	XII	12
	5	XIII	13
	9	XIV	14
	14	XV	15
	20	XVI	16
	27	XVII	17
	35	XVIII	18
	44	XIX	19
	54	XX	20
	65	XXI	21

Height of Dominant Waves (taken from NODC Publication M-2) WMO Code 1555

Code

0 Less than 1/4 m (1 ft)
 1 1/2 m (1 1/2 ft)
 2 1 m (3 ft)
 3 1 1/2 m (5 ft)
 4 2 m (6 1/2 ft)
 5 2 1/2 m (8 ft)
 6 3 m (9 1/2 ft)
 7 3 1/2 m (11 ft)
 8 4 m (13 ft)
 9 4 1/2 m (14 ft)
 x Height not determined

Code

If 50 is added to direction

0 5 m (16 ft)
 1 5 1/2 m (17 1/2 ft)
 2 6 m (19 ft)
 3 6 1/2 m (21 ft)
 4 7 m (22 1/2 ft)
 5 7 1/2 m (24 ft)
 6 8 m (25 1/2 ft)
 7 8 1/2 m (27 ft)
 8 9 m (29 ft)
 9 9 1/2 m (30 1/2 ft)

Period of Dominant Waves (taken from NODC Publication M-2) WMO Code 3155

Code		CODE	
2	5 seconds or less	8	16 or 17 seconds
3	6 or 7 seconds	9	18 or 19 seconds
4	8 or 9 seconds	0	20 or 21 seconds
5	10 or 11 seconds	1	Over 21 seconds
6	12 or 13 seconds	x	Calm, or period not determined
7	14 or 15 seconds		

Present Weather (taken from NODC Publication M-2) WMO Code 4501

Code
figure

- 0 Clear (no cloud at any level)
- 1 Partly cloudy (scattered or broken)
- 2 Continuous layer(s) or cloud(s)
- 3 Sandstorm, duststorm, or blowing snow
- 4 Fog, thick dust or haze
- 5 Drizzle
- 6 Rain
- 7 Snow, or rain and snow mixed
- 8 Shower(s)
- 9 Thunderstorm(s)

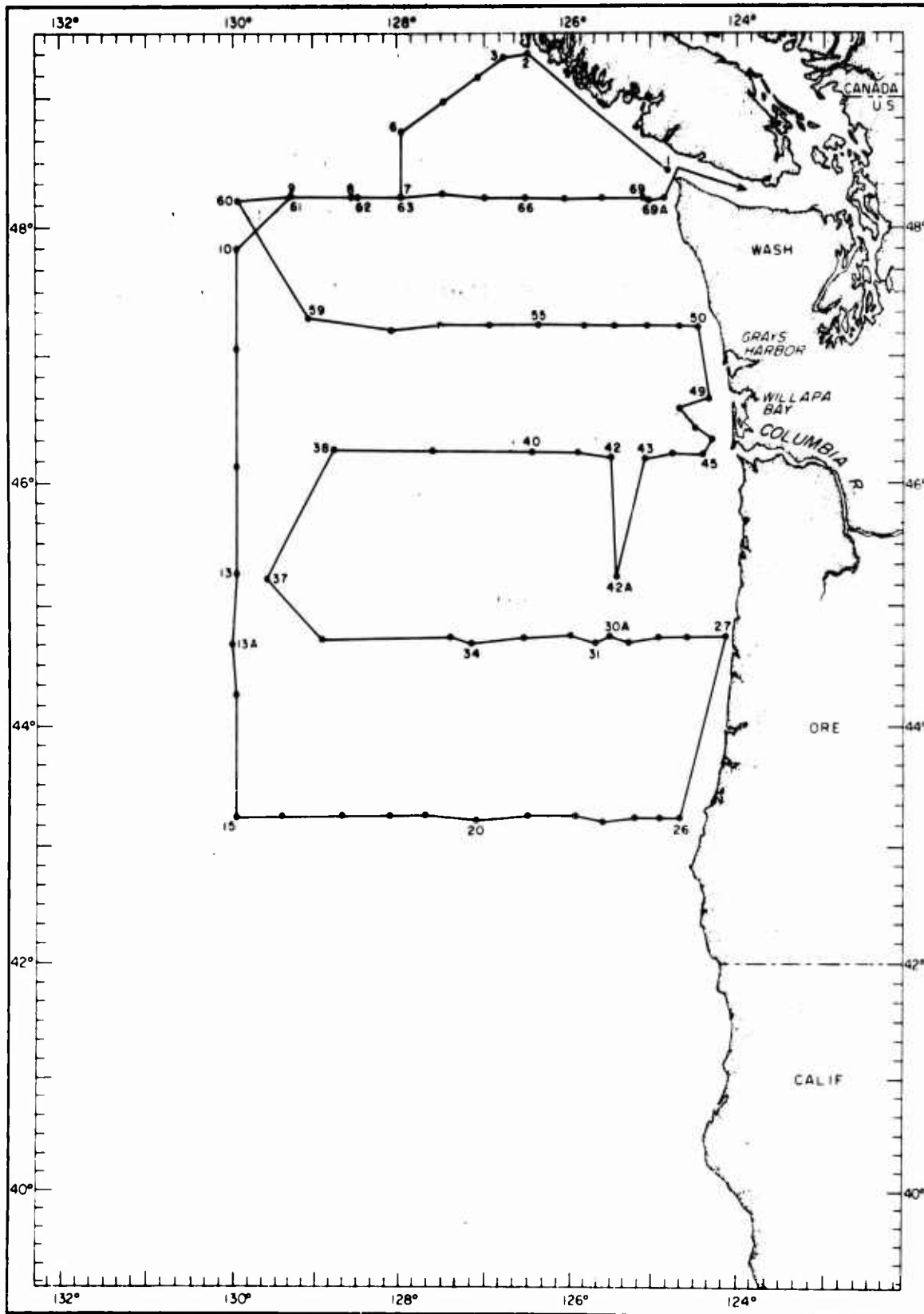


Fig. 1. Station locations Oshawa Cruise 001, 12-26 March 1963.

CNAV OSHAWA CRUISE OS1 STATION 001 OBSERVED VALUES

TATOOSH ISLAND

DATE 13/03/63 HR 03.1 LAT 48-27 N LCNG 124-51 W SNOG 283 WEA 02 WIND VEL 5 DIR 24
 BAROM 25.0 TEMP DRY 7.2 WET 6.1 RELHU 85 WTRCLR SECDI SEA 2 DIR 24 SWELL 4 DIR 27
 CLOUD TYPE AMT 2 VIS 7 WIRE ANGLE(S) 0, 7

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	8.07	31.283	24.37	6.27	0.560	0.027	95	
1	5	7.96	31.293	24.39	6.06	0.541	0.047	92	
1	10	7.99	31.302	24.40	6.15	0.549	0.038	93	
1	25	7.66	31.407	24.53	5.65	0.505	0.087	85	
1	35	7.68	31.511	24.61	5.42	0.484	0.107	82	
1	55	7.82	32.399	25.28	4.35	0.389	0.197	66	
1	80	7.78	33.405	26.08	3.33	0.297	0.285	51	
1	105	7.50	33.580	26.25	3.03	0.271	0.314	46	
1	130	7.48	33.707	26.36	2.70	0.241	0.344	41	
1	155	7.18	33.816	26.48	2.46	0.220	0.369	37	
1	173	7.09	33.856	26.53	2.37	0.212	0.378	36	
1	198	6.88	33.895	26.59	2.25	0.201	0.391	34	
1	277	6.38	33.984	26.72	1.83	0.163	0.436	27	

CNAV OSHAWA CRUISE OS1 STATION 001 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.97		31.286
5	1.00		31.283
17	0.82		31.401
33	0.49		31.580

26.35 - WATER COLUMN VALUES

MESSENGER TIME 1911

CNAV OSHAWA		CRUISE OSI			STATION 001			INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	8.07	0.00	31.283	0.000	24.37	356.4	0.000	0.00	6.27	0.00		
10	7.99	0.00	31.302	0.000	24.40	354.1	0.036	0.02	6.15	0.00		
20	7.78	0.04	31.362	0.002	24.48	346.8	0.072	0.07	5.87	0.05	0.99	
30	7.66	0.01	31.443	0.008	24.56	339.3	0.106	0.16	5.54	0.01	0.56	
50	7.79	0.01	32.138	0.031	25.08	289.6	0.169	0.42	4.65	0.03	0.75	
75	7.81	0.00	33.242	0.019	25.94	208.1	0.232	0.81	3.49	0.01	0.77	
100	7.56	0.01	33.580	0.021	26.25	179.8	0.281	1.24	3.06	0.02	0.77	
150	7.24	0.01	33.797	0.001	26.46	160.2	0.367	2.33	2.50	0.00	0.82	
200	6.86	0.00	33.898	0.000	26.59	148.4	0.444	3.72	2.24	0.00	9.67	
250	6.44	0.03	33.949	0.003	26.69	139.6	0.517	5.39	1.99	0.00	56.20	

CNAV OSHAWA		CRUISE OSI			STATION 002			OBSERVED VALUES				
DATE	HR	LAT	LONG	W	SEA	DIR	VEL	DIR	SEA	DIR	VEL	
13/03/63	12.3	49-20 N	126-33 W	73	03	5	36					
BAROM	22.0	TEMP	DRY	6.7	WET	5.0	RELHU	77	WTRCLR	0		
CLOUD	TYPE	AMT	2	VIS	7	WIRE	ANGLE(S)	0				
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	AOU	SATN				
1	0	8.49	32.105	24.95								
1	5	8.48	32.130	24.97								
1	10	8.59	32.363	25.14								
	20	8.71										
1	30	7.99	33.368	26.02								
1	50	7.96	33.462	26.09								

CNAV OSHAWA CRUISE OSI STATION 002 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.49	0.00	32.105	0.000	24.95	301.1	0.000	0.00			
10	8.59	0.00	32.363	0.000	25.14	283.5	0.030	0.02			
20	8.71	0.00	32.915	0.043	25.55	244.3	0.057	0.06			1.32
30	7.99	0.00	33.368	0.000	26.02	200.5	0.079	0.11			0.56
50	7.96	0.00	33.462	0.000	26.09	193.4	0.119	0.27			0.75

CNAV OSHAWA CRUISE OSI STATION 003 OBSERVED VALUES

DATE	HR	LAT	LONG	WEA	SEA	WIND DIR	WIND VEL	DIR	SMELL
13/03/63	14.2	49-16 N	126-50 W	03	SEA	DIR	VEL	DIR	SMELL
20.0	TEMP DRY	5.6	WET	3.9	RELHU	76	WTRCLR		
CLOUD TYPE	AMT	7	WIRE	ANGLE(S)	0				
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	AOU	SATN	SECDI
1	0	8.49	32.072*	24.93					
1	5	8.47	31.622	24.58					
1	10	8.52	31.637	24.58					
1	20	8.58	31.737	24.65					
1	30	8.20	32.985	25.69					
1	50	7.88	33.493	26.13	3.71	0.331	0.249		57
1	75	7.43	33.817	26.45	2.85	0.255	0.330		44
1	100	6.67	33.938	26.65	2.25	0.201	0.394		34
1	130	6.44	33.958	26.70	2.12	0.189	0.409		32

CNAV OSHAWA CRUISE OS1 STATION 003 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY LAB-1 DECK-1 SAL
 0 0.42 17.80 31.648
 0 16.56

MESSENGER TIME 0620 INCOMING SOLAR RADIATION - AM 77 PM 64
 THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
 INTENSITY INSTEAD OF 100 PERCENT

DEPTH	CNAV OSHAWA CRUISE OS1 STATION 003				INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.49	0.00									
10	8.52	0.00	31.637	0.000	24.58	336.5					
20	8.58	0.00	31.737	0.000	24.65	330.0					
30	8.20	0.00	32.985	0.000	25.69	232.0					
50	7.88	0.00	33.493	0.000	26.13	190.0			3.71	0.00	
75	7.43	0.00	33.817	0.000	26.45	160.1			2.85	0.00	
100	6.67	0.00	33.938	0.000	26.65	141.4			2.25	0.00	

CNAV OSHAWA CRUISE 051 STATION 004 OBSERVED VALUES

DATE 13/03/63 MR 16.5 LAT 49-08 N LONG 127-09 W SNDG 1298 MEA 60 WIND VEL 10 DIR 15
 BAROM 18. TEMP DRY 5.6 WET 4.4 RELHU 83 WTRCLR SECDI 15 SWELL 2 DIR 27
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 10, 6, 5 SEA 1 DIR 15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	8.43	31.724	24.67	6.66	0.595	-0.015	103	
1	5	8.42	31.756	24.69	6.67	0.596	-0.016	103	
1	10	8.44	31.736	24.67	6.72	0.600	-0.020	104	
1	20	8.44	31.762	24.69	6.77	0.605	-0.025	104	
1	29	8.46	31.766	24.69	6.68	0.597	-0.017	103	
1	49	8.52	32.655	25.38	5.59	0.499	0.076	87	
1	74	7.82	33.242	25.94	4.65	0.415	0.167	71	
1	98	7.52	33.609	26.27	3.91	0.349	0.235	60	
1	123	7.59	33.797	26.41	2.96	0.264	0.319	45	
1	147	7.22	33.886	26.53	3.08	0.275	0.313	47	
2	174	6.88	33.868*	26.57	2.91	0.260	0.333	44	
2	199	6.68	33.958	26.66	2.51	0.224	0.371	38	
2	298	5.72	34.018	26.83	1.74	0.155	0.433	27	
2	497	4.63	34.185	27.09	0.62	0.055	0.569	9	
3	745	4.02	34.294	27.24	0.28	0.025	0.609	4	
3	995	3.38	34.422	27.41	0.31	0.028	0.616	4	

CNAV OSHAWA CRUISE 051 STATION 004 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.65		31.731
6	0.75		31.733
19	0.66		31.752
38	0.37		32.091

23.14 - WATER COLUMN VALUES

MESSENGER TIME 0830 INCOMING SOLAR RADIATION - AM 77 PM 64

DEPTH	CNAV OSHAWA	CRUISE OSI	STATION 004	INTERPOLATED AND COMPUTED VALUES										VAR RATIO	
	TEMP E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)						
0	8.43	31.724	0.000	24.67	328.6	0.000	0.00	6.66	0.00						
10	8.44	31.736	0.000	24.67	328.0	0.034	0.02	6.72	0.00						
20	8.44	31.762	0.000	24.69	326.2	0.067	0.07	6.77	0.00						
30	8.47	31.800	0.013	24.72	323.9	0.099	0.15	6.64	0.01					0.99	
50	8.50	32.686	0.002	25.41	258.8	0.158	0.39	5.55	0.00					0.95	
75	7.80	33.261	0.000	25.96	206.6	0.217	0.75	4.62	0.00					0.94	
100	7.53	33.629	0.001	26.29	175.8	0.265	1.18	3.82	0.02					0.89	
150	7.18	33.893	0.001	26.54	152.2	0.347	2.23	3.08	0.00					0.99	
200	6.67	33.959	0.000	26.67	141.3	0.421	3.55	2.50	0.00					1.02	
250	6.18	33.994	0.005	26.76	133.1	0.491	5.14	2.02	0.05					1.26	
300	5.70	34.020	0.000	26.84	125.9	0.556	6.99	1.73	0.00					1.00	
400	5.06	34.104	0.006	26.98	112.9	0.676	11.29	1.08	0.01					0.78	
500	4.62	34.187	0.000	27.10	102.7	0.785	16.30	0.61	0.00					0.99	
600	4.33	34.236	0.005	27.17	96.7	0.886	21.98	0.39	0.03					0.69	
700	4.10	34.278	0.003	27.22	91.9	0.981	28.33	0.28	0.02					0.78	
800	3.91	34.316	0.003	27.27	87.8	1.072	35.33	0.28	0.02					1.21	

CNAV OSHAWA CRUISE 051 STATION 005 OBSERVED VALUES

DATE 13/03/63 HR 20.4 LAT 48-57 N LONG 127-31 W SNRG 2103 WEA 18 WIND VEL 20 DIR 19
 BAROM 14.0 TEMP DRY 6.7 WET 6.7 RELHU 99 WTRCLR SEA 3 DIR 19 SWELL 2 DIR 27
 CLOUD TYPE VIS 6 WIRE ANGLE(S) 23,15,---

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	8.53	32.105	24.95	6.66	0.595	-0.018	103	
1	5	8.53	32.098	24.94	6.70	0.598	-0.021	104	
1	9	8.54	32.134	24.97	6.74	0.602	-0.025	104	
1	18	8.50	32.095	24.94	6.72	0.600	-0.023	104	
1	28	8.52	32.107	24.95	6.75	0.603	-0.026	104	
1	46	8.63	32.153	24.97	6.68	0.597	-0.021	104	
1	69	8.60	32.489	25.24	6.24	0.557	0.017	97	
1	92	7.72	33.218	25.94	4.72	0.422	0.162	72	
1	116	7.86	33.737	26.32	3.09	0.276	0.303	48	
1	139	7.62	33.774	26.39	2.77	0.247	0.335	42	
2	147	7.60	33.774	26.39	2.77	0.247	0.335	42	
2	171	7.54	33.840	26.45	2.65	0.237	0.347	41	
2	195	7.38	33.799*	26.44	2.60	0.232	0.354	40	
2	239	6.38	33.982	26.72	2.12	0.189	0.410	32	
2	492	4.96	34.083	26.98	0.88	0.079	0.542	13	
2	739	4.12	34.266	27.21	0.30	0.027	0.606	4	
3	968	3.72	34.358	27.33	0.26	0.023	0.615	4	
3	1452	2.72	34.502	27.53	0.68	0.061	0.594	9	
3	1743	2.32	34.540	28.43	0.85	0.076	0.585	11	

CNAV OSHAWA CRUISE OS1 STATION 005 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-1	SAL DECK-1
0	0.68	12.62	32.178
7	0.69	11.58	32.162
23	0.68	1.88	32.171
46	0.55	0.00	32.283

29.86 214.00 - WATER COLUMN VALUES

MESSANGER TIME 1224 INCOMING SOLAR RADIATION - AM 77 PM 64

CNAV OSHAWA CRUISE OS1 STATION 005				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.53	0.00	32.105	0.000	24.95	301.6	0.000	0.00	6.66	0.00	0.97
10	8.54	0.00	32.133	0.004	24.97	299.8	0.031	0.02	6.74	0.00	0.78
20	8.50	0.00	32.095	0.001	24.94	302.3	0.061	0.06	6.73	0.00	0.93
30	8.53	0.00	32.107	0.003	24.95	302.0	0.092	0.14	6.75	0.00	
50	8.66	0.02	32.186	0.002	24.99	298.3	0.152	0.39	6.66	0.02	0.82
75	8.36	0.06	32.670	0.020	25.41	258.4	0.222	0.83	5.90	0.03	0.72
100	7.73	0.05	33.432	0.009	26.10	193.3	0.279	1.33	4.11	0.05	0.69
150	7.58	0.01	33.789	0.004	26.41	165.5	0.369	2.48	2.72	0.02	0.87
200	7.28	0.02	33.908	0.001	26.54	153.3	0.450	3.91	2.56	0.01	1.00
250	6.24	0.05	33.992	0.005	26.75	133.9	0.522	5.57	2.03	0.01	1.15
300	5.67	0.21	34.033	0.023	26.85	124.5	0.587	7.41	1.67	0.06	1.80
400	5.02	0.26	34.080	0.029	26.97	114.2	0.708	11.71	1.14	0.07	1.70
500	4.93	0.00	34.089	0.001	26.98	113.6	0.823	17.03	0.85	0.00	0.95
600	4.53	0.00	34.163	0.007	27.09	104.5	0.933	23.24	0.55	0.00	0.65
700	4.22	0.00	34.237	0.004	27.18	96.3	1.034	30.00	0.35	0.00	0.81
800	4.00	0.01	34.295	0.002	27.25	90.3	1.129	37.26	0.26	0.01	0.70
1000	3.65	0.01	34.370	0.000	27.34	82.3	1.303	53.15	0.28	0.01	0.97
1200	3.23	0.03	34.438	0.001	27.44	73.9	1.461	71.18	0.43	0.04	0.91
1500	2.64	0.01	34.511	0.000	27.55	63.4	1.670	99.98	0.72	0.01	0.98

CNAV OSHAMA CRUISE OS1 STATION 006 OBSERVED VALUES

DATE 14/03/63 HR 01.3 LAT 48-44 N LONG 128-00 W MEA 01 WIND VEL 6 DIR 27
 BAROM 09. TEMP DRY 5.6 WET 4.4 RELHU 83 WTRCLR SNDCG 274 SEA 2 DIR 27 SWELL 2 DIR 25
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 5.15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	8.67	32.162	24.97	6.70	0.598	-0.023	104	
1	5	8.66	32.164	24.97	6.70	0.598	-0.023	104	
1	10	8.69	32.232	25.02	6.72	0.600	-0.026	104	
1	20	8.70	32.200	25.00	6.65	0.594	-0.020	103	
1	30	8.72	32.212	25.00	6.64	0.593	-0.019	103	
1	50	8.74	32.272	25.05	6.61	0.590	-0.017	103	
1	75	8.50	32.601	25.34	6.04	0.539	0.036	94	
1	100	7.67	33.175	25.91	4.86	0.434	0.150	74	
1	125	7.37	33.588	26.28	4.05	0.362	0.225	62	
2	145	7.52	33.806	26.43	3.13	0.280	0.304	48	
1	150	7.47	33.782	26.42	3.20	0.286	0.299	49	
2	169	7.24	33.872	26.52	3.24	0.289	0.298	49	
2	194	6.92	33.899	26.58	3.48	0.311	0.281	53	
2	291	5.98	33.992	26.78	1.78	0.159	0.446	26	
2	488	4.79	34.101	27.01	0.77	0.069	0.554	11	
2	735	4.06	34.262	27.22	0.33	0.029	0.604	5	
2	983	3.46	34.384	27.37	0.31	0.028	0.615	4	
2	1481	2.52	34.516	27.56	1.00	0.069	0.569	14	

CNAV OSHAWA CRUISE OS1 STATION 006 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.66		32.122
7	0.73		32.120
23	0.74		32.158
46	1.03		32.301

36.95 -- WATER COLUMN VALUES

MESSANGER TIME 1800 INCOMING SOLAR RADIATION - AM 77 PM 64

CNAV OSHAWA CRUISE OS1 STATION 006 INTERPOLATED AND COMPUTED VALUES											
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.67	0.00	32.162	0.000	24.97	299.4	0.000	0.00	6.70	0.00	
10	8.69	0.00	32.232	0.000	25.02	294.6	0.030	0.02	6.72	0.00	
20	8.70	0.00	32.200	0.000	25.00	297.3	0.060	0.06	6.65	0.00	
30	8.72	0.00	32.212	0.000	25.00	296.9	0.090	0.14	6.64	0.00	
50	8.74	0.00	32.272	0.000	25.05	293.0	0.150	0.38	6.61	0.00	
75	8.50	0.00	32.601	0.000	25.34	265.5	0.220	0.83	6.04	0.00	
100	7.67	0.00	33.175	0.000	25.91	211.6	0.280	1.36	4.86	0.00	
150	7.47	0.00	33.782	0.000	26.42	164.5	0.375	2.55	3.20	0.00	
200	6.85	0.00	33.905	0.000	26.60	147.7	0.453	3.95	3.42	0.05	1.09
250	6.33	0.01	33.955	0.000	26.71	137.9	0.525	5.61	2.71	0.20	1.17
300	5.91	0.00	33.998	0.001	26.79	130.0	0.593	7.51	1.69	0.02	0.98
400	5.23	0.02	34.058	0.005	26.92	118.4	0.718	11.99	0.98	0.11	0.77
500	4.74	0.01	34.109	0.001	27.02	109.9	0.834	17.30	0.73	0.00	0.94
600	4.40	0.03	34.175	0.003	27.11	102.0	0.941	23.33	0.49	0.02	0.68
700	4.13	0.01	34.240	0.001	27.19	95.1	1.040	29.98	0.35	0.01	0.82
800	3.89	0.00	34.298	0.000	27.26	88.9	1.133	37.13	0.29	0.01	0.72
1000	3.42	0.00	34.391	0.000	27.38	78.1	1.302	52.67	0.32	0.00	1.15
1200	3.02	0.01	34.460	0.000	27.47	69.8	1.452	69.56	0.53	0.03	3.31

CNAV OSHAWA CRUISE 051 STATION 007 OBSERVED VALUES

DATE 14/03/63 HR 06.8 LAT 48-14 N LONG 128-00 W WEA 02 WIND VEL 20 DIR 30
 BAROM 07.5 TEMP DRY 5.6 WET 4.4 RELHU 83 WTRCLR SEA 3 DIR 28 SWELL 1 DIR 25
 CLOUD TYPE VIS 4 VIS 7 WIRE ANGLE(S) 20.24

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
1	0	8.15*	32.387	25.22				
1	5	8.64	32.391	25.15				
1	9	8.64	32.402	25.16	6.80	0.607	-0.033	106
1	19	8.68	32.396	25.15				
1	28	8.19*	32.399	25.23	6.79	0.606	-0.026	104
1	47	8.64	32.406	25.17	6.75	0.603	-0.029	105
1	71	8.68	32.406	25.16	6.74	0.602	-0.028	105
1	94	8.08	33.374	26.01	4.01	0.358	0.220	62
1	118	7.76	33.711	26.32	2.96	0.264	0.317	46
1	142	7.60	33.800	26.41	2.52	0.225	0.358	39
2	163	7.53	33.858	26.47	2.27	0.203	0.381	35
2	185	7.42	33.880	26.50	2.13	0.190	0.395	33
2	279	6.91	33.974	26.64	2.16	0.188	0.404	32
2	468	5.66	34.096	26.90	1.41	0.126	0.483	21
2	705	4.25	34.235	27.17	0.36	0.032	0.598	5
2	943*		34.438		0.31	0.028		
2	1420*	2.74	34.548	27.57	0.58	0.052	0.602	8
2	1707	2.32	34.545	27.60	0.90	0.080	0.581	12

CNAV OSHAWA		CRUISE OSI		STATION 007		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.64*	0.00	32.387	0.000	25.15	282.2	0.000	0.00	6.80	0.00	1.06
10	8.64	0.00	32.402	0.001	25.16	281.3	0.029	0.02	6.79	0.02	1.38
20	8.68	0.00	32.396	0.000	25.15	282.5	0.057	0.06	6.79	0.02	1.03
30	8.67	0.01	32.400	0.000	25.16	282.2	0.086	0.13		0.00	
50	8.66	0.01	32.378	0.019	25.14	284.0	0.143	0.37	6.83	0.05	0.86
75	8.59	0.02	32.563	0.038	25.30	269.6	0.212	0.81	6.30	0.10	0.78
100	7.98	0.00	33.502	0.014	26.12	191.5	0.271	1.32	3.63	0.04	0.73
150	7.57	0.00	33.825	0.001	26.44	162.6	0.360	2.45	2.41	0.00	0.64
200	7.34	0.00	33.896	0.000	26.52	155.0	0.440	3.88	2.11	0.03	1.29
250	7.07	0.00	33.946	0.001	26.60	148.4	0.516	5.65	2.11	0.05	1.10
300	6.78	0.01	33.990	0.001	26.68	141.8	0.590	7.71	2.11	0.02	0.95
400	6.12	0.02	34.058	0.003	26.81	129.6	0.726	12.60	1.75	0.04	0.75
500	5.45	0.00	34.116	0.000	26.94	118.0	0.851	18.35	1.26	0.01	0.87
600	4.84	0.01	34.176	0.000	27.06	107.2	0.965	24.76	0.80	0.02	0.60
700	4.28	0.00	34.232	0.000	27.17	97.3	1.068	31.64	0.38	0.00	0.95
800	3.75	0.02	34.285	0.001	27.27	88.2	1.162	38.85	0.35*		3.12
1000	2.87	0.09	34.380	0.004	27.42	72.9	1.325	53.78	0.35*		15.46
1200	2.26	0.14	34.455	0.007	27.54	61.8	1.462	69.12	0.45*		31.35
1500	1.98	0.13	34.528	0.007	27.62	54.7	1.639	93.61	0.70*		22.26

SURFACE TEMPERATURE ASSUMED FOR PURPOSES OF INTERPOLATION.

CNAV OSHAWA CRUISE 051 STATION 008 OBSERVED VALUES

DATE 14/03/63 HR 11.2 LAT 48-14 N LONG 128-32 W WIND VEL 30 DIR 27
 BAROM 07.5 TEMP DRY 5.6 WET 4.4 RELHU 83 WTRCLR SEA 3 DIR 28 SWELL 3 DIR 25
 CLOUD TYPE 8 AMT 3 VIS 7 WIRE ANGLE(S) 26,30,43

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
1	0		32.390		6.71	0.599		
1	4	8.78	32.451	25.18	6.67	0.596	-0.023	104
1	9	8.79	32.385	25.13	6.67	0.596	-0.023	104
1	18	8.76	32.388	25.13	6.69	0.598	-0.025	104
1	27	8.78	32.448	25.18	6.58	0.588	-0.015	103
1	45	8.84	32.381	25.12	6.62	0.591	-0.019	103
1	67	8.80	32.388	25.13	6.72	0.600	-0.028	105
1	90	8.18	32.828	25.57	5.54	0.495	0.084	85
1	112	8.12	33.406	26.03	4.05	0.362	0.216	63
1	134	7.75	33.705	26.32	3.18	0.284	0.297	49
2	154*	7.80	33.653	26.27	3.39	0.303	0.278	52
2	176	7.58	33.858	26.46	3.18	0.284	0.299	49
2	265	6.50	33.972	26.70	2.16	0.193	0.405	32
2	442	5.16	34.071	26.94	0.99	0.088	0.529	14
2	667	4.19	34.215	27.16	0.40	0.036	0.596	6
2	891	3.69	34.356	27.33	0.32	0.029	0.611	4
2	1345	2.75	34.494	27.53	0.52	0.046	0.608	7
3	1613	2.34	34.539	27.60	0.78	0.070	0.591	11

CNAV OSHAWA CRUISE 051 STATION 008 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY LAB-I DECK-I SAL
 0 0.42 4.76 32.506
 0 6.94

MESSENGER TIME 0615 INCOMING SOLAR RADIATION - AM 152 PM 214
 THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
 INTENSITY INSTEAD OF 100 PERCENT

CNAV OSHAWA				INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	CRUISE 051	STATION 008	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OX% ML/L	E(0)	VAR RATIO
0	8.78*	0.00	32.390	25.73	284.0	0.000	0.00	6.71	0.00	0.93
10	8.79	0.00	32.380	25.12	285.0	0.023	0.02	5.57	0.00	0.75
20	8.76	0.00	32.402	25.14	282.2	0.058	0.06	6.57	0.01	0.93
30	8.79	0.00	32.443	25.17	280.8	0.083	0.13	6.57	0.01	0.93
50	8.86	0.01	32.361	25.10	288.2	0.144	0.37	6.09	0.04	0.78
75	8.59	0.04	32.506	25.25	279.8	0.277	0.62	5.41	0.04	0.48
100	8.14	0.03	33.098	25.38	229.8	0.375	1.38	4.87	0.04	0.64
150	7.66	0.04	33.799	26.40	165.8	0.575	2.60	3.07	0.10	0.80
200	7.32	0.04	33.905	26.53	150.1	0.566	4.04	2.95	0.05	0.90
250	6.71	0.03	33.964	26.66	142.1	0.530	5.76	2.37	0.04	0.77
300	6.17	0.01	33.998	26.76	133.4	0.600	7.32	1.86	0.01	0.91
400	5.41	0.02	34.055	26.90	120.8	0.728	12.30	1.19	0.02	0.76
500	4.85	0.01	34.107	27.01	111.3	0.845	17.69	0.77	0.02	0.76
600	4.41	0.01	34.171	27.11	102.6	0.953	23.77	0.50	0.02	0.71
700	4.10	0.01	34.237	27.19	94.9	1.053	30.42	0.37	0.01	0.82
800	3.86	0.02	34.302	27.27	68.2	1.145	37.54	0.31	0.02	0.59
1000	3.45	0.01	34.402	27.39	77.6	1.313	52.98	0.33	0.01	0.92
1200	3.03	0.01	34.465	27.48	69.5	1.462	69.77	0.41	0.01	0.88
1500	2.49	0.00	34.520	27.57	61.1	1.661	97.22	0.66	0.00	0.71

SURFACE TEMPERATURE ASSUMED FOR PURPOSES OF INTERPOLATION.

CNAV OSHAWA CRUISE 051 STATION 009 OBSERVED VALUES

DATE 14/03/63 HR 18.8 LAT 48-14 N LONG 129-18 W WEA 02 WIND VEL 30 DIR 32
 BAROM 08.0 TEMP DRY 7.8 WET 5.6 RELHU 72 WTRCLR SEA 4 DIR 32 SWELL 4 DIR 29
 CLOUD TYPE AMT 4 VIS 7 WIRE ANGLE(S) 10.25, 43 SECDI SNDCI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0		32.435		6.76	0.604			
1	5	8.44	32.434	25.22	6.84	0.611	-0.034		106
1	10	8.44	32.436	25.22	6.70	0.598	-0.021		104
1	20	8.42	32.496	25.27	6.72	0.600	-0.023		104
1	29	8.43	32.427	25.21	6.76	0.604	-0.027		105
1	49	8.47	32.435	25.21	6.72	0.600	-0.024		104
1	74	8.46	32.429	25.21	6.72	0.600	-0.023		104
1	98	7.88	32.722	25.53	6.10	0.545	0.039		193
1	123	7.06	33.312	26.10	4.82	0.430	0.162		73
1	148	7.08	33.644	26.36	4.12	0.368	0.223		62
2	154	7.07	33.702	26.41	4.33	0.387	0.204		65
2	177	6.88	33.829	26.53	4.12	0.368	0.225		62
2	267	5.62	33.912	26.76	3.02	0.270	0.341		44
2	454	4.43	34.004	26.97	1.47	0.131	0.498		21
2	690	4.00	34.244	27.21	0.37	0.033	0.602		5
2	930	3.50	34.362	27.35	0.31	0.028	0.615		4
3	1416	2.58	34.505	27.55	0.63	0.056	0.601		9
3	1662	2.22	34.552	27.62	0.97	0.087	0.576		13

CNAV OSHAWA CRUISE 051 STATION 009 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.39		2.70	32.427
8	0.36		4.64	32.469
27	0.37		0.70	32.427
54	0.38		0.10	32.436

19.98 90.84 - WATER COLUMN VALUES

MESSANGER TIME 1049 INCOMING SOLAR RADIATION - AM 152 PM 214

CNAV OSHAWA				CRUISE OSI				STATION 009				INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO						
0	8.44*	0.00	32.435	0.000	25.22	275.8	0.000	0.00	6.76	0.00	0.99						
10	8.44	0.00	32.436	0.000	25.22	275.9	0.028	0.01	6.70	0.00	0.95						
20	8.42	0.00	32.496	0.000	25.27	271.3	0.056	0.06	6.72	0.00	0.89						
30	8.43	0.00	32.425	0.002	25.21	276.9	0.083	0.13	6.76	0.00	0.57						
50	8.48	0.00	32.432	0.002	25.21	277.3	0.139	0.36	6.73	0.00	0.95						
75	8.44	0.00	32.436	0.000	25.22	277.0	0.209	0.81	6.71	0.00	0.94						
100	7.80	0.01	32.769	0.007	25.57	243.6	0.275	1.39	6.00	0.02	0.89						
150	7.08	0.00	33.665	0.001	26.38	167.9	0.378	2.67	4.24	0.10	0.57						
200	6.58	0.04	33.883	0.020	26.62	145.7	0.457	4.08	3.85	0.02	1.32						
250	5.87	0.03	33.923	0.016	26.74	134.5	0.528	5.70	3.24	0.02	0.89						
300	5.31	0.03	33.929	0.005	26.81	127.9	0.594	7.57	2.69	0.01	0.93						
400	4.64	0.04	33.979	0.007	26.93	117.4	0.718	12.00	1.84	0.01	0.75						
500	4.30	0.03	34.050	0.007	27.02	109.3	0.832	17.27	1.18	0.00	0.81						
600	4.10	0.05	34.152	0.010	27.12	100.3	0.938	23.23	0.67	0.00	0.68						
700	3.98	0.00	34.250	0.001	27.21	92.5	1.036	29.72	0.36	0.01	0.95						
800	3.77	0.00	34.308	0.004	27.28	86.7	1.126	36.70	0.27	0.04	0.61						
1000	3.36	0.00	34.389	0.001	27.39	77.5	1.293	52.00	0.32	0.00	0.95						
1200	2.96	0.01	34.453	0.003	27.47	69.7	1.442	68.81	0.42	0.01	0.94						
1500	2.45	0.00	34.522	0.001	27.57	60.4	1.639	96.11	0.73	0.00	0.81						

SURFACE TEMPERATURE ASSUMED FOR PURPOSES OF INTERPOLATION.

CNAV OSHAWA CRUISE 051 STATION 010 OBSERVED VALUES

DATE 15/03/63 HR 12.0 LAT 47-49 N LONG 130-00 W WEA 62 WIND VEL 22 DIR 28
 BAROM 08. TEMP DRY 5.6 WET 5.6 RELHU 99 WTRCLR SECDI SEA 4 DIR 28 SWELL 4 DIR 27
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 0, 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0		32.469		6.66	0.595			
1	5	8.79	32.466	25.19	6.64	0.593	-0.021		104
1	10	8.82	32.466	25.19	6.64	0.593	-0.021		104
1	20	8.81							
1	30	8.82	32.543	25.25	6.63	0.592	-0.021		104
1	50	8.84	32.473	25.19	6.68	0.597	-0.025		104
1	75	8.84	32.469	25.19	6.68	0.597	-0.025		104
1	100	8.83	32.469	25.19	6.70	0.598	-0.027		105
1	125	8.81	32.465	25.19	6.67	0.596	-0.024		104
1	150	7.16	32.757	25.65	6.07	0.542	0.051		91
2	171	6.80	33.702	26.45	4.64	0.414	0.180		70
2	194	6.92	33.861	26.55	4.10	0.366	0.226		62
2	291	5.54	33.910	26.77	3.25	0.290	0.322		47
2	489	4.19	34.021	27.01	1.34	0.120	0.513		19
2	737	3.77	34.257	27.24	0.43	0.038	0.600		6
2	984	3.37	34.399	27.39	0.32	0.029	0.616		4
2	1482	2.53	34.496	27.55	0.59	0.053	0.605		8
2	1698	2.18	34.546	27.62	1.01	0.090	0.573		14

CNAV OSHAWA CRUISE OSI STATION O10 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY SAL
LAB-I DECK-I

0 0.17 2.44 32.464

0 0.17 3.52

MESSENGER TIME 0635 INCOMING SOLAR RADIATION - AM 149 PM 150

THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
INTENSITY INSTEAD OF 100 PERCENT

DEPTH	TEMP	E(T)	SAL	E(S)	STATION O10	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.79*	0.00	32.469	0.000	25.19	278.3	0.000	0.000	0.00	6.66	0.00	
10	8.82	0.00	32.466	0.000	25.19	279.1	0.029	0.01	0.01	6.64	0.00	1.32
20	8.81	0.00	32.506	0.011	25.22	276.2	0.057	0.06	0.06	6.63	0.00	
30	8.82	0.00	32.543	0.000	25.25	273.8	0.084	0.13	0.13	6.63	0.00	
50	8.84	0.00	32.473	0.000	25.19	279.6	0.140	0.36	0.36	6.68	0.00	
75	8.84	0.00	32.469	0.000	25.19	280.3	0.210	0.81	0.81	6.68	0.00	
100	8.83	0.00	32.469	0.000	25.19	280.6	0.281	1.45	1.45	6.70	0.00	
150	7.16	0.00	32.757	0.000	25.65	236.5	0.411	3.09	3.09	6.07	0.00	
200	6.87	0.03	33.879	0.010	26.57	149.9	0.509	4.79	4.79	4.01	0.02	1.12
250	6.28	0.14	33.950	0.041	26.71	137.6	0.581	6.45	6.45	3.47	0.10	1.27
300	5.45	0.01	33.914	0.000	26.78	130.6	0.649	8.36	8.36	3.15	0.01	0.98
400	4.62	0.04	33.966	0.002	26.92	118.2	0.774	12.84	12.84	2.15	0.05	0.77
500	4.16	0.01	34.031	0.001	27.02	109.1	0.889	18.12	18.12	1.27	0.01	0.95
600	3.91	0.06	34.126	0.008	27.12	100.2	0.995	24.08	24.08	0.78	0.03	0.68
700	3.79	0.03	34.221	0.004	27.21	92.5	1.092	30.57	30.57	0.49	0.02	0.81
800	3.67	0.00	34.301	0.001	27.29	86.1	1.182	37.52	37.52	0.36	0.02	0.72
1000	3.34	0.00	34.404	0.001	27.40	76.3	1.347	52.63	52.63	0.32	0.00	0.98
1200	3.01	0.00	34.455	0.011	27.47	70.0	1.495	69.35	69.35	0.34	0.01	1.00
1500	2.50	0.00	34.499	0.001	27.55	62.7	1.697	97.26	97.26	0.62	0.00	0.95

SURFACE TEMPERATURE ASSUMED FOR PURPOSES OF INTERPOLATION.

CNAV OSHAWA CRUISE 051 STATION 011 OBSERVED VALUES

DATE 15/03/63 HR 20.2 LAT 47-02 N LONG 130-00 W WEA 01 WIND VEL 28 DIR 30
 BAROM 97.0 TEMP DRY 7.8 WET 7.8 RELHU 99 WTRCLR SECDG SEA 4 DIR 30 SWELL 4 DIR 28
 CLOUD TYPE 6 AMT 4 VIS 7 WIRE ANGLE(S) 27.45

CST	DEPTH	TEMP	SAL	SIGMA-T	OXYGEN		ADU	SATN
					ML/L	MGA/L		
1	0		32.506			0.589		
1	4	9.17	32.547	25.19	6.59	0.590	-0.024	104
1	9	9.28	32.540	25.17	6.61	0.591	-0.026	105
1	18	9.22	32.588	25.22	6.59	0.589	-0.023	104
1	27	9.24	32.577	25.21	6.59	0.589	-0.023	104
1	45	9.23	32.555	25.19	6.57	0.587	-0.020	104
1	67	9.25	32.602	25.23	6.60	0.589	-0.024	104
1	89	9.24	32.516	25.16	6.59	0.589	-0.023	104
1	111	8.58	32.613	25.34	6.30	0.563	0.012	98
1	133	6.32	33.112	26.04	5.74	0.513	0.091	85
2	139	6.22	33.342	26.24	5.43	0.485	0.119	80
2	159	6.42	33.669	26.47	4.75	0.424	0.176	71
2	245	6.02	33.900	26.70	3.47	0.310	0.295	51
2	418	4.58	34.029	26.98	1.30	0.116	0.510	19
2	639	3.94	34.172	27.15	0.54	0.048	0.589	8
2	862	3.37	34.290	27.31	0.43	0.038	0.606	6
2	1312	2.66	34.544	27.57	0.47	0.042	0.613	6
2	1582	2.33	34.587	27.64	0.84	0.075	0.586	11

CNAV OSHAWA CRUISE OSI STATION G11 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-1	DECK-1	SAL
0	0.22	2.68		32.501
8	0.23	2.80		32.503
27	0.22	0.84		32.499
54	0.20	0.08		32.502

11.68 69.12 - WATER COLUMN VALUES

MESSENGER TIME 1216 INCOMING SOLAR RADIATION - AM 149 PM 150
 SURFACE TEMPERATURE ASSUMED FOR PURPOSES OF INTERPOLATION.

DEPTH	CNAV OSHAWA			CRUISE OSI			STATION OII			INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)		SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOI ANOMALY	POT ENERGY	OXY ML/L	E(10)	VAR RATIO				
0	9.20*	0.01		32.506	0.000	25.16	281.6	0.000	0.00	6.59	0.00	0.93				
10	9.28	0.00		32.545	0.002	25.18	280.1	0.029	0.01	6.62	0.00	0.75				
20	9.22	0.00		32.588	0.002	25.22	276.2	0.057	0.06	6.59	0.00	0.93				
30	9.24	0.00		32.571	0.001	25.20	277.9	0.085	0.13	6.59	0.00	0.93				
50	9.23	0.00		32.568	0.006	25.20	278.4	0.141	0.36	6.58	0.00	0.78				
75	9.29	0.02		32.568	0.012	25.19	279.6	0.211	0.81	6.61	0.01	0.67				
100	9.05	0.04		32.528	0.009	25.20	279.4	0.281	1.44	6.48	0.00	0.64				
150	6.19	0.10		33.507	0.018	26.37	168.2	0.394	2.82	5.09	0.03	0.59				
200	6.37	0.08		33.905	0.075	26.66	141.4	0.472	4.21	3.97	0.11	1.42				
250	5.98	0.01		33.907	0.002	26.71	137.0	0.542	5.83	3.39	0.00	0.99				
300	5.56	0.06		33.966	0.016	26.81	128.1	0.609	7.71	2.68	0.03	0.86				
400	4.73	0.03		34.026	0.007	26.96	114.9	0.732	12.08	1.48	0.01	0.85				
500	4.26	0.05		34.085	0.000	27.05	106.2	0.843	17.22	0.85	0.06	0.71				
600	4.00	0.03		34.149	0.000	27.13	99.4	0.947	23.08	0.57	0.04	0.79				
700	3.77	0.00		34.205	0.001	27.20	93.5	1.045	29.58	0.47	0.02	0.71				
800	3.52	0.00		34.258	0.001	27.27	87.5	1.136	36.62	0.42	0.02	0.64				
1000	3.11	0.01		34.379	0.009	27.40	75.5	1.301	51.77	0.39	0.01	0.91				
1200	2.80	0.01		34.490	0.008	27.52	65.0	1.443	67.78	0.41	0.01	0.88				
1500	2.43	0.00		34.571	0.008	27.61	56.6	1.628	93.32	0.69	0.00	0.88				

CNAV OSHAWA CRUISE 051 STATION 012 OBSERVED VALUES

DATE 16/03/63 HR 03.4 LAT 46-06 N LONG 130-00 W WEATHER 02 WIND VEL 25 DIR 31
 BAROM 96. TEMP DRY 5.6 WET 5.6 RELHU 99 WTRCLR SEA 3 DIR 34 SWELL 7 DIR 28
 CLOUD TYPE AMT 8 VIS 6 WIRE ANGLE(S) 15,12,18

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0		32.543		6.65	0.594			
1	5	9.45	32.546	25.15	6.52	0.582	-0.019	103	
1	10	9.50	32.584	25.17	6.56	0.586	-0.023	104	
1	19	9.47	32.544	25.14	6.49	0.580	-0.017	103	
1	29	9.50	32.617	25.20	6.48	0.579	-0.016	103	
1	48	9.46	32.546	25.15	6.50	0.581	-0.017	103	
1	72	9.48	32.581	25.17	6.54	0.584	-0.021	104	
2	98	8.02	32.785	25.56	6.08	0.543	0.038	93	
2	122	6.84	33.147	26.00	5.82	0.520	0.076	87	
2	147	6.75	33.450	26.25	5.13	0.458	0.138	77	
3	168	7.04	33.739	26.44	4.27	0.381	0.209	65	
3	191	6.90	33.850	26.55	3.88	0.347	0.246	59	
3	288	5.66	33.922	26.77	2.88	0.257	0.353	42	
3	482	4.61	34.062	27.00	0.96	0.086	0.540	14	
3	725	3.87	34.248	27.22	0.37	0.033	0.604	5	

CNAV OSHAWA CRUISE 051 STATION 012 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY
 LAB-I DECK-I

0	0.21
8	0.21
27	0.19
54	0.19

10.56 - WATER COLUMN VALUES

MESSANGER TIME 1927 INCOMING SOLAR RADIATION - AM 149 PH 150

CNAV OSHAWA		CRUISE OS1		STATION O12		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.47*	0.00	32.543	0.000	25.14	283.0	0.000	0.00	6.65	0.00	
10	9.50	0.00	32.584	0.000	25.17	280.6	0.029	0.02	6.56	0.00	
20	9.47	0.00	32.550	0.003	25.15	282.8	0.057	0.06	6.49	0.00	0.88
30	9.50	0.00	32.616	0.003	25.20	278.6	0.086	0.13	6.48	0.00	0.97
50	9.49	0.02	32.543	0.000	25.14	284.1	0.142	0.36	6.51	0.01	0.91
75	9.35	0.03	32.595	0.000	25.20	278.5	0.213	0.82	6.50	0.01	0.86
100	7.90	0.01	32.813	0.003	25.60	241.6	0.279	1.40	6.06	0.01	0.88
150	6.79	0.01	33.496	0.004	26.28	176.6	0.384	2.71	5.00	0.02	0.80
200	6.80	0.02	33.870	0.009	26.58	149.5	0.466	4.17	3.76	0.01	1.17
250	6.18	0.06	33.932	0.025	26.71	137.7	0.539	5.84	3.21	0.04	1.22
300	5.56	0.01	33.931	0.000	26.78	130.7	0.606	7.75	2.74	0.01	0.97
400	4.91	0.06	34.003	0.001	26.92	118.8	0.732	12.24	1.69	0.05	0.76
500	4.57	0.01	34.075	0.000	27.01	110.4	0.848	17.57	0.82	0.01	15.11
600	4.34	0.06	34.149	0.000	27.10	103.2	0.956	23.65	0.29	0.05	16.84
700	4.00	0.03	34.228	0.000	27.19	94.4	1.055	30.31	0.27	0.02	27.11

SURFACE TEMPERATURE ASSUMED FOR PURPOSES OF INTERPOLATION.

CNAV OSHAWA CRUISE 051 STATION 013 OBSERVED VALUES
 DATE 16/03/63 HR 11.2 LAT 45-14 N LONG 130-00 W WEA 90 WIND VEL 37 DIR 34
 BAROM 00.0 TEMP DRY 6.1 WET 5.6 REL HU 93 WTR CLR SECD1 SEA 3 DIR 34 SWELL 7 DIR 30
 CLOUD TYPE VIS 5 WIRE ANGLE(S) 20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MG/L	OXYGEN	ADP	SATN
1	0	9.74	32.575	25.13	6.44	0.575	-0.015	103	
1	5	9.71	32.572	25.13	6.46	0.577	-0.015	103	
1	9	9.75	32.583	25.13	6.43	0.574	-0.015	103	
1	19	9.75	32.596	25.12	6.35	0.567	-0.008	101	
1	28	9.77	32.575	25.12	6.35	0.567	-0.008	101	
1	47	9.74	32.575	25.13	6.39	0.563	-0.003	101	
1	71	9.79	32.574	25.12	6.39	0.571	-0.012	102	
1	94	9.78	32.578	25.12	6.39	0.571	-0.012	102	
1	117	8.20	32.756	25.51	5.97	0.533	0.046	92	
1	141	7.02	33.067	25.92	5.64	0.504	0.090	85	

CNAV OSHAWA CRUISE 051 STATION 013 INTERPRETED AND COMPUTED VALUES

DEPTH	TEMP	ECTI	SAL	EIS	SIGMA-T	SP. PO. ANOMALY	GEOPOT ANOMALY	POI ENERGY	OXY ML/L	ECI	VAR RATIO
0	9.74	0.00	32.575	0.000	25.13	284.8	0.000	0.00	6.44	0.00	1.12
10	9.75	0.00	32.584	0.001	25.13	284.5	0.029	0.02	6.42	0.00	1.47
20	9.75	0.00	32.584	0.004	25.13	284.7	0.058	0.06	6.35	0.00	0.96
30	9.77	0.00	32.575	0.000	25.12	285.9	0.087	0.13	6.34	0.00	0.86
50	9.75	0.00	32.575	0.000	25.12	285.8	0.144	0.37	6.31	0.00	0.78
75	9.85	0.04	32.568	0.004	25.10	288.3	0.216	0.83	6.41	0.01	0.72
100	9.42	0.06	32.610	0.002	25.20	279.0	0.288	1.47	6.30	0.02	

CNAV OSHAWA CRUISE OSI STATION 13A BIOLOGICAL DATA

DATE 16/03/63 LAT 44-40 N LONG 130-02 W

DEPTH CHL-A PRODUCTIVITY SAL
LAB-1 DECK-1

0 0.25 3.84 32.531
0 4.74

MESSENGER TIME 0645 INCOMING SOLAR RADIATION - AM 200 PM 241
THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
INTENSITY INSTEAD OF 100 PERCENT

CNAV OSHAWA CRUISE OSI STATION 014 OBSERVED VALUES

DATE 16/03/63 HR 17.8 LAT 44-14 N LONG 130-00 W WEA 02 WIND VEL 25 DIR 32
 BAROM 04. TEMP DRY 8.9 WET 8.9 RELHU 99 WTRCLR SECDI 2195 SEA 4 DIR 32 SWELL 4 DIR 30
 CLOUD TYPE AMT 3 VIS 7 WIRE ANGLE(S) 13.24

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.90	32.556	25.08	6.54	0.584	-0.027		105
1	5	9.98	32.552	25.07	6.48	0.579	-0.022		104
1	10	9.61	32.554	25.13	6.46	0.577	-0.016		103
1	19	9.60	32.574	25.15	6.46	0.577	-0.016		103
1	29	9.61	32.567	25.14	6.47	0.578	-0.017		103
1	49	9.59	32.556	25.13	6.49	0.580	-0.018		103
1	73	9.61	32.556	25.13	6.44	0.575	-0.014		103
1	97	9.52	32.563	25.15	6.43	0.574	-0.012		102
1	122	7.98	32.938	25.68	5.69	0.508	0.073		87
1	146	7.45	33.428	26.14	5.09	0.455	0.132		78
2	165	7.52	33.765	26.40	4.71	0.421	0.163		72
2	188	7.58			4.40	0.393			
2	283	6.28	33.920	26.69	3.12	0.279	0.322		46
2	478	4.78	34.029	26.95	1.19	0.106	0.517		17
2	722	3.95	34.242	27.21	0.41	0.037	0.599		6
2	968	3.40	34.410	27.40	0.26	0.023	0.621		4
2	1462	2.58	34.527	27.57	0.76	0.068	0.589		10
2	1759	2.12	34.556	27.63	1.19	0.106	0.558		16

CNAV OSHAWA CRUISE OSI STATION 014 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I DECK-I	SAL
0	0.20	12.18	32.561
7	0.20	3.30	32.569
24	0.22	0.94	32.569
51	0.22	0.02	32.567

10.85 103.16 - WATER COLUMN VALUES

MESSANGER TIME 0948 INCOMING SOLAR RADIATION - AM 200 PM 241

CNAV OSHAWA CRUISE OSI STATION 014				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.90	0.00	32.556	0.000	25.08	288.7	0.000	0.00	6.54	0.00	0.88
10	9.61	0.00	32.554	0.000	25.13	284.5	0.029	0.02	6.46	0.00	0.98
20	9.60	0.00	32.574	0.000	25.15	283.1	0.058	0.06	6.46	0.00	0.85
30	9.61	0.00	32.566	0.000	25.14	283.9	0.087	0.13	6.47	0.00	0.75
50	9.59	0.00	32.556	0.000	25.13	284.8	0.144	0.37	6.49	0.00	0.95
75	9.63	0.02	32.550	0.004	25.12	286.3	0.216	0.83	6.45	0.01	0.89
100	9.35	0.04	32.594	0.004	25.20	279.1	0.287	1.47	6.36	0.02	0.85
150	7.45	0.01	33.504	0.001	26.20	184.8	0.404	2.91	5.00	0.00	0.75
200	7.47	0.05	33.989	0.114	26.58	150.0	0.488	4.40	4.23	0.00	2.11
250	6.85	0.11	34.048	0.110	26.71	137.8	0.561	6.07	3.55	0.01	1.53
300	6.10	0.01	33.932	0.003	26.72	137.4	0.630	8.03	2.91	0.00	0.97
400	5.24	0.03	33.993	0.010	26.87	123.4	0.762	12.73	1.84	0.01	0.76
500	4.68	0.01	34.047	0.002	26.98	113.7	0.881	18.24	1.07	0.02	0.90
600	4.27	0.04	34.133	0.005	27.09	103.7	0.991	24.42	0.65	0.05	0.67
700	4.00	0.01	34.222	0.002	27.19	94.8	1.091	31.11	0.43	0.02	0.88
800	3.75	0.01	34.302	0.001	27.28	87.0	1.183	38.18	0.31	0.01	0.68
1000	3.34	0.00	34.423	0.002	27.42	74.8	1.347	53.21	0.27	0.01	0.97
1200	2.99	0.01	34.489	0.009	27.50	67.3	1.491	69.44	0.41	0.03	0.89
1500	2.52	0.00	34.530	0.001	27.57	60.7	1.686	96.37	0.82	0.01	0.99

CNAV OSHAWA CRUISE OSI STATION 015 OBSERVED VALUES

DATE 17/03/63 HR 01.5 LAT 43-12 N LONG 130-00 W WIND VEL 32 DIR 36
 BAROM 07.5 TEMP DRY 7.8 WET 5.6 RELHU 72 WTRCLR SEA 4 DIR 36 SWELL 7 DIR 32
 CLOUD TYPE VIS 6 WIRE ANGLE(S) 5,10,10,18

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SECDI	SATN
1	0	10.84	32.742	25.07	6.41	0.573	-0.027		105	
1	10	10.86	32.747	25.07	6.29	0.562	-0.017		103	
2	20	10.87	32.790	25.10	6.37	0.569	-0.024		104	
2	29	10.86	32.748	25.07	6.29	0.562	-0.017		103	
2	49	10.86	32.768	25.09	6.29	0.562	-0.017		103	
2	74	10.78	32.785	25.11	6.08	0.543	0.003		100	
2	99	9.36	33.223	25.69	4.84	0.432	0.129		177	
3	123	8.54	33.644	26.15	4.01	0.358	0.213		63	
3	148	8.14	33.823	26.35	3.35	0.299	0.276		52	
3	172	7.70	33.903	26.48	3.25	0.290	0.291		50	
4	191	7.50								
4	287	6.32	34.023	26.76	1.80	0.161	0.439		27	
4	481	5.06	34.140	27.01	0.73	0.065	0.553		11	
4	725	4.32	34.316	27.23	0.30	0.027	0.602		4	
4	968	3.56	34.386	27.36	0.29	0.026	0.615		4	
4	1456	2.56	34.535	27.58	0.72	0.064	0.593		10	
4	1751	2.13	34.624*	27.68	1.26	0.113	0.551		17	
4	2045	1.89	34.614	27.69	1.56	0.139	0.529		21	
4	2340	1.82	34.630	27.71	1.72	0.154	0.516		23	
4	2636	1.75	34.640	27.72	1.83	0.163	0.507		24	
4	3127	1.61	34.657	27.75	2.35	0.210	0.463		31	

CNAV OSHAWA CRUISE 051 STATION 015 BIOLOGICAL DATA
DEPTH CHL-A PRODUCTIVITY
LAB-I DECK-I

0	0.59
7	0.64
24	0.67
51	0.71

34.14 - WATER COLUMN VALUES

MESSENGER TIME 1732 INCOMING SOLAR RADIATION - AM 200 PM 241

INTERPOLATED AND COMPUTED VALUES

CNAV OSHAWA CRUISE 051 STATION 015

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VUL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.84	0.00	32.742	0.000	25.07	290.1	0.000	0.00	6.41	0.00	
10	10.86	0.00	32.790	0.000	25.07	290.3	0.030	0.02	6.29	0.00	
30	10.86	0.00	32.747	0.001	25.10	287.5	0.059	0.06	6.37	0.00	0.99
50	10.87	0.01	32.765	0.003	25.08	290.0	0.146	0.38	6.29	0.01	0.95
75	10.73	0.01	32.798	0.003	25.13	285.7	0.219	0.84	6.04	0.01	0.94
100	9.32	0.00	33.243	0.001	25.71	230.5	0.284	1.42	4.80	0.00	0.94
150	8.10	0.00	33.832	0.001	26.36	169.6	0.385	2.67	3.33	0.01	0.90
200	7.39	0.01	33.954	0.012	26.56	151.3	0.466	4.11	2.94	0.07	1.54
250	6.77	0.03	34.010	0.014	26.69	139.5	0.539	5.80	2.32	0.08	1.47
300	6.20	0.01	34.032	0.001	26.78	131.2	0.607	7.72	1.69	0.01	0.97
400	5.46	0.04	34.096	0.005	26.93	118.3	0.733	12.22	1.03	0.04	0.76
500	4.99	0.01	34.155	0.001	27.03	109.3	0.848	17.51	0.67	0.01	0.91
600	4.64	0.04	34.230	0.006	27.13	100.7	0.954	23.49	0.43	0.02	0.68
700	4.37	0.01	34.300	0.002	27.21	93.4	1.052	30.02	0.31	0.01	0.86
800	4.08	0.01	34.343	0.004	27.28	87.6	1.144	37.07	0.27	0.01	0.68
1000	3.48	0.00	34.397	0.001	27.38	78.3	1.312	52.52	0.30	0.00	0.97
1200	3.02	0.01	34.461	0.003	27.48	69.7	1.461	69.41	0.42	0.00	0.89
1500	2.49	0.00	34.544	0.000	27.59	59.2	1.657	96.43	0.80	0.01	0.91
2000	1.92	0.00	34.611	0.000	27.69	49.8	1.934	145.80	1.53	0.00	0.96
2500	1.78	0.00	34.636	0.000	27.72	48.2	2.184	203.68	1.77	0.01	0.60
3000	1.65	0.00	34.652	0.000	27.74	46.9	2.427	272.66	2.14	0.01	6.73

CNAV OSHAWA CRUISE 051 STATION 016 OBSERVED VALUES

DATE 17/03/63 HR 07.9 LAT 43-14 N LONG 129-25 W WEA 03 WIND VEL 20 DIR 36
 BAROM 11.1 TEMP DRY 7.8 MET 6.7 RELHU 86 WTRCLR SECDI SEA 3 DIR 35 SWELL 5 DIR 32
 CLOUD TYPE AMT 5 VIS 7 WIRE ANGLE(S) 0.20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	10.74	32.692	25.05	6.41	0.573	-0.027	105
1	5		32.700		6.29	0.562		
1	10	10.72	32.708	25.06	6.33	0.565	-0.019	103
1	20	10.73	32.715	25.07	6.24	0.557	-0.011	102
1	30	10.74	32.701	25.05	6.29	0.562	-0.015	103
1	50	10.72	32.702	25.06	6.29	0.562	-0.015	103
1	75	10.81	32.765	25.09	6.29	0.562	-0.016	103
1	100	9.32	33.397	25.83	4.36	0.389	0.172	69
1	125	8.65	33.630	26.12	3.80	0.339	0.230	60
1	150	8.01	33.849	26.39	3.27	0.292	0.285	51
2	164	7.95	33.864	26.41	3.24	0.289	0.288	50
2	185	7.74	33.903	26.47	3.23	0.288	0.292	50
2	279	6.41	33.931	26.68	3.23	0.288	0.311	48
2	468	5.25	34.103	26.96	0.97	0.087	0.525	14
2	706	4.40	34.381*	27.27	0.33	0.029	0.598	5
2	945	3.72	34.401	27.36	0.34	0.030	0.608	5
2	1424	2.68	34.511	27.55	0.60	0.054	0.602	8
2	1712	2.25	34.630	27.68	1.07	0.096	0.566	14

DEPTH	CNAV OSHAWA		CRUISE OSL		STATION O16		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	10.74	0.00	32.692	0.000	25.05	292.2	0.000	0.00	6.41	0.00			
10	10.72	0.00	32.708	0.000	25.06	290.9	0.030	0.02	6.33	0.00			
20	10.73	0.00	32.715	0.000	25.07	290.7	0.059	0.06	6.24	0.00			
30	10.74	0.00	32.701	0.000	25.05	292.1	0.089	0.14	6.29	0.00			
50	10.72	0.00	32.702	0.000	25.06	292.1	0.147	0.38	6.29	0.00			
75	10.81	0.00	32.765	0.000	25.09	289.5	0.221	0.85	6.29	0.00			
100	9.32	0.00	33.397	0.000	25.83	219.2	0.285	1.41	4.36	0.00			
150	8.01	0.00	33.849	0.000	26.39	167.1	0.382	2.63	3.27	0.00			
200	7.53	0.03	33.914	0.006	26.51	156.3	0.464	4.09	3.25	0.02	1.33		
250	6.83	0.04	33.933	0.010	26.62	146.0	0.540	5.84	3.27	0.03	1.15		
300	6.22	0.03	33.947	0.003	26.71	137.7	0.611	7.86	3.02	0.08	0.96		
400	5.53	0.06	34.034	0.007	26.87	123.8	0.743	12.57	1.87	0.18	0.75		
500	5.11	0.01	34.129	0.000	26.99	112.8	0.863	18.07	0.79	0.04	1.00		
600	4.73	0.02	34.205	0.000	27.10	103.7	0.972	24.23	0.42	0.07	0.99		
700	4.42	0.00	34.272	0.000	27.19	96.0	1.073	30.95	0.33	0.01	0.96		
800	4.12	0.00	34.331	0.000	27.26	89.0	1.166	38.15	0.29	0.02	0.83		
1000	3.58	0.00	34.416	0.005	27.39	78.1	1.336	53.70	0.35	0.01	0.95		
1200	3.11	0.00	34.465	0.012	27.47	70.6	1.486	70.68	0.42	0.01	0.88		
1500	2.55	0.00	34.534	0.003	27.57	60.7	1.686	98.23	0.69	0.00	0.94		

CNAV OSHAWA CRUISE OSI STATION O17 OBSERVED VALUES															
DATE	17/03/63	HR	12.4	LAT	43-14 N	LONG	128-40 W	SEA	01	WIND	VEL	23	DIR	36	
BAROM	12	TEMP	DRY	9.4	WEI	7.8	RELHU	81	WTRCLR	SECDI	SECDI	SMELL	5	DIR	32
CLOUD	TYPE	AMT	3	VIS	7	WIRE	ANGLE(S)	10.25							
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN							
1	0	10.72	32.758	25.10	6.33	0.565	-0.019	103							
1	5	10.77	32.750	25.09	6.31	0.564	-0.018	103							
1	10	10.78	32.784	25.11	6.32	0.564	-0.019	103							
1	20	10.78	32.748	25.08	6.33	0.565	-0.019	104							
1	29	10.79	32.776	25.10	6.28	0.561	-0.015	103							
1	49	10.80	32.822	25.14	6.31	0.564	-0.018	103							
1	74	10.82	32.790	25.11	6.27	0.560	-0.015	103							
1	99	9.50	33.101	25.57	5.14	0.459	0.101	82							
1	123	8.82	33.450	25.95	4.36	0.389	0.178	69							
1	148	8.42	33.714	26.22	3.55	0.317	0.255	55							
2	158	8.28	33.800	26.31	3.31	0.296	0.278	52							
2	181	7.96	33.929	26.46	2.84	0.254	0.324	44							
2	271	7.08	34.033	26.67	2.01	0.180	0.410	30							
2	457	5.62	34.112	26.92	1.09	0.097	0.513	16							
2	693	4.52	34.250	27.16	0.45	0.040	0.586	6							
2	929	3.88	34.375	27.32	0.31	0.028	0.608	4							
2	1404	2.78	34.497	27.53	0.56	0.050	0.604	8							
2	1691	2.34	34.560	27.61	1.00	0.089	0.572	14							

CNAV OSHAWA CRUISE OSI STATION 017 BIOLOGICAL DATA

DEPTH CML-A PRODUCTIVITY SAL
 LAB-I DECK-I
 0 0-59 8-42 32.745
 0 12.22

MESSENGER TIME 0620 INCOMING SOLAR RADIATION - AM 214 PM 166

THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
 INTENSITY INSTEAD OF 100 PERCENT

INTERPOLATED AND COMPUTED VALUES

DEPTH	CNAV OSHAWA	CRUISE OSI	STATION 017	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(D)	VAR RATIO
0	10-72	0-00	32-758	0-000	25-10	287-0	0-000	6-33	0-00	
10	10-78	0-00	32-784	0-000	25-11	286-3	0-029	6-32	0-00	
20	10-78	0-00	32-748	0-000	25-08	289-1	0-058	6-33	0-00	
30	10-79	0-00	32-779	0-000	25-11	287-2	0-087	6-28	0-00	0-99
50	10-81	0-01	32-818	0-003	25-13	285-1	0-145	6-32	0-01	0-95
75	10-77	0-01	32-799	0-002	25-12	286-4	0-217	6-23	0-01	0-94
100	9-46	0-00	33-116	0-001	25-59	242-3	0-284	5-10	0-00	0-94
150	8-39	0-00	33-734	0-002	26-24	181-2	0-390	3-50	0-01	0-62
200	7-74	0-01	33-979	0-017	26-53	154-5	0-475	2-59	0-04	1-28
250	7-25	0-01	34-039	0-018	26-65	143-9	0-550	2-12	0-04	0-93
300	6-82	0-00	34-050	0-005	26-72	137-9	0-621	1-82	0-02	0-94
400	6-01	0-00	34-096	0-007	26-86	125-3	0-754	1-30	0-02	0-75
500	5-37	0-01	34-136	0-001	26-97	115-5	0-876	0-93	0-00	0-82
600	4-88	0-02	34-194	0-002	27-07	106-3	0-988	0-64	0-00	0-68
700	4-50	0-00	34-254	0-000	27-16	98-3	1-091	0-44	0-00	0-96
800	4-20	0-02	34-310	0-001	27-24	91-5	1-187	0-34	0-01	0-61
1000	3-69	0-00	34-399	0-003	27-36	80-6	1-361	0-31	0-00	0-94
1200	3-21	0-01	34-457	0-006	27-45	72-3	1-516	0-37	0-00	0-88
1500	2-61	0-00	34-515	0-002	27-56	62-8	1-721	0-69	0-00	0-90

CNAV OSHAWA CRUISE 051 STATION 018 OBSERVED VALUES
 DATE 17/03/63 HR 17.8 LAT 43-14 N LONG 128-06 W WEA 02 WIND VEL 12 DIR 32
 BAROM 16. TEMP DRY 10.0 WET 9.4 RELHU 93 WTRCLR SECDI 3109 SEA 2 DIR 32 SWELL 3 DIR 34
 CLOUD TYPE AMT 4 VIS 7 WIRE ANGLE(S) 15.20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	10.40	32.652	25.07	6.47	0.578	-0.027		105
1	5	10.35	32.627	25.06	6.40	0.572	-0.020		104
1	10	10.35	32.644	25.08	6.50	0.581	-0.029		105
1	19	10.41	32.668	25.09	6.40	0.572	-0.021		104
1	29	10.36	32.635	25.07	6.42	0.573	-0.022		104
1	48	10.37	32.625	25.06	6.48	0.579	-0.027		105
1	73	10.40	32.629	25.06	6.41	0.573	-0.022		104
1	96	9.16	32.977	25.53	5.52	0.493	0.072		87
1	121	8.73	33.508	26.01	4.11	0.367	0.202		65
1	145	8.34	33.746	26.26	3.47	0.310	0.263		54
2	165	8.18	33.836	26.35	3.17	0.283	0.292		49
2	189	7.92	33.897	26.44	2.97	0.265	0.313		46
2	283	6.94	34.010	26.67	2.16	0.193	0.398		33
2	472	5.47	34.101	26.93	0.94	0.084	0.528		14
2	709	4.32	34.239	27.17	0.36	0.032	0.597		5
2	946	3.75	34.398	27.35	0.28	0.025	0.613		4
2	1423	2.78	34.515	27.54	0.71	0.063	0.590		10
2	1710	2.32	34.572	27.62	1.09	0.097	0.565		15

CNAV OSHAWA CRUISE OSI STATION O18 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.78	12.52	32.625	
4	0.87	13.92	32.627	
20	0.88	2.96	32.624	
44	0.96	0.00	32.631	

39.42 223.44 - WATER COLUMN VALUES

MESSANGER TIME 0950 INCOMING SOLAR RADIATION - AM 214 PM 166

CNAV OSHAWA CRUISE OSI STATION O18 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.40	0.00	32.652	0.000	25.07	289.6	0.000	0.00	6.47	0.00	0.88
10	10.35	0.00	32.644	0.000	25.08	289.5	0.030	0.02	6.50	0.00	0.97
20	10.41	0.00	32.666	0.001	25.08	289.0	0.059	0.06	6.40	0.00	0.91
30	10.36	0.00	32.633	0.000	25.07	290.8	0.088	0.14	6.42	0.00	0.81
50	10.40	0.02	32.618	0.005	25.05	293.0	0.147	0.38	6.49	0.01	0.70
75	10.30	0.03	32.650	0.003	25.09	289.5	0.220	0.85	6.36	0.01	0.88
100	9.06	0.02	33.066	0.010	25.62	239.7	0.287	1.44	5.28	0.03	0.81
150	8.30	0.01	33.775	0.002	26.29	176.7	0.392	2.74	3.38	0.00	0.70
200	7.80	0.00	33.917	0.003	26.47	159.9	0.477	4.26	2.87	0.00	1.18
250	7.27	0.00	33.984	0.006	26.60	148.2	0.554	6.05	2.44	0.01	1.08
300	6.78	0.00	34.022	0.003	26.70	139.6	0.627	8.09	2.03	0.00	0.96
400	5.96	0.01	34.076	0.008	26.85	126.1	0.761	12.88	1.33	0.00	0.75
500	5.30	0.00	34.116	0.000	26.96	116.0	0.883	18.51	0.83	0.01	0.87
600	4.76	0.01	34.173	0.000	27.07	106.5	0.995	24.84	0.53	0.02	0.67
700	4.35	0.00	34.233	0.000	27.16	98.0	1.099	31.72	0.37	0.00	0.94
800	4.06	0.02	34.303	0.003	27.25	90.4	1.194	39.05	0.29	0.01	0.63
1000	3.63	0.00	34.419	0.004	27.38	78.4	1.365	54.75	0.30	0.01	0.95
1200	3.20	0.00	34.479	0.010	27.47	70.5	1.516	71.75	0.44	0.02	0.89
1500	2.65	0.00	34.526	0.002	27.56	62.4	1.718	99.67	0.81	0.00	10.08

CNAV OSHAWA CRUISE OSI STATION 019 OBSERVED VALUES

DATE 17/03/63 HR 21.7 LAT 43-14 N LONG 127-42 W WEA 02 WIND VEL 13 DIR 29
 BAROM 18.0 TEMP DRY 12.8 WET 11.7 RELHU 88 WTRCLR SNODG SEA 2 DIR 35 SMELL 3 DIR 20
 CLOUD TYPE 8 AMT 4 VIS 7 WIRE ANGLE(S) 5.16

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SECDI	SATN
1	0	10.45	32.644	25.06	6.51	0.581	-0.031		106	
1	5	10.42	32.605	25.03	6.54	0.584	-0.033		106	
1	10	10.33	32.610	25.05	6.44	0.575	-0.023		104	
1	20	10.30	32.618	25.07	6.54	0.584	-0.032		106	
1	30	10.30	32.627	25.07	6.39	0.571	-0.019		103	
1	50	10.22	32.622	25.08	6.46	0.577	-0.024		104	
1	75	10.33	32.620	25.06	6.39	0.571	-0.019		103	
1	100	9.19	32.883	25.45	5.52	0.493	0.072		87	
1	124	8.59	33.353	25.91	4.56	0.407	0.164		71	
1	149	8.16	33.633	26.20	3.91	0.349	0.227		61	
2	168	7.86	33.764	26.35	3.56	0.318	0.261		55	
2	191	7.42	33.869	26.49	3.42	0.305	0.280		52	
2	286	6.35	33.958	26.71	2.68	0.239	0.360		40	
2	480	5.09	34.109	26.98	0.87	0.078	0.540		13	
2	729	4.20	34.294	27.23	0.63	0.056	0.575		9	
2	971	3.66	34.456	27.41	0.29	0.026	0.613		4	
2	1466	2.58	34.520	27.56	0.69	0.062	0.595		9	
2	1764	2.11	34.582	27.65	1.25	0.112	0.553		17	

CNAV OSHAWA CRUISE OSI STATION 019 BIOLOGICAL DATA
 DEPTH CHL-A PRODUCTIVITY LAB-I DECK-I

0 0.92
 4 0.95
 20 1.18
 44 0.88

45.45 - WATER COLUMN VALUES

MESSANGER TIME 1342 INCOMING SOLAR RADIATION - AM 214 PM 166

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.45	0.00	32.644	0.000	25.06	291.0	0.000	0.00	6.51	0.00	0.92
10	10.33	0.00	32.610	0.000	25.05	291.7	0.030	0.02	6.44	0.00	1.17
20	10.30	0.00	32.618	0.000	25.07	290.9	0.059	0.06	6.54	0.00	1.18
30	10.30	0.00	32.627	0.000	25.07	290.4	0.088	0.14	6.39	0.00	0.97
50	10.22	0.00	32.622	0.000	25.08	289.9	0.147	0.38	6.46	0.00	0.76
75	10.33	0.00	32.620	0.000	25.06	292.3	0.220	0.85	6.39	0.00	1.17
100	9.19	0.00	32.883	0.000	25.45	255.3	0.289	1.46	5.52	0.00	1.18
150	8.14	0.00	33.641	0.000	26.21	184.4	0.400	2.84	3.89	0.00	0.97
200	7.29	0.01	33.890	0.008	26.53	154.7	0.485	4.35	3.36	0.00	0.76
250	6.67	0.04	33.958	0.021	26.66	142.1	0.560	6.08	2.98	0.01	1.17
300	6.23	0.01	33.970	0.000	26.73	136.2	0.630	8.06	2.53	0.02	1.18
400	5.50	0.03	34.050	0.001	26.88	122.4	0.761	12.71	1.55	0.07	0.97
500	5.00	0.01	34.124	0.000	27.00	111.8	0.879	18.15	0.81	0.03	0.76
600	4.59	0.02	34.200	0.000	27.11	102.4	0.987	24.25	0.62	0.10	0.91
700	4.27	0.01	34.273	0.000	27.20	94.2	1.087	30.87	0.60	0.04	0.68
800	4.02	0.01	34.347	0.002	27.29	86.7	1.178	37.90	0.52	0.02	0.85
1000	3.59	0.00	34.464	0.004	27.42	74.7	1.341	52.91	0.28	0.01	0.69
1200	3.14	0.01	34.505	0.017	27.50	67.8	1.486	69.19	0.34	0.03	0.97
1500	2.52	0.00	34.522	0.003	27.57	61.2	1.682	96.33	0.75	0.01	0.99

CNAV OSHAWA CRUISE 051 STATION 020 OBSERVED VALUES

DATE 18/03/63 HR 01.7 LAT 43-12 N LONG 127-06 W WEA 02 WIND VEL 15 DIR 30
 BAROM 18.0 TEMP DRY 10.6 WET 10.0 RELHU 93 WTRCLR SEA 2 DIR 30 SWELL 6 DIR 30
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 5.21 SMDG SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L			
1	0	10.42	32.678	25.09	6.56	0.586	-0.035	106
1	5	10.42	32.675	25.09	6.55	0.585	-0.034	106
1	10	10.42	32.664	25.08	6.60	0.589	-0.039	107
2	14	10.28	32.690	25.12	6.51	0.581	-0.029	105
1	20	10.27	32.648	25.09	6.54	0.584	-0.032	106
1	30	10.26	32.709	25.14	6.51	0.581	-0.029	105
2	38	10.24	32.655	25.10	6.36	0.568	-0.015	103
1	50	10.28	32.662	25.10	6.52	0.582	-0.030	105
1	75	9.53	33.040	25.52	5.19	0.464	0.097	83
1	100	8.73	33.406	25.93	4.21	0.376	0.193	66
1	124	8.41	33.695	26.21	3.60	0.322	0.251	56
2	133	8.04	33.797	26.34	3.27	0.292	0.285	51
1	149	7.91	33.853	26.41	3.11	0.278	0.301	48
2	325	5.81	34.002	26.81	2.65	0.237	0.371	39
2	569	4.68	34.190	27.09	0.58	0.052	0.572	8
2	812	4.01	34.341	27.28	0.47	0.042	0.592	7
2	1301	2.91	34.493	27.51	0.69	0.062	0.590	9
2	1597	2.35	34.582	27.63	0.99	0.088	0.572	13

CNAV OSHAWA CRUISE OS1 STATION O20 BIOLOGICAL DATA
 DEPTH CHL-A PRODUCTIVITY
 LAB-I DECK-I

0 0.79
 4 0.79
 20 1.14
 44 1.03

44.70 - WATER COLUMN VALUES

MESSENGER TIME 1747 INCOMING SOLAR RADIATION - AM 214 PM 166

CNAV OSHAWA CRUISE OS1 STATION O20 INTERPOLATED AND COMPUTED VALUES											
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.42	0.00	32.678	0.000	25.09	288.0	0.000	0.00	6.56	0.00	
10	10.42	0.00	32.664	0.000	25.08	289.2	0.030	0.02	6.60	0.00	
20	10.27	0.00	32.648	0.000	25.09	288.1	0.059	0.06	6.54	0.00	
30	10.26	0.00	32.709	0.000	25.14	283.7	0.087	0.13	6.51	0.00	
50	10.28	0.00	32.662	0.000	25.10	287.9	0.145	0.37	6.52	0.00	
75	9.53	0.00	33.040	0.000	25.52	248.5	0.213	0.80	5.19	0.00	
100	8.73	0.00	33.406	0.000	25.93	209.6	0.270	1.31	4.21	0.00	
150	7.90	0.00	33.855	0.001	26.41	165.0	0.365	2.49	3.11	0.00	1.05
200	7.31	0.08	33.941	0.029	26.56	151.2	0.444	3.92	2.90	0.11	4.39
250	6.71	0.09	33.992	0.034	26.69	140.2	0.518	5.61	2.75	0.13	4.78
300	6.11	0.05	34.007	0.017	26.78	131.9	0.586	7.54	2.67	0.07	1.71
400	5.33	0.06	34.063	0.001	26.92	119.3	0.713	12.07	2.00	0.13	0.75
500	4.87	0.05	34.140	0.001	27.03	109.2	0.828	17.37	1.15	0.12	0.73
600	4.58	0.01	34.212	0.000	27.12	101.4	0.935	23.37	0.51	0.03	0.84
700	4.29	0.02	34.277	0.001	27.20	94.1	1.034	29.95	0.39	0.07	0.59
800	4.04	0.00	34.335	0.000	27.28	87.8	1.125	37.03	0.45	0.01	0.91
1000	3.55	0.00	34.412	0.008	27.39	78.1	1.293	52.48	0.50	0.01	0.90
1200	3.11	0.00	34.470	0.005	27.47	70.2	1.444	69.41	0.61	0.01	0.89
1500	2.53	0.00	34.548	0.004	27.59	59.4	1.641	96.58	0.88	0.00	0.67

CNAV OSHAWA CRUISE 051 STATION 021 OBSERVED VALUES

DATE 18/03/63 HR 06.0 LAT 43-14 N LONG 126-32 W MEA 02 WIND VEL 8 DIR 25
 BAROM 20. TEMP DRY 10.0 WET 10.0 RELHU 99 WTRCLR SECDI SNMG 2880 SEA 1 DIR 25 SWELL 2 DIR 27
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 8,24, 9

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	10.48	32.697	25.10	6.44	0.575	-0.025	105	
1	5	10.47	32.700	25.10	6.47	0.578	-0.028	105	
1	10	10.49	32.690	25.09	6.42	0.573	-0.024	104	
1	20	10.41	32.726	25.13	6.48	0.579	-0.028	105	
1	30	10.40	32.707	25.12	6.39	0.571	-0.020	104	
1	49	10.40	32.717	25.13	6.37	0.569	-0.018	103	
1	74	9.62	33.109	25.56	5.21	0.465	0.093	83	
1	99	8.58	33.438	25.98	4.15	0.371	0.200	65	
1	124	8.11	33.662	26.23	3.63	0.324	0.252	56	
3	148	7.87	33.834	26.40	3.21	0.287	0.292	50	
2	161	7.74	33.891	26.46	2.91	0.260	0.321	45	
2	185	7.46	33.951	26.55	2.80	0.250	0.334	43	
2	276	6.58	33.965	26.68	2.32	0.207	0.389	35	
2	460	5.34	34.135	26.97	0.87	0.078	0.536	13	
2	692	4.27	34.264	27.10	0.61	0.054	0.576	9	
2	925	3.69	34.420	27.38	0.30	0.027	0.612	4	
2	1392	2.74	34.527	27.55	0.65	0.058	0.596	9	
2	1671	2.28	34.564	27.62	1.04	0.093	0.569	14	
2	1952	1.98	34.601	27.68	1.43	0.128	0.539	19	
2	2326	1.83	34.624	27.71	1.74	0.155	0.514	23	
2	2607	1.79	34.631	27.71	1.91	0.171	0.500	25	

CNAV OSHAWA		CRUISE OSI			STATION O21		INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	10.48	0.00	32.697	0.000	25.10	287.5	0.000	0.00	6.44	0.00			
10	10.49	0.00	32.690	0.000	25.09	288.4	0.030	0.02	6.42	0.00			
20	10.41	0.00	32.726	0.000	25.13	284.6	0.058	0.06	6.48	0.00			
30	10.40	0.00	32.707	0.000	25.12	286.1	0.087	0.13	6.39	0.00			
50	10.38	0.00	32.729	0.003	25.14	284.5	0.145	0.37	6.34	0.01	0.95		
75	9.58	0.01	33.124	0.000	25.58	243.0	0.211	0.79	5.18	0.00	0.94		
100	8.55	0.00	33.448	0.000	25.99	203.8	0.267	1.29	4.12	0.00	0.94		
150	7.85	0.00	33.844	0.000	26.41	165.2	0.360	2.46	3.16	0.00	0.77		
200	7.30	0.00	33.963	0.009	26.58	149.4	0.440	3.97	2.73	0.00	1.22		
250	6.81	0.00	33.976	0.013	26.66	142.6	0.513	5.51	2.43	0.00	0.97		
300	6.39	0.01	33.983	0.005	26.72	137.2	0.584	7.56	2.12	0.00	0.95		
400	5.69	0.01	34.072	0.009	26.88	122.9	0.775	12.24	1.12	0.06	0.75		
500	5.12	0.00	34.160	0.003	27.02	110.6	0.933	13.67	0.76	0.04	0.82		
600	4.63	0.00	34.217	0.005	27.12	101.8	0.940	23.71	0.61	0.07	0.68		
700	4.25	0.00	34.270	0.001	27.20	94.1	1.039	30.30	0.60	0.00	0.96		
800	3.97	0.02	34.339	0.004	27.29	86.7	1.130	37.33	0.45	0.02	0.60		
1000	3.52	0.00	34.448	0.005	27.42	75.0	1.294	52.36	0.30	0.02	0.93		
1200	3.10	0.00	34.503	0.009	27.50	67.6	1.438	68.64	0.40	0.04	0.88		
1500	2.55	0.00	34.543	0.001	27.58	60.7	1.633	95.47	0.79	0.01	0.61		
2000	1.95	0.00	34.605	0.000	27.68	50.7	1.914	145.63	1.48	0.00	0.87		
2500	1.80	0.00	34.629	0.000	27.71	49.0	2.168	204.53	1.85	0.00	0.76		

CNAV OSHAWA CRUISE 051 STATION 022 OBSERVED VALUES

DATE 18/03/63 HR 11.0 LAT 43-14 N LONG 125-57 W MEA 62 WIND VEL 18 DIR 27
 BAROM 20.0 TEMP DRY 9.4 WET 9.4 RELHU 99 WTRCLR SECDI 2926 SEA 2 DIR 25 SWELL 4 DIR 27
 CLOUD TYPE AMT 8 VIS 6 WIRE ANGLE(S) 0.22

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	10.74	32.750	25.09	6.34	0.566	-0.020		104
1	5	10.75	32.752	25.09	6.34	0.566	-0.020		104
1	10	10.78	32.769	25.10	6.40	0.572	-0.026		105
1	20	10.78	32.769	25.10	6.32	0.564	-0.019		103
1	30	10.80	32.770	25.10	6.35	0.567	-0.022		104
1	50	10.46	32.740	25.13	6.35	0.567	-0.017		103
1	75	9.66	33.203	25.63	4.88	0.436	0.122		78
1	100	8.78	33.500	26.00	3.79	0.338	0.230		60
1	125	8.44	33.698	26.31					
1	150	8.12	33.833	26.26	3.21	0.287	0.291		50
2	160	8.08	33.833	26.37	3.02	0.270	0.306		47
2	183	7.94	33.960	26.49	2.63	0.235	0.343		41
2	275	6.80	34.034	26.71	1.86	0.166	0.427		28
2	460	5.41	34.138	26.97	0.78	0.070	0.543		11
2	697	4.50	34.326	27.22	0.32	0.029	0.598		5
2	936	3.71	34.419	27.38	0.27	0.024	0.614		4
2	1419	2.67	34.530	27.56	0.71	0.063	0.592		10
2	1711	2.17	34.600	27.66	1.12	0.100	0.564		15

DEPTH	CNAV OSHAWA			CRUISE OS1			STATION 022			INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)		SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO			
0	10.74	0.00		32.750	0.000	25.09	287.9	0.000	0.00	6.34	0.00				
10	10.78	0.00		32.769	0.000	25.10	287.4	0.029	0.02	6.40	0.00				
20	10.78	0.00		32.769	0.000	25.10	287.6	0.058	0.06	6.32	0.00				
30	10.80	0.00		32.770	0.000	25.10	288.0	0.087	0.13	6.35	0.00				
50	10.46	0.00		32.740	0.000	25.13	285.0	0.145	0.37	6.35	0.00				
75	9.66	0.00		33.203	0.000	25.63	238.4	0.211	0.79	4.88	0.00				
100	8.78	0.00		33.500	0.000	26.00	203.4	0.267	1.28	3.79	0.00				
150	8.12	0.00		33.833	0.000	26.36	169.9	0.361	2.47	3.21	0.00				
200	7.75	0.03		34.000	0.017	26.55	153.0	0.442	3.92	2.43	0.03			1.28	
250	7.14	0.04		34.049	0.022	26.67	141.7	0.516	5.63	2.00	0.04			0.99	
300	6.56	0.01		34.049	0.002	26.75	134.6	0.586	7.59	1.68	0.00			0.94	
400	5.76	0.02		34.105	0.004	26.90	121.4	0.715	12.21	1.06	0.00			0.74	
500	5.22	0.02		34.171	0.004	27.01	111.0	0.833	17.61	0.65	0.01			0.83	
600	4.81	0.03		34.251	0.006	27.13	101.2	0.940	23.64	0.42	0.03			0.68	
700	4.49	0.00		34.328	0.000	27.22	92.7	1.038	30.17	0.32	0.00			0.98	
800	4.14	0.00		34.374	0.003	27.30	86.1	1.128	37.13	0.26	0.01			0.61	
1000	3.54	0.01		34.436	0.002	27.41	76.2	1.292	52.23	0.30	0.01			0.94	
1200	3.08	0.02		34.486	0.004	27.49	68.6	1.439	68.76	0.45	0.02			0.88	
1500	2.53	0.01		34.547	0.001	27.59	59.5	1.634	95.66	0.82	0.01			0.93	

CNAV OSHAWA CRUISE OS1 STATION 023 OBSERVED VALUES
 DATE 18/03/63 HR 14.2 LAT 43-12 N LONG 125-36 W WEA 02 WIND VEL 10 DIR 32
 BAROM 20.0 TEMP DRY 9.4 WET 9.4 RELHU 99 WTRCLR SMDG 2980 SEA 2 DIR 32 SWELL 3 DIR 32
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 18.11 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	10.85	32.768	25.09	6.39	0.571	-0.026	105
1	5	10.88	32.773	25.09	6.40	0.572	-0.027	105
1	10	10.90	32.786	25.09	6.43	0.574	-0.030	106
1	19	10.77	32.760	25.09	5.86	0.523	0.023	96
1	29	10.81	32.791	25.11	5.35	0.478	0.068	88
1	48	10.58	32.838	25.19	6.04	0.539	0.008	98
1	72	9.78	33.259	25.65	5.26	0.470	0.086	84
1	95	9.07	33.519	25.97	4.28	0.382	0.182	68
1	119	8.62	33.673	26.16	3.62	0.323	0.246	57
1	143	8.02	33.861	26.40	3.24	0.289	0.287	50
2	172	7.76	33.922	26.48	2.92	0.261	0.319	45
2	197	7.40	33.976	26.58	2.59	0.231	0.353	40
2	293	6.52	34.052	26.76	1.67	0.149	0.448	25
2	489	5.42	34.165	26.99	0.78	0.070	0.543	11
2	734	4.46	34.324	27.22	0.34	0.030	0.597	5
2	980	3.75	34.455	27.40	0.32	0.029	0.609	4
2	1472	2.63	34.518	27.56	0.76	0.068	0.588	10
2	1767	2.12	34.597	27.66	1.17	0.104	0.560	16

CNAV OSHAWA CRUISE OS1 STATION 023 BIOLOGICAL DATA

DEPTH	CHL-A	LAB-I	PRODUCTIVITY	DECK-I	SAL
0			13.60		32.773

MESSENGER TIME 0625

CNAV OSHAWA			CRUISE OSI			STATION 023			INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO				
0	10.85	0.00	32.768	0.000	25.09	288.4	0.000	0.00	6.39	0.00					
10	10.90	0.00	32.786	0.000	25.09	288.1	0.030	0.02	6.43	0.00					
20	10.77	0.00	32.762	0.001	25.10	288.0	0.059	0.06	5.79	0.01					0.88
30	10.81	0.00	32.791	0.002	25.11	286.6	0.087	0.13	5.37	0.03					0.97
50	10.52	0.01	32.868	0.007	25.22	276.6	0.144	0.37	6.01	0.02					0.91
75	9.68	0.00	33.300	0.001	25.70	231.5	0.208	0.77	5.13	0.01					0.83
100	8.97	0.01	33.555	0.004	26.01	202.2	0.263	1.26	4.12	0.00					0.77
150	7.94	0.02	33.884	0.006	26.43	163.5	0.355	2.41	3.16	0.01					0.77
200	7.36	0.00	33.980	0.001	26.59	149.1	0.434	3.82	2.55	0.00					1.05
250	6.85	0.02	34.032	0.008	26.70	139.0	0.506	5.49	2.03	0.01					1.19
300	6.47	0.00	34.056	0.000	26.77	132.9	0.575	7.43	1.62	0.00					0.99
400	5.84	0.03	34.116	0.003	26.90	121.7	0.703	12.02	1.07	0.04					0.77
500	5.37	0.00	34.172	0.000	27.00	112.8	0.822	17.47	0.75	0.00					0.95
600	4.94	0.01	34.238	0.002	27.10	103.8	0.931	23.63	0.51	0.01					0.68
700	4.57	0.00	34.302	0.001	27.19	95.6	1.032	30.34	0.37	0.01					0.82
800	4.25	0.01	34.364	0.001	27.28	88.2	1.125	37.49	0.31	0.01					0.71
1000	3.70	0.00	34.459	0.002	27.41	76.3	1.291	52.78	0.33	0.00					0.98
1200	3.20	0.00	34.494	0.014	27.48	69.4	1.439	69.42	0.46	0.01					0.89
1500	2.58	0.00	34.521	0.002	27.56	61.9	1.638	97.04	0.80	0.00					0.99

CNAV OSHAMA CRUISE OSI STATION 024 OBSERVED VALUES

DATE 18/03/63 HR 17.7 LAT 43-14 N LONG 125-13 W WEA 01 WIND VEL 3 DIR 32
 BAROM 25. TEMP DRY 11.1 WET 10.6 RELHU 94 WTRCLR SECDI 2057 SEA 1 DIR 32 SWELL 2 DIR 30
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 0.18

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L			
1	0	10.39	32.685	25.10	6.65	0.594	-0.043	108
1	5	10.35	32.690	25.11	6.65	0.594	-0.043	108
1	10	10.29	32.686	25.12	6.52	0.582	-0.030	105
1	20	10.26	32.704	25.14	6.60	0.589	-0.037	107
1	30	10.29	32.714	25.14	6.61	0.590	-0.038	107
1	50	9.91	33.045	25.46	5.57	0.497	0.058	90
1	75	9.40	33.387	25.81	4.02	0.359	0.201	64
1	100	8.94	33.679	26.11	3.51	0.313	0.252	55
1	125	8.65	33.830	26.28	2.61	0.233	0.335	41
1	150	8.21	33.928	26.42	1.98	0.177	0.397	31
2	167	8.09	33.953	26.46	2.42	0.216	0.359	38
2	191	7.87	33.977	26.51	2.33	0.208	0.370	36
2	287	6.90	34.058	26.71	1.38	0.123	0.468	21
2	482	5.45	34.141	26.96	0.73	0.065	0.547	11
2	728	4.39	34.310	27.22	0.34	0.030	0.598	5
2	976	3.85	34.414	27.36	0.32	0.029	0.608	4
2	1273	3.03	34.526	27.53	0.55	0.049	0.600	8
2	1672	2.40	34.559	27.61	0.93	0.083	0.577	13

CNAV OSHAWA CRUISE OSI STATION 024 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	1.36	30.86	32.661
6	1.40	27.38	32.665
16	1.66	3.74	32.669
31	1.28	0.18	32.660

45.68 359.66 - WATER COLUMN VALUES

MESSENGER TIME 0946 INCOMING SOLAR RADIATION - AM 235 PM 193

CNAV OSHAWA CRUISE OSI STATION 024				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.39	0.00	32.685	0.000	25.10	287.0	0.000	0.00	6.65	0.00	
10	10.29	0.00	32.686	0.000	25.12	285.5	0.029	0.02	6.52	0.00	
20	10.26	0.00	32.704	0.000	25.14	283.8	0.058	0.06	6.60	0.00	
30	10.29	0.00	32.714	0.000	25.14	283.8	0.087	0.13	6.61	0.00	
50	9.91	0.00	33.045	0.000	25.46	253.6	0.141	0.35	5.57	0.00	
75	9.40	0.00	33.387	0.000	25.81	220.7	0.200	0.73	4.02	0.00	
100	8.94	0.00	33.579	0.000	26.11	192.5	0.253	1.19	3.51	0.00	
150	8.21	0.00	33.928	0.000	26.42	164.1	0.342	2.33	1.98	0.00	
200	7.78	0.00	33.986	0.000	26.53	154.5	0.423	3.77	2.25	0.02	1.15
250	7.27	0.01	34.030	0.000	26.64	144.9	0.498	5.50	1.78	0.05	1.15
300	6.78	0.00	34.065	0.002	26.73	136.4	0.569	7.50	1.31	0.01	0.97
400	5.98	0.01	34.110	0.006	26.87	123.9	0.700	12.20	0.88	0.06	0.76
500	5.35	0.00	34.153	0.002	26.99	113.9	0.820	17.72	0.69	0.00	0.92
600	4.86	0.01	34.222	0.006	27.10	103.9	0.931	23.92	0.49	0.00	0.68
700	4.48	0.01	34.291	0.002	27.19	95.3	1.031	30.63	0.36	0.00	0.85
800	4.21	0.02	34.344	0.002	27.26	89.2	1.124	37.81	0.30	0.01	0.70
1000	3.78	0.01	34.425	0.001	27.37	79.8	1.295	53.55	0.33	0.00	0.91
1200	3.23	0.02	34.503	0.002	27.49	69.1	1.446	70.52	0.48	0.01	0.70
1500	2.55	0.04	34.569	0.005	27.60	58.1	1.640	97.17	0.78	0.02	1.65

CNAV OSHAWA CRUISE 051 STATION 025 OBSERVED VALUES

DATE 18/03/63 HR 21.0 LAT 43-14 N LONG 124-53 W SNDG 384 WEA 03 WIND VEL 0 DIR 99
 BAROM 26.0 TEMP DRY 11.7 WET 11.7 RELHU 99 WTRCLR SEA 1 DIR 32 SWELL 2 DIR 30
 CLOUD TYPE 8 AMT 6 VIS 7 WIRE ANGLE(S) 0, 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	10.31	32.677	25.11	6.69	0.598	-0.046	108	
1	5	10.27	32.691	25.13	6.65	0.594	-0.042	108	
1	10	10.18	32.717	25.16	6.66	0.595	-0.042	108	
1	20	10.12	32.699	25.16	6.66	0.595	-0.041	107	
1	30	10.12	32.715	25.17	6.50	0.581	-0.026	105	
1	50	9.55	33.186	25.63	5.01	0.447	0.112	80	
1	75	9.12	33.585	26.01	3.89	0.347	0.216	62	
1	100	8.72	33.773	26.22	3.21	0.287	0.281	50	
1	125	8.33	33.895	26.38	2.74	0.245	0.328	43	
1	150	8.20	33.914	26.41	2.57	0.230	0.345	40	
2	169	7.99	33.953	26.47	2.46	0.220	0.357	38	
2	193	7.32	34.015	26.62	2.08	0.186	0.400	32	
2	289	6.20	34.088	26.83	1.24	0.111	0.491	18	
2	361	5.86	34.122	26.90	1.00	0.089	0.517	15	

CNAV OSHAWA CRUISE 051 STATION 025 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	LAB-I	DECK-I
0		1.48		
6		1.55		
16		1.67		
31		1.19		

46.73 - WATER COLUMN VALUES

MESSANGER TIME 1302 INCOMING SOLAR RADIATION - AM 235 PM 193

CNAV OSHAWA		CRUISE OS1			STATION O25			INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	10.31	0.00	32.677	0.000	25.11	286.3	0.000	0.00	6.69	0.00		
10	10.18	0.00	32.717	0.000	25.16	281.4	0.029	0.02	6.66	0.00		
20	10.12	0.00	32.699	0.000	25.16	282.0	0.057	0.06	6.66	0.00		
30	10.12	0.00	32.715	0.000	25.17	281.0	0.086	0.13	6.50	0.00		
50	9.55	0.00	33.186	0.000	25.63	237.5	0.138	0.34	5.01	0.00		
75	9.12	0.00	33.585	0.000	26.01	201.8	0.193	0.69	3.89	0.00		
100	8.72	0.00	33.773	0.000	26.22	182.2	0.242	1.12	3.21	0.00		
150	8.20	0.00	33.914	0.000	26.41	165.0	0.329	2.23	2.57	0.00		
200	7.18	0.02	34.026	0.003	26.65	143.2	0.407	3.62	1.99	0.01	1.11	
250	6.46	0.07	34.077	0.010	26.79	130.5	0.476	5.20	1.48	0.02	1.26	
300	6.16	0.02	34.089	0.003	26.84	126.3	0.541	7.03	1.19	0.01	1.14	

CNAV OSHAWA		CRUISE OS1			STATION O26			OBSERVED VALUES				
DATE	HR	LAT	LONG	W	WEA	SEA	DIR	DIR	VEL	DIR	DIR	
18/03/63	23.0	43-14 N	124-39 W	137	01	0	DIR	99				
BAROM	26	TEMP	DRY	12.2	WET	11.7	RELHU	94	WTRCLR	SNDCI	137	
CLOUD	TYPE	8	AMT	3	VIS	7	WIRE	ANGLE(S)	0	SMELL	2	
											DIR	
											28	
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	AOU	SATN				
1	0	10.27	32.582	25.04	6.82	0.609	-0.056	110				
1	5	10.26	32.588	25.05	6.78	0.606	-0.053	110				
1	10	10.26	32.588	25.05	6.84	0.611	-0.058	111				
1	20	10.18	32.589	25.06	6.80	0.607	-0.054	110				
1	30	10.13	32.644	25.11	6.65	0.594	-0.040	107				
1	50	9.61	33.303	25.71	4.93	0.440	0.118	79				
1	75	8.48	33.765	26.25	3.02	0.270	0.301	47				
1	100	7.88	33.932	26.47	2.42	0.216	0.362	37				
1	135	7.37	34.002	26.60	1.92	0.171	0.414	29				

FIVE MILE POINT

CNAV OSHAWA CRUISE 051 STATION 026 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY
LAB-I DECK-I

0 1.12
6 1.21
16 1.32
31 1.08

37.62 - WATER COLUMN VALUES

MESSANGER TIME 1500 INCOMING SOLAR RADIATION - AM 235 PM 193

CNAV OSHAWA CRUISE 051 STATION 026		INTERPOLATED AND COMPUTED VALUES								
DEPTH	TEMP E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.27	32.582	0.000	25.04	292.6	0.000	0.00	6.82	0.00	
10	10.26	32.588	0.000	25.05	292.2	0.030	0.02	6.84	0.00	
20	10.18	32.589	0.000	25.06	291.1	0.059	0.06	6.80	0.00	
30	10.13	32.644	0.000	25.11	286.4	0.088	0.14	6.65	0.00	
50	9.61	33.303	0.000	25.71	229.8	0.140	0.34	4.93	0.00	
75	8.48	33.765	0.000	26.25	178.8	0.192	0.67	3.02	0.00	
100	7.88	33.932	0.000	26.47	158.2	0.234	1.04	2.42	0.00	

CNAV OSHAWA CRUISE OS1 STATION 027 OBSERVED VALUES

CAPE FOULWEATHER

DATE 19/03/63 HR 06.2 LAT 44-44 N LONG 124-09 W SNDG 64 WEA 02 WIND VEL 12 DIR 18
 BAROM 26.0 TEMP DRY 10.0 WET 9.4 RELHU 93 WTRCLR SECDI 64 SEA 2 DIR 18 SWELL 2 DIR 30
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 8

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.68	32.073	24.74	6.77	0.605	-0.043	108	
1	5	9.69	32.081	24.75	5.62	0.502	0.060	89	
1	10	9.65	32.122	24.79	5.01	0.447	0.115	80	
1	19	9.34	32.941	25.48	4.36	0.389	0.174	69	
1	29	9.39	33.055	25.56	3.73	0.333	0.229	59	
1	49	9.07	33.444	25.91	3.38	0.302	0.263	53	

CNAV OSHAWA CRUISE OS1 STATION 027 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.68	0.00	32.073	0.000	24.74	321.1	0.000	0.00	6.77	0.00	
10	9.65	0.00	32.122	0.000	24.79	317.1	0.033	0.02	5.01	0.00	
20	9.34	0.01	32.970	0.013	25.50	249.7	0.061	0.06	4.29	0.00	0.88
30	9.40	0.01	33.045	0.016	25.55	245.2	0.086	0.12	3.68	0.00	1.23

CNAV OSHAWA CRUISE 051 STATION 028 OBSERVED VALUES

DATE 19/03/63 HR 08.5 LAT 44-44 N LONG 124-35 W MEA 03 WIND VEL 20 DIR 18
 BAROM 24.0 TEMP DRY 10.0 WET 10.0 RELHU 99 WTRCLR SNRG 238 SEA 3 DIR 18 SWELL 4 DIR 22
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					MGA/L	ML/L		
1	0	9.84	31.368*	24.17	7.03*	0.628	-0.064	111
1	5	9.77	31.350	24.17	6.99	0.624	-0.059	110
1	10	9.76			6.97	0.623		
1	20	9.80	32.001	24.67	6.56	0.586	-0.025	104
1	30	9.92	32.423	24.98	6.46	0.577	-0.019	103
1	50	9.96	32.750	25.23	5.92	0.529	0.027	95
1	75	9.55	33.067	25.54	5.09	0.455	0.105	81
1	100	9.10	33.439	25.90	4.27	0.381	0.183	68
1	125	8.69	33.745	26.21	3.20	0.286	0.282	50
1	150	8.12	33.857	26.38	2.80	0.250	0.325	43
1	175	7.81	33.923	26.48	2.61	0.233	0.346	40

CNAV OSHAWA CRUISE 051 STATION 028 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.84	0.00		0.000	24.34	359.8			6.97	0.00	
10	9.76	0.00	31.569	0.000	24.67	328.6			6.56	0.00	
20	9.80	0.00	32.001	0.000	24.98	299.4			6.46	0.00	
30	9.92	0.00	32.423	0.000							
50	9.96	0.00	32.750	0.000	25.23	276.2			5.92	0.00	
75	9.55	0.00	33.067	0.000	25.54	246.7			5.09	0.00	
100	9.10	0.00	33.439	0.000	25.90	212.7			4.27	0.00	
150	8.12	0.00	33.857	0.000	26.38	168.0			2.80	0.00	

CNAV OSHAWA CRUISE 051 STATION 029 OBSERVED VALUES

DATE 19/03/63 HR 10.5 LAT 44-44 N LONG 124-56 W WEA 02 WIND VEL 18 DIR 21
 BAROM 25.0 TEMP DRY 10.0 WET 10.0 RELHU 99 WTRCLR SNDDG 640 SEA 3 DIR 18 SWELL 4 DIR 22
 CLOUD TYPE AMT 8 VIS 6 WIRE ANGLE(S) 10.29 WTRCLR SNDDG 640 SEA 3 DIR 18 SWELL 4 DIR 22

CST	DEPTH	TEMP	SAL	SIGMA-T	OXYGEN		ADU	SATN
					ML/L	MGA/L		
1	0	9.84	31.844	24.54	6.96	0.622	-0.061	111
1	5	9.84	31.844	24.54	6.99	0.624	-0.063	111
1	10	9.85	31.851	24.54	6.98	0.623	-0.063	111
1	20	9.73	32.011	24.69	6.78	0.606	-0.044	108
1	29	9.78	32.308	24.91	6.43	0.574	-0.014	103
1	49	9.90	33.042	25.46	5.58	0.498	0.057	90
1	74	9.81	33.256	25.64	5.22	0.466	0.090	84
1	99	9.28	33.515	25.93	4.14	0.370	0.192	66
1	123	8.78	33.653	26.12	3.38	0.302	0.266	53
2	146	8.67	33.774	26.23	3.02	0.270	0.299	47
1	148	8.43	33.825	26.31	2.92	0.261	0.311	46
2	169	8.12	33.883	26.40	2.79	0.249	0.326	43
2	256	6.94	33.997	26.66	2.14	0.191	0.400	32
2	436	5.22	34.109	26.97	0.93	0.083	0.533	13

CNAV OSHAWA		CRUISE OSI			STATION 029			INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	9.84	0.00	31.844	0.000	24.54	340.5	0.000	0.00	6.96	0.00		
10	9.85	0.00	31.851	0.000	24.54	340.3	0.035	0.02	6.98	0.00		
20	9.73	0.00	32.011	0.000	24.69	326.8	0.068	0.07	6.78	0.00		
30	9.79	0.00	32.349	0.005	24.94	302.8	0.100	0.15	6.38	0.00	0.99	
50	9.90	0.00	33.058	0.005	25.47	252.5	0.156	0.37	5.57	0.01	0.95	
75	9.79	0.00	33.267	0.001	25.66	235.8	0.218	0.77	5.18	0.01	0.94	
100	9.26	0.00	33.522	0.001	25.94	209.0	0.274	1.27	4.10	0.00	0.94	
150	8.50	0.07	33.812	0.012	26.29	177.0	0.371	2.49	2.94	0.02	0.88	
200	7.68	0.00	33.938	0.006	26.51	156.6	0.455	3.99	2.57	0.01	1.42	
250	7.02	0.00	33.993	0.002	26.65	144.1	0.531	5.74	2.19	0.00	0.90	
300	6.42	0.01	34.010	0.020	26.74	135.6	0.601	7.72	1.79	0.03	7.48	
400	5.47	0.01	34.055	0.030	26.89	121.6	0.731	12.36	1.10	0.04	12.44	

CNAV OSHAWA CRUISE OSI STATION 030 OBSERVED VALUES

DATE	HR	LAT	LONG	WIND DIR	WIND VEL	SEA DIR	SEA SWELL	DIR
19/03/63	13.3	44.42 N	125.18 W	2304	02	27		
BAROM	DRY	10.0	WET	8.9	RELHU	87	WTRCLR	
CLOUD	TYPE	AMT	8	WIRE	ANGLE(S)	20	SECDI	
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU
1	0	10.44	32.784	25.18	6.48	0.579	-0.029	105
1	5	10.35	32.802	25.21	6.48	0.579	-0.027	105
1	9	10.35	32.788	25.19	6.49	0.580	-0.029	105
1	19	10.37	32.794	25.19	6.49	0.580	-0.029	105
1	28	10.37	32.784	25.18	6.40	0.572	-0.021	104
1	47	10.36	32.786	25.19	6.27	0.560	-0.009	102
1	70	9.20	33.188	25.69	5.29	0.472	0.091	84
1	94	8.80	33.536	26.03	3.96	0.354	0.214	62
1	117	8.53	33.770	26.25	3.24	0.289	0.281	51
1	141	8.00	33.871	26.41	2.90	0.259	0.318	45
1	164	7.46	33.918	26.52	2.81	0.251	0.333	43

DEPTH	CNAV OSHAWA			CRUISE OSI			STATION 030			INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO					
0	10.44	0.00	32.784	0.000	25.17	280.4	0.000	0.00	6.48	0.00	1.00					
10	10.35	0.00	32.788	0.001	25.19	278.9	0.029	0.01	6.49	0.00	0.85					
20	10.37	0.00	32.793	0.000	25.19	279.0	0.057	0.06	6.48	0.00	0.96					
30	10.39	0.01	32.776	0.004	25.17	280.8	0.085	0.13	6.40	0.01						
50	10.22	0.04	32.828	0.009	25.24	274.6	0.141	0.36	6.18	0.01	0.85					
75	9.08	0.02	33.268	0.001	25.77	224.6	0.204	0.76	5.00	0.02	0.77					
100	8.74	0.01	33.608	0.001	26.09	194.7	0.257	1.23	3.73	0.01	0.71					
150	7.78	0.00	33.890	0.001	26.46	160.7	0.346	2.35	2.85	0.00	4.70					

CNAV OSHAWA CRUISE OSI STATION 30A BIOLOGICAL DATA
 DATE 19/03/63 LAT 44-44 N LONG 125-29 W

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	1.60	32.06	32.16	32.536
0				

MESSENGER TIME 0625 INCOMING SOLAR RADIATION - AM 190 PM 166
 THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT INTENSITY INSTEAD OF 100 PERCENT

CNAV OSHAWA CRUISE 051 STATION 031 OBSERVED VALUES

DATE 19/03/63 HR 15.6 LAT 44-42 N LONG 125-42 W SNOG 2834 WEA 50 WIND VEL 25 DIR 20
 BAROM 21.0 TEMP DRY 10.0 WET 10.0 RELHU 99 WTRCLR SEA 3 DIR 22 SWELL 3 DIR 27
 CLOUD TYPE AMT 7 VIS 7 WIRE ANGLE(S) 10,22

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L	ML/L		
1	0	10.01	32.598	25.10	6.56	0.586	-0.030	105
1	5	9.99	32.605	25.11	6.49	0.580	-0.024	104
1	10	10.01	32.610	25.11	6.49	0.580	-0.024	104
1	20	10.00	32.606	25.11	6.50	0.581	-0.025	104
1	29	10.01	32.601	25.10	6.57	0.587	-0.031	106
1	49	9.94	32.609	25.12	6.50	0.581	-0.024	104
1	74	10.03	33.095	25.48	5.69	0.508	0.046	92
1	99	9.38	33.505	25.91	4.41	0.394	0.166	70
1	123	8.78	33.758	26.20	3.29	0.294	0.273	52
1	148	8.30	33.836	26.34	2.99	0.267	0.306	47
2	164	8.09	33.839*	26.37	2.72	0.243	0.333	42
2	187	7.60	33.897	26.49	2.12	0.189	0.393	33
2	282	6.39	33.980	26.72	2.14	0.191	0.408	32
2	472	5.22	34.124	26.98	0.84	0.075	0.541	12
2	712	4.34	34.279	27.20	0.26	0.023	0.606	4
2	952	3.74	34.370	27.33	0.26	0.023	0.615	4
2	1434	2.72	34.502	27.53	0.64	0.057	0.597	9
2	1723	2.25	34.554	27.62	1.04	0.093	0.570	14

CNAV OSHAWA		CRUISE OS1			STATION O31		INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	10.01	0.00	32.598	0.000	25.10	287.3	0.000	0.00	6.56	0.00	0.99		
10	10.01	0.00	32.610	0.000	25.11	286.6	0.029	0.02	6.49	0.00	0.95		
20	10.00	0.00	32.606	0.000	25.11	286.9	0.058	0.06	6.50	0.00	0.94		
30	10.01	0.00	32.597	0.002	25.10	287.9	0.087	0.13	6.58	0.00	0.94		
50	9.95	0.01	32.624	0.004	25.13	285.4	0.145	0.37	6.48	0.00	0.96		
75	10.01	0.00	33.114	0.000	25.50	250.6	0.212	0.80	5.64	0.00	0.94		
100	9.35	0.00	33.519	0.000	25.92	210.7	0.271	1.31	4.35	0.00	0.94		
150	8.27	0.00	33.840	0.000	26.34	171.6	0.367	2.53	2.96	0.00	0.96		
200	7.38	0.02	33.911	0.002	26.53	154.4	0.449	3.99	2.02	0.09	1.24		
250	6.70	0.03	33.958	0.003	26.66	142.5	0.524	5.72	1.93	0.17	1.11		
300	6.23	0.02	33.995	0.000	26.75	134.4	0.594	7.68	2.04	0.04	0.96		
400	5.54	0.05	34.072	0.000	26.90	121.2	0.723	12.29	1.39	0.10	0.75		
500	5.09	0.01	34.145	0.001	27.01	111.5	0.840	17.69	0.73	0.01	0.87		
600	4.69	0.02	34.213	0.001	27.11	102.7	0.948	23.79	0.42	0.03	0.67		
700	4.37	0.00	34.272	0.000	27.19	95.4	1.048	30.46	0.27	0.00	0.93		
800	4.10	0.01	34.317	0.002	27.25	89.8	1.142	37.67	0.22	0.02	0.64		
1000	3.63	0.00	34.386	0.000	27.36	80.9	1.315	53.58	0.28	0.00	0.95		
1200	3.18	0.00	34.446	0.000	27.45	72.7	1.470	71.11	0.40	0.01	0.89		
1500	2.60	0.00	34.515	0.000	27.56	62.7	1.676	99.53	0.72	0.00	0.95		

CNAV OSHAWA CRUISE 051 STATION 032 OBSERVED VALUES

DATE 19/03/63 HR 19.3 LAT 44-45 N LONG 126-01 W SNDG 2834 WEA 01 WIND VEL 20 DIR 22
 BAROM 22.0 TEMP DRY 11.1 WET 11.1 RELHU 99 WTRCLR SECD1 SEA 3 DIR 22 SWELL 3 DIR 27
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L			
1	0	10.30	32.626	25.07	6.52	0.582	-0.029	105
1	5	10.20	32.640	25.10	6.58	0.588	-0.034	106
1	10	10.21	32.616	25.08				
1	20	10.21	32.638	25.10	6.49	0.580	-0.026	105
1	30	10.19	32.704	25.15	6.37	0.569	-0.016	103
1	50	10.20	32.721	25.16	6.24	0.557	-0.004	101
1	75	9.82	33.055	25.49	5.45	0.487	0.070	87
1	100	9.00	33.553	26.01	3.93	0.351	0.214	62
1	125	8.61	33.798	26.26	3.08	0.275	0.294	48
1	150	8.34	33.877	26.36	2.80	0.250	0.322	44
1	175	7.85	33.964	26.50	2.63	0.235	0.344	41

CNAV OSHAWA CRUISE 051 STATION 032 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	1-23	27.32	32.631
4	1-16	27.60	32.666
20	1-33	6.80	32.650
44	0-74	0.00	32.712

49.49 466.58 - WATER COLUMN VALUES

MESSANGER TIME 1119 INCOMING SOLAR RADIATION - AM 190 PM 166

CNAV OSHAWA		CRUISE OSI		STATION 032		INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	10.30	0.00	32.626	0.000	25.07	289.9	0.000	0.00	6.52	0.00		
10	10.21	0.00	32.616	0.000	25.08	289.3	0.030	0.02	6.58	0.01	1.12	
20	10.21	0.00	32.638	0.000	25.10	287.9	0.059	0.06	6.49	0.00		
30	10.19	0.00	32.704	0.000	25.15	282.9	0.087	0.13	6.37	0.00		
50	10.20	0.00	32.721	0.000	25.16	282.2	0.144	0.37	6.24	0.00		
75	9.82	0.00	33.055	0.000	25.49	251.9	0.212	0.79	5.45	0.00		
100	9.00	0.00	33.553	0.000	26.01	202.7	0.269	1.30	3.93	0.00		
150	8.34	0.00	33.877	0.000	26.36	169.8	0.363	2.48	2.80	0.00		

CNAV OSHAWA CRUISE 051 STATION 033 OBSERVED VALUES

DATE 19/03/63 HR 22.7 LAT 44-44 N LONG 126-35 W WEA 03 WIND VEL 25 DIR 22
 BAROM 20.0 TEMP DRY 11.1 WET 11.1 RELHU 99 WTRCLR SEA 2 DIR 22 SWELL 3 DIR 25
 CLOUD TYPE 6 AMT 8 VIS 7 WIRE ANGLE(S) 0.27 SEC DI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	10.35	32.650	25.08	6.61	0.590	-0.039		107
1	5	10.34	32.648	25.08	6.64	0.593	-0.041		108
1	10	10.31	32.653	25.09	6.64	0.593	-0.041		107
1	20	10.33	32.644	25.08	6.59	0.589	-0.037		107
1	30	10.31	32.664	25.10	6.62	0.591	-0.039		107
1	50	10.21	32.676	25.13	6.47	0.578	-0.025		104
1	75	10.02	32.741	25.21	6.45	0.576	-0.021		104
1	100	9.12	33.240	25.74	5.08	0.454	0.111		80
1	125	8.78	33.545	26.04	3.91	0.349	0.219		61
1	150	8.54	33.752	26.23	3.28	0.293	0.277		51
2	155	7.91	33.878	26.43	2.97	0.265	0.313		46
2	177	7.71	33.921	26.49	2.78	0.248	0.332		43
2	265	6.67	33.998	26.70	2.09	0.187	0.408		31
2	442	5.56	34.090	26.91	1.05	0.094	0.517		15
2	662	4.41	34.269	27.18	0.30	0.027	0.601		4
2	897	3.77	34.374	27.33	0.24	0.021	0.616		3
2	1380	2.69	34.514	27.55	0.61	0.054	0.601		8
2	1674	2.25	34.560	27.62	0.99	0.088	0.574		13
2	1969	1.95	34.590	27.67	1.44	0.129	0.539		19
2	2266	1.80	34.624	27.71	1.70	0.152	0.518		23

CNAV OSHAWA			CRUISE 051			STATION 033			INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO					
0	10.35	0.00	32.650	0.000	25.08	288.9	0.000	0.00	6.61	0.00						
10	10.31	0.00	32.653	0.000	25.09	288.2	0.030	0.02	6.64	0.00						
20	10.33	0.00	32.644	0.000	25.08	289.4	0.059	0.06	6.59	0.00						
30	10.31	0.00	32.664	0.000	25.10	287.8	0.088	0.13	6.62	0.00						
50	10.21	0.00	32.676	0.000	25.13	285.7	0.146	0.37	6.47	0.00						
75	10.02	0.00	32.741	0.000	25.21	278.3	0.217	0.83	6.45	0.00						
100	9.12	0.00	33.240	0.000	25.74	227.8	0.280	1.39	5.08	0.00						
150	8.54	0.00	33.752	0.000	26.23	182.0	0.384	2.69	3.26	0.00						
200	7.44	0.02	33.949	0.004	26.55	152.4	0.468	4.18	2.59	0.00	1.34					
250	6.85	0.02	33.991	0.003	26.67	142.0	0.542	5.89	2.20	0.00	0.89					
300	6.39	0.03	34.018	0.003	26.75	134.7	0.612	7.86	1.85	0.00	0.91					
400	5.76	0.03	34.070	0.004	26.87	124.0	0.742	12.53	1.26	0.00	0.76					
500	5.22	0.01	34.137	0.005	26.99	113.5	0.862	18.05	0.79	0.00	0.75					
600	4.69	0.01	34.219	0.005	27.11	102.2	0.971	24.18	0.45	0.00	0.71					
700	4.28	0.01	34.290	0.001	27.21	93.1	1.070	30.75	0.26	0.01	0.82					
800	3.99	0.02	34.338	0.003	27.28	87.1	1.161	37.76	0.21	0.02	0.60					
1000	3.51	0.00	34.411	0.001	27.39	77.6	1.328	53.10	0.28	0.01	0.93					
1200	3.05	0.00	34.472	0.001	27.48	69.2	1.476	69.86	0.41	0.01	0.88					
1500	2.49	0.00	34.536	0.001	27.58	59.9	1.673	96.96	0.75	0.00	0.60					
2000	1.93	0.00	34.593	0.000	27.67	51.3	1.955	147.40	1.48	0.00	1.10					

CNAV OSHAWA CRUISE 031 STATION 034 OBSERVED VALUES

DATE 20/03/63 HR 03.2 LAT 44-42 N LONG 127-12 W SNDCG 2871 WEA 50 WIND VEL 25 DIR 20
 BAROM 16.0 TEMP DRY 10.0 WET 10.0 RELHU 99 WTRCLR SEA 3 DIR 20 SWELL 4 DIR 30
 CLOUD TYPE AMT 9 VIS 6 WIRE ANGLE(S) 13 SEC DI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	10.00	32.590	25.09	6.71	0.599	-0.043	108
1	5	9.91	32.590	25.11	5.54	0.495	0.062	89
1	10	9.92	32.638	25.14	5.90	0.527	0.030	95
1	19	9.94	32.579	25.10	6.34	0.566	-0.009	102
1	29	9.84	32.614	25.14	6.16	0.550	0.008	99
1	49	9.83	32.649	25.17	6.30	0.563	-0.005	101
1	73	9.78	32.617	25.15	5.67	0.506	0.052	91
1	97	8.37	33.378	25.97	3.87	0.346	0.228	60
1	121	8.86	33.805	26.23	3.03	0.271	0.295	48
1	146	8.46	33.845	26.32	2.93	0.228	0.343	60
1	170	7.75	33.864	26.44	2.55	0.262	0.318	55

CNAV OSHAWA CRUISE 031 STATION 034 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEO POT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.00	0.00	32.590	0.000	25.09	287.7	0.000	0.00	6.71	0.00	
10	9.92	0.00	32.638	0.000	25.14	283.1	0.029	0.02	5.90	0.00	
20	9.93	0.00	32.580	0.002	25.10	287.7	0.058	0.06	6.33	0.01	0.88
30	9.84	0.00	32.617	0.000	25.14	283.7	0.087	0.13	6.17	0.01	0.98
50	9.84	0.01	32.641	0.006	25.16	282.4	0.144	0.37	6.29	0.00	0.95
75	9.65	0.04	32.672	0.014	25.21	277.8	0.214	0.82	5.52	0.03	0.89
100	8.40	0.05	33.451	0.001	26.02	201.4	0.275	1.35	3.72	0.00	0.84
150	8.35	0.00	33.840	0.003	26.33	172.7	0.369	2.54	2.91	0.01	5.52

CNAV OSHAWA CRUISE OSI STATION 035 OBSERVED VALUES

DATE 20/03/63 HR 06-6 LAT 44-44 N LONG 127-25 W WEA 81 WIND VEL 24 DIR 20
 BAROM 15.0 TEMP DRY 10.0 WET 10.0 RELHU 99 WTRCLR SECDI 2852 SEA 3 DIR 20 SWELL 3 DIR 27
 CLOUD TYPE VIS 8 WIRE ANGLE(S) 13.27

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L			
1	0	10.19	32.593	25.06	6.49	0.580	-0.026	105
1	5	10.15	32.615	25.09	6.50	0.581	-0.026	105
1	10	10.17	32.623	25.09	6.58	0.588	-0.034	106
1	19	10.16	32.595	25.07	6.47	0.578	-0.024	104
1	29	10.14	32.593	25.07	6.45	0.576	-0.022	104
1	49	10.05	32.612	25.10	6.37	0.569	-0.014	102
1	73	10.06	32.598	25.09	6.37	0.569	-0.014	102
1	97	8.64	32.734	25.42	6.02	0.538	0.035	94
1	121	7.99	33.310	25.97	4.62	0.413	0.167	71
1	146	7.80	33.592	26.22	3.83	0.342	0.239	59
2	161	7.65	33.724	26.34	3.73	0.333	0.249	57
2	183	7.64	33.830	26.43	3.36	0.300	0.282	52
2	277	6.20	33.936	26.71	2.68	0.239	0.363	40
2	463	4.22	34.041	27.02	1.09	0.097	0.535	15
2	697	4.05	34.212	27.18	0.40	0.036	0.598	6
2	932	3.65	34.377	27.35	0.24	0.021	0.618	3
2	1402	2.69	34.507	27.54	0.61	0.054	0.601	8
2	1685	2.21	34.564	27.63	1.00	0.089	0.574	13

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION O35		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	10.19	0.00	32.593	0.000	25.06	290.5	0.000	0.00	6.49	0.00	0.88		
10	10.17	0.00	32.623	0.000	25.07	288.2	0.030	0.02	6.58	0.00	0.98		
20	10.16	0.00	32.594	0.000	25.07	290.4	0.059	0.06	6.47	0.00			
30	10.14	0.00	32.594	0.000	25.07	290.2	0.088	0.14	6.45	0.00			
50	10.06	0.01	32.610	0.001	25.10	288.2	0.146	0.37	6.37	0.00	0.95		
75	9.95	0.03	32.598	0.004	25.11	287.8	0.219	0.84	6.37	0.01	0.89		
100	8.53	0.01	32.802	0.013	25.49	251.4	0.287	1.44	5.86	0.03	0.84		
150	7.76	0.00	33.631	0.001	26.26	179.7	0.395	2.79	3.80	0.01	0.66		
200	7.45	0.06	33.871	0.013	26.49	158.4	0.481	4.31	3.19	0.04	1.32		
250	6.71	0.09	33.936	0.018	26.64	144.3	0.557	6.07	2.80	0.05	1.07		
300	5.88	0.01	33.952	0.003	26.76	133.1	0.627	8.03	2.47	0.02	0.94		
400	4.73	0.02	34.012	0.006	26.94	116.1	0.752	12.51	1.60	0.05	0.74		
500	4.11	0.06	34.067	0.001	27.05	105.9	0.865	17.67	0.91	0.02	0.83		
600	3.98	0.11	34.139	0.002	27.13	99.9	0.969	23.53	0.57	0.04	0.68		
700	4.05	0.00	34.214	0.000	27.13	95.9	1.067	30.14	0.40	0.00	0.98		
800	3.89	0.01	34.289	0.002	27.25	89.5	1.161	37.36	0.28	0.01	0.61		
1000	3.51	0.01	34.405	0.005	27.38	78.1	1.331	52.95	0.25	0.01	0.94		
1200	3.10	0.02	34.470	0.009	27.47	70.0	1.481	69.86	0.37	0.02	0.88		
1500	2.51	0.01	34.523	0.004	27.57	61.0	1.680	97.36	0.74	0.01	0.89		

CNAV OSHAWA CRUISE 031 STATION 036 OBSERVED VALUES
 DATE 20/03/63 HR 14.4 LAT 44-42 N LONG 128-54 W WEA 02 WIND VEL 42 DIR 19
 BAROM 04. TEMP DRY VIS WET WIRE ANGLE(S) 23 WTRCLR SECDI SEA 4 DIR 19 SWELL 5 DIR 21
 CLOUD TYPE

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	10.27	32.636	25.08	6.34	0.566	-0.014	102	
1	5	10.27	32.639	25.09	6.34	0.566	-0.014	102	
1	9	10.29	32.635	25.08	6.40	0.572	-0.019	103	
1	18	10.28	32.635	25.08	6.35	0.567	-0.015	103	
1	28	10.28	32.641	25.09	6.34	0.566	-0.014	103	
1	46	10.28	32.678	25.12	6.29	0.562	-0.009	102	
1	69	10.22	32.634	25.09	6.28	0.561	-0.007	101	
1	92	10.19	32.634	25.10					
1	115	8.19	33.040	25.73	5.42	0.484	0.094	84	
1	138	7.85	33.420	26.08	4.55	0.406	0.175	70	

CNAV OSHAWA CRUISE 031 STATION 036 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.30	4.42	32.630
0		3.36	

MESSENGER TIME 0635 INCOMING SOLAR RADIATION - AM 48 PM 40

THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT INTENSITY INSTEAD OF 100 PERCENT

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 036		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	10.27	0.00	32.636	0.000	25.08	288.6	0.000	0.00	6.34	0.00	0.99		
10	10.29	0.00	32.635	0.000	25.08	289.3	0.030	0.02	6.40	0.00	1.04		
20	10.28	0.00	32.636	0.000	25.08	289.2	0.059	0.06	6.35	0.00	1.11		
30	10.28	0.00	32.646	0.002	25.09	288.7	0.088	0.14	6.34	0.01	0.82		
50	10.27	0.00	32.672	0.004	25.11	286.9	0.146	0.37	6.33	0.00	0.72		
75	10.31	0.06	32.612	0.012	25.06	292.4	0.219	0.84	6.33	0.03	0.67		
100	9.51	0.14	32.754	0.016	25.30	269.8	0.290	1.48	6.03	0.03			

CNAV OSHAMA CRUISE 051 STATION 037 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.18	3.06		32.588
7	0.18	1.78		32.604
24	0.15	0.30		32.595
51	0.20	0.00		32.632

8.82 38.68 - WATER COLUMN VALUES

MESSENGER TIME 1202 INCOMING SOLAR RADIATION - AM 48 PM 40

CNAV OSHAWA		CRUISE OSI			STATION 037		INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	10.16	0.00	32.592	0.000	25.07	290.1	0.000	0.00	6.42	0.00	1.13		
10	10.17	0.00	32.610	0.000	25.08	289.2	0.030	0.02	6.35	0.01			
20	10.18	0.00	32.628	0.000	25.09	288.2	0.059	0.06	6.38	0.00			
30	10.17	0.00	32.629	0.000	25.10	288.1	0.088	0.13	6.37	0.00	0.99		
50	10.20	0.01	32.632	0.000	25.09	288.7	0.146	0.37	6.32	0.00	0.95		
75	10.21	0.01	32.656	0.001	25.11	287.7	0.218	0.84	6.27	0.00	0.94		
100	9.81	0.01	32.760	0.000	25.42	258.6	0.287	1.45	6.00	0.01	0.94		
150	7.54	0.00	33.624	0.004	26.28	177.2	0.397	2.81	4.18	0.01	0.86		
200	7.06	0.00	33.894	0.010	26.56	151.4	0.480	4.28	3.51	0.01	1.12		
250	6.47	0.01	33.963	0.035	26.70	139.0	0.553	5.97	3.00	0.04	1.20		
300	5.92	0.00	33.947	0.000	26.75	133.9	0.622	7.91	2.59	0.01	0.98		
400	5.05	0.00	34.028	0.002	26.92	118.6	0.749	12.45	1.69	0.03	0.76		
500	4.47	0.01	34.111	0.000	27.05	106.6	0.863	17.67	0.97	0.01	0.93		
600	4.18	0.06	34.189	0.001	27.14	98.4	0.966	23.51	0.54	0.03	0.67		
700	4.02	0.03	34.259	0.001	27.22	92.2	1.063	29.93	0.30	0.01	0.84		
800	3.84	0.00	34.318	0.001	27.28	86.6	1.153	36.90	0.21	0.02	0.70		
1000	3.40	0.00	34.409	0.001	27.40	76.5	1.318	52.08	0.27	0.00	0.98		
1200	2.99	0.01	34.471	0.004	27.49	68.5	1.465	68.64	0.43	0.02	0.89		
1500	2.44	0.00	34.535	0.000	27.59	59.3	1.660	95.48	0.79	0.00	0.87		
2000	1.91	0.01	34.605	0.000	27.68	50.2	1.938	145.09	1.45	0.00	2.87		
2500	1.79	0.00									7.54		

CNAV OSHAWA CRUISE 051 STATION 038 OBSERVED VALUES

DATE 21/03/63 HR 05.4 LAT 46.14 N LONG 128.46 W SMDG 2560 WEA 62 WIND VEL 28 DIR 03
 BAROM 05. TEMP DRY 7.8 WET 7.8 RELHU 99 WTRCLR SEA 4 DIR 02 SWELL 2 DIR 36
 CLOUD TYPE VIS 6 WIRE ANGLE(S) 21.32

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.61	32.521	25.10	6.49	0.580	0.018	103	
1	5	9.60	32.514	25.10	6.49	0.580	0.018	103	
1	19	9.67	32.538	25.11	6.47	0.578	0.017	103	
1	28	9.66	32.566	25.13	6.51	0.581	0.021	104	
1	47	9.53	32.544	25.14	6.49	0.580	0.019	103	
1	70	9.45	32.533	25.14	6.52	0.582	0.020	104	
1	93	9.36	32.555	25.17	6.49	0.580	0.017	103	
1	117	7.35	32.955	25.78	6.42	0.573	0.009	102	
1	140	6.71	33.279	26.13	5.84	0.522	0.068	88	
2	152	6.80	33.286	26.12	5.41	0.483	0.174	81	
2	173	6.80	33.504	26.29	5.34	0.477	0.119	80	
2	259	6.71	33.938	26.64	4.91	0.439	0.157	74	
2	439	5.86	34.060	26.85	2.77	0.247	0.347	42	
2	665	4.26	34.214	27.16	1.04	0.093	0.514	15	
2	894	3.67	34.340	27.32	0.34	0.030	0.600	5	
2	1352	2.66	34.483	27.52	0.24	0.021	0.618	3	
2	1633	2.26	34.564	27.62	0.58	0.052	0.604	8	
					0.90	0.080	0.582	12	

CNAV OSHAWA		CRUISE OSI			STATION 038			INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	9.61	0.00	32.521	0.000	25.10	286.8	0.000	0.00	6.49	0.00	1.00		
10	9.64	0.00	32.531	0.001	25.11	286.6	0.029	0.02	6.47	0.00	0.85		
20	9.67	0.00	32.541	0.001	25.11	286.6	0.058	0.06	6.51	0.00	0.96		
30	9.65	0.00	32.566	0.002	25.13	284.6	0.087	0.13	6.49	0.00			
50	9.52	0.00	32.541	0.000	25.13	284.8	0.144	0.37	6.52	0.00	0.85		
75	9.52	0.05	32.521	0.009	25.12	286.6	0.216	0.83	6.50	0.01	0.75		
100	8.80	0.11	32.655	0.015	25.34	266.4	0.286	1.45	6.27	0.02	0.71		
150	6.78	0.01	33.286	0.005	26.12	192.1	0.402	2.89	5.35	0.01	0.75		
200	6.79	0.00	33.693	0.018	26.44	162.7	0.491	4.48	4.23	0.05	1.40		
250	6.73	0.00	33.916	0.008	26.62	146.0	0.569	6.27	2.99	0.02	0.88		
300	6.57	0.02	34.013	0.031	26.72	137.5	0.640	8.28	2.17	0.08	0.91		
400	6.10	0.01	34.079	0.030	26.83	127.7	0.774	13.07	1.21	0.08	0.77		
500	5.41	0.05	34.103	0.001	26.94	118.4	0.898	18.79	0.74	0.03	0.75		
600	4.70	0.05	34.171	0.001	27.07	105.8	1.011	25.16	0.43	0.04	0.71		
700	4.13	0.02	34.235	0.000	27.19	95.4	1.113	31.93	0.30	0.01	0.82		
800	3.85	0.04	34.292	0.000	27.26	88.7	1.206	39.10	0.23	0.02	0.59		
1000	3.41	0.01	34.380	0.004	27.37	78.8	1.376	54.69	0.28	0.01	0.92		
1200	2.96	0.01	34.444	0.005	27.47	70.3	1.527	71.70	0.41	0.02	0.87		
1500	2.42	0.00	34.522	0.003	27.58	60.1	1.725	99.04	0.75	0.01	0.77		

CNAV OSHAMA CRUISE 051 STATION 039 OBSERVED VALUES

DATE 21/03/63 HR 12.3 LAT 46-14 N LONG 127-37 W SMDG 2743 WEA 62 WIND VEL 35 DIR 12
 BAROM 97.0 TEMP DRY 9.47 WET 9.49 VIS 6 WIRE ANGLE(S) 23.50 WTRCLR SEA 4 DIR 12 SWELL 4 DIR 14
 CLOUD TYPE 1 1 1 1 1 1 1 1 2 2 2

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	MG/L	AOU	SECDI	SATN
1	0	9.47	32.532	25.14	6.53	0.583	-0.020		104	
1	5	9.49	32.515	25.12	6.54	0.584	-0.021		104	
1	9	9.47	32.510	25.12	6.65	0.594	-0.031		105	
1	18	9.51	32.532	25.13	6.51	0.581	-0.019		103	
1	28	9.51	32.538	25.13	6.56	0.586	-0.023		104	
1	46	9.42	32.529	25.14	6.51	0.581	-0.018		103	
1	69	9.28	32.522	25.16	6.51	0.581	-0.016		103	
1	92	9.07	32.683	25.32	6.09	0.544	0.024		96	
1	115	8.12	33.301	25.94	4.46	0.398	0.179		69	
1	138	7.63	33.670	26.30	3.75	0.335	0.248		57	
2	402	5.56	33.992	26.83	1.78	0.159	0.452		26	
2	617	4.59	34.145	27.07	0.56	0.050	0.576		8	
2	834	4.09	34.294	27.24	0.26	0.023	0.610		4	
2	1270	3.07	34.477	27.48	0.47	0.042	0.607		6	
2	1533	2.51	34.533	27.58	0.74	0.066	0.592		10	

DEPTH	CNAV OSHAWA		CRUISE OS1		STATION 039		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP_VCL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	9.47	0.00	32.532	0.000	25.14	283.8	0.000	0.00	6.53	0.00	0.97		
10	9.47	0.00	32.512	0.001	25.12	285.5	0.029	0.02	6.64	0.01	0.78		
20	9.51	0.00	32.534	0.000	25.13	284.6	0.058	0.06	6.51	0.01	0.93		
30	9.50	0.00	32.538	0.000	25.13	284.4	0.087	0.13	6.56	0.00			
50	9.40	0.00	32.522	0.004	25.14	284.4	0.144	0.37	6.52	0.01	0.82		
75	9.26	0.02	32.534	0.009	25.17	281.8	0.215	0.83	6.48	0.03	0.72		
100	8.76	0.05	32.886	0.027	25.52	248.5	0.282	1.42	5.54	0.08	0.67		
150	7.45	0.04	33.764	0.051	26.40	165.5	0.386	2.71	3.53	0.08	1.48		
200	6.81	0.17	33.785*		26.51	153.2	0.466	4.12	3.20*				
250	6.29	0.23	33.840*		26.62	142.7	0.541	5.81	2.82*				
300	5.91	0.22	33.890*		26.71	134.2	0.612	7.75	2.46*				
400	5.56	0.01	34.003	0.009	26.84	126.5	0.744	12.39	1.77	0.01	0.99		
500	5.05	0.01	34.068	0.004	26.95	116.6	0.866	18.04	1.15	0.02	0.62		
600	4.65	0.00	34.135	0.001	27.05	107.8	0.980	24.43	0.63	0.01	0.89		
700	4.37	0.02	34.205	0.001	27.14	100.4	1.085	31.44	0.37	0.03	0.64		
800	4.15	0.01	34.272	0.001	27.21	93.7	1.183	38.99	0.27	0.01	0.75		
1000	3.70	0.01	34.379	0.002	27.35	82.1	1.361	55.35	0.26	0.03	0.90		
1200	3.23	0.00	34.457	0.001	27.45	72.5	1.518	72.99	0.39	0.02	0.90		
1500	2.58	0.00	34.528	0.000	27.57	61.4	1.721	101.06	0.71	0.00	15.15		

MACHINE-INTERPOLATED VALUES OF SALINITY AND OXYGEN AT 200, 250 AND 300 METERS WERE UNREASONABLE BECAUSE OF POOR OBSERVED SPACING.

CNAV OSHAWA CRUISE 051 STATION 040 OBSERVED VALUES
 DATE 22/03/63 HR 06.3 LAT 46-14 N LONG 126-28 W SMDG WEA 01 WIND VEL 10 DIR 27
 BAROM 12.0 TEMP DRY 7.8 WET 7.8 RELHU 99 WTRCLR SEA 2 DIR 27 SWELL 3 DIR 27
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.37	32.482	25.11	6.49	0.580	-0.015	103	
1	5	9.35	32.480	25.11	6.61	0.590	-0.026	105	
1	10	9.32	32.482	25.12	6.60	0.589	-0.024	104	
1	20	9.35	32.487	25.12	6.56	0.586	-0.021	104	
1	30	9.35	32.486	25.12	6.56	0.586	-0.021	104	
1	49	9.36	32.486	25.12	6.54	0.584	-0.020	103	
1	74	9.23	32.531	25.17	6.42	0.573	-0.007	101	
1	99	8.56	33.321	25.89	4.24	0.379	0.193	66	
1	124	8.09	33.651	26.22	3.62	0.323	0.253	56	
1	149	7.91	33.798	26.36	3.21	0.287	0.292	50	
1	174	7.54	33.882	26.48	2.93	0.262	0.322	45	

CNAV OSHAWA		CRUISE 051 STATION 040			INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.37	0.00	32.482	0.000	25.11	286.0	0.000	0.00	6.49	0.00	
10	9.32	0.00	32.482	0.000	25.12	285.4	0.029	0.02	6.60	0.00	
20	9.35	0.00	32.487	0.000	25.12	285.7	0.058	0.06	6.56	0.00	
30	9.35	0.00	32.486	0.000	25.12	285.9	0.087	0.13	6.56	0.00	
50	9.36	0.00	32.480	0.004	25.11	286.9	0.145	0.37	6.56	0.01	0.95
75	9.21	0.00	32.560	0.008	25.20	279.0	0.216	0.83	6.34	0.02	0.94
100	8.54	0.00	33.340	0.002	25.91	211.6	0.278	1.37	4.20	0.01	0.94
150	7.90	0.00	33.802	0.001	26.37	169.0	0.374	2.58	3.20	0.00	1.04

CNAV OSHAWA CRUISE OSI STATION 041 OBSERVED VALUES
 DATE 22/03/63 HR 09.3 LAT 46-14 N LONG 125-54 W SNDG 2743 WEA 02 WIND VEL 3 DIR 36
 BAROM 13.0 TEMP DRY 8.9 WET 8.9 RELHU 99 WTRCLR SEA 2 DIR 27 SWELL 3 DIR 27
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 0,15,15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.44	32.428	25.06	6.53	0.583	-0.019		103
1	5	9.46	32.407	25.04	6.48	0.579	-0.015		103
1	10	9.47	32.402	25.03	6.56	0.586	-0.022		104
1	20	9.50	32.406	25.03	6.53	0.583	-0.020		104
1	30	9.49	32.408	25.04	6.50	0.581	-0.017		103
1	50	9.46	32.422	25.05	6.53	0.583	-0.020		103
1	75	9.52	32.536	25.13	6.42	0.573	-0.011		102
1	100	8.60	33.032	25.66	5.01	0.447	0.125		78
1	125	8.22	33.334	25.96	4.11	0.367	0.209		64
1	150	8.07	33.546	26.14	3.54	0.316	0.261		55
2	170	7.91	33.784	26.35	2.72	0.243	0.336		42
2	194	7.35	33.924	26.54	2.12	0.189	0.396		32
2	290	6.14	34.023	26.79	1.58	0.141	0.461		23
2	483	4.91	34.135	27.02	0.70	0.063	0.558		10
4	725	4.13	34.292	27.23	0.28	0.025	0.607		4
4	967	3.57	34.443	27.41	0.30	0.027	0.614		4
4	1450	2.58	34.509	27.55	0.67	0.060	0.597		9
4	1741	2.16	34.610	27.67	1.08	0.096	0.567		15

CNAV OSHAWA				CRUISE OSI				STATION 041				INTERPOLATED AND COMPUTED VALUES			
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO				
0	9.44	0.00	32.428	0.000	25.06	291.0	0.000	0.00	6.53	0.00					
10	9.47	0.00	32.402	0.000	25.03	293.6	0.030	0.02	6.56	0.00					
20	9.50	0.00	32.406	0.000	25.03	294.0	0.060	0.06	6.53	0.00					
30	9.49	0.00	32.408	0.000	25.04	293.8	0.089	0.14	6.50	0.00					
50	9.46	0.00	32.422	0.000	25.05	292.7	0.148	0.38	6.53	0.00					
75	9.52	0.00	32.536	0.000	25.13	285.6	0.221	0.85	6.42	0.00					
100	8.60	0.00	33.032	0.000	25.66	235.4	0.287	1.43	5.01	0.00					
150	8.07	0.00	33.546	0.000	26.14	190.4	0.394	2.78	3.54	0.00					
200	7.24	0.01	33.941	0.007	26.57	150.3	0.480	4.29	2.04	0.03					1.10
250	6.52	0.05	34.028	0.029	26.74	134.9	0.552	5.95	1.62	0.12					1.19
300	6.05	0.01	34.030	0.001	26.80	129.4	0.618	7.83	1.53	0.00					0.98
400	5.31	0.04	34.093	0.005	26.94	116.7	0.743	12.26	1.03	0.01					0.76
500	4.84	0.01	34.146	0.000	27.04	108.3	0.856	17.49	0.65	0.00					0.92
600	4.47	0.03	34.210	0.001	27.13	100.2	0.961	23.43	0.42	0.01					0.67
700	4.19	0.01	34.275	0.000	27.21	93.0	1.059	29.94	0.30	0.00					0.86
800	3.94	0.01	34.343	0.003	27.29	86.1	1.150	36.90	0.26	0.01					0.68
1000	3.49	0.00	34.450	0.005	27.42	74.6	1.312	51.84	0.31	0.00					0.96
1200	3.06	0.01	34.486	0.018	27.49	68.3	1.457	68.16	0.43	0.00					0.89
1500	2.50	0.00	34.517	0.004	27.57	61.3	1.654	95.43	0.73	0.00					0.97

CNAV OSHAWA CRUISE OSI STATION 042 OBSERVED VALUES

DATE 22/03/63 HR 13.6 LAT 46-12 N LONG 125-30 W SNGD 2195 WEA 02 WIND VEL 0 DIR 99
 BAROM 12.0 TEMP DRY 6.7 WET 4.4 RELHU 59 MTRCLR SEA 2 DIR 25 SWELL 2 DIR 27
 CLOUD TYPE AMT 3 VIS 7 WIRE ANGLE(S) 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.52	32.381	25.01	6.48	0.579	-0.016		103
1	5	9.42	32.360	25.01	6.53	0.583	-0.019		103
1	10	9.48	32.365	25.00	6.50	0.581	-0.017		103
1	20	9.50	32.360	25.00	6.51	0.581	-0.018		103
1	30	9.53	32.359	24.99	6.53	0.583	-0.020		104
1	50	9.57	32.390	25.01	6.53	0.583	-0.021		104
1	75	9.42	32.545	25.15	6.23	0.556	0.007		99
1	100	8.53	33.319	25.90	4.71	0.421	0.151		74
1	125	8.20	33.660	26.21	3.35	0.299	0.276		52
1	150	7.88	33.803	26.37	2.93	0.262	0.317		45
1	175	7.55	33.900	26.50	2.74	0.245	0.338		42

CNAV OSHAWA CRUISE OSI STATION 042 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.52	0.00	32.381	0.000	25.01	295.8	0.000	0.00	6.48	0.00	
10	9.48	0.00	32.365	0.000	25.00	296.5	0.030	0.02	6.50	0.00	
20	9.50	0.00	32.360	0.000	25.00	297.4	0.060	0.06	6.51	0.00	
30	9.53	0.00	32.359	0.000	24.99	298.1	0.090	0.14	6.53	0.00	
50	9.57	0.00	32.390	0.000	25.01	296.8	0.150	0.38	6.53	0.00	
75	9.42	0.00	32.545	0.000	25.15	283.4	0.223	0.85	6.23	0.00	
100	8.53	0.00	33.319	0.000	25.90	213.1	0.286	1.40	4.71	0.00	
150	7.88	0.00	33.803	0.000	26.37	168.6	0.382	2.61	2.93	0.00	

CNAV OSHAWA CRUISE DS1 STATION 42A BIOLOGICAL DATA
DATE 22/03/63 LAT 45-14 N LONG 125-24 W

DEPTH CHL-A PRODUCTIVITY SAL
LAB-I DECK-I

0 1.07 19.12 32.295
0 19.62

MESSENGER TIME 0630 INCOMING SOLAR RADIATION - AM 155 PM 163
THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
INTENSITY INSTEAD OF 100 PERCENT

CNAV OSHAWA CRUISE 051 STATION 043 OBSERVED VALUES

DATE 22/03/63 HR 15.8 LAT 46-12 N LONG 125-06 W WEA 03 WIND VEL 10 DIR 06
 BAROM 11.0 TEMP DRY 7.8 WET 6.1 REL HU 78 WTRCLR SECD1 SEA 1 DIR 06 SWELL 2 DIR 27
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 0.4

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L			
1	0	9.46	32.174	24.86	6.57	0.587	-0.022	104
1	5	9.49	32.172	24.85	6.63	0.592	-0.028	105
1	10	9.56	32.164	24.83	6.61	0.590	-0.027	105
1	20	9.55	32.165	24.84	6.58	0.588	-0.024	104
1	30	9.54	32.172	24.84	6.61	0.590	-0.027	105
1	50	9.56	32.189	24.85	6.60	0.589	-0.026	105
1	75	8.96	32.776	25.41	5.58	0.498	0.070	88
1	100	8.08	33.336	25.98	4.30	0.384	0.194	66
1	125	7.88	33.561	26.18	3.82	0.341	0.239	59
1	150	7.49	33.814	26.44	3.28	0.293	0.291	50
2	173	7.41	33.880	26.50	3.06	0.273	0.312	47
2	197	7.03	33.929	26.59	2.85	0.255	0.336	43
2	296	6.11	33.998	26.77	1.90	0.170	0.433	28
2	495	5.00	34.131	27.01	0.73	0.065	0.554	11
2	744	4.24	34.307	27.23	0.31	0.028	0.603	4
2	994	3.55	34.438	27.41	0.30	0.027	0.614	4
2	1394	2.82	34.504	27.53	0.65	0.058	0.595	9

CNAV OSHAWA		CRUISE OSI			STATION 043		INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	9.46	0.00	32.174	0.000	24.86	310.2	0.000	0.00	6.57	0.00			
10	9.56	0.00	32.164	0.000	24.83	312.6	0.032	0.02	6.61	0.00			
20	9.55	0.00	32.165	0.000	24.84	312.6	0.063	0.07	6.58	0.00			
30	9.54	0.00	32.172	0.000	24.84	312.1	0.095	0.15	6.61	0.00			
50	9.56	0.00	32.189	0.000	24.85	311.5	0.158	0.40	6.60	0.00			
75	8.96	0.00	32.776	0.000	25.41	259.3	0.230	0.86	5.58	0.00			
100	8.08	0.00	33.336	0.000	25.98	205.3	0.288	1.37	4.30	0.00			
150	7.49	0.00	33.814	0.000	26.44	162.4	0.381	2.54	3.28	0.00			
200	6.99	0.00	33.933	0.001	26.60	147.5	0.459	3.93	2.82	0.00	1.05		
250	6.46	0.03	33.979	0.009	26.71	137.7	0.531	5.59	2.33	0.02	1.29		
300	6.08	0.00	34.001	0.000	26.78	132.0	0.599	7.50	1.87	0.00	0.99		
400	5.44	0.02	34.068	0.001	26.91	120.3	0.726	12.05	1.18	0.01	0.77		
500	4.98	0.00	34.135	0.000	27.01	110.8	0.843	17.42	0.71	0.00	0.98		
600	4.63	0.03	34.207	0.002	27.11	102.3	0.950	23.49	0.46	0.03	0.69		
700	4.35	0.02	34.277	0.001	27.20	94.8	1.050	30.13	0.33	0.02	0.79		
800	4.07	0.00	34.341	0.001	27.28	87.7	1.142	37.23	0.28	0.01	0.75		
1000	3.54	0.00	34.440	0.000	27.41	75.8	1.308	52.43	0.30	0.00	1.04		
1200	3.10	0.01	34.498	0.003	27.50	67.9	1.453	68.84	0.46	0.03	2.15		

CNAV OSHAWA CRUISE OSI STATION 044 OBSERVED VALUES
 DATE 22/03/63 HR 19.1 LAT 46-14 N LONG 124-45 W WEA 02 WIND VEL 17 DIR 36
 BAROM 11.0 TEMP DRY 9.4 WET 7.8 RELHU 81 WTRCLR SECDI 969 SEA 2 DIR 36 SWELL 2 DIR 27
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 11.31

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ACU	SATN
1	0	9.55	32.005	24.71	6.66	0.595	-0.031	105	
1	5	9.55	32.007	24.71	6.73	0.601	-0.037	107	
1	10	9.56	32.013	24.72	6.69	0.598	-0.034	106	
1	20	9.57	32.076	24.76	6.66	0.595	-0.031	106	
1	29	9.59	32.048	24.74	6.74	0.602	-0.039	107	
1	49	9.57	32.466	25.07	6.18	0.552	0.010	98	
1	74	9.17	33.021	25.56	4.93	0.440	0.125	78	
1	98	8.58	33.613	26.12	3.52	0.314	0.256	55	
1	123	8.26	33.738	26.27	3.14	0.280	0.294	49	
1	147	7.69	33.886*	26.47	3.14	0.280	0.302	48	
2	154	7.64	33.822	26.42	3.18	0.284	0.298	49	
2	175	7.42	33.882	26.50	3.03	0.271	0.314	46	
2	263	6.49	33.989	26.71	2.20	0.196	0.401	33	
2	440	5.43	34.089	26.93	1.04	0.093	0.520	15	
2	663	4.46	34.150*	27.08	0.39	0.035	0.593	6	
2	841	4.02	34.404	27.33	0.26	0.023	0.610	4	

CNAV OSHAWA CRUISE OSI STATION 044 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0		30.06	31.990
6		27.40	31.993
16		5.56	32.000
31		0.20	32.044
45.24		380.50	WATER COLUMN VALUES

MESSANGER TIME 1109 INCOMING SOLAR RADIATION - AM 155 PM 163

CNAV OSHAWA		CRUISE OSI			STATION 044		INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	9.55	0.00	32.005	0.000	24.71	324.1	0.000	0.00	6.66	0.00	0.99		
10	9.56	0.00	32.013	0.000	24.72	323.8	0.033	0.02	6.69	0.00	0.95		
20	9.57	0.00	32.076	0.000	24.76	319.5	0.066	0.07	6.66	0.00	0.94		
30	9.59	0.00	32.061	0.005	24.75	321.2	0.098	0.15	6.73	0.00	0.90		
50	9.56	0.00	32.487	0.000	25.09	289.4	0.159	0.40	6.14	0.00	0.88		
75	9.14	0.00	33.050	0.003	25.59	241.8	0.226	0.82	4.86	0.01	0.94		
100	8.55	0.01	33.633	0.006	26.14	190.1	0.281	1.30	3.46	0.01	0.90		
150	7.67	0.02	33.813	0.002	26.41	164.9	0.370	2.43	3.16	0.02	0.88		
200	7.14	0.01	33.926	0.007	26.58	150.0	0.449	3.85	2.80	0.02	1.41		
250	6.62	0.01	33.982	0.004	26.69	139.7	0.522	5.53	2.33	0.01	0.89		
300	6.21	0.02	34.015	0.005	26.77	132.6	0.591	7.47	1.91	0.00	0.92		
400	5.61	0.02	34.072	0.005	26.89	122.0	0.720	12.06	1.25	0.00	0.76		
500	5.13	0.00	34.108	0.014	26.98	114.6	0.839	17.57	0.79	0.01	2.59		
600	4.69	0.00	34.145	0.037	27.05	107.7	0.951	23.90	0.50	0.01	7.40		
700	4.34	0.00	34.211	0.046	27.14	99.6	1.056	30.88	0.34	0.01	8.74		
800	4.09	0.00	34.332	0.023	27.27	88.6	1.151	38.19	0.27	0.01	2.46		

CNAV OSHAWA CRUISE OSI STATION 045 OBSERVED VALUES

COLUMBIA RIVER ENTRANCE

DATE 22/03/63 HR 22.0 LAT 46-14 N LONG 124-24 W SMDG 137 WEA 02 WIND VEL 25 DIR 35
 BAROM 08. TEMP DRY 10.6 WET 8.3 RELHU 73 WTRCLR SECD1 SEA 2 DIR 36 SWELL 2 DIR 27
 CLOUD TYPE 6 AMT 7 VIS 7 WIRE ANGLE(S) 26

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	9.38	31.730	24.52	6.66	0.595	-0.027	105
1	5	9.38	31.729	24.52	6.66	0.595	-0.027	105
1	9	9.40	31.726	24.52	6.67	0.596	-0.029	105
1	18	9.38	31.747	24.54	6.69	0.598	-0.030	105
1	27	9.35	31.834	24.61	6.65	0.594	-0.027	105
1	45	8.53	32.181	25.01	6.14	0.548	0.028	95
1	68	8.99	32.739	25.37	4.98	0.445	0.124	78
1	90	8.57	33.358	25.92	3.85	0.344	0.228	60
1	135	7.38	33.926	26.54	2.26	0.202	0.383	34

CNAV OSHAWA CRUISE OSI STATION 045 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.38	0.00	31.730	0.000	24.52	341.9	0.000	0.00	6.66	0.00	0.97
10	9.40	0.00	31.726	0.000	24.52	342.7	0.035	0.02	6.67	0.00	0.75
20	9.38	0.01	31.761	0.000	24.55	340.1	0.069	0.07	6.69	0.00	0.93
30	9.21	0.05	31.881	0.004	24.67	328.7	0.103	0.16	6.60	0.01	
50	8.60	0.07	32.293	0.001	25.08	289.4	0.165	0.41	5.91	0.02	0.79
75	8.91	0.03	32.944	0.011	25.55	246.1	0.233	0.83	4.61	0.01	0.67
100	8.25	0.06	33.605	0.026	26.16	187.8	0.287	1.32	3.38	0.02	2.25

CNAV OSHAWA CRUISE OSI STATION 046 OBSERVED VALUES

NORTH HEAD

DATE 22/03/63 HR 23.6 LAT 46-22 N LONG 124-18 W MEA 01 WIND VEL 25 DIR 36
 BAROM 06.0 TEMP DRY 8.9 WET 6.7 RELHU 73 WTRCLR SECDI 64 SEA 2 DIR 00 SWELL 2 DIR 28
 CLOUD TYPE 6 AMT 5 VIS 7 WIRE ANGLE(S) 35

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	9.59	28.795	22.21	6.87	0.614	-0.037	106
1	4	9.47	29.834	23.03	6.76	0.604	-0.030	105
1	8	9.32	31.771	24.57	6.74	0.602	-0.034	106
1	16	9.31	31.780	24.57	6.74	0.602	-0.034	106
1	25	9.31	31.784	24.58	6.68	0.597	-0.029	105
1	41	8.99	31.912	24.73	6.54	0.584	-0.012	102
1	57	9.11	32.830	25.43	5.04	0.450	0.116	79

CNAV OSHAWA CRUISE OSI STATION 046 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY
 LAB-I DECK-I

0	1.40
3	1.43
6	1.28
12	1.18

15.71 - WATER COLUMN VALUES

MESSENGER TIME 1337 INCOMING SOLAR RADIATION - AM 155 PM 163

CNAV OSHAWA CRUISE OS1 STATION 046 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.59	0.00	28.795	0.000	22.21	563.2	0.000	0.00	6.87	0.00	
10	9.30	0.01	32.015	0.161	24.76	319.7	0.045	0.02	6.74	0.00	0.89
20	9.32	0.01	31.779	0.002	24.57	337.7	0.078	0.07	6.72	0.00	0.63
30	9.21	0.03	31.773	0.023	24.59	336.7	0.112	0.16	6.71	0.05	0.82
50	8.94	0.04	32.284	0.032	25.03	295.1	0.176	0.41	5.96	0.07	1.24

CNAV OSHAWA CRUISE OS1 STATION 047 OBSERVED VALUES

DATE 23/03/63 HR 01.1 LAT 46-26 N LONG 124-30 W SMDG 124 WEA 02 WIND VEL 25 DIR 35
 BAROM 06.0 TEMP DRY 8.3 WET 6.1 RELHU 72 WTRCLR SEA 3 DIR 35 SWELL 2 DIR 29
 CLOUD TYPE AMT 7 VIS 7 WIRE ANGLE(S) 28.27 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.11	31.894	24.69	6.68	0.597	-0.026	105	
1	4	9.17	31.891	24.68	6.61	0.590	-0.021	104	
1	18	9.21	31.895	24.68	6.75	0.603	-0.034	106	
1	27	9.21	32.000	24.76	6.66	0.595	-0.026	105	
2	44	9.39	32.475	25.10	6.32	0.564	0.004	99	
2	66	8.98	33.155	25.70	5.84	0.522	0.043	92	
2	88	8.24	33.635	26.19	4.11	0.367	0.200	65	
2	106	7.74	33.864	26.44	3.25	0.290	0.284	51	
					2.59	0.231	0.349	40	

CNAV OSHAWA CRUISE OSI STATION 047 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.11	0.00	31.894	0.000	24.69	325.7	0.000	0.00	6.68	0.00	0.93
10	9.19	0.00	31.893	0.002	24.68	327.2	0.033	0.02	6.76	0.00	0.75
20	9.21	0.00	31.909	0.000	24.69	326.4	0.066	0.07	6.59	0.01	0.91
30	9.25	0.02	32.069	0.008	24.81	315.3	0.099	0.15	6.25	0.02	
50	9.33	0.01	32.667	0.009	25.26	272.6	0.158	0.39	5.39	0.07	0.76
75	8.69	0.02	33.377	0.001	25.92	210.7	0.219	0.77	3.70	0.03	0.67
100	7.88	0.01	33.805	0.001	26.38	167.6	0.266	1.19	2.84	0.02	0.74

CNAV OSHAWA CRUISE OSI STATION 048 OBSERVED VALUES

DATE 23/03/63 HR 03.5 LAT 46-36 N LONG 124-42 W SNDG 1006 WEA 02 WIND VEL 25 DIR 34
 BAROM 05 TEMP DRY 7.2 WET 5.6 RELHU 79 WTRCLR SEA 2 DIR 32 SWELL 3 DIR 27
 CLOUD TYPE AMT 7 VIS 7 WIRE ANGLE(S) 0.41

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN MGA/L	AU	SATN
1	0	9.20	32.143	24.87	6.54	0.584	-0.016	103
1	5	9.21	32.142	24.87	6.63	0.592	-0.024	104
1	10	9.24	32.146	24.87	6.65	0.594	-0.026	105
1	19	9.27	32.173	24.89	6.64	0.593	-0.026	105
1	29	9.25	32.195	24.91	6.53	0.583	-0.016	103
1	48	9.37	32.468	25.10	6.39	0.571	-0.006	101
1	71	8.23	33.193	25.84	4.67	0.417	0.160	72
1	97	7.90	33.548	26.17	3.89	0.347	0.232	60
1	120	7.89	33.775	26.35	3.15	0.281	0.298	49
2	141	7.75	33.875	26.45	2.65	0.237	0.344	41
1	144	7.64	33.902	26.49	2.78	0.248	0.333	43
2	161	7.51	33.931	26.53	2.68	0.239	0.344	41
2	247	6.57	33.974	26.69	2.24	0.200	0.396	34
2	420	5.47	34.076	26.91	1.13	0.101	0.511	16
2	639	4.48			0.41	0.037		
2	843	3.91	34.341	27.29	0.26	0.023	0.612	4

CNAV OSHAWA		CRUISE OSI				STATION 048		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	PGT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	9.20	0.00	32.143	0.000	24.87	308.6	0.000	0.00	6.54	0.00			
10	9.24	0.00	32.146	0.000	24.87	309.1	0.032	0.02	6.65	0.00			
20	9.27	0.00	32.174	0.001	24.89	307.7	0.063	0.06	6.63	0.00	0.88		
30	9.27	0.01	32.202	0.000	24.91	305.7	0.094	0.14	6.54	0.01	0.97		
50	9.28	0.03	32.530	0.011	25.16	282.0	0.153	0.38	6.25	0.04	0.90		
75	8.14	0.01	33.267	0.008	25.92	210.8	0.215	0.77	4.51	0.03	0.82		
100	7.90	0.01	33.583	0.001	26.20	184.3	0.265	1.21	3.79	0.00	0.82		
150	7.63	0.02	33.909	0.003	26.49	157.2	0.351	2.30	2.67	0.05	0.62		
200	7.10	0.03	33.961	0.007	26.61	146.8	0.427	3.67	2.48	0.01	1.73		
250	6.55	0.00	33.976	0.000	26.70	139.1	0.499	5.33	2.22	0.00	1.00		
300	6.16	0.03	34.004	0.001	26.77	132.8	0.568	7.27	1.89	0.03	0.87		
400	5.56	0.01	34.064	0.000	26.89	122.1	0.697	11.86	1.25	0.01	0.84		
500	5.06	0.00	34.127	0.002	27.00	112.3	0.815	17.31	0.79	0.01	3.72		
600	4.63	0.00	34.192	0.004	27.10	103.4	0.924	23.45	0.49	0.00	9.70		
700	4.28	0.00	34.256	0.005	27.19	95.5	1.024	30.15	0.32	0.01	10.90		
800	4.00	0.00	34.317	0.003	27.26	88.7	1.117	37.31	0.26	0.01	12.99		

CNAV OSHAWA CRUISE OSI STATION 049 OBSERVED VALUES

WILLAPA BAY ENTRANCE

DATE 23/03/63 HR 06.7 LAT 46.40 N LONG 124.21 W SNDC 77 WEA 02 WIND VEL 18 DIR 34
 BAROM 05. TEMP DRY 7.2 WET 5.6 RELHU 79 WTRCLR SECDI 77 SEA 3 DIR 34 SWELL 2 DIR 29
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 7

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.36	29.494	22.79	6.74	0.602	-0.026	104	
1	5	9.26	29.585	22.87	6.79	0.606	-0.029	105	
1	10	9.23	31.178	24.12	6.66	0.595	-0.023	104	
1	20	9.19	31.713	24.54	6.54	0.584	-0.014	102	
1	30	9.29	32.023	24.77	5.93	0.530	0.038	93	
1	59	8.94	33.070	25.64	4.33	0.387	0.181	68	

CNAV OSHAWA		CRUISE OS1			STATION 049			INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	9.36	0.00	29.494	0.000	22.79	507.9	0.000	0.00	6.74	0.00		
10	9.23	0.00	31.178	0.000	24.12	380.9	0.045	0.02	6.66	0.00		
20	9.19	0.00	31.713	0.000	24.54	340.7	0.082	0.08	6.54	0.00		
30	9.29	0.00	32.023	0.000	24.77	319.3	0.115	0.16	5.93	0.00		
50	9.29	0.09	32.583	0.092	25.20	278.1	0.175	0.40	4.51	0.19	7.37	

CNAV OSHAWA CRUISE OS1 STATION 050 OBSERVED VALUES

MOCLIPS RIVER

DATE 23/03/63 HR 10.6 LAT 47-14 N LONG 124-28 W SNDG 51 WEA 02 WIND VEL 25 DIR 34
 BAROM 03.0 TEMP DRY 7.8 WET 6.7 RELHU 86 WTRCLR SECDI SEA 2 DIR 34 SWELL 2 DIR 29
 CLOUD TYPE AMT 3 VIS 7 WIRE ANGLE(S) 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.02	28.757	22.26	6.75	0.603	-0.019	103	
1	5	8.68	31.302	24.30	6.58	0.588	-0.009	102	
1	10	8.68	31.548	24.49	6.63	0.592	-0.015	103	
1	20	8.68	31.519	24.47	6.65	0.594	-0.017	103	
1	30	8.68	31.658	24.58	6.54	0.584	-0.007	101	
1	45	8.72	32.349	25.11	5.84	0.522	0.052	91	

CNAV OSHAWA		CRUISE OSI		STATION 050		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.02	0.00	28.757	0.000	22.26	557.9	0.000	0.00	6.75	0.00	
10	8.68	0.00	31.548	0.000	24.49	345.4	0.046	0.02	6.63	0.00	
20	8.68	0.00	31.519	0.000	24.47	347.7	0.081	0.07	6.65	0.00	
30	8.68	0.00	31.658	0.000	24.58	337.5	0.115	0.16	6.54	0.00	

CNAV OSHAWA CRUISE OSI STATION 051 OBSERVED VALUES

DATE 23/03/63 HR 12.0 LAT 47-14 N LONG 124-42 W SMDG 113 WEA 02 WIND VEL 22 DIR 34
 BAROM 03.0 TEMP DRY 7.8 WET 6.7 REL HU 86 WTRCLR SEA 2 DIR 34 SWELL 2 DIR 29
 CLOUD TYPE VIS 3 WIRE ANGLE(S) 23

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	AOU	SATN
1	0	8.60	31.830	24.72	6.66	0.595	-0.018	103
1	5	8.63	31.834	24.72	6.61	0.590	-0.014	102
1	9	8.67	31.856	24.73	6.65	0.594	-0.018	103
1	18	8.66	31.829	24.71	6.60	0.589	-0.013	102
1	27	8.68	31.862	24.74	6.61	0.590	-0.014	102
1	46	8.27	32.208	25.07	5.64	0.504	0.076	87
1	69	8.24	33.318	25.94	3.94	0.352	0.224	61
1	92	8.03	33.672	26.25	3.31	0.296	0.282	51

CNAV OSHAWA CRUISE 051 STATION 051 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.60	0.00	31.830	0.000	24.72	323.1	0.000	0.00	6.66	0.00	
10	8.67	0.00	31.854	0.003	24.73	322.5	0.033	0.02	6.65	0.00	0.97
20	8.67	0.00	31.830	0.001	24.71	324.4	0.066	0.07	6.61	0.01	0.75
30	8.62	0.02	31.887	0.003	24.76	319.7	0.098	0.15	6.51	0.02	0.94
50	8.25	0.02	32.401	0.036	25.22	276.5	0.158	0.39	5.33	0.04	0.82
75	8.23	0.02	33.548	0.043	26.12	191.3	0.217	0.76	3.60	0.05	1.21

CNAV OSHAWA CRUISE 051 STATION 052 OBSERVED VALUES

DATE 23/03/63 HR 14.4 LAT 47-14 N LONG 125-05 W SNDG 622 WEA 02 WIND VEL 20 DIR 32
 BAROM 02 TEMP DRY 7.2 WET 6.1 RELHU 85 WTRCLR SEA 3 DIR 32 SWELL 3 DIR 27
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 23,26,20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN AUU	SATN
1	0	8.88	32.000	24.81	6.57	0.587	-0.014	102
1	5	8.88	32.047	24.85	6.57	0.587	-0.014	102
1	9	8.90	32.037	24.84	6.29	0.562	0.011	98
1	18	9.18	32.190	24.91	6.27	0.560	0.008	99
1	27	9.15	32.204	24.93	6.12	0.547	0.022	96
2	45	9.15	32.232	24.95	6.18	0.552	0.016	97
2	68	9.04	32.688	25.33	5.48	0.489	0.079	86
2	92	8.56	33.132	25.75	4.46	0.398	0.174	70
2	112	7.94	33.471	26.10	3.61	0.322	0.257	56
2	135	7.76	33.805	26.39	3.10	0.277	0.304	48
3	166	7.21	33.912	26.55	2.85	0.255	0.333	43
3	189	7.08	33.973	26.62	2.60	0.232	0.357	39
3	284	6.13	34.092	26.84	1.82	0.163	0.440	27
3	474	5.13	34.144	27.00	0.84	0.075	0.542	12
3	569	4.66	34.189	27.09	0.54	0.048	0.576	8

CNAV OSHAWA CRUISE 051 STATION 052 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-1	DECK-1	SAL
0	0.45	13.46		32.021
0		14.00		

MESSENGER TIME 0625 INCOMING SOLAR RADIATION - AM 142 PM 208

THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
INTENSITY INSTEAD OF 100 PERCENT

CNAV OSHAWA CRUISE 051 STATION 052				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.88	0.00	32.000	0.000	24.81	314.5	0.000	0.00	6.57	0.00	0.97
10	8.93	0.01	32.051	0.006	24.85	311.6	0.032	0.02	6.27	0.02	0.75
20	9.19	0.01	32.199	0.004	24.92	304.5	0.063	0.06	6.24	0.01	0.93
30	9.15	0.00	32.199	0.007	24.93	304.2	0.094	0.14	6.13	0.02	
50	9.15	0.01	32.312	0.014	25.02	296.1	0.154	0.39	6.08	0.02	0.79
75	8.93	0.00	32.821	0.000	25.45	255.6	0.224	0.83	5.20	0.01	0.72
100	8.30	0.03	33.272	0.001	25.90	213.2	0.283	1.35	4.10	0.02	0.62
150	7.49	0.03	33.883	0.015	26.49	157.2	0.376	2.52	2.95	0.03	0.73
200	6.98	0.02	33.994	0.003	26.65	142.8	0.452	3.87	2.49	0.00	1.20
250	6.49	0.04	34.065	0.006	26.77	131.8	0.521	5.46	2.06	0.01	1.15
300	6.02	0.01	34.100	0.004	26.86	123.8	0.585	7.27	1.71	0.00	0.96
400	5.44	0.04	34.135	0.012	26.96	115.3	0.706	11.59	1.15	0.01	0.94
500	5.02	0.01	34.151	0.003	27.02	110.1	0.820	16.84	0.75	0.00	0.85

CNAV OSHAWA CRUISE 051 STATION 053 OBSERVED VALUES
 DATE 23/03/63 HR 18.3 LAT 47-14 N LONG 125-28 W SNGD 1737 WEA 02 WIND VEL 15 DIR 31
 BAROM 07.8 TEMP DRY 7.8 WET 5.6 RELHU 72 WTRCLR SEA 2 DIR 31 SWELL 2 DIR 30
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 16.26 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
		TEMP			MGA/L	ML/L		
1	0	8.89	32.102	24.89	6.61	0.590	-0.018	103
1	5	8.91	32.097	24.88	6.65	0.594	-0.022	104
1	10	8.95	32.095	24.88	6.66	0.595	-0.023	104
1	19	8.97	32.097	24.87	6.66	0.595	-0.024	104
1	29	9.00	32.187	24.94	6.59	0.589	-0.018	103
1	48	8.99	32.199	24.95	6.58	0.588	-0.017	103
1	72	9.08	32.722	25.35	5.78	0.516	0.051	91
1	96	8.11	33.482	26.09	4.36	0.389	0.188	67
1	120	7.92	33.684	26.27	3.50	0.313	0.266	54
1	144	7.70	33.835	26.42	3.03	0.271	0.311	47
2	157	7.62	33.857	26.45	2.98	0.266	0.316	46
2	181	7.38	33.946	26.56	2.77	0.247	0.338	42
2	271	6.51	33.986	26.71	2.16	0.193	0.404	32
2	454	5.16	34.116	26.98	0.87	0.078	0.539	13
2	683	4.34	34.264	27.19	0.34	0.030	0.599	5
2	914	3.73	34.377	27.34	0.26	0.023	0.615	4
2	1376	2.77	34.499	27.53	0.56	0.050	0.604	8

CNAV OSHAWA CRUISE 051 STATION 053 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.99	23.20	32.067
4	0.86	18.32	32.061
20	0.95	2.80	32.062
44	0.84	0.06	32.149

39.70 286.08 - WATER COLUMN VALUES

MESSANGER TIME 1021 INCOMING SOLAR RADIATION - AM 142 PM 208

CNAV OSHAWA CRUISE 051 STATION 053				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(D)	VAR RATIO
0	8.89	0.00	32.102	0.000	24.89	307.0	0.000	0.00	6.61	0.00	0.88
10	8.95	0.00	32.095	0.000	24.88	308.6	0.032	0.02	6.66	0.00	0.97
20	8.97	0.00	32.105	0.002	24.88	308.4	0.063	0.06	6.65	0.00	
30	9.00	0.00	32.186	0.005	24.94	302.9	0.093	0.14	6.59	0.01	
50	9.02	0.01	32.227	0.004	24.97	300.4	0.154	0.39	6.54	0.00	0.91
75	8.97	0.03	32.826	0.014	25.44	255.7	0.224	0.83	5.60	0.02	0.84
100	8.05	0.02	33.537	0.012	26.14	190.0	0.280	1.33	4.18	0.00	0.80
150	7.66	0.00	33.847	0.003	26.44	162.3	0.369	2.45	3.00	0.01	0.55
200	7.19	0.00	33.973	0.013	26.61	147.2	0.447	3.84	2.63	0.01	1.25
250	6.70	0.00	33.997	0.014	26.69	139.7	0.519	5.51	2.29	0.01	0.91
300	6.26	0.00	34.005	0.002	26.76	133.9	0.588	7.46	1.93	0.02	0.93
400	5.50	0.00	34.075	0.003	26.91	120.4	0.717	12.04	1.21	0.03	0.75
500	4.95	0.02	34.148	0.001	27.03	109.5	0.833	17.38	0.70	0.02	0.80
600	4.57	0.03	34.213	0.001	27.12	101.1	0.939	23.37	0.44	0.03	0.68
700	4.29	0.00	34.274	0.000	27.20	94.4	1.038	29.96	0.32	0.00	0.91
800	4.01	0.01	34.326	0.000	27.27	88.2	1.130	37.06	0.26	0.01	0.59
1000	3.54	0.01	34.410	0.000	27.39	78.1	1.298	52.54	0.30	0.02	3.00
1200	3.13	0.02	34.468	0.000	27.47	70.5	1.449	69.50	0.45	0.05	3.17

CNAV OSHAWA CRUISE 051 STATION 054 OBSERVED VALUES

DATE 23/03/63 HR 21.6 LAT 47-14 N LONG 125-50 W SNRG 1682 WEA 02 WIND VEL 8 DIR 32
 BAROM 08.0 TEMP DRY 10.0 WET 6.7 RELHU 62 WTRCLR SEA 1 DIR 31 SWELL 2 DIR 30
 CLOUD TYPE 6 AMT 8 VIS 7 WIRE ANGLE(S) 0, 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	9.22	32.369	25.05	6.53	0.583	-0.016	103	
1	5	9.25	32.367	25.04	6.58	0.588	-0.021	104	
1	10	9.24	32.366	25.04	6.59	0.589	-0.022	104	
1	20	9.25	32.368	25.04	6.54	0.584	-0.018	103	
1	30	9.22	32.369	25.05	6.54	0.584	-0.017	103	
1	50	9.22	32.379	25.06	6.59	0.589	-0.022	104	
1	75	9.11	32.610	25.25	6.18	0.552	0.015	197	
1	100	8.70	33.463	25.98	3.81	0.340	0.229	60	
1	125	8.26	33.638	26.19	3.03	0.271	0.304	47	
1	150	8.05	33.804	26.35	2.88	0.257	0.319	45	
2	170	7.91	33.855	26.41	2.79	0.249	0.329	43	
2	194	7.79	33.883	26.45	2.85	0.255	0.325	44	
2	492	6.74	33.983	26.67	2.19	0.196	0.398	33	
2	488	5.12	34.126	26.99	0.90	0.080	0.537	13	
2	735	4.19	34.279	27.22	0.34	0.030	0.601	5	
2	984	3.63	34.399	27.37	0.27	0.024	0.616	4	
2	1484	2.55	34.531	27.57	0.75	0.067	0.590	10	
2	1684	2.28	34.561	27.62	1.00	0.089	0.573	13	

CNAV OSHAWA CRUISE OSI STATION 054 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY
LAB-I DECK-I

0 0.66
4 0.72
20 0.79
44 0.77

33.62 - WATER COLUMN VALUES

MESSENGER TIME 1333 INCOMING SOLAR RADIATION - AM 142 PM 208

INTERPOLATED AND COMPUTED VALUES												
DEPTH	TEMP	E(T)	SAL	E(S)	STATION 054	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.22	0.00	32.369	0.000	25.05	25.05	292.1	0.000	0.00	6.53	0.00	1.11
10	9.24	0.00	32.366	0.000	25.04	25.04	292.8	0.030	0.02	6.59	0.00	1.24
20	9.25	0.00	32.368	0.000	25.04	25.04	293.0	0.059	0.06	6.54	0.00	0.98
30	9.22	0.00	32.369	0.000	25.05	25.05	292.6	0.089	0.14	6.54	0.00	0.76
50	9.22	0.00	32.379	0.000	25.06	25.06	292.2	0.148	0.38	6.59	0.00	
75	9.11	0.00	32.610	0.000	25.25	25.25	273.9	0.219	0.83	6.18	0.00	
100	8.70	0.00	33.463	0.000	25.98	25.98	204.9	0.279	1.36	3.81	0.00	
150	8.05	0.00	33.804	0.000	26.35	26.35	171.0	0.374	2.56	2.88	0.00	
200	7.74	0.01	33.890	0.000	26.46	26.46	161.0	0.458	4.06	2.83	0.01	1.11
250	7.24	0.04	33.943	0.000	26.58	26.58	150.8	0.536	5.87	2.56	0.06	1.24
300	6.66	0.00	33.990	0.000	26.69	26.69	140.3	0.610	7.93	2.13	0.00	0.98
400	5.76	0.01	34.068	0.002	26.87	26.87	124.2	0.743	12.69	1.43	0.03	0.76
500	5.06	0.01	34.134	0.000	27.00	27.00	111.8	0.862	18.17	0.85	0.01	0.94
600	4.60	0.04	34.199	0.000	27.11	27.11	102.5	0.971	24.27	0.54	0.03	0.68
700	4.27	0.02	34.259	0.000	27.19	27.19	95.2	1.071	30.93	0.37	0.01	0.82
800	4.02	0.01	34.314	0.000	27.26	27.26	89.2	1.164	38.11	0.29	0.01	0.72
1000	3.59	0.00	34.405	0.000	27.38	27.38	79.0	1.334	53.77	0.28	0.00	0.98
1200	3.12	0.02	34.470	0.003	27.47	27.47	70.3	1.485	70.81	0.41	0.03	1.03
1500	2.52	0.00	34.534	0.000	27.58	27.58	60.4	1.684	98.24	0.77	0.00	0.94

CNAV OSHAWA CRUISE 051 STATION 055 OBSERVED VALUES
 DATE 24/03/63 HR 01.5 LAT 47-14 N LONG 126-25 W SNDG 2560 WEA 02 WIND VEL 5 DIR 27
 BAROM 12.0 TEMP DRY 8.3 WET 6.1 RELHU 72 WTRCLR SEA 0 DIR SWELL 1 DIR 30
 CLOUD TYPE AMT 4 VIS 7 WIRE ANGLE(S) 5.20 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.38	32.396	25.04	6.56	0.586	-0.021		104
1	5	9.43	32.396	25.04	6.54	0.584	-0.020		104
1	10	9.38	32.396	25.04	6.64	0.593	-0.028		105
1	20	9.32	32.393	25.05	6.58	0.588	-0.022		104
1	30	9.29	32.397	25.06	6.53	0.583	-0.017		103
1	50	9.28	32.401	25.06	6.58	0.588	-0.022		104
1	75	9.24	32.680	25.29	5.80	0.518	0.047		92
1	100	8.78	33.340	25.87	4.11	0.367	0.202		65
1	124	8.05	33.426	26.05	3.98	0.355	0.223		61
1	149	7.86	33.657	26.26	3.55	0.317	0.263		55
2	165	7.71	33.757	26.36	3.34	0.298	0.283		51
2	188	7.56	33.859	26.46	2.92	0.261	0.322		45
2	282	6.58	33.993	26.70	2.08	0.186	0.411		31
2	473	5.08	34.128	27.00	0.78	0.070	0.548		11
2	959	3.53	34.382	27.36	0.30	0.027	0.615		4
2	1453	2.63	34.561	27.59	0.65	0.058	0.598		9
2	1751	2.23	34.577	27.64	1.12	0.100	0.563		15
2	2048	1.89	34.524	27.62	1.44	0.129	0.540		19
2	2347	1.78	34.660	27.74	1.73	0.155	0.516		23

CNAV OSHAWA		CRUISE OSI			STATION 055		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	9.38	0.00	32.396	0.000	25.04	292.5	0.000	0.00	6.56	0.00		
10	9.38	0.00	32.396	0.000	25.04	292.7	0.030	0.02	6.64	0.00		
20	9.32	0.00	32.393	0.000	25.05	292.2	0.059	0.06	6.58	0.00		
30	9.29	0.00	32.397	0.000	25.06	291.6	0.089	0.14	6.53	0.00		
50	9.28	0.00	32.401	0.000	25.06	291.5	0.148	0.38	6.58	0.00		
75	9.24	0.00	32.680	0.000	25.29	270.6	0.218	0.83	5.80	0.00		
100	8.78	0.00	33.340	0.000	25.87	215.2	0.280	1.37	4.11	0.00		
150	7.85	0.00	33.664	0.000	26.27	178.5	0.379	2.62	3.54	0.00	0.90	
200	7.45	0.01	33.890	0.008	26.50	156.9	0.463	4.13	2.77	0.02	1.22	
250	6.94	0.03	33.975	0.015	26.64	144.4	0.539	5.87	2.28	0.05	1.11	
300	6.41	0.00	34.010	0.002	26.74	135.6	0.610	7.86	1.93	0.00	0.97	
400	5.58	0.01	34.088	0.006	26.91	120.5	0.739	12.47	1.21	0.00	0.71	
500	4.94	0.02	34.145	0.000	27.03	109.6	0.855	17.82	0.69	0.03	1.00	
600	4.49	0.08	34.204	0.002	27.12	100.9	0.961	23.80	0.42	0.10	0.99	
700	4.11	0.11	34.259	0.002	27.21	93.4	1.060	30.35	0.25	0.13	0.93	
800	3.82	0.10	34.310	0.002	27.28	87.1	1.151	37.37	0.19	0.12	0.84	
1000	3.44	0.00	34.402	0.001	27.39	77.5	1.317	52.70	0.30	0.00	0.89	
1200	3.03	0.02	34.486	0.005	27.49	68.0	1.465	69.29	0.38	0.01	0.77	
1500	2.56	0.00	34.565	0.002	27.60	58.5	1.657	95.84	0.72	0.01	0.77	
2000	1.94	0.00	34.587	0.011	27.67	51.8	1.938	146.02	1.39	0.00	2.48	

CNAV OSHAWA CRUISE 051 STATION 056 OBSERVED VALUES

DATE 24/03/63 HR 06.3 LAT 47-14 N LONG 126-59 W SNRG 2560 WEA 01 WIND VEL 20 DIR 14
 BAROM 14.2 TEMP DRY 8.3 WET 6.7 RELHU 80 WTRCLR SEA 2 DIR 14 SWELL 2 DIR 27
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 11, 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
2	0	8.91	32.425	25.14	6.60	0.589	-0.019	103
1	5	8.88	32.427	25.15	6.63	0.592	-0.021	104
1	10	8.93	32.435	25.14	6.66	0.595	-0.024	104
1	20	8.86	32.475	25.19	6.62	0.591	-0.020	104
1	29	8.84	32.422	25.15	6.61	0.590	-0.019	103
1	49	8.81	32.430	25.16	6.59	0.589	-0.017	103
1	74	8.80	32.429	25.16	6.66	0.595	-0.023	104
1	98	7.56	32.972	25.77	5.54	0.495	0.092	84
1	123	7.20	33.421	26.17	4.68	0.418	0.172	71
1	147	7.39	33.738	26.39	3.76	0.336	0.250	57

CNAV OSHAWA CRUISE 051 STATION 056 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEO POT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.91	0.00	32.425	0.000	25.14	283.3	0.000	0.00	6.60	0.00	
10	8.93	0.00	32.435	0.000	25.14	283.1	0.029	0.02	6.66	0.00	
20	8.86	0.00	32.475	0.000	25.19	279.2	0.057	0.06	6.62	0.00	
30	8.84	0.00	32.420	0.001	25.15	283.1	0.086	0.13	6.61	0.00	0.99
50	8.82	0.01	32.425	0.004	25.15	282.9	0.143	0.37	6.60	0.01	0.95
75	8.75	0.01	32.447	0.004	25.18	280.6	0.214	0.82	6.62	0.01	0.94
100	7.50	0.00	33.012	0.000	25.81	221.4	0.277	1.38	5.47	0.01	0.89

CNAV OSHAWA CRUISE 051 STATION 057 OBSERVED VALUES

DATE 24/03/63 HR 09.1 LAT 47-14 N LONG 127-23 W WIND VEL 15 DIR 16
 BAROM 13.0 TEMP DRY 7.8 WET 6.7 RELHU 86 WIRCLR SEA 1 DIR 14 SWELL 1 DIR 27
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 17,20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	SECDI	SATN
					MGA/L	μM		
1	0	8.80	32.405	25.14	6.62	0.591	0.019	103
1	5	8.86	32.404	25.13	6.60	0.589	0.018	103
1	10	8.87	32.402	25.13	6.66	0.595	0.023	104
1	19	8.90	32.436	25.15	6.60	0.589	0.019	103
1	29	8.84	32.402	25.13	6.83	0.610	0.038	107
1	48	8.81	32.414	25.15	6.67	0.596	0.024	104
1	72	8.86	32.430	25.15	6.60	0.589	0.018	103
1	96	8.82	32.421	25.15	6.59	0.589	0.017	103
1	119	8.83	32.431	25.16	6.54	0.584	0.012	102
1	143	7.72	32.819	25.63	5.86	0.523	0.062	89
2	156	7.28	33.777	26.44	3.72	0.332	0.255	57
2	180	7.13	33.876	26.54	3.32	0.297	0.292	50
2	271	6.03	33.969	26.76	2.18	0.195	0.410	32
2	460	4.89	34.100	27.00	0.95	0.085	0.536	14
2	698	3.98	34.241	27.21	0.36	0.032	0.603	5
2	938	3.43	34.366	27.36	0.31	0.028	0.616	4
2	1422	2.58	34.507	27.55	0.74	0.066	0.591	10
2	1714	2.17	34.559	27.63	1.20	0.107	0.557	16

DEPTH	CNAV OSHAWA			CRUISE OSI			STATION 057			INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO					
0	8.80	0.00	32.405	0.000	25.14	283.2	0.000	0.00	6.62	0.00						
10	8.87	0.00	32.402	0.000	25.13	284.6	0.029	0.02	6.66	0.00						
20	8.90	0.00	32.434	0.002	25.15	282.8	0.058	0.06	6.62	0.01						0.88
30	8.84	0.00	32.401	0.001	25.13	284.5	0.086	0.13	6.83	0.01						0.97
50	8.81	0.00	32.416	0.000	25.15	283.4	0.143	0.37	6.66	0.00						0.91
75	8.86	0.00	32.429	0.001	25.15	283.5	0.215	0.83	6.60	0.00						0.84
100	8.86	0.03	32.409	0.008	25.14	285.4	0.287	1.47	6.60	0.01						0.78
150	7.46	0.01	33.342	0.048	26.07	197.0	0.408	2.97	4.70	0.11						0.55
200	6.91	0.03	33.916	0.012	26.60	147.6	0.495	4.50	3.03	0.01						1.26
250	6.31	0.04	33.968	0.013	26.72	136.6	0.567	6.15	2.40	0.01						0.91
300	5.79	0.03	33.992	0.001	26.80	129.0	0.634	8.04	1.92	0.02						0.94
400	5.15	0.04	34.064	0.002	26.94	117.0	0.758	12.47	1.22	0.03						0.75
500	4.70	0.01	34.125	0.000	27.04	108.3	0.871	17.71	0.79	0.01						0.83
600	4.30	0.01	34.186	0.000	27.13	100.1	0.977	23.64	0.51	0.02						0.68
700	3.97	0.00	34.242	0.000	27.21	93.1	1.074	30.15	0.36	0.00						0.99
800	3.72	0.01	34.297	0.001	27.28	86.9	1.165	37.15	0.29	0.02						0.62
1000	3.31	0.00	34.390	0.001	27.39	76.9	1.331	52.39	0.33	0.01						0.94
1200	2.94	0.01	34.456	0.003	27.48	69.2	1.479	69.07	0.47	0.01						0.88
1500	2.47	0.00	34.522	0.001	27.57	60.6	1.676	96.33	0.85	0.00						0.94

CNAV OSHAWA CRUISE OSI STATION 058 OBSERVED VALUES
 DATE 24/03/63 HR 12.9 LAT 47-12 N LONG 128-06 W WEA 02 WIND VEL 28 DIR 13
 BAROM 12.0 TEMP DRY 7.2 WET 6.1 RELHU 85 WTRCLR SNRG 2651 SEA 3 DIR 12 SWELL 3 DIR 27
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 23,34

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	O:YGEN	AOU	SATN
1	0	8.73	32.389	25.14	6.62	0.591	-0.018	103	
1	5	8.75	32.390	25.14	6.62	0.591	-0.018	103	
1	9	8.78	32.389	25.13	6.67	0.596	-0.023	104	
1	18	8.79	32.398	25.14	6.62	0.591	-0.019	103	
1	28	8.79	32.390	25.13	6.60	0.589	-0.017	103	
1	46	8.77	32.392	25.14	6.60	0.589	-0.017	103	
1	69	8.76	32.395	25.14	6.54	0.584	-0.011	102	
1	92	8.49	32.661	25.39	5.90	0.527	0.048	92	
1	115	7.46	33.354	26.08	4.24	0.379	0.208	65	
1	138	7.46	33.705	26.36	3.24	0.289	0.296	49	
2	170	7.28	33.818	26.47	2.42	0.216	0.371	37	
2	257	5.82	33.990	26.80	1.74	0.155	0.452	26	
2	434	4.86	34.097	27.00	0.83	0.074	0.548	12	
2	658	4.15	34.236	27.19	0.36	0.032	0.600	5	
2	884	3.66	34.355	27.33	0.27	0.024	0.615	4	
2	1340	2.71	34.486	27.52	0.54	0.048	0.607	7	
2	1614	2.26	34.552	27.61	0.96	0.086	0.577	13	

CNAV OSHAWA CRUISE OSI STATION 058 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.46	6.90	32.411
0		8.68	

MESSENGER TIME 0630 INCOMING SOLAR RADIATION - AM 139 PM 257
 THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
 INTENSITY INSTEAD OF 100 PERCENT

DEPTH	CNAV OSHAWA		CRUISE OSI		STATION 058		INTERPOLATED AND COMPUTED VALUES						
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	8.73	0.00	32.389	0.000	25.14	283.4	0.000	0.00	6.62	0.00	0.97		
10	8.78	0.00	32.390	0.001	25.13	284.3	0.029	0.02	6.67	0.00	0.78		
20	8.79	0.00	32.397	0.001	25.14	284.0	0.058	0.06	6.61	0.00	0.93		
30	8.79	0.00	32.390	0.000	25.13	284.7	0.086	0.13	6.60	0.00			
50	8.78	0.01	32.383	0.006	25.13	285.3	0.144	0.37	6.61	0.01	0.82		
75	8.74	0.02	32.431	0.005	25.17	281.6	0.215	0.83	6.45	0.01	0.72		
100	8.12	0.07	32.897	0.029	25.63	238.4	0.281	1.41	5.34	0.06	0.67		
150	7.42	0.00	33.775	0.016	26.42	164.3	0.382	2.66	2.88	0.01	0.70		
200	6.82	0.08	33.893	0.004	26.59	148.2	0.461	4.07	2.05	0.08	1.01		
250	5.95	0.03	33.981	0.001	26.78	131.2	0.531	5.69	1.75	0.03	0.86		
300	5.45	0.07	34.031	0.010	26.88	121.9	0.595	7.48	1.47	0.00	0.90		
400	4.93	0.06	34.089	0.008	26.98	112.5	0.713	11.71	0.96	0.00	0.78		
500	4.61	0.01	34.139	0.001	27.06	106.2	0.824	16.80	0.63	0.01	0.74		
600	4.30	0.01	34.201	0.001	27.14	98.9	0.927	22.64	0.43	0.01	0.73		
700	4.05	0.01	34.260	0.000	27.21	92.6	1.024	29.09	0.32	0.01	0.78		
800	3.83	0.01	34.314	0.001	27.28	86.9	1.115	36.08	0.27	0.01	0.60		
1000	3.40	0.01	34.396	0.004	27.39	77.5	1.281	51.39	0.28	0.00	0.92		
1200	2.99	0.01	34.455	0.004	27.47	69.8	1.430	68.21	0.40	0.00	0.88		
1500	2.43	0.00	34.522	0.002	27.58	60.2	1.628	95.49	0.76	0.00	0.72		

CNAV OSHAWA CRUISE OSI STATION 059 OBSERVED VALUES
 DATE 24/03/63 HR 19.0 LAT 47-17 N LONG 129-05 W SMDG 2651 WEA 01 WIND VEL 22 DIR 14
 BAROM 08.0 TEMP DRY 8.9 WET 8.9 RELHU 99 WTRCLR SEA 3 DIR 14 SWELL 3 DIR 13
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 6, 0, ---

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	8.79	32.406	25.14	6.62	0.591	-0.019	103	
1	5	8.81	32.405	25.14	6.64	0.593	-0.021	104	
1	10	8.82	32.405	25.14	6.62	0.591	-0.019	103	
1	20	8.84	32.408	25.14	6.66	0.595	-0.023	104	
1	30	8.81	32.506*	25.22	6.56	0.586	-0.014	102	
1	50	8.80	32.405	25.14	6.57	0.587	-0.015	103	
1	75	8.77	32.433	25.17	6.55	0.585	-0.012	102	
1	100	7.89	33.080	25.81	4.92	0.439	0.142	176	
1	124	7.01	33.386	26.17	4.65	0.415	0.177	70	
1	149	7.32	33.734	26.40	3.58	0.320	0.267	54	
2	175	7.32	33.832	26.48	3.22	0.288	0.299	49	
2	200	7.16	33.886	26.54	2.90	0.259	0.330	44	
3	294	6.03	33.992	26.77	1.92	0.171	0.433	28	

CNAV OSHAWA CRUISE OSI STATION 059 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.56	9.88	32.399
7	0.55	10.68	32.394
24	0.58	1.10	32.394
51	0.62	0.14	32.409
29.85		185.10	WATER COLUMN VALUES

MESSANGER TIME 1206 INCOMING SOLAR RADIATION - AM 139 PM 257

DEPTH	CNAV OSHAWA			CRUISE OSI			STATION 059			INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OX ₂ ML/L	E(O)	VAR RATIO				
0	8.79	0.00	32.406	0.000	25.14	283.0	0.000	0.00	6.62	0.00					
10	8.82	0.00	32.405	0.000	25.14	283.7	0.029	0.02	6.62	0.00					
20	8.84	0.00	32.408	0.000	25.14	283.9	0.058	0.06	6.66	0.00					
30	8.81	0.00	32.406	0.002	25.14	283.8	0.086	0.13	6.56	0.00	1.10				
50	8.80	0.00	32.405	0.000	25.14	284.0	0.143	0.37	6.57	0.00					
75	8.77	0.00	32.433	0.000	25.17	281.9	0.215	0.82	6.55	0.00					
100	7.89	0.00	33.080	0.000	25.81	221.6	0.278	1.38	4.92	0.00	0.95				
150	7.32	0.00	33.741	0.001	26.40	165.5	0.376	2.60	3.56	0.00					
200	7.16	0.00	33.886	0.000	26.54	153.2	0.456	4.04	2.90	0.00					
250	6.57	0.03	33.935	0.009	26.66	142.5	0.531	5.75	2.34	0.00	52.44				

CNAV OSHAWA CRUISE 051 STATION 060 OBSERVED VALUES									
DATE	HR	LAT	LONG	W	WEA	WIND	VEL	DIR	DIR
25/03/63	03-5	48-12	130-00	W	2834	SEA	2	13	13
BAROM	DRY	9.4	RELHU	94	WTRCLR	SECDI	SECDI	SECDI	SECDI
CLOUD	TYPE	VIS	7	WIRE	ANGLE(S)	5.25	5.25	5.25	5.25
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	8.38	32.406	25.21	6.59	0.589	-0.011		102
1	5	8.36	32.408	25.21	6.65	0.594	-0.016		103
1	10	8.40	32.412	25.21	6.66	0.595	-0.017		103
1	20	8.38	32.401	25.20	6.63	0.592	-0.014		102
1	30	8.32	32.414	25.22	6.52	0.582	-0.004		101
1	50	8.30	32.409	25.22	6.62	0.591	-0.012		102
1	75	8.24	32.445	25.26	6.46	0.577	0.003		100
1	100	7.56	32.866	25.68	5.37	0.480	0.108		82
1	124	6.58	33.352	26.20	4.97	0.444	0.155		74
1	149	6.70	33.692	26.45	4.40	0.393	0.203		66
2	163*	6.64	33.718	26.48	4.31	0.385	0.212		65
2	187	6.74	33.886	26.60	3.92	0.350	0.244		59
2	279	5.84	33.922	26.74	3.15	0.281	0.326		46
2	1421	2.82	34.514	27.54	0.53	0.047	0.606		7
2	1708	2.17	34.568	27.63	1.03	0.092	0.572		14
2	2092	1.88	34.567*	27.66	1.39	0.124	0.545		19
2	2380	1.76	34.630	27.72	1.72	0.154	0.517		23

CNAV OSHAMA		CRUISE 051			STATION 060		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	8.38	0.00	32.406	0.000	25.21	277.1	0.000	0.00	6.59	0.00		
10	8.40	0.00	32.412	0.000	25.21	277.1	0.028	0.01	6.66	0.00		
20	8.38	0.00	32.401	0.000	25.20	277.8	0.056	0.06	6.63	0.00		
30	8.32	0.00	32.414	0.000	25.22	276.1	0.084	0.13	6.52	0.00		
50	8.30	0.00	32.409	0.000	25.22	276.5	0.140	0.36	6.62	0.00		
75	8.24	0.00	32.445	0.000	25.26	273.4	0.209	0.80	6.46	0.00		
100	7.56	0.00	32.866	0.000	25.68	233.0	0.273	1.37	5.37	0.00		
150	6.70	0.00	33.700	0.001	26.46	160.3	0.372	2.59	4.38	0.00	0.98	
200	6.65	0.03	33.910	0.012	26.63	144.7	0.449	3.97	3.79	0.01	1.02	
250	6.19	0.05	33.944	0.022	26.72	137.0	0.520	5.60	3.36	0.02	0.74	
300	5.71	0.04	33.934	0.002	26.77	132.3	0.588	7.52	3.01	0.02	1.19	
400	5.15	0.23	33.993	0.014	26.88	122.3	0.716	12.11	2.39	0.09	2.47	
500	4.64	0.37	34.050	0.023	26.98	113.1	0.835	17.58	1.85	0.14	3.99	
600	4.19	0.48	34.105	0.029	27.08	104.8	0.945	23.79	1.39	0.18	5.38	
700	3.81	0.56	34.160	0.034	27.16	97.3	1.047	30.59	1.01	0.21	6.38	
800	3.48	0.60	34.213	0.036	27.23	90.5	1.142	37.90	0.70	0.23	6.82	
1000	3.02	0.56	34.315	0.034	27.36	79.1	1.314	53.68	0.32	0.21	5.86	
1200	2.79	0.37	34.412	0.023	27.46	70.7	1.466	70.78	0.25	0.14	3.17	
1500	2.62	0.01	34.532	0.001	27.57	61.7	1.667	98.57	0.65	0.02	0.61	
2000	1.91	0.02	34.602	0.001	27.68	50.4	1.952	149.23	1.32	0.01	3.43	

CNAV OSHAWA CRUISE OSI STATION 061 OBSERVED VALUES

DATE 25/03/63 HR 09.1 LAT 48-14 N LONG 129-18 W SNDG 2286 WEA 02 WIND VEL 12 DIR 12
 BAROM 11.0 TEMP DRY 8.9 MET 8.9 RELHU 99 WTRCLR SEA 2 DIR 13 SWELL 4 DIR 13
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 10.10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L	ML/L		
1	0	8.70	32.494	25.23	6.59	0.589	-0.015	103
1	5	8.74	32.489	25.22	6.52	0.582	-0.010	102
1	10	8.74	32.492	25.22	6.59	0.589	-0.016	103
1	20	8.73	32.490	25.22	6.59	0.589	-0.016	103
1	30	8.69	32.498	25.23	6.57	0.587	-0.013	102
1	50	8.67	32.502	25.24	6.60	0.589	-0.016	103
1	75	8.67	32.506	25.24	6.56	0.586	-0.012	102
1	99	8.43	32.604	25.35	6.34	0.566	0.010	98
1	124	7.17	32.945	25.80	5.69	0.508	0.091	85
1	149	6.57	33.422	26.26	4.99	0.446	0.151	75
2	171	6.65	33.629	26.41	4.14	0.370	0.225	62
2	195	6.72	33.828	26.56				
2	294	5.70	33.927	26.76	3.06	0.273	0.336	45
2	493	4.23	34.050	27.03	1.38	0.123	0.509	20
2	741	3.78	34.246	27.23	0.45	0.040	0.598	6
2	988	3.30	34.384	27.39	0.29	0.026	0.620	4
2	1486	2.49	34.477	27.53	0.76	0.068	0.591	10
2	1786	2.10	34.568	27.64	1.13	0.101	0.564	15

CNAV OSHAWA		CRUISE OSI			STATION 061		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	8.70	0.00	32.494	0.000	25.23	275.1	0.000	0.00	6.59	0.00		
10	8.74	0.00	32.492	0.000	25.22	276.0	0.028	0.01	6.59	0.00		
20	8.73	0.00	32.490	0.000	25.22	276.2	0.056	0.06	6.59	0.00		
30	8.69	0.00	32.498	0.000	25.23	275.2	0.084	0.13	6.57	0.00		
50	8.67	0.00	32.502	0.000	25.24	274.9	0.139	0.36	6.60	0.00		
75	8.67	0.00	32.506	0.000	25.24	275.1	0.209	0.80	6.56	0.00		
100	8.38	0.01	32.614	0.001	25.37	263.3	0.276	1.41	6.33	0.00	0.99	
150	6.57	0.00	33.434	0.001	26.27	178.4	0.388	2.78	5.66	0.00	0.93	
200	6.69	0.02	33.847	0.009	26.57	149.9	0.470	4.25	4.04	0.03	1.09	
250	6.27	0.09	33.956	0.047	26.72	137.0	0.543	5.92	3.29	0.15	1.27	
300	5.64	0.00	33.931	0.001	26.77	131.7	0.610	7.83	3.00	0.00	0.99	
400	4.81	0.01	33.997	0.005	26.92	118.0	0.736	12.32	2.07	0.01	0.77	
500	4.21	0.01	34.056	0.000	27.04	107.8	0.850	17.57	1.34	0.00	0.97	
600	3.94	0.06	34.135	0.004	27.13	99.8	0.955	23.48	0.85	0.02	0.68	
700	3.80	0.04	34.214	0.002	27.20	93.2	1.053	29.98	0.53	0.01	0.80	
800	3.65	0.00	34.284	0.000	27.27	87.3	1.144	37.01	0.37	0.02	0.73	
1000	3.28	0.00	34.387	0.001	27.39	76.8	1.310	52.27	0.29	0.00	0.99	
1200	2.93	0.00	34.434	0.013	27.46	70.7	1.459	69.13	0.41	0.04	0.90	
1500	2.47	0.00	34.479	0.001	27.54	63.8	1.664	97.42	0.78	0.00	1.00	

CNAV OSHAWA CRUISE 051 STATION 062 OBSERVED VALUES

DATE 25/03/63 HR 14.2 LAT 48-14 N LONG 128-30 W WEA 01 WIND VEL 15 DIR 15
 BAROM 11.3 TEMP DRY 8.9 WET 8.3 RELHU 92 WTRCLR SEA 2 DIR 15 SWELL 4 DIR 13
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 17.18 SDCI SNOG 2468

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	8.90	32.432	25.15	6.51	0.581	-0.011		102
1	5	8.93	32.424	25.14	6.53	0.583	-0.013		102
1	10	8.96	32.431	25.14	6.59	0.589	-0.019		103
1	19	8.98	32.434	25.14	6.43	0.574	-0.005		101
1	29	8.94	32.424	25.13	6.51	0.581	-0.011		102
1	48	8.92	32.426	25.14	6.55	0.585	-0.014		103
1	72	8.83	32.421	25.15	6.55	0.585	-0.013		102
1	96	8.50	32.656	25.38	5.26	0.470	0.105		82
1	119	7.40	33.179	25.95	5.02	0.448	0.140		76
1	143	7.36	33.516	26.22	4.27	0.381	0.206		65
2	164	7.16	33.664	26.37	4.18	0.373	0.216		63
2	187	7.23	33.854	26.51	3.12	0.279	0.309		47
2	280	6.03	33.942	26.74	2.89	0.258	0.346		43
2	470	4.85	34.068	26.98	0.97	0.087	0.535		14
2	710	4.14	34.252	27.20	0.30	0.027	0.606		4
2	950	3.58	34.372	27.35	0.28	0.025	0.616		4
2	1434	2.59	34.459*	27.51	0.64	0.057	0.600		9
2	1724	2.18	34.562	27.63	1.09	0.097	0.566		15

CNAV OSHAWA CRUISE OSI STATION 062 BIOLOGICAL DATA

DEPTH CHL-A PRODUCTIVITY SAL
 LAB-I DECK-I
 0 0.39 7.28 32.418
 0 8.74

MESSENGER TIME 0625 INCOMING SOLAR RADIATION - AM 231 PM 182

THE SECOND PRODUCTIVITY VALUE WAS INCUBATED AT 50 PERCENT LIGHT
 INTENSITY INSTEAD OF 100 PERCENT

CNAV OSHAWA CRUISE OSI STATION 062				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.90	0.00	32.432	0.000	25.15	282.7	0.000	0.00	6.51	0.00	0.88
10	8.96	0.00	32.431	0.000	25.14	283.8	0.029	0.02	6.59	0.00	0.97
20	8.98	0.00	32.433	0.000	25.14	284.1	0.058	0.06	6.43	0.00	
30	8.94	0.00	32.424	0.000	25.13	284.4	0.086	0.13	6.51	0.00	
50	8.92	0.00	32.421	0.003	25.14	284.6	0.144	0.37	6.58	0.02	0.91
75	8.82	0.01	32.435	0.001	25.16	282.5	0.215	0.83	6.39	0.04	0.84
100	8.30	0.04	32.744	0.012	25.48	252.5	0.282	1.43	5.20	0.03	0.78
150	7.29	0.02	33.572	0.006	26.28	177.6	0.391	2.77	4.26	0.03	0.66
200	7.12	0.06	33.900	0.022	26.56	151.7	0.474	4.25	2.91	0.14	1.23
250	6.52	0.10	33.974	0.039	26.70	139.0	0.547	5.93	2.63	0.25	1.07
300	5.85	0.02	33.957	0.001	26.77	132.4	0.615	7.86	2.70	0.05	0.96
400	5.15	0.05	34.025	0.003	26.91	120.0	0.743	12.41	1.72	0.12	0.75
500	4.73	0.01	34.092	0.002	27.01	111.1	0.859	17.78	0.81	0.02	0.86
600	4.40	0.03	34.170	0.004	27.11	102.4	0.967	23.86	0.45	0.05	0.67
700	4.16	0.00	34.245	0.001	27.19	95.0	1.067	30.51	0.30	0.01	0.94
800	3.92	0.00	34.302	0.000	27.26	88.8	1.160	37.66	0.25	0.02	0.64
1000	3.46	0.00	34.391	0.002	27.38	78.6	1.329	53.25	0.29	0.00	1.67
1200	3.03	0.01	34.451	0.010	27.47	70.7	1.481	70.29	0.40	0.00	7.31
1500	2.48	0.00	34.514	0.016	27.57	61.4	1.681	98.01	0.73	0.00	9.56

CNAV OSHAWA CRUISE 051 STATION 063 OBSERVED VALUES

DATE 25/03/63 HR 18.8 LAT 48-14 N LONG 128-00 W WEA 01 WIND VEL 10 DIR 17
 BAROM 16. TEMP DRY 9.4 WET 8.9 RELHU 94 WTRCLR SNGD 2560 SEA 2 DIR 18 SWELL 3 DIR 18
 CLOUD TYPE VIS 1 VIS 7 WIRE ANGLE(S) 0.14

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	8.73	32.300	25.07	6.63	0.592	-0.019		103
1	5	8.71	32.282	25.06	6.62	0.591	-0.017		103
1	10	8.80	32.327	25.08	6.74	0.602	-0.029		105
1	20	8.76	32.335	25.09	6.73	0.601	-0.028		105
1	30	8.71	32.338	25.10	6.58	0.588	-0.014		102
1	50	8.70	32.350	25.11	6.60	0.589	-0.016		103
1	75	8.68	32.382	25.14	6.60	0.589	-0.016		103
1	100	8.11	33.199	25.87	4.49	0.401	0.177		69
1	125	7.63	33.808	26.41	2.47	0.221	0.362		38
1	150	7.57	33.871	26.47	2.20	0.196	0.386		34
2	168	7.48	33.880	26.49	2.29	0.205	0.380		35
2	289*	6.86	33.962	26.64	2.18	0.195	0.398		33
2	483*	5.34	34.056	26.91	1.20	0.107	0.507		17
2	727	4.19	34.250	27.19	0.31	0.028	0.604		4
2	970	3.56	34.405	27.38	0.27	0.024	0.617		4
2	1458	2.58	34.472*	27.52	0.69	0.062	0.596		9
2	1752	2.17	34.442*	27.53	1.07	0.096	0.569		14

CNAV OSHAWA CRUISE OS1 STATION 063 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.68	16.28	32.200
7	0.72	13.78	32.197
24	0.86	2.40	32.220
51	0.37	0.00	32.334

34.92 275.14 - WATER COLUMN VALUES

MESSANGER TIME 1041 INCOMING SOLAR RADIATION - AM 231 PM 182

CNAV OSHAWA CRUISE OS1 STATION 063				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.73	0.00	32.300	0.000	25.07	290.0	0.000	0.00	6.63	0.00	
10	8.80	0.00	32.327	0.000	25.08	289.2	0.030	0.02	6.74	0.00	
20	8.76	0.00	32.335	0.000	25.09	288.2	0.059	0.06	6.73	0.00	
30	8.71	0.00	32.338	0.000	25.10	287.4	0.088	0.13	6.58	0.00	
50	8.70	0.00	32.350	0.000	25.11	286.6	0.146	0.37	6.60	0.00	
75	8.68	0.00	32.382	0.000	25.14	284.4	0.217	0.83	6.60	0.00	
100	8.11	0.00	33.199	0.000	25.87	215.9	0.280	1.39	4.49	0.00	
150	7.57	0.00	33.871	0.000	26.47	159.2	0.375	2.57	2.20	0.00	
200	7.27	0.03	33.899	0.002	26.54	153.8	0.454	3.98	2.27	0.11	3.77
250	6.95	0.07	33.929	0.004	26.60	147.9	0.530	5.73	2.21	0.25	11.19
300	6.63	0.11	33.960	0.006	26.67	142.1	0.603	7.80	2.12	0.36	19.77
400	6.02	0.14	34.024	0.008	26.80	130.7	0.741	12.72	1.87	0.48	31.94
500	5.43	0.14	34.090	0.008	26.93	119.6	0.867	18.53	1.51	0.48	30.31
600	4.87	0.10	34.159	0.006	27.05	108.7	0.982	25.02	1.05	0.35	16.15
700	4.33	0.03	34.230	0.001	27.16	98.0	1.087	31.98	0.48	0.09	2.00
800	3.97	0.01	34.300	0.001	27.25	89.5	1.181	39.27	0.26	0.01	99.99
1000	3.49	0.00							0.28	0.00	0.97
1200	3.05	0.00							0.41	0.02	0.89
1500	2.51	0.00							0.74	0.00	11.79

CNAV OSHAWA CRUISE OS1 STATION 064 OBSERVED VALUES
 DATE 25/03/63 HR 22.3 LAT 48-15 N LONG 127-32 W MEA 03 WIND VEL 3 DIR 15
 BAROM 17. TEMP DRY 11.7 WEI 10.0 RELHU 81 WTRCLR SCDG 2560 SEA 2 DIR 18 SWELL 3 DIR 18
 CLOUD TYPE 6 AMT 4 VIS 7 WIRE ANGLE(S) 0.20 SECDI 105

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	8.83	32.140	24.93	6.64	0.593	-0.020		104
1	5	9.07	32.417	25.11	6.64	0.593	-0.024		104
1	10	9.00	32.414	25.12	6.68	0.597	-0.027		105
1	20	8.91	32.422	25.14	6.66	0.595	-0.024		104
1	30	8.88	32.427	25.15	6.65	0.594	-0.023		104
1	50	8.85	32.424	25.15	6.68	0.597	-0.025		104
1	75	8.86	32.418	25.14	6.58	0.588	-0.016		103
1	100	8.04	33.161	25.85	4.62	0.413	0.167		71
1	125	7.76	33.550	26.19	3.41	0.305	0.277		52
1	150	7.59	33.817	26.43	2.89	0.258	0.325		44
2	163	7.57	33.820	26.43	2.84	0.254	0.329		44
2	186	7.32	33.896	26.53	2.68	0.239	0.347		41
2	279	6.08	33.939	26.73	2.54	0.227	0.377		38
2	471	4.90	34.091	26.99	0.86	0.077	0.544		12
2	713	4.14	34.277	27.22	0.34	0.030	0.602		5
2	957	3.60	34.390	27.36	0.28	0.025	0.615		4
2	1448	2.57	34.508	27.55	0.65	0.058	0.599		9
2	1744	2.23	34.560	27.62	1.00	0.089	0.573		13

CNAV OSHAWA				CRUISE OSI				STATION 064				INTERPOLATED AND COMPUTED VALUES			
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO				
0	8.83	0.00	32.140	0.000	24.93	303.3	0.000	0.00	6.64	0.00					
10	9.00	0.00	32.414	0.000	25.12	285.6	0.030	0.02	6.68	0.00					
20	8.91	0.00	32.422	0.000	25.14	283.9	0.059	0.06	6.66	0.00					
30	8.88	0.00	32.427	0.000	25.15	283.2	0.087	0.13	6.65	0.00					
50	8.85	0.00	32.424	0.000	25.15	283.3	0.144	0.37	6.68	0.00					
75	8.86	0.00	32.418	0.000	25.14	284.3	0.216	0.83	6.58	0.00					
100	8.04	0.00	33.161	0.000	25.85	217.7	0.279	1.38	4.62	0.00					
150	7.59	0.00	33.817	0.000	26.43	163.5	0.375	2.58	2.89	0.00					
200	7.13	0.02	33.909	0.005	26.56	151.1	0.455	4.00	2.65	0.03				1.24	
250	6.46	0.03	33.937	0.009	26.68	140.9	0.528	5.69	2.56	0.04				1.05	
300	5.89	0.02	33.954	0.001	26.76	133.1	0.597	7.64	2.37	0.05				0.96	
400	5.20	0.05	34.030	0.003	26.91	120.1	0.725	12.20	1.53	0.12				0.76	
500	4.78	0.01	34.115	0.001	27.02	109.9	0.841	17.55	0.74	0.02				0.87	
600	4.43	0.02	34.195	0.003	27.12	100.8	0.947	23.54	0.44	0.05				0.67	
700	4.17	0.00	34.268	0.000	27.21	93.3	1.046	30.08	0.34	0.01				0.92	
800	3.93	0.01	34.324	0.001	27.28	87.4	1.137	37.11	0.28	0.01				0.65	
1000	3.50	0.01	34.404	0.001	27.38	78.0	1.304	52.51	0.29	0.01				0.96	
1200	3.05	0.02	34.460	0.004	27.47	70.1	1.454	69.42	0.41	0.02				0.89	
1500	2.49	0.00	34.517	0.000	27.57	61.2	1.654	97.00	0.71	0.00				1.42	

CNAV OSHAWA CRUISE 051 STATION 065 OBSERVED VALUES

DATE 26/03/63 HR 01-8 LAT 48-14 N LONG 127-03 W SMDG 2560 WEA 03 WIND VEL 10 DIR 13
 BAROM 18. TEMP DRY 10.0 WET 9.4 RELHU 93 WTRCLR SEA 2 DIR 13 SWELL 4 DIR 14
 CLOUD TYPE VIS 7 WIRE ANGLE(S) 2

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN ADU	SATN
1	0	8.82	32.239	24.99	6.62	0.597	-0.020	103
1	5	8.83	32.238	25.01	6.68	0.597	-0.024	104
1	10	8.67	32.238	25.03	6.66	0.595	-0.020	104
1	20	8.65	32.240	25.04	6.68	0.597	-0.022	104
1	30	8.63	32.226	25.04	6.64	0.593	-0.018	103
1	50	8.58	32.248	25.05	6.62	0.591	-0.015	103
1	75	8.56	32.512	25.26	6.22	0.556	0.019	97
1	100	7.86	33.269	25.96	4.50	0.402	0.179	69
1	125	7.53	33.594	26.26	3.77	0.337	0.248	58
1	150	7.23	33.801	26.46	3.49	0.312	0.276	53

CNAV OSHAWA CRUISE 051 STATION 065 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.92	0.00	32.239	0.000	24.99	297.3	0.000	0.00	6.62	0.00	
10	8.67	0.00	32.238	0.000	25.03	293.9	0.030	0.02	6.66	0.00	
20	8.65	0.00	32.240	0.000	25.04	293.6	0.060	0.06	6.68	0.00	
30	8.63	0.00	32.236	0.000	25.04	293.8	0.089	0.14	6.64	0.00	
50	8.58	0.00	32.248	0.000	25.05	292.5	0.149	0.38	6.62	0.00	
75	8.56	0.00	32.512	0.000	25.26	273.0	0.220	0.83	6.22	0.00	
100	7.86	0.00	33.269	0.000	25.96	207.2	0.280	1.37	4.50	0.00	
150	7.23	0.00	33.801	0.000	26.46	159.8	0.373	2.52	3.49	0.00	

CNAV OSHAWA CRUISE OSI STATION 066 OBSERVED VALUES

DATE	HR	LAT	LONG	WEA	WIND	VEL	DIR	DIR	DIR
26/03/63	04.0	48-14 N	126-35 W	02	02	15	12	12	14
BAROM	DRY	WET	RELHU	99	WTRCLR	SEA	2	DIR	13
18.	8.3	8.3	8.3	15.26		SHELL	4	DIR	14
CLOUD	AMT	WIRE	ANGLE(S)						
TYPE	8	7							
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	9.02	32.230	24.97	5.25	0.469	0.101		82
1	5	9.05	32.227	24.96	4.56	0.407	0.162		71
1	10	9.05	32.235	24.97	4.74	0.423	0.147		74
1	19	9.00	32.249	24.99	5.55	0.496	0.075		87
1	29	8.98	32.264	25.00	5.90	0.527	0.043		92
1	48	8.88	32.365	25.10	5.60	0.500	0.071		88
1	72	8.75	32.766	25.43	5.05	0.451	0.120		79
1	97	8.02	33.130	25.83	4.52	0.404	0.176		70
1	121	7.85	33.646	26.25	2.63*	0.235	0.345		41
1	145	7.52	33.809	26.43	2.75*	0.246	0.338		42
2	160	7.44	33.827	26.46	3.37	0.301	0.284		51
2	179	7.11	33.874	26.54	3.43	0.306	0.283		52
2	269	6.41	33.968	26.71	2.33	0.208	0.391		35
2	453	4.82			1.08	0.096			
2	685	4.25	34.238	27.18	0.38	0.034	0.597		5
2	919	3.61	34.262*	27.26	0.31	0.028	0.613		4
2	1200	3.12	34.457	27.46	0.39	0.035	0.613		5
2	1671	2.37	34.553	27.61	0.86	0.077	0.584		17
2	1954	2.04	34.584	27.66	1.25	0.112	0.554		17
2	2170	1.85	34.630	27.71	1.38	0.123	0.546		18

CNAV OSHAWA			CRUISE OSI			STATION 066			INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO				
0	9.02	0.00	32.230	0.000	24.97	299.4	0.000	0.00	5.25	0.00	0.88				
10	9.00	0.00	32.235	0.000	24.97	299.7	0.031	0.02	4.74	0.00	0.97				
30	8.98	0.00	32.266	0.001	24.99	298.0	0.061	0.06	5.61	0.00					
50	8.88	0.01	32.394	0.004	25.12	286.0	0.149	0.38	5.56	0.00	0.91				
75	8.66	0.02	32.806	0.004	25.48	252.6	0.217	0.81	4.98	0.00	0.86				
100	7.99	0.01	33.200	0.009	25.88	214.1	0.276	1.33	4.44	0.01	1.00				
150	7.50	0.01	33.818	0.003	26.44	162.2	0.371	2.52	3.47	0.04	1.15				
200	6.89	0.04	33.906	0.006	26.59	148.1	0.449	3.91	3.26	0.08	1.53				
250	6.50	0.04	33.958	0.005	26.69	139.9	0.522	5.58	2.64	0.07	1.02				
300	6.11	0.03	33.994	0.002	26.77	132.8	0.590	7.52	2.05	0.02	1.17				
400	5.24	0.04	34.072	0.007	26.93	117.4	0.717	12.02	1.34	0.02	1.56				
500	4.64	0.04	34.140	0.008	27.06	106.4	0.830	17.22	0.87	0.01	1.45				
600	4.37	0.06	34.197	0.005	27.13	100.0	0.934	23.10	0.54	0.01	1.02				
700	4.21	0.00	34.246	0.000	27.19	95.4	1.033	29.69	0.36	0.01	0.96				
800	3.93	0.01	34.298	0.000	27.26	89.2	1.126	36.88	0.30	0.02	0.78				
1000	3.45	0.01	34.387	0.000	27.38	78.8	1.296	52.51	0.32	0.00	0.73				
1200	3.12	0.00	34.457	0.000	27.46	71.1	1.448	69.63	0.39	0.00	0.84				
1500	2.62	0.01	34.527	0.001	27.56	62.0	1.650	97.59	0.65	0.01	0.84				
2000	2.00	0.00	34.591	0.000	27.67	52.2	1.940	149.33	1.30	0.00	2.56				

CNAV OSHAWA CRUISE OSI STATION 067 OBSERVED VALUES

DATE 26/03/63 HR 08.0 LAT 48-14 N LONG 126-06 W WEA 01 WIND VEL 15 DIR 12
 BAROM 18.0 TEMP DRY 7.8 WET 7.2 RELHU 92 WTRCLR SECDI 1372 SEA 2 DIR 12 SWELL 3 DIR 14
 CLOUD TYPE VIS 5 WIRE ANGLE(S) 10.20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	8.78	31.910	24.76	6.65	0.595	-0.020	104
1	5	8.84	31.902	24.74	6.69	0.598	-0.024	104
1	10	8.84	31.907	24.75	6.71	0.599	-0.026	104
1	20	8.79	31.908	24.75	6.73	0.601	-0.027	105
1	30	8.81	32.122	24.92	6.63	0.592	-0.019	103
1	49	8.72	32.330	25.10	6.51	0.581	-0.008	101
1	74	8.44	32.637	25.38	5.86	0.523	0.053	91
1	99	8.25	33.218	25.86	4.59	0.410	0.166	71
1	124	7.99	33.538	26.15	3.71	0.331	0.247	57
1	149	7.39	33.802	26.44	3.55	0.317	0.268	54
2	162	7.32	33.838	26.48	3.48	0.311	0.276	53
2	186	7.01	33.900	26.57	3.19	0.285	0.306	48
2	280	6.36	34.033	26.76	1.98	0.177	0.423	30
2	472	5.21	34.100	26.96	0.93	0.083	0.533	13
2	713	4.21	34.256	27.19	0.36	0.032	0.599	5
2	1041	3.51	34.409	27.39	0.35	0.031	0.611	5

CNAV OSHAWA		CRUISE OSI			STATION 067		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	8.78	0.00	31.910	0.000	24.76	319.7	0.000	0.00	6.66	0.00		
10	8.84	0.00	31.907	0.000	24.75	321.0	0.033	0.02	6.71	0.00		
20	8.79	0.00	31.908	0.000	24.75	320.3	0.065	0.07	6.73	0.00		
30	8.81	0.00	32.122	0.000	24.92	304.9	0.097	0.15	6.63	0.00		
50	8.71	0.00	32.339	0.002	25.10	287.6	0.156	0.39	6.50	0.00	0.95	
75	8.43	0.00	32.660	0.003	25.40	260.2	0.225	0.83	5.81	0.01	0.94	
100	8.24	0.00	33.234	0.001	25.87	215.3	0.285	1.36	4.54	0.00	0.94	
150	7.38	0.00	33.806	0.001	26.45	161.5	0.380	2.54	3.55	0.00	0.87	
200	6.88	0.02	33.927	0.002	26.61	146.5	0.458	3.93	3.00	0.01	1.22	
250	6.52	0.03	34.004	0.004	26.72	136.7	0.529	5.57	2.35	0.02	1.04	
300	6.23	0.00	34.045	0.005	26.79	130.5	0.596	7.47	1.81	0.02	0.96	
400	5.61	0.00	34.088	0.013	26.90	120.8	0.723	12.01	1.18	0.05	0.75	
500	5.07	0.00	34.117	0.002	26.99	113.2	0.841	17.46	0.83	0.01	0.88	
600	4.62	0.00	34.180	0.005	27.09	104.2	0.951	23.64	0.55	0.01	0.64	
700	4.25	0.00	34.247	0.001	27.18	95.9	1.052	30.38	0.37	0.00	0.91	
800	3.96	0.00	34.312	0.006	27.27	88.5	1.146	37.56	0.30	0.02	1.64	
1000	3.56	0.00	34.402	0.005	27.38	78.9	1.315	53.15	0.33	0.02	0.91	

CNAV OSHAWA CRUISE DS1 STATION 069 OBSERVED VALUES
 DATE 26/03/63 HR 11.5 LAT 48-14 N LONG 125-37 W SNDG 155 WEA 01 WIND VEL 13 DIR 10
 BAROM 17.0 TEMP DRY 8.9 WET 8.9 RELHU 99 WTRCLR SEA 1 DIR 09 SWELL 1 DIR 12
 CLOUD TYPE AMT 3 VIS 7 WIRE ANGLE(S) 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					MGA/L			
1	0	8.66	31.872	24.75	6.54	0.584	-0.008	101
1	5	8.68	31.876	24.75	6.57	0.587	-0.011	102
1	10	8.74	31.868	24.73	6.60	0.589	-0.014	102
1	20	8.70	31.876	24.74	6.59	0.589	-0.013	102
1	30	8.51	31.929	24.81	6.55	0.585	-0.007	101
1	50	8.52	32.599	25.34	5.86	0.523	0.052	91
1	75	7.85	33.234	25.93	4.54	0.405	0.176	70
1	100	7.88	33.559	26.18	3.53	0.315	0.265	54
1	125	7.73	33.760	26.44	3.15*	0.281	0.335	43
1	150	7.21			2.84	0.254		

CNAV OSHAWA CRUISE DS1 STATION 068		INTERPOLATED AND COMPUTED VALUES									
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.66	0.00	31.872	0.000	24.75	320.8	0.000	0.00	6.54	0.00	
10	8.74	0.00	31.868	0.000	24.73	322.4	0.033	0.02	6.60	0.00	
20	8.70	0.00	31.876	0.000	24.74	321.4	0.065	0.07	6.59	0.00	
30	8.51	0.00	31.929	0.000	24.81	314.9	0.097	0.15	6.55	0.00	
50	8.52	0.00	32.599	0.000	25.34	265.6	0.156	0.38	5.86	0.00	
75	7.85	0.00	33.234	0.000	25.93	209.3	0.216	0.76	4.54	0.00	
100	7.88	0.00	33.559	0.000	26.18	185.9	0.265	1.20	3.53	0.00	
150	7.21	0.00	33.760	0.000	26.44	162.5	0.353	2.31	2.84	0.00	

CNAV OSHAWA CRUISE 051 STATION 069 OBSERVED VALUES

DATE 26/03/63 HR 13-8 LAT 48-14 N LONG 125-09 W SNDG 119 WEA 03 WIND VEL 15 DIR 05
 BARGM 15 TEMP DRY MET WTRCLR WTRCLR SEA 2 DIR 05 SWELL 3 DIR 15
 CLOUD TYPE VIS WIRE ANGLE(S) 15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	8.68	31.952	24.81				
1	10	8.64	31.959	24.82				
1	19	8.67	31.961	24.81	6.60	0.589	-0.014	102
1	29	8.70	31.961	24.81	6.55	0.585	-0.010	102
1	48	8.57	32.617	25.34	5.61	0.501	0.073	87
1	72	8.11	33.116	25.80	4.26	0.380	0.198	66
1	97	7.32	33.634	26.32	2.89	0.258	0.329	44
1	106	7.27	33.682	26.37	2.80	0.250	0.338	43

CNAV OSHAWA CRUISE 051 STATION 069 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.68	0.00	31.952	0.000	24.81	315.2	0.000	0.00			
10	8.64	0.00	31.959	0.000	24.82	314.2	0.032	0.02			
20	8.67	0.00	31.956	0.004	24.81	315.1	0.064	0.07	6.60	0.00	0.88
30	8.70	0.00	31.988	0.009	24.83	313.2	0.096	0.15	6.52	0.01	0.97
50	8.54	0.00	32.666	0.005	25.38	260.9	0.153	0.38	5.50	0.00	0.91
75	8.00	0.02	33.193	0.010	25.88	214.4	0.213	0.76	4.05	0.03	0.87
100	7.28	0.01	33.662	0.003	26.35	170.0	0.262	1.18	2.83	0.01	0.69

CNAV OSHAWA CRUISE OS1 STATION 69A BIOLOGICAL DATA

DATE 26/03/63 LAT 48-13 N LONG 125-01 W

DEPTH CHL-A PRODUCTIVITY
LAB-I DECK-I

0 0.60

MESSENGER TIME 0625

CNAV OSHAWA CRUISE OS1 STATION 070 OBSERVED VALUES

POINT OF THE ARCHES

DATE 26/03/63 HR 15.3 LAT 48-14 N LONG 124-52 W SNDC 64 WEA 02 WIND VEL 10 DIR 07
 BAROM 16.0 TEMP DRY 9.4 WET 8.9 RELHU 94 WTRCLR SECDI SEA 2 DIR 07 SWELL 3 DIR 16
 CLOUD TYPE AMT 8 VIS 7 WIRE ANGLE(S) 20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	8.80	29.421	22.81	6.66	0.595	-0.011	102	
1	5	8.77	30.144	23.38	6.68	0.597	-0.015	103	
1	9	8.73	30.992	24.05	6.65	0.594	-0.015	103	
1	19	8.76	31.354	24.33	6.69	0.598	-0.020	104	
1	28	8.67	31.584	24.52	6.45	0.576	0.001	100	
1	47	8.59	31.794	24.70	6.27	0.560	0.018	97	

DEPTH	CNAV OSHAWA		CRUISE DS1		STATION 070		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POI ENERGY	OXY ML/L	E(O)		
0	8.80	0.00	29.421	0.000	22.81	505.3	0.000	0.00	6.66	0.00	1.00	
10	8.73	0.00	31.087	0.036	24.12	380.4	0.045	0.02	6.66	0.01	0.85	
20	8.75	0.00	31.384	0.000	24.35	358.7	0.082	0.08	6.67	0.01	1.54	
30	8.65	0.01	31.623	0.000	24.55	339.6	0.118	0.17	6.39	0.01		

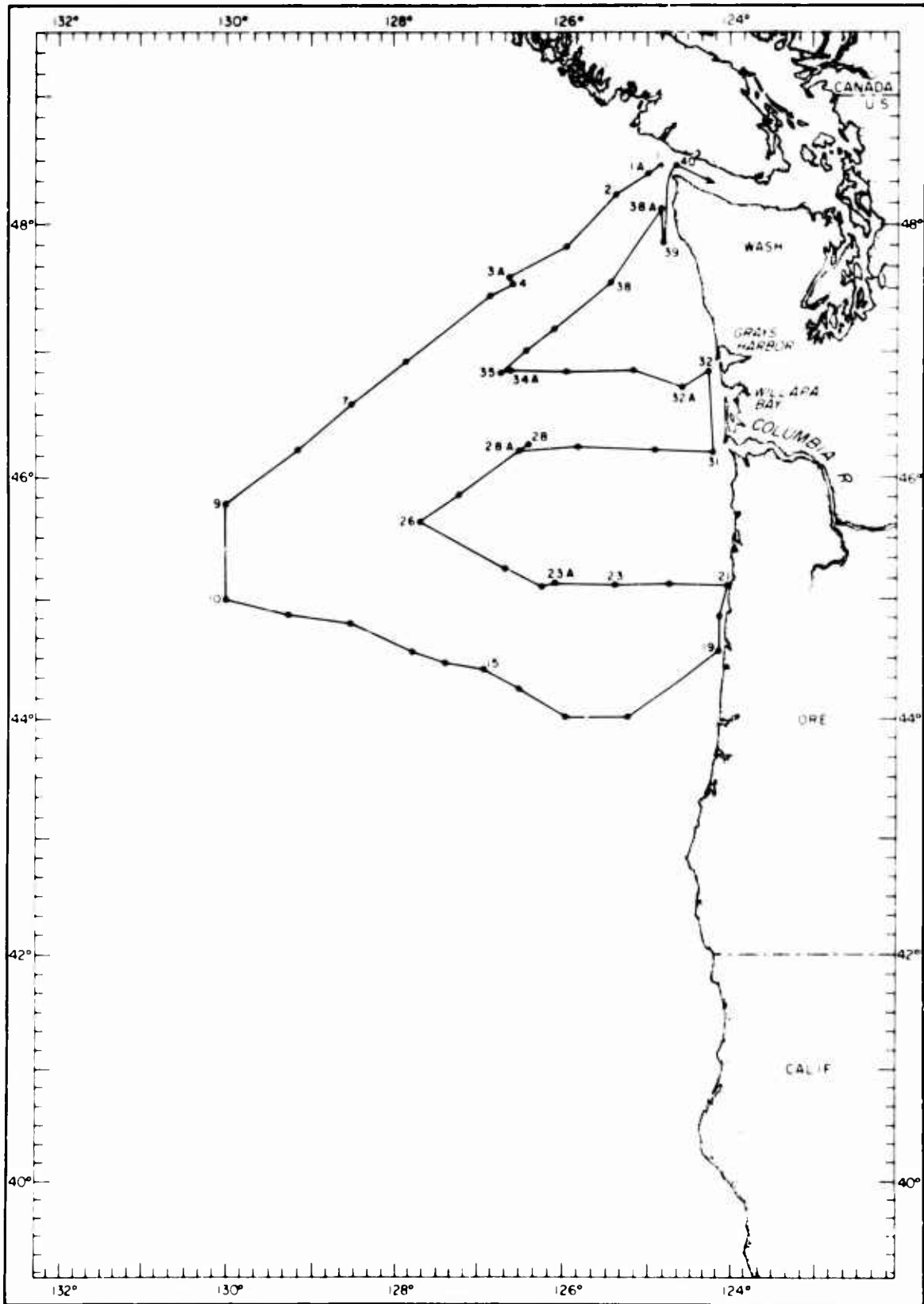


Fig 2. Station locations Brown Bear Cruise 320, 28 March - 10 April 1963.

BROWN BEAR CRUISE 320 STATION 001 OBSERVED VALUES
 TATOOSH ISLAND
 DATE 29/03/63 HR 12.5 LAT 48-27 N LONG 124-51 W WEA 21 WIND VEL 26 DIR 23
 BAROM 28.0 TEMP DRY 7.9 WET 5.8 RELHU 72 WTRCLR SECDI 281 SEA 2 DIR 23 SWELL 3 DIR 23
 CLOUD TYPE 7 AMT 2 VIS 7 WIRE ANGLE(S) 25

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	8.57	31.447	24.43	6.20	0.554	0.025		96
1	4	8.58	31.546	24.50	5.81	0.519	0.060		90
1	9	8.61	31.631	24.57	5.95	0.531	0.046		92
1	18	8.68	31.764	24.66	5.78	0.516	0.060		90
1	26	8.70	31.777	24.67	5.85	0.522	0.054		91
1	44	8.67	31.876	24.75	5.66	0.506	0.071		88
1	66	8.58	31.886	24.77	5.52	0.493	0.084		85
1	88	7.85	32.496	25.35	4.18	0.373	0.211		64
1	110	7.64	33.041	25.81	3.29	0.294	0.292		50
1	132	7.37	33.534	26.24	3.16	0.282	0.305		48
1	153	7.34	33.534	26.24	3.08	0.275	0.312		47
1	174	7.24	33.658	26.35	2.90	0.259	0.329		44
1	218	7.15	33.790	26.47	2.90	0.259	0.330		44

BROWN BEAR CRUISE 320 STATION 001 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.98	1.25		30.590
3	1.23	2.08		30.601
6	1.33	2.03		30.590
12	1.42	2.38		30.587
15.43 24.40 - WATER COLUMN VALUES				

MESSANGER TIME 0315 INCOMING SOLAR RADIATION - AM 162 PM 121
 ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0211-0221 DEPTHS 100, 70
 35, 0

BROWN BEAR CRUISE 320 STATION 001					INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEO POT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.57	0.00	31.447	0.000	24.43	351.2	0.000	0.00	6.20	0.00	0.93
10	8.62	0.00	31.650	0.002	24.58	336.9	0.035	0.02	5.94	0.01	0.71
20	8.69	0.00	31.771	0.004	24.66	329.0	0.069	0.07	5.79	0.01	0.94
30	8.70	0.00	31.798	0.005	24.68	327.3	0.102	0.15	5.83	0.02	
50	8.68	0.02	31.855	0.024	24.73	323.1	0.167	0.42	5.68	0.04	0.75
75	8.29	0.05	32.103	0.027	24.98	299.5	0.246	0.92	5.02	0.07	0.65
100	7.71	0.02	32.801	0.001	25.61	239.9	0.314	1.52	3.62	0.01	0.64
150	7.34	0.01	33.544	0.012	26.25	180.3	0.419	2.84	3.09	0.00	0.82
200	7.14	0.01	33.719	0.026	26.41	165.3	0.507	4.40	2.78	0.02	12.40

BROWN BEAR CRUISE 320 STATION 01A BIOLOGICAL DATA

DATE 29/03/63 LAT 48-24 N LONG 124-59 W

DEPTH CHL-A PRODUCTIVITY SAL
LAB-I DECK-I

0 0.51 0.52 2.10 31.840

MESSENGER TIME 0626 INCOMING SOLAR RADIATION - AM 162 PM 121

BROWN BEAR CRUISE 320 STATION 002 OBSERVED VALUES

DATE 30/03/63 HR 00.0 LAT 48-14 N LONG 125-23 W WEA 02 WIND VEL 30 DIR 23
 BAROM 97.0 TEMP DRY 6.9 WET 5.2 RELHU 78 WTRCLR SECDI 113 SEA 3 DIR 23 SWELL 4 DIR 23
 CLOUD TYPE 8 AMT 7 VIS 7 WIRE ANGLE(S) 15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	8.88	32.022	24.83	5.92	0.529	0.044	92	
1	5	8.83	32.022	24.84	5.85	0.522	0.051	91	
1	15	8.84	32.026	24.84	6.31	0.564	0.010	98	
1	24	8.88	32.019	24.83	5.90	0.527	0.046	92	
1	44	8.96	32.753	25.39	5.92	0.529	0.040	93	
1	68	8.66	33.579	26.08	4.89	0.437	0.133	77	
1	92	7.50			2.77	0.247			

BROWN BEAR CRUISE 320 STATION 002 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT SAT PROD	SAT FILT	SAL	PHOS	NITR	SIL
0	0.55	0.56	4.00	0.21	100	32.111	0.85	5.1	10
7	0.64	0.70	4.66	0.24	59	32.111	0.87	5.1	10
24	0.72	0.85	0.80	0.24	32	32.107	0.87	5.0	10
49	0.75	0.93	0.00	0.13	13	32.107	0.75	3.6	8
100	0.61	0.23		0.03	4	32.142	0.91	5.4	10

34.05 39.74 86.46 - WATER COLUMN VALUES

MESSANGER TIME 1146 INCOMING SOLAR RADIATION - AM 162 PM 121
 LIGHT SATURATION INCUBATOR ILLUMINATION 22200

BROWN BEAR CRUISE 320 STATION 002 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	8.88	0.00	32.022	0.000	24.83	312.8	0.000	0.00	5.92	0.00	0.81
10	8.82	0.00	32.024	0.001	24.84	312.0	0.032	0.02	6.09	0.07	0.58
20	8.86	0.00	32.010	0.009	24.82	313.8	0.063	0.07	6.11	0.04	0.91
30	8.92	0.01	32.187	0.038	24.95	301.7	0.094	0.14	5.88	0.07	
50	8.95	0.01	33.036	0.047	25.61	239.3	0.149	0.36	5.77	0.00	1.66
75	8.43	0.01									

BROWN BEAR CRUISE 320 STATION 003 OBSERVED VALUES

DATE 30/03/63 HR 07.4 LAT 47-50 N LONG 125-57 W WEA 02 WIND VEL 24 DIR 20
 BAROM 00.7 TEMP DRY 7.2 WET 5.0 RELHU 71 WTRCLR SECDI 1646
 CLOUD TYPE 8 AMT 3 VIS 7 WIRE ANGLE(S) 22.7 SEA 2 DIR 20 SWELL 1 DIR 18

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
2	0	8.90	32.165	24.94	6.65	0.594	-0.022	104	
2	5	8.87	32.141	24.92	6.73	0.601	-0.029	105	
2	10	8.85	32.135	24.92	6.65	0.594	-0.021	104	
2	20	8.92	32.178	24.95	6.73	0.601	-0.030	105	
2	31	8.96	32.183	24.94	6.73	0.601	-0.030	105	
2	51	9.05	32.252	24.98	6.55	0.585	-0.015	103	
2	75	8.60	32.611	25.33	5.91	0.528	0.046	92	
2	100	8.13	33.163	25.84	4.60	0.411	0.167	71	
2	125	7.96	33.396	26.04	4.13	0.369	0.211	64	
2	150	7.58	33.597	26.26	3.89	0.347	0.236	60	
2	174	7.35	33.753	26.41	3.44	0.307	0.279	52	
1	190	7.12	33.875	26.54	2.97	0.265	0.324	45	
1	286	5.84	34.018	26.82	1.58	0.141	0.466	23	
1	478	4.93	34.131	27.02	0.74	0.066	0.554	11	
1	719	4.17	34.273	27.21	0.32	0.029	0.603	5	
1	960	3.57	34.391	27.37	0.27	0.024	0.617	4	
1	1445	2.64	34.519	27.56	0.73	0.065	0.591	10	
1	1542	2.53	34.526	27.57	0.77	0.069	0.589	10	

BROWN BEAR CRUISE 320 STATION 003 BIOLOGICAL DATA

INCOMING SOLAR RADIATION - AM 163 PM 146

ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0108-0118 DEPTHS 100, 70, 35, 0

BROWN BEAR		CRUISE 320		STATION 003		INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	8.90	0.00	32.165	0.000	24.94	302.5	0.000	0.00	6.65	0.00	0.84	
10	8.85	0.00	32.135	0.000	24.92	304.2	0.031	0.02	6.65	0.00		
20	8.92	0.00	32.178	0.000	24.95	302.2	0.062	0.06	6.73	0.00		
30	8.96	0.00	32.183	0.001	24.94	302.5	0.092	0.14	6.73	0.00		
50	9.05	0.00	32.245	0.001	24.98	299.6	0.153	0.39	6.57	0.00	0.92	
75	8.60	0.00	32.611	0.000	25.33	266.2	0.224	0.84	5.91	0.00		
100	8.13	0.00	33.163	0.000	25.84	218.9	0.285	1.38	4.60	0.00		
150	7.58	0.00	33.597	0.000	26.26	179.7	0.386	2.65	3.89	0.00		
200	6.97	0.01	33.915	0.015	26.59	148.6	0.468	4.12	2.75	0.03	1.41	
250	6.28	0.01	34.027	0.037	26.77	131.9	0.539	5.74	1.92	0.07	1.78	
300	5.73	0.02	34.030	0.003	26.84	125.4	0.604	7.57	1.47	0.02	0.97	
400	5.15	0.08	34.099	0.009	26.97	114.4	0.725	11.89	0.90	0.09	0.75	
500	4.85	0.00	34.144	0.000	27.04	108.5	0.837	17.08	0.68	0.00	0.90	
600	4.51	0.01	34.204	0.001	27.12	101.1	0.943	23.05	0.46	0.01	0.67	
700	4.22	0.00	34.262	0.000	27.20	94.4	1.042	29.64	0.33	0.00	0.89	
800	3.95	0.00	34.316	0.000	27.27	88.2	1.134	36.75	0.27	0.01	0.66	
1000	3.47	0.00	34.407	0.000	27.39	77.5	1.302	52.17	0.30	0.01	1.01	
1200	3.05	0.01	34.473	0.000	27.48	69.2	1.451	68.91	0.48	0.05	1.80	
1500	2.57	0.00	34.524	0.000	27.56	61.7	1.650	96.43	0.76	0.00	0.52	

BROWN BEAR CRUISE 320 STATION 03A BIOLOGICAL DATA

DATE 30/03/63 LAT 47-35 N LONG 126-35 W

DEPTH CHL-A PRODUCTIVITY
LAB-I DECK-I

0 0.20 0.16

MESSENGER TIME 0632 INCOMING SOLAR RADIATION - AM 163 PM 146

BROWN BEAR CRUISE 320 STATION 005 OBSERVED VALUES
 DATE 30/03/63 MR 20.0 LAT 47-26 N LONG 126-51 W WIND VEL 16 DIR 26
 BAROM 05.1 TEMP DRY 7.3 WEI 4.4 RELHU 65 WTRCLR SEA 2 DIR 26 SWELL 3 DIR 22
 CLOUD TYPE 7 AMT 6 VIS 7 WIRE ANGLE(S) 11 SNRG 2468 WEA 03
 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATM
1	0	9.02	32.420	25.12	6.61	0.590	-0.021		104
1	5		32.413		6.62	0.591			
1	10	8.98	32.421	25.13	6.88	0.614	-0.045		108
1	19	8.98	32.418	25.12	6.96	0.622	-0.052		109
1	29	8.98	32.417	25.12	6.65	0.594	-0.073		104
1	48	8.98	32.416	25.12	6.65	0.594	-0.024		104
1	71	9.01	32.452	25.15	6.59	0.589	-0.019		103
1	96	8.03	32.809	25.57	5.61	0.501	0.080		86
1	120	6.88	33.297	26.12	5.23	0.467	0.128		79
1	145	7.29	33.685	26.36	4.08	0.364	0.228		61
1	170	7.17	33.807	26.48	3.84	0.343	0.246		58
1	193	6.96	33.887	26.57	3.57	0.319	0.272		54
1	282	5.69	33.921	26.76	2.77	0.247	0.362		41

BROWN BEAR CRUISE 320 STATION 005 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL	PHOS	NITR	SIL
0	0.24	0.24	1.87	0.22	100	50	32.406	0.88	4.8	8
9	0.30	0.20	1.98	0.19	59	10	32.401	0.86	4.6	8
31	0.34	0.16	0.40				32.407	0.82	3.6	7
64	0.30	0.17	0.08			1	32.405	0.91	5.0	8

19.93 11.47 51.28 - WATER COLUMN VALUES

MESSENGER TIME 1130 INCOMING SOLAR RADIATION - AM 163 PM 146

LIGHT SATURATION INCUBATOR ILLUMINATION 22100

BROWN BEAR CRUISE 320 STATION 005 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POI ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.02	0.00	32.420	0.000	25.12	285.3	0.000	0.00	6.61	0.00	
10	8.98	0.00	32.421	0.000	25.13	284.8	0.029	0.02	6.88	0.00	
20	8.98	0.00	32.418	0.000	25.12	285.2	0.058	0.06	6.93	0.01	0.88
30	8.98	0.00	32.417	0.000	25.12	285.5	0.087	0.13	6.64	0.01	0.97
50	9.00	0.01	32.413	0.003	25.12	286.4	0.144	0.37	6.66	0.01	0.90
75	8.90	0.02	32.493	0.004	25.20	279.4	0.216	0.83	6.45	0.03	0.81
100	7.79	0.04	32.889	0.006	25.67	234.5	0.280	1.40	5.55	0.03	0.79
150	7.29	0.01	33.721	0.006	26.39	166.5	0.381	2.65	4.00	0.03	0.77
200	6.88	0.00	33.905	0.000	26.59	148.1	0.461	4.07	3.48	0.01	2.15
250	6.18	0.03	33.958	0.001	26.73	135.8	0.532	5.71	2.94	0.05	17.24

BROWN BEAR CRUISE 320 STATION 006 OBSERVED VALUES

DATE 31/03/63 HR 05.0 LAT 46-56 N LONG 127-51 W WEA 10 WIND VEL 18 DIR 27
 BAROM 11.2 TEMP DRY 7.8 WET 5.0 RELHU 65 WTRCLR SECD1 2670 SECD2 2670 WIND DIR 27 SWELL 1 DIR 23
 CLOUD TYPE 4 AMT 7 VIS 7 WIRE ANGLE(S) 25, 7

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
2	0	9.58	32.551	25.13	6.61	0.590	-0.029	105	
2	5	9.54	32.551	25.14	6.57	0.587	-0.025	104	
2	10	9.53	32.544	25.14	6.60	0.589	-0.027	105	
2	20	9.53	32.546	25.14	6.57	0.587	-0.025	104	
2	30	9.54	32.552	25.14	6.69	0.598	-0.035	106	
2	50	9.58	32.546	25.13	6.53	0.583	-0.022	104	
2	74	9.56	32.555	25.14	6.57	0.587	-0.025	104	
2	99	9.15	32.835	25.42	5.99	0.535	0.031	195	
2	124	7.10	33.175	25.99	5.42	0.484	0.108	82	
2	149	7.38	33.574	26.27	4.40	0.393	0.194	67	
2	174	7.21	33.850	26.51	3.76	0.336	0.252	57	
1	185	7.12	33.867	26.53	3.77	0.337	0.252	57	
1	279	5.94	33.929	26.74	2.82	0.252	0.354	42	
1	468	4.63	34.056	26.99	1.00	0.089	0.536	14	
1	705	3.89	34.237	27.21	0.41	0.037	0.600	6	
1	945	3.54	34.371	27.35	0.35	0.031	0.610	5	
1	1425	2.59	34.509	27.55	0.69	0.062	0.595	9	
1	1716	2.16	32.559	26.03	1.05	0.094	0.580	14	

BROWN BEAR CRUISE 320 STATION 006 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.18	0.17	32.561
9	0.20	0.06	32.548
31	0.16	0.14	32.543
64	0.21	0.10	32.555

11.83 7.17 - WATER COLUMN VALUES

MESSANGER TIME 2128 INCOMING SOLAR RADIATION - AM 163 PM 146

BROWN BEAR CRUISE 320 STATION 006				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.58	0.00	32.551	0.000	25.13	284.1	0.000	0.00	6.61	0.00	
10	9.53	0.00	32.544	0.000	25.14	284.0	0.029	0.02	6.60	0.00	
20	9.53	0.00	32.546	0.000	25.14	284.0	0.058	0.06	6.57	0.00	
30	9.54	0.00	32.552	0.000	25.14	283.9	0.086	0.13	6.69	0.00	
50	9.58	0.00	32.546	0.000	25.13	285.4	0.144	0.37	6.53	0.00	0.94
75	9.56	0.01	32.563	0.001	25.14	284.3	0.215	0.83	6.55	0.00	0.94
100	9.06	0.03	32.847	0.000	25.45	256.0	0.283	1.44	5.97	0.00	0.96
150	7.38	0.00	33.586	0.001	26.27	177.8	0.393	2.79	4.37	0.00	
200	6.94	0.02	33.954	0.052	26.62	145.3	0.474	4.23	3.44	0.12	1.48
250	6.32	0.04	33.996	0.057	26.74	134.8	0.545	5.86	2.95	0.10	1.04
300	5.74	0.01	33.943	0.000	26.77	132.1	0.612	7.76	2.59	0.02	0.95
400	4.98	0.03	34.009	0.000	26.91	119.1	0.739	12.28	1.58	0.04	0.75
500	4.49	0.01	34.081	0.001	27.03	109.1	0.854	17.58	0.85	0.03	0.85
600	4.13	0.03	34.158	0.003	27.13	100.2	0.960	23.54	0.52	0.06	0.67
700	3.90	0.00	34.233	0.000	27.21	92.9	1.057	30.04	0.41	0.00	0.97
800	3.73	0.02	34.296	0.000	27.28	87.2	1.148	37.05	0.34	0.02	0.63
1000	3.43	0.01	34.497	0.068	27.47	70.4	1.308	51.64	0.37	0.01	0.95
1200	3.04	0.03	34.715	0.166	27.68	51.2	1.431	65.39	0.47	0.01	0.88
1500	2.46	0.01	34.231	0.052	27.34	81.9	1.633	94.29	0.78	0.00	0.94

BROWN BEAR CRUISE 320 STATION 007 OBSERVED VALUES
 DATE 31/03/63 HR 12.1 LAT 46-35 N LONG 128-31 W SMDG 2706 WEA 90 WIND VEL 22 DIR 30
 BAROM 14.0 TEMP DRY 7.5 WET 5.8 RELHU 79 WTRCLR SEA 2 DIR 30 SWELL 3 DIR 30
 CLOUD TYPE 3 AMT 6 VIS 5 WIRE ANGLE(S) 32,15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
2	0	9.60	32.548	25.13	6.38	0.570	-0.009	102
2	5	9.58	32.552	25.13	6.41	0.573	-0.011	102
2	18	9.56	32.566	25.15	6.37	0.569	-0.007	101
2	27	9.58	32.555	25.14	6.38	0.570	-0.008	101
2	44	9.59	32.550	25.13	6.38	0.570	-0.008	101
2	66	9.59	32.548	25.13	6.38	0.570	-0.008	101
2	87	9.09	32.636	25.28	6.12	0.547	0.021	96
2	109	7.64	33.007	25.78	5.41	0.483	0.102	83
2	131	6.66	33.192	26.06	4.96	0.443	0.151	75
2	152	6.88	33.473	26.25	4.46	0.398	0.193	67
1	170	7.01	33.712	26.43				
1	257	5.90	33.922	26.74	3.16	0.282	0.324	47
1	430	4.99	34.028	26.93	1.18	0.105	0.515	17
1	649	4.12	34.206	27.16	0.38	0.034	0.599	5
1	871	3.54	34.327	27.32	0.27	0.024	0.618	4
1	1315	2.70	34.501	27.54	0.60	0.054	0.601	8
1	1584	2.26	34.542	27.61	0.91	0.081	0.581	12

BROWN BEAR CRUISE 320 STATION 007 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.24	0.28	1.64	32.554
9	0.22	0.29		32.555
31	0.24	0.17		32.556
64	0.20	0.26		32.555
100	0.22	0.20		32.556

14.30 15.05 - WATER COLUMN VALUES

MESSENGER TIME 0554 INCOMING SOLAR RADIATION - AM 195 PM 211

BROWN BEAR CRUISE 320 STATION 007 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.60	0.00	32.548	0.000	25.13	284.6	0.000	0.00	6.38	0.00	0.97
10	9.54	0.00	32.555	0.001	25.14	283.3	0.029	0.02	6.41	0.00	0.75
20	9.56	0.00	32.564	0.001	25.15	283.2	0.058	0.06	6.37	0.00	0.91
30	9.58	0.00	32.553	0.000	25.13	284.5	0.086	0.13	6.38	0.00	
50	9.62	0.02	32.544	0.003	25.12	286.0	0.144	0.37	6.35	0.01	0.76
75	9.46	0.02	32.564	0.007	25.16	282.6	0.215	0.83	6.31	0.01	0.64
100	8.26	0.06	32.849	0.019	25.57	244.1	0.282	1.42	5.71	0.03	0.66
150	6.84	0.02	33.444	0.001	26.24	181.1	0.389	2.75	4.98	0.02	0.99
200	6.77	0.12	33.879	0.055	26.59	148.5	0.472	4.22	3.90	0.06	1.65
250	6.03	0.04	33.936	0.018	26.73	135.6	0.543	5.87	3.23	0.02	0.91
300	5.58	0.05	33.966	0.014	26.81	128.4	0.610	7.75	2.57	0.01	0.89
400	5.08	0.04	34.023	0.011	26.91	119.2	0.735	12.22	1.45	0.01	0.79
500	4.68	0.00	34.085	0.004	27.01	110.9	0.851	17.57	0.78	0.04	0.73
600	4.29	0.00	34.167	0.003	27.12	101.4	0.958	23.61	0.45	0.04	0.75
700	3.97	0.01	34.237	0.001	27.21	93.4	1.057	30.17	0.32	0.02	0.74
800	3.70	0.01	34.293	0.001	27.28	87.1	1.148	37.19	0.26	0.02	0.62
1000	3.27	0.01	34.389	0.001	27.39	76.5	1.313	52.41	0.32	0.02	0.91
1200	2.89	0.01	34.467	0.001	27.49	67.8	1.460	68.88	0.47	0.02	0.88
1500	2.40	0.01	34.536	0.001	27.59	58.8	1.652	95.48	0.82	0.01	0.66

BROWN BEAR CRUISE 320 STATION 008 OBSERVED VALUES

DATE 31/03/63 HR 20.4 LAT 46-13 N LONG 129-10 W WEA 01 WIND VEL 22 DIR 32
 BAROM 17.3 TEMP DRY 8.1 WET 5.8 RELHU 70 WTRCLR SECDI 2597 SEA 3 DIR 23 SWELL 4 DIR 27
 CLOUD TYPE 6 VIS 6 WIRE ANGLE(S) 31.10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L	ML/L		
2	0	9.39	32.526	25.14	6.40	0.572	-0.008	101
2	5	9.37	32.526	25.15	6.45	0.576	-0.012	102
2	10	9.36	32.524	25.15	6.46	0.577	-0.013	102
2	20	9.35	32.526	25.15	6.48	0.579	-0.014	103
2	29	9.37	32.526	25.15	6.42	0.573	-0.009	102
2	49	9.35	32.523	25.15	6.38	0.570	-0.005	101
2	73	9.35	32.531	25.15	6.40	0.572	-0.007	101
2	97	9.32	32.528	25.16	6.37	0.569	-0.004	101
2	121	7.27	32.962	25.80	5.73	0.512	0.079	87
2	145	6.63	33.277	26.13	5.38	0.481	0.118	80
2	172	6.85	33.676	26.42	4.61	0.412	0.182	69
1	230	6.20	33.918	26.69	3.42	0.305	0.297	51
1	395	4.91	33.997	26.91	1.50	0.134	0.487	22
1	606	4.24	34.187	27.14	0.46	0.041	0.590	7
1	819	3.74	34.304	27.28	0.26	0.023	0.615	4
1	1246	2.74	34.474	27.51	0.43	0.038	0.616	6
1	1510	2.36						

BROWN BEAR CRUISE 320 STATION 009 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-1	DECK-1	SAL
0	0.19	0.04		32.535
9	0.18	0.19		32.532
31	0.18	0.12		32.531
64	0.21	0.07		32.527
100	0.18	0.15		32.527

12.07 7.39 - WATER COLUMN VALUES

MESSANGER TIME 2202 INCOMING SOLAR RADIATION - AM 195 PM 211
 ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0025-0035 DEPTHS 100, 70
 35, 0

BROWN BEAR			CRUISE 320			STATION 009			INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO			
0	9.37	0.00	32.532	0.000	25.15	282.3	0.000	0.00	6.48	0.00				
10	9.32	0.00	32.524	0.000	25.15	282.3	0.029	0.02	6.52	0.00				
20	9.34	0.00	32.530	0.000	25.15	282.3	0.057	0.06	6.62	0.00				
30	9.35	0.00	32.533	0.000	25.16	282.4	0.086	0.13	6.68	0.00				
50	9.34	0.00	32.531	0.000	25.16	282.8	0.143	0.37	6.48	0.00				0.94
75	9.36	0.00	32.533	0.002	25.15	283.3	0.214	0.82	6.53	0.00				0.94
100	8.74	0.02	32.657	0.003	25.35	265.3	0.283	1.44	6.20	0.00				0.94
150	6.64	0.01	33.451	0.003	26.27	178.0	0.395	2.82	5.19	0.01				0.94
200	6.81	0.04	33.860	0.008	26.57	150.5	0.478	4.29	3.67	0.04				1.97
250	6.23	0.06	33.911	0.014	26.68	139.9	0.551	5.98	3.22	0.07				2.26
300	5.62	0.01	33.926	0.001	26.77	131.8	0.619	7.91	2.85	0.03				0.95
400	4.87	0.02	33.992	0.003	26.91	119.0	0.746	12.43	1.81	0.06				0.75
500	4.39	0.02	34.066	0.003	27.03	109.0	0.861	17.72	0.98	0.02				0.85
600	4.09	0.04	34.159	0.007	27.13	99.7	0.966	23.66	0.57	0.05				0.67
700	3.90	0.00	34.248	0.000	27.22	91.7	1.063	30.10	0.37	0.00				0.97
800	3.66	0.00	34.308	0.003	27.29	85.4	1.153	37.00	0.26	0.02				0.62
1000	3.26	0.01	34.393	0.001	27.40	76.1	1.316	52.04	0.25	0.00				0.94
1200	2.95	0.03	34.459	0.003	27.48	69.0	1.463	68.62	0.35	0.01				0.88
1500	2.50	0.00	34.529	0.001	27.58	60.5	1.660	95.81	0.74	0.00				9.64

BROWN BEAR CRUISE 320 STATION 010 OBSERVED VALUES

DATE 1/04/63 HR 14.5 LAT 45-00 N LONG 130-00 W WEA 02 WIND VEL 8 DIR 36
 BAROM 21.0 TEMP DRY 9.6 WET 6.1 RELHU 60 WTRCLR SECDI 2468 SEA 1 DIR 36 SWELL 2 DIR 36
 CLOUD TYPE 3 AMT 6 VIS 7 WIRE ANGLE(S) 10, 8, 7

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
3	0	9.93	32.597	25.11	6.42	0.573	-0.016		103
3	5	9.90	32.594	25.11	6.41	0.573	-0.015		103
3	10	9.87	32.593	25.12	6.40	0.572	-0.014		102
3	20	9.88	32.587	25.11	6.41	0.573	-0.015		103
3	30	9.89	32.591	25.11	6.37	0.569	-0.011		102
3	50	9.87	32.587	25.11	6.40	0.572	-0.014		102
3	73	9.85	32.592	25.12	6.41	0.573	-0.015		103
3	98	9.93	32.599	25.11	6.37	0.569	-0.012		102
3	123	7.18	33.022	25.86	5.73	0.512	0.080		86
3	148	6.76	33.360	26.18	5.23	0.467	0.129		78
3	173	7.06	33.747	26.45	4.40	0.393	0.198		67
2	196	7.06	33.864	26.54	3.96	0.354	0.236		60
2	294	5.66	33.919	26.76	2.91	0.260	0.350		43
2	492	4.50	34.090	27.03	0.79	0.071	0.557		11
2	737	3.86	34.284	27.25	0.24	0.021	0.615		3
2	984	3.37	34.404	27.40	0.28	0.025	0.619		4
2	1479	2.47	34.525	27.57	0.77	0.069	0.590		10
2	1776	2.10	34.573	27.64	1.16	0.104	0.561		16
1	1780	2.07	34.567	27.64	1.28	0.114	0.551		17
1	2077	1.87	34.614	27.69	1.71	0.153	0.516		23
1	2428	1.81	34.643	27.72	2.06	0.184	0.486		27

BROWN BEAR CRUISE 320 STATION 010 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL	PHOS	NITR	SIL
0	0.16	0.30	1.18	0.33	100	50	32.591	0.57	0.9	3
8	0.16	0.22	1.72	0.32	59		32.586	0.60	1.5	3
				0.29	44					
26	0.19	0.26	0.10	0.22	32	10	32.586	0.64	1.5	3
				0.10	13					
				0.00	4					
60	0.21	0.20	0.06			1	32.589	0.72	1.9	3
100	0.06	0.00					32.826	0.98	6.9	9
150	0.00						33.352	1.63	26.3	28
200	0.00						33.884	1.96	27.5	39

11.07 14.30 30.78 - WATER COLUMN VALUES

MESSENGER TIME 1123 INCOMING SOLAR RADIATION - AM 200 PM 211

LIGHT SATURATION INCUBATOR ILLUMINATION 20600

BROWN BEAR		CRUISE 320		STATION 10A		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.93	0.00	32.597	0.000	25.11	286.1	0.000	0.00	6.42	0.00	
10	9.87	0.00	32.593	0.000	25.12	285.7	0.029	0.02	6.40	0.00	
20	9.88	0.00	32.587	0.000	25.11	286.4	0.058	0.06	6.41	0.00	
30	9.89	0.00	32.591	0.000	25.11	286.5	0.087	0.13	6.37	0.00	
50	9.87	0.00	32.587	0.000	25.11	286.9	0.145	0.37	6.40	0.00	0.90
75	9.91	0.04	32.585	0.005	25.11	288.1	0.217	0.84	6.42	0.01	0.89
100	9.72	0.06	32.627	0.006	25.17	282.5	0.289	1.48	6.33	0.01	0.89
150	6.78	0.01	33.395	0.004	26.21	184.0	0.407	2.93	5.16	0.01	0.89
200	7.02	0.02	33.873	0.005	26.55	152.3	0.491	4.43	3.90	0.01	1.08
250	6.40	0.12	33.938	0.030	26.68	140.0	0.565	6.13	3.30	0.06	1.32
300	5.60	0.01	33.924	0.000	26.77	131.8	0.634	8.06	2.83	0.01	0.99
400	4.86	0.07	34.006	0.004	26.93	118.0	0.760	12.55	1.68	0.06	0.77
500	4.47	0.00	34.097	0.000	27.04	107.7	0.873	17.80	0.75	0.01	0.96
600	4.15	0.03	34.181	0.002	27.14	98.7	0.978	23.67	0.37	0.07	0.68
700	3.92	0.02	34.258	0.001	27.23	91.3	1.074	30.07	0.23	0.04	0.81
800	3.73	0.00	34.320	0.001	27.30	85.3	1.163	36.94	0.22	0.01	0.72
1000	3.34	0.00	34.410	0.001	27.40	75.8	1.326	51.94	0.29	0.00	0.98
1200	2.95	0.01	34.470	0.004	27.49	68.3	1.472	68.40	0.45	0.01	0.89
1500	2.44	0.00	34.528	0.000	27.58	59.8	1.667	95.30	0.80	0.00	0.88
2000	1.72	0.12	34.556	0.032	27.66	51.5	1.950	145.82	2.41	0.53	3.97

BROWN BEAR CRUISE 320 STATION 10A BIOLOGICAL DATA

DATE 1/04/63 LAT 45-00 N LONG 130-00 W

DEPTH CHL-A PRODUCTIVITY
LAB-I DECK-I

0 0.22 0.42 2.68

MESSENGER TIME 0550 INCOMING SOLAR RADIATION - AM 200 PM 211

BROWN BEAR CRUISE 320 STATION 011 OBSERVED VALUES

DATE	2/04/63	HR	00.0	LAT	44-53 N	LONG	129-16 W	SEA	1 DIR	20	WIND	VEL	4 DIR	20
BAROM	20.0	TEMP	DRY	9.0	WET	6.1	RELHU	65	WTRCLR					
CLOUD	TYPE	3	AMT	6	VIS	9	WIRE	ANGLE(S)	0.2					
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN						
2	0	10.33	32.640	25.08	6.50	0.581	-0.029	105						
2	5	10.32	32.613	25.06	6.46	0.577	-0.025	105						
2	10	9.96	32.593	25.10	6.50	0.581	-0.024	104						
2	20	9.94	32.597	25.11	6.42	0.573	-0.017	103						
2	30	9.89	32.583	25.11	6.50	0.581	-0.023	104						
2	50	9.68	32.552	25.12	6.48	0.579	-0.019	103						
2	74	9.68	32.554	25.12	6.46	0.577	-0.017	103						
2	99	8.95	32.929	25.53	5.63	0.503	0.065	89						
2	124	8.00	33.089	25.80	5.36	0.479	0.101	83						
2	149	6.92	33.358	26.16	5.19	0.464	0.131	78						
2	174	7.42	33.788	26.43										
1	190	7.00	33.819	26.51	4.16	0.372	0.220	63						
1	294	5.64	33.923	26.77	2.92	0.261	0.350	43						
1	492	4.54	34.068	27.01	0.97	0.087	0.540	14						
1	740	3.92	34.270	27.24	0.27	0.024	0.612	4						
1	990	3.38	34.411	27.40	0.29	0.026	0.618	4						
1	1484	2.45	34.529	27.58	0.76	0.068	0.591	10						
1	1785	2.05	34.575	27.65	1.22	0.109	0.557	16						

BROWN BEAR CRUISE 320 STATION 011 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I DECK-I	SAL
0	0.17	0.34	32.626
8	0.24	0.24	32.603
26	0.31	0.44	32.590
60	0.31	0.35	32.546
100	0.06	0.01	32.931

17.19 21.82 - WATER COLUMN VALUES

MESSENGER TIME 1637 INCOMING SOLAR RADIATION - AM 200 PM 211

INTERPOLATED AND COMPUTED VALUES

DEPTH	BROWN BEAR		CRUISE 320		STATION OIL		INTERPOLATED AND COMPUTED VALUES					VAR RATIO
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	FOT ENERGY	OXY ML/L	E(O)		
0	10.33	0.00	32.640	0.000	25.08	289.3	0.000	0.00	6.50	0.00		
10	9.96	0.00	32.593	0.000	25.10	287.1	0.030	0.02	6.50	0.00		
20	9.94	0.00	32.597	0.000	25.11	286.6	0.058	0.06	6.42	0.00		
30	9.89	0.00	32.583	0.000	25.11	287.1	0.087	0.13	6.50	0.00		
50	9.68	0.00	32.552	0.000	25.12	286.5	0.145	0.37	6.48	0.00		
75	9.66	0.00	32.567	0.004	25.13	285.5	0.217	0.83	6.43	0.01		0.94
100	8.92	0.00	32.936	0.002	25.54	247.2	0.284	1.43	5.61	0.00		0.94
150	6.94	0.02	33.378	0.004	26.17	187.3	0.394	2.80	5.17	0.00		0.98
200	6.81	0.03	33.333	0.002	26.55	152.5	0.479	4.31	3.99	0.03		1.44
250	6.04	0.07	33.890	0.006	26.69	139.0	0.553	6.00	3.32	0.07		2.14
300	5.59	0.01	33.928	0.000	26.78	131.3	0.621	7.92	2.85	0.00		0.98
400	4.90	0.06	34.004	0.003	26.92	118.5	0.747	12.42	1.77	0.03		0.75
500	4.51	0.00	34.075	0.000	27.02	109.8	0.862	17.73	0.93	0.01		0.96
600	4.21	0.03	34.158	0.003	27.12	101.1	0.969	23.74	0.50	0.05		0.68
700	3.99	0.02	34.239	0.002	27.20	93.5	1.067	30.29	0.29	0.03		0.80
800	3.78	0.00	34.309	0.000	27.28	86.8	1.158	37.30	0.23	0.02		0.73
1000	3.36	0.00	34.415	0.001	27.41	75.7	1.323	52.41	0.29	0.00		0.99
1200	2.95	0.01	34.477	0.007	27.49	67.8	1.468	68.78	0.43	0.01		0.89
1500	2.42	0.00	34.531	0.000	27.58	59.5	1.661	95.51	0.78	0.00		1.00

BROWN BEAR CRUISE 320 STATION 012 OBSERVED VALUES

DATE 2/04/63 HR 05.8 LAT 44-48 N LONG 128-32 W SEA 03 WIND VEL 10 DIR 14
 BAROM 18.3 TEMP DRY 11.0 WET 5.4 RELHU 40 WTRCLR SNDCG 2287 SEA 1 DIR 14 SWELL 2 DIR 11
 CLOUD TYPE 2 AMT 7 VIS 6 WIRE ANGLE(S) 13,10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					MGA/L			
2	0	10.70	32.737	25.09	6.27	0.560	-0.013	102
2	5	10.68	32.709	25.07	6.37	0.569	-0.022	104
2	10	10.66	32.707	25.07	6.34	0.566	-0.019	103
2	20	10.55	32.707	25.09	6.33	0.565	-0.017	103
2	30	10.55	32.710	25.09	6.29	0.562	-0.013	102
2	50	10.55	32.702	25.09	6.25	0.558	-0.009	102
2	74	10.56	32.703	25.09	6.23	0.556	-0.008	101
2	99	9.49	32.864	25.39	5.68	0.507	0.054	90
2	124	8.46	33.092	25.73	5.25	0.469	0.105	82
2	149	8.14	33.442	26.05	4.12	0.368	0.209	64
2	174	7.71	33.786	26.38	3.57	0.319	0.262	55
1	195	7.66	33.890	26.47	2.99	0.267	0.315	46
1	293	5.96	33.929	26.73	2.88	0.257	0.348	42
1	490	4.55	34.074	27.01	0.96	0.086	0.541	14
1	736	3.96	34.255	27.22	0.34	0.030	0.605	5
1	983	3.42	34.389	27.38	0.36	0.032	0.611	5
1	1476	2.47	34.530	27.58	0.76	0.068	0.591	10
1	1774	2.06			1.32	0.118		

BROWN BEAR CRUISE 320 STATION 012 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.24	0.36		32.702
8	0.25	0.12		32.698
26	0.42	0.29		32.658
60	0.39	0.25		32.694
100	0.05	0.00		32.953

21.87 14.86 - WATER COLUMN VALUES

MESSANGER TIME 2119 INCOMING SOLAR RADIATION - AM 200 PM 211
 ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 2259-2309 DEPTHS 100, 70
 35, 0

BROWN BEAR			CRUISE 320			STATION 012			INTERPOLATED AND COMPUTED VALUES				
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	10.70	0.00	32.737	0.000	25.09	288.2	0.000	0.00	6.27	0.00			
10	10.66	0.00	32.707	0.000	25.07	289.9	0.030	0.02	6.34	0.00			
20	10.55	0.00	32.707	0.000	25.09	288.3	0.059	0.06	6.33	0.00			
30	10.55	0.00	32.710	0.000	25.09	288.3	0.088	0.13	6.29	0.00			
50	10.55	0.00	32.702	0.000	25.09	289.3	0.146	0.37	6.25	0.00			
75	10.53	0.01	32.707	0.001	25.10	289.0	0.219	0.84	6.21	0.00	0.94		
100	9.44	0.00	32.871	0.000	25.40	260.0	0.288	1.46	5.67	0.01	0.94		
150	8.12	0.00	33.458	0.001	26.07	197.6	0.403	2.90	4.09	0.00	0.94		
200	7.59	0.02	33.901	0.006	26.49	158.1	0.493	4.48	2.94	0.04	1.12		
250	6.81	0.13	33.956	0.031	26.64	144.1	0.569	6.24	2.70	0.20	1.44		
300	5.88	0.01	33.933	0.001	26.75	134.4	0.639	8.22	2.82	0.02	0.98		
400	4.98	0.08	34.002	0.004	26.91	119.5	0.767	12.79	1.90	0.15	0.77		
500	4.51	0.01	34.082	0.000	27.02	109.3	0.883	18.10	0.91	0.01	0.95		
600	4.20	0.05	34.158	0.002	27.12	101.0	0.989	24.09	0.52	0.06	0.68		
700	4.00	0.03	34.230	0.001	27.20	94.3	1.088	30.66	0.35	0.03	0.82		
800	3.82	0.00	34.294	0.000	27.27	88.2	1.180	37.77	0.31	0.02	0.72		
1000	3.38	0.00	34.397	0.000	27.39	77.2	1.347	53.16	0.36	0.00	5.85		
1200	2.97	0.01	34.471	0.000	27.49	68.4	1.495	69.78	0.47	0.01	12.71		
1500	2.43	0.00							0.80	0.00	12.36		

BROWN BEAR CRUISE 320 STATION 013 OBSERVED VALUES

DATE 2/04/63 HR 12.7 LAT 44-34 N LONG 127-48 W SNDG 2834 WEA 03 WIND VEL 18 DIR 12
 BAROM 18.0 TEMP DRY 9.7 WET 7.2 RELHU 67 WTRCLR SEA 1 DIR 12 SWELL 3 DIR 15
 CLOUD TYPE 3 AMT 8 VIS 6 WIRE ANGLE(S) 32.20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
2	0	9.99	32.592	25.10	6.48	0.579	-0.023	104	
2	5	9.96	32.590	25.10	6.46	0.577	-0.020	104	
2	10	9.91	32.587	25.11	6.52	0.582	-0.025	105	
2	20	9.94	32.591	25.10	6.47	0.578	-0.021	104	
2	30	9.96	32.590	25.10	6.47	0.578	-0.021	104	
2	50	9.93	32.589	25.10	6.42	0.573	-0.016	103	
2	74	9.93	32.589	25.10	6.44	0.575	-0.018	103	
2	99	9.14	32.741	25.35	6.00	0.536	0.031	95	
2	124	8.08	33.362	26.00	4.70	0.420	0.158	73	
2	149	7.81	33.689	26.29	4.02	0.359	0.221	62	
1	171	7.61	33.868	26.46	3.42	0.305	0.277	52	
2	174	7.54	33.878	26.48	3.36	0.300	0.283	51	
1	258	6.30	33.955	26.71	2.72	0.243	0.358	40	
1	435	4.86	34.017	26.93	1.36	0.121	0.501	20	
1	658	4.04	34.184	27.16	0.50	0.045	0.590	7	
1	883	3.66	34.328	27.31	0.39	0.035	0.605	5	
1	1334	2.78	34.494	27.52	0.54	0.048	0.605	7	
1	1609	2.20			0.97	0.087			

BROWN BEAR CRUISE 320 STATION 013 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	SAL
0	0.24	0.39	32.601
8	0.26	0.34	32.591
26	0.24	0.27	32.590
60	0.26	0.22	32.587

15.16 16.74 - WATER COLUMN VALUES

MESSANGER TIME 0604 INCOMING SOLAR RADIATION - AM 55 PM 47

BROWN BEAR CRUISE 320 STATION 013				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.99	0.00	32.592	0.000	25.10	287.4	0.000	0.00	6.48	0.00	
10	9.91	0.00	32.587	0.000	25.11	286.7	0.029	0.02	6.52	0.00	
20	9.94	0.00	32.591	0.000	25.10	287.1	0.058	0.06	6.47	0.00	
30	9.96	0.00	32.590	0.000	25.10	287.7	0.087	0.13	6.47	0.00	
50	9.93	0.00	32.589	0.000	25.10	287.6	0.145	0.37	6.42	0.00	0.94
75	9.91	0.00	32.589	0.002	25.11	287.7	0.218	0.84	6.44	0.00	0.94
100	9.09	0.01	32.764	0.005	25.38	262.6	0.287	1.46	5.95	0.01	0.95
150	7.80	0.00	33.699	0.000	26.30	175.2	0.397	2.82	3.99	0.00	
200	7.19	0.05	33.956	0.034	26.59	148.5	0.479	4.27	3.03	0.09	1.38
250	6.43	0.02	33.969	0.013	26.70	138.1	0.551	5.93	2.73	0.04	0.88
300	5.85	0.03	33.973	0.006	26.78	131.2	0.619	7.84	2.37	0.02	0.91
400	5.05	0.02	34.008	0.005	26.90	120.0	0.746	12.37	1.61	0.02	0.78
500	4.54	0.02	34.062	0.004	27.01	111.1	0.862	17.75	1.02	0.01	0.74
600	4.18	0.02	34.137	0.004	27.10	102.3	0.970	23.82	0.64	0.01	0.73
700	3.95	0.01	34.213	0.000	27.19	94.9	1.070	30.46	0.45	0.02	0.78
800	3.78	0.02	34.279	0.001	27.26	88.9	1.163	37.61	0.38	0.02	0.60
1000	3.44	0.00	34.389	0.001	27.38	78.5	1.332	53.19	0.37	0.01	1.24
1200	3.05	0.00	34.466	0.001	27.48	69.7	1.482	70.10	0.43	0.01	9.61
1500	2.43	0.00							0.76	0.00	6.44

BROWN BEAR CRUISE 320 STATION 015 OBSERVED VALUES
 DATE 3/04/63 HR 14-8 LAT 44-25 N LONG 126-52 W SNRG 2834 WEA 02 WIND VEL 20 DIR 22
 BAROM 15.0 TEMP DRY 10.6 WET 9.7 RELHU 88 WTRCLR SEA 1 DIR 22 SWELL 6 DIR 15
 CLOUD TYPE 3 AMT 8 VIS 7 WIFE ANGLE(S) 20,14,14

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L			
2	0	9.73	32.569	25.12	6.46	0.577	-0.017	103
2	5	9.74	32.564	25.12	6.44	0.575	-0.016	103
2	10	9.68	32.568	25.13	6.47	0.578	-0.018	103
2	20	9.70	32.570	25.13	6.46	0.577	-0.017	103
3	30	9.66	32.571	25.14	6.47	0.578	-0.017	103
3	50	9.66	32.565	25.13	6.47	0.578	-0.017	103
3	74	9.68	32.568	25.13	6.50	0.581	-0.020	104
3	99	8.84	33.144	25.71	4.70	0.420	0.149	174
3	124	8.68	33.659	26.14	3.45	0.308	0.261	54
3	149	7.80	33.745	26.34	3.56	0.318	0.262	55
3	174	7.31	33.847	26.49	3.45	0.308	0.278	53
1	188	7.14	33.901	26.56	3.29	0.294	0.295	50
1	279	6.19	33.973	26.74	2.28	0.204	0.398	34
1	474	4.78	34.069	26.98	1.05	0.094	0.529	15
1	714	4.16	34.267	27.21	0.39	0.035	0.597	6
1	955	3.50	34.399	27.38	0.37	0.033	0.609	5
1	1437	2.61	34.518	27.56	0.71	0.063	0.593	10
1	1733	2.11	34.558	27.63	1.15	0.103	0.562	15

BROWN BEAR CRUISE 320 STATION 015 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	SAL
0	0.35	0.45	32.562
8	0.43	0.53	32.562
26	0.45	0.36	32.561
60	0.46	0.23	32.561

26.37 22.00 - WATER COLUMN VALUES

MESSANGER TIME 0740 INCOMING SOLAR RADIATION - AM 136 PM 106

BROWN BEAR CRUISE 320 STATION 015				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.73	0.00	32.569	0.000	25.12	285.1	0.000	0.00	6.46	0.00	
10	9.68	0.00	32.568	0.000	25.13	284.5	0.029	0.02	6.47	0.00	
20	9.70	0.00	32.570	0.000	25.13	284.9	0.058	0.06	6.46	0.00	
30	9.66	0.00	32.571	0.000	25.14	284.4	0.087	0.13	6.47	0.00	
50	9.66	0.00	32.565	0.000	25.13	285.2	0.144	0.37	6.47	0.00	
75	9.65	0.01	32.586	0.004	25.15	283.9	0.216	0.83	6.44	0.02	
100	8.83	0.01	33.169	0.002	25.73	228.7	0.280	1.40	4.63	0.01	0.94
150	7.77	0.00	33.749	0.000	26.35	171.2	0.381	2.66	3.56	0.00	0.94
200	7.00	0.00	33.925	0.009	26.59	148.2	0.461	4.09	3.15	0.00	1.61
250	6.47	0.00	33.977	0.017	26.71	138.0	0.534	5.75	2.58	0.01	1.76
300	6.00	0.00	33.984	0.002	26.77	132.2	0.602	7.67	2.10	0.01	0.97
400	5.22	0.00	34.034	0.005	26.91	120.1	0.729	12.22	1.41	0.03	0.77
500	4.68	0.02	34.090	0.002	27.01	110.7	0.845	17.58	0.94	0.00	0.88
600	4.38	0.05	34.172	0.006	27.11	102.1	0.953	23.64	0.60	0.01	0.67
700	4.18	0.01	34.255	0.001	27.20	94.5	1.052	30.25	0.41	0.00	0.92
800	3.92	0.01	34.321	0.001	27.28	87.5	1.144	37.33	0.34	0.02	0.65
1000	3.40	0.01	34.416	0.002	27.40	76.1	1.310	52.54	0.38	0.00	0.95
1200	3.01	0.02	34.476	0.005	27.49	68.5	1.456	60.05	0.48	0.00	0.88
1500	2.51	0.01	34.526	0.001	27.57	60.8	1.653	96.22	0.79	0.00	0.97

BROWN BEAR CRUISE 320 STATION 016 OBSERVED VALUES
 DATE 3/04/63 HR 19.8 LAT 44-15 N LONG 126-31 W SNGD 2926 WEA 03 WIND VEL 18 DIR 23
 BAROM 20.7 TEMP DRY 11.4 WET 9.9 RELHU 84 WTRCLR SEA 2 DIR 23 SWELL 8 DIR 23
 CLOUD TYPE 7 AMT 8 VIS 5 WIRE ANGLE(S) 5 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
1	0	9.94	32.558	25.08	6.46	0.577	-0.020	104
1	5	9.99	32.561	25.07	6.50	0.581	-0.024	104
1	10	9.89	32.557	25.09	6.55	0.585	-0.027	105
1	20	9.90	32.557	25.08	6.51	0.581	-0.024	104
1	30	9.90	32.555	25.08	7.38	0.659	-0.102	118
1	50	9.92	32.558	25.08	6.46	0.577	-0.020	104
1	73	9.90	32.559	25.09	6.44	0.575	-0.018	103
1	98	8.09	33.191	25.86	4.86	0.434	0.145	75
1	123	7.61	33.564	26.22	4.47	0.399	0.184	68
1	148	7.65	33.823	26.42	3.40	0.304	0.278	52
1	172	7.49	33.899	26.50	3.16	0.282	0.302	48

BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	CRUISE 320 DECK-I	STATION 016 LIGHT PROD	SAT FILT	IRRAD	SAL	PHOS	NITR	SIL
0		0.49	2.66	0.38	100	50	32.570	0.68	1.7	4
6	0.37	0.47	3.34			10	32.565	0.61	1.8	5
24	0.38	0.37	0.14			1	32.579	0.61	0.8	3
60	0.32	0.30	0.00				32.567	0.64	1.4	3

21.57 22.52 44.28 - WATER COLUMN VALUES

MESSANGER TIME 1127 INCOMING SOLAR RADIATION - AM 136 PM 106
 LIGHT SATURATION INCUBATOR ILLUMINATION 19700

INTERPOLATED AND COMPUTED VALUES											
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.94	0.00	32.558	0.000	25.08	289.2	0.000	0.00	6.46	0.00	
10	9.89	0.00	32.557	0.000	25.09	288.6	0.030	0.02	6.55	0.00	
20	9.90	0.00	32.557	0.000	25.08	289.0	0.059	0.06	6.51	0.00	
30	9.90	0.00	32.555	0.000	25.08	289.3	0.088	0.14	7.38	0.00	
50	9.92	0.00	32.558	0.000	25.08	289.8	0.146	0.37	6.46	0.00	0.90
75	9.77	0.04	32.602	0.011	25.14	284.5	0.218	0.84	6.32	0.03	0.89
100	8.02	0.01	33.228	0.002	25.90	212.5	0.281	1.39	4.82	0.02	1.07
150	7.65	0.01	33.837	0.001	26.43	162.9	0.376	2.57	3.33	0.01	

BROWN BEAR CRUISE 320 STATION 017 OBSERVED VALUES

DATE 4/04/63 HR 00-2 LAT 44-01 N LONG 125-59 W WEA 00 WIND VEL 18 DIR 22
 BAROM 24.0 TEMP DRY 10.3 MET 10.1 RELHU 97 WTRCLR SECDI 2926 SEA 2 DIR 22 SWELL 4 DIR 16
 CLOUD TYPE 3 AMT 8 VIS 5 WIRE ANGLE(S) 33,---

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L			
2	0	10.07	32.598	25.09	6.57	0.587	-0.032	106
2	5	10.04	32.602	25.10	6.60	0.589	-0.034	106
2	10	10.02	32.595	25.09	6.57	0.587	-0.031	106
2	20	10.02	32.599	25.10	6.57	0.587	-0.031	106
2	30	10.07	32.631	25.11	6.53	0.583	-0.028	105
2	50	10.09	32.632	25.11	6.46	0.577	-0.022	104
2	74	9.71	33.320	25.71	6.50	0.581	-0.024	104
2	99	9.00	33.706	26.13	4.93	0.440	0.124	78
2	124	8.57	33.834	26.29	2.88	0.257	0.312	45
2	149	8.31	33.896	26.38	2.65	0.237	0.336	41
1	169	8.13	33.923	26.43	2.54	0.227	0.348	39
2	174	8.08	33.943	26.45	2.46	0.220	0.356	38
1	259	6.96	34.019	26.67	1.88	0.168	0.423	28
1	435	5.53	34.074	26.90	1.09	0.097	0.514	16
1	663	4.56	34.249	27.15	0.34	0.030	0.595	5
1	895	3.95	34.318	27.27	0.31	0.028	0.607	4
1	1363	2.76	34.515	27.54	0.69	0.062	0.592	9
1	1650	2.24	34.550	27.61	1.01	0.090	0.572	14

BROWN BEAR		CRUISE 320			STATION 017		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	10.07	0.00	32.598	0.000	25.09	288.3	0.000	0.00	6.57	0.00		
10	10.02	0.00	32.595	0.000	25.09	287.9	0.030	0.02	6.57	0.00		
20	10.02	0.00	32.599	0.000	25.10	287.8	0.059	0.06	6.57	0.00		
30	10.07	0.00	32.631	0.000	25.11	286.4	0.087	0.13	6.53	0.00		
50	10.09	0.00	32.632	0.000	25.11	287.0	0.145	0.37	6.46	0.00	0.94	
75	9.68	0.00	33.341	0.001	25.73	228.5	0.210	0.78	6.46	0.01	0.94	
100	8.98	0.00	33.714	0.001	26.14	190.5	0.263	1.25	4.84	0.01	0.94	
150	8.30	0.00	33.898	0.000	26.38	167.7	0.353	2.39	2.64	0.00		
200	7.75	0.03	33.965	0.003	26.52	155.6	0.435	3.85	2.31	0.02	1.57	
250	7.08	0.01	34.012	0.000	26.65	143.6	0.510	5.58	1.95	0.01	0.89	
300	6.55	0.02	34.035	0.006	26.74	133.5	0.580	7.57	1.66	0.01	0.91	
400	5.74	0.02	34.066	0.006	26.87	124.1	0.711	12.25	1.22	0.01	0.78	
500	5.18	0.02	34.123	0.008	26.98	114.1	0.832	17.79	0.82	0.01	0.75	
600	4.76	0.02	34.200	0.007	27.09	104.4	0.942	24.00	0.50	0.01	0.72	
700	4.45	0.01	34.263	0.003	27.17	97.0	1.044	30.79	0.31	0.01	0.81	
800	4.18	0.01	34.295	0.005	27.23	92.3	1.140	38.16	0.27	0.02	0.59	
1000	3.66	0.01	34.366	0.007	27.34	82.7	1.317	54.47	0.36	0.01	0.92	
1200	3.15	0.01	34.452	0.009	27.46	71.9	1.473	72.10	0.51	0.02	0.87	
1500	2.48	0.01	34.547	0.005	27.59	58.9	1.672	99.48	0.85	0.01	0.81	

BROWN BEAR CRUISE 320 STATION 018 OBSERVED VALUES

DATE	4/04/63	HR	06.1	LAT	44-01 N	LONG	125-16 W	WEA	02	WIND	VEL	12	DIR	22	
BAROM	36.2	TEMP	DRY	11.2	WET	10.4	REL	HU	92	WTR	CLR	SEA	2	DIR	22
CLOUD	TYPE	3	AMT	7	VIS	7	WIRE	ANGLE(S)	25.12	6	SMELL	4	DIR	17	
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN	SECDI	SECDI	SECDI	SECDI	SECDI	
2	0	10.18	32.731*	25.17	6.53	0.583	-0.030	105	105						
2	5	10.16	32.642	25.11	6.52	0.582	-0.028	105	105						
2	10	10.12	32.652	25.12	6.53	0.583	-0.029	105	105						
2	20	10.10	32.647	25.12	6.51	0.581	-0.027	105	105						
2	30	10.12	32.643	25.12	6.50	0.581	-0.026	105	105						
2	50	10.09	32.644	25.12	6.40	0.572	-0.017	103	87						
2	74	9.97	33.176	25.56	5.38	0.481	0.074	71	71						
2	99	9.47	33.436	25.84	4.45	0.397	0.162	56	44						
2	124	8.97	33.666	26.10	3.57	0.319	0.246	39	37						
2	149	8.38	33.830	26.32	2.84	0.254	0.318	27	11						
2	174	8.15	33.913	26.42	2.53	0.226	0.349	4	5						
3	198	7.86	33.961	26.50	2.42	0.216	0.362								
3	297	6.71	34.030	26.72	1.80	0.161	0.434								
3	494	5.17	34.131	26.99	0.76	0.068	0.549								
3	741	4.31	34.309	27.23	0.27	0.024	0.605								
3	988	3.70	34.404	27.36	0.35	0.031	0.607								
3	1484	2.71	34.522	27.55	0.82	0.073	0.581								
3	1781	2.19	34.564	27.63	1.19	0.106	0.557								
1	1815	2.21	34.572	27.63	1.21	0.108	0.555								
1	1963	2.05	34.601	27.67	1.38	0.123	0.542								
1	2356	1.77	34.630	27.71	1.92	0.171	0.499								
1	2750	1.69	34.628	27.72	2.07	0.185	0.487								

BROWN BEAR CRUISE 320 STATION 018 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	1.22	1.43		32.630
2	1.33	0.96		32.630
9	1.35	1.16		32.630
24	1.51	0.85		32.631

33.36 24.81 - WATER COLUMN VALUES

MESSENGER TIME 2107 INCOMING SOLAR RADIATION - AM 136 PM 106
 ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0050-0100 DEPTHS 100, 70
 35, 0

BROWN BEAR		CRUISE 320		STATION 018		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.18	0.00	32.731	0.000	25.17	280.2	0.000	0.00	6.53	0.00	
10	10.12	0.00	32.652	0.000	25.12	285.2	0.029	0.02	6.53	0.00	
20	10.10	0.00	32.647	0.000	25.12	285.5	0.058	0.06	6.51	0.00	
30	10.12	0.00	32.643	0.000	25.12	286.3	0.087	0.13	6.50	0.00	
50	10.09	0.00	32.644	0.000	25.12	286.1	0.144	0.37	6.40	0.00	0.94
75	9.95	0.00	33.190	0.002	25.57	244.1	0.211	0.79	5.34	0.00	0.94
100	9.45	0.00	33.446	0.000	25.85	217.6	0.269	1.31	4.41	0.00	0.94
150	8.37	0.00	33.834	0.000	26.32	173.4	0.368	2.55	2.82	0.00	
200	7.84	0.00	33.963	0.001	26.51	156.9	0.451	4.03	2.41	0.00	1.04
250	7.24	0.01	34.011	0.008	26.63	145.8	0.527	5.79	2.11	0.01	1.31
300	6.68	0.00	34.032	0.000	26.72	137.5	0.599	7.80	1.78	0.00	0.99
400	5.80	0.01	34.084	0.004	26.88	123.5	0.730	12.50	1.20	0.01	0.77
500	5.14	0.00	34.135	0.001	27.00	112.7	0.849	17.99	0.74	0.00	0.97
600	4.71	0.04	34.209	0.006	27.10	103.2	0.959	24.13	0.46	0.01	0.68
700	4.40	0.02	34.280	0.003	27.19	95.2	1.059	30.81	0.30	0.01	0.80
800	4.15	0.01	34.337	0.002	27.27	89.0	1.152	37.98	0.26	0.01	0.73
1000	3.67	0.00	34.408	0.000	27.37	79.8	1.323	53.70	0.36	0.00	0.99
1200	3.25	0.01	34.464	0.002	27.46	72.2	1.477	71.06	0.51	0.01	0.90
1500	2.68	0.00	34.524	0.000	27.55	63.0	1.682	99.43	0.84	0.00	0.91
2000	2.01	0.00	34.606	0.001	27.68	51.4	1.973	151.13	1.44	0.01	1.01
2500	1.72	0.00	34.630	0.002	27.72	47.8	2.225	209.60	2.05	0.02	1.60

BROWN BEAR CRUISE 320 STATION 18A BIOLOGICAL DATA

DATE 4/04/63 LAT 44-20 N LONG 124-36 W

DEPTH CHL-A PRODUCTIVITY SAL
LAB-I DECK-I

0 1.05 2.44 15.04 32.594

MESSENGER TIME 0602 INCOMING SOLAR RADIATION - AM 101 PM 135

BROWN BEAR CRUISE 320 STATION 019 OBSERVED VALUES

YAQUINA BAY ENTRANCE

DATE 4/04/63 HR 17.2 LAT 44-34 N LONG 124-08 W SNDG 40 WEA 45 WIND VEL 6 DIR 18
 BAROM 26.1 TEMP DRY 11.7 WET 11.2 RELHU 94 WTRCLR SECDI SEA 1 DIR 18 SWELL 2 DIR 25
 CLOUD TYPE 7 AMT 9 VIS 2 WIRE ANGLE(S) 15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	10.11	28.576	21.96	6.71	0.599	-0.029	105	
1	5	10.02	30.353	23.35	6.64	0.593	-0.029	105	
1	10	10.00	30.866	23.75	6.62	0.591	-0.028	105	
1	14	10.00	31.436	24.20	6.55	0.585	-0.024	104	
1	19	10.04	31.741	24.43	6.48	0.579	-0.020	104	
1	24	10.00	31.756	24.44	6.50	0.581	-0.021	104	

BROWN BEAR CRUISE 320 STATION 019 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	3.07	13.94	28.386
2	3.32	14.06	29.435
6	2.93	13.91	30.377
10	2.59	11.79	30.771
25	1.99	8.53	31.756
29.93	135.43	-	WATER COLUMN VALUES

MESSANGER TIME 0920 INCOMING SOLAR RADIATION - AM 101 PM 135

BROWN BEAR CRUISE 320 STATION 019 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.11	0.00	28.576	0.000	21.96	587.3	0.000	0.00	6.71	0.00	
10	10.00	0.00	30.866	0.000	23.75	415.7	0.051	0.02	6.62	0.00	
20	10.04	0.00	31.762	0.004	24.44	350.2	0.090	0.08	6.47	0.00	1.19

BROWN BEAR CRUISE 320 STATION 020 OBSERVED VALUES

DATE 4/04/63 HR 20.3 LAT 44-52 N LONG 124-07 W SNDC 62 WEA 02 WIND VEL 6 DIR 18
 BAROM 24.7 TEMP DRY 12.3 WET 11.5 RELHU 92 WTRCLR SEA 0 DIR 18 SWELL 1 DIR 28
 CLOUD TYPE 7 AMT 8 VIS 5 WIRE ANGLE(S) 20

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	10.39	29.335	22.50	7.00	0.625	-0.061	111	111
1	5	10.03	31.066	23.90	6.78	0.606	-0.044	108	108
1	9	9.98	31.726	24.42	6.57	0.587	-0.027	105	105
1	14	9.96	32.256	24.84	6.46	0.577	-0.019	103	103
1	19	9.97	32.300	24.87	6.27	0.560	-0.002	100	100
1	23	9.92	32.319	24.90	6.42	0.573	-0.015	103	103
1	33	9.90	32.334	24.91	6.35	0.567	-0.009	102	102
1	42	9.91	32.347	24.92	6.38	0.570	-0.012	102	102
1	52	9.88	32.352	24.93	6.33	0.565	-0.007	101	101

BROWN BEAR CRUISE 320 STATION 020 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL	PHOS	NITR	SIL
0	2.51	6.66		18.56	100	50	29.459	0.61	4.7	24
2	3.04	13.87		13.84		10	30.289	0.62	4.2	19
7	2.94	11.11			59		31.201	0.71	3.5	14
12	2.59	8.05		9.70						
52	0.77	1.59		8.70						
				3.25						
				0.77						
						1	31.816	0.64	1.3	8
							32.340	0.68	2.7	6

34.52 130.88 - WATER COLUMN VALUES

MESSANGER TIME 1232 INCOMING SOLAR RADIATION - AM 101 PM 135

LIGHT SATURATION INCUBATOR ILLUMINATION 18500

BROWN BEAR CRUISE 320 STATION 020										INTERPOLATED AND COMPUTED VALUES			
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	10.39	0.00	29.335	0.000	22.50	535.2	0.000	0.00	7.00	0.00	0.80		
10	9.97	0.00	31.865	0.004	24.53	341.2	0.045	0.02	6.54	0.01	0.70		
20	9.96	0.00	32.306	0.000	24.88	308.5	0.077	0.07	6.30	0.01	0.85		
30	9.90	0.00	32.332	0.002	24.91	305.8	0.108	0.15	6.40	0.03			
50	9.89	0.00	32.352	0.000	24.93	304.6	0.170	0.40	6.36	0.01	0.80		

BROWN BEAR CRUISE 320 STATION 021 OBSERVED VALUES

CASCADE HEAD

DATE 4/04/63 HR 22.3 LAT 45-07 N LONG 124-02 W SNOG 38 WEA 45 WIND VEL 8 DIR 20
 BAROM 23.0 TEMP DRY 11.8 WET 11.3 RELHU 96 WTRCLR SECDI 38 SEA 0 DIR 20 SWELL 1 DIR 18
 CLOUD TYPE 7 AMT 9 VIS 2 WIRE ANGLE(S) 10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
1	0	10.30	30.008	23.04	6.85	0.612	-0.050	109	
1	5	10.07	30.462	23.43	6.73	0.601	-0.038	107	
1	10	10.00	30.790	23.69	6.59	0.589	-0.026	105	
1	15	9.95	31.538	24.28	6.50	0.581	-0.020	104	
1	20	9.96	31.770	24.46	6.43	0.574	-0.015	103	
1	30	9.91	32.082	24.71	6.23	0.556	0.003	100	

BROWN BEAR CRUISE 320 STATION 021 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.30	0.00	30.008	0.000	23.04	483.9	0.000	0.00	6.85	0.00	
10	10.00	0.00	30.790	0.000	23.69	421.3	0.046	0.02	6.59	0.00	
20	9.96	0.00	31.770	0.000	24.46	348.2	0.085	0.08	6.43	0.00	
30	9.91	0.00	32.082	0.000	24.71	324.5	0.119	0.17	6.23	0.00	

BROWN BEAR CRUISE 320 STATION 022 OBSERVED VALUES

DATE 5/04/63 HR 03.0 LAT 45-07 N LONG 124-44 W SNDG 366 HEA 10 WIND VEL 4 DIR 18
 BAROM 19.3 TEMP DRY 10.4 WET 9.9 RELHU 93 WTRCLR SEA 2 DIR 18 SWELL 1 DIR 13
 CLOUD TYPE 7 VIS 1 WIRE ANGLE(S) 0

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.93	32.045	24.68	6.69	0.598	-0.038	107	
1	5	9.94	32.042	24.68	6.69	0.598	-0.039	107	
1	10	9.85	32.038	24.69	6.66	0.595	-0.035	106	
1	20	9.75	32.051	24.72	6.56	0.586	-0.025	104	
1	30	9.80	32.117	24.76	6.54	0.584	-0.024	104	
1	50	9.83	32.222	24.84	6.50	0.581	-0.021	104	
1	75	9.80	33.023	25.46	5.25	0.469	0.088	84	
1	100	9.11	33.438	25.90	4.13	0.369	0.195	65	
1	125	8.41	33.632	26.16	3.45	0.308	0.264	54	
1	150	8.11	33.751*	26.30	3.12	0.279	0.295	48	
1	181	7.74	33.877*	26.45	2.77	0.247	0.333	43	
1	203	7.38	34.019*	26.61	2.48	0.221	0.363	38	
1	253	6.18	33.934*	26.71	1.79	0.160	0.442	27	

BROWN BEAR CRUISE 320 STATION 022 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	1.39	1.80	32.043
2	1.37	1.85	32.043
7	1.58	2.06	32.040
12	1.49	2.17	32.047

17.81 24.01 - WATER COLUMN VALUES

MESSANGER TIME 1918 INCOMING SOLAR RADIATION - AM 101 PM 135

BROWN BEAR		CRUISE 320		STATION 022		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.93	0.00	32.045	0.000	24.68	327.0	0.000	0.00	6.69	0.00	
10	9.85	0.00	32.038	0.000	24.69	326.5	0.033	0.02	6.66	0.00	
20	9.75	0.00	32.051	0.000	24.72	324.1	0.066	0.07	6.56	0.00	
30	9.80	0.00	32.117	0.000	24.76	320.2	0.099	0.15	6.54	0.00	
50	9.83	0.00	32.222	0.000	24.84	313.2	0.162	0.41	6.50	0.00	
75	9.80	0.00	33.023	0.000	25.46	253.9	0.234	0.86	5.25	0.00	
100	9.11	0.00	33.438	0.000	25.90	212.9	0.293	1.38	4.13	0.00	
150	8.11	0.00							3.12	0.00	
200	7.43	0.00							2.52	0.00	0.77
250	6.27	0.00							1.83	0.00	10.77

BROWN BEAR CRUISE 320 STATION 023 OBSERVED VALUES

DATE 5/04/63 HR 07.9 LAT 45-07 N LONG 125-24 W WEA 62 WIND VEL 10 DIR 14
 BAROM 13.9 TEMP DRY 11.7 WET 10.0 RELHU 83 WTRCLR SECDI 1920 SEA 1 DIR 14 SWELL 2 DIR 11
 CLOUD TYPE 7 AMT 9 VIS 2 WIRE ANGLE(S) 16, 3

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					MGA/L			
2	0	10.15	32.424*	24.94	6.54	0.584	-0.029	105
2	5	10.11	32.420*	24.94	6.70	0.598	-0.043	108
2	10	10.00	32.461	24.99	6.65	0.594	-0.037	107
2	20	9.98	32.465	25.00	6.85	0.612	-0.055	110
2	30	9.94	32.467	25.01	6.27	0.560	-0.003	100
2	50	9.91	32.592	25.11	6.34	0.566	-0.009	102
2	74	9.66	33.187	25.62	5.05	0.451	0.107	81
2	99	9.20	33.440	25.89	4.20	0.375	0.188	67
2	124	8.74	33.624	26.10	3.37	0.301	0.267	53
2	149	8.32	33.710	26.23	3.00	0.268	0.305	47
2	174	8.15	33.854	26.37	2.50	0.223	0.352	39
1	188	8.10	33.893	26.41	2.62	0.234	0.342	41
1	281	6.21	33.994	26.75	2.07	0.185	0.417	31
1	471	5.18	34.102	26.96	0.95	0.085	0.532	14
1	707	4.30	34.269	27.20	0.36	0.032	0.598	5
1	943	3.65	34.399	27.37	0.43	0.038	0.601	6
1	1421	2.81	34.511	27.53	0.85	0.076	0.577	12
1	1706	2.26	34.563	27.62	1.18	0.105	0.557	16

BROWN BEAR CRUISE 320 STATION 023 BIOLOGICAL DATA

INCOMING SOLAR RADIATION - AM 134 PM 156
 ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0123-0133 DEPTHS 100, 70, 30, 0

INTERPOLATED AND COMPUTED VALUES												
DEPTH	BROWN BEAR			CRUISE 320			STATION 023			INTERPOLATED AND COMPUTED VALUES		
	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	10.15	0.00	32.461	0.000	24.99	297.5			6.54	0.00		
10	10.00	0.00	32.465	0.000	25.00	297.1			6.65	0.00		
20	9.98	0.00	32.467	0.000	25.01	296.5			6.85	0.00		
30	9.94	0.00							6.27	0.00		
50	9.91	0.00	32.592	0.000	25.11	287.1			6.34	0.00	0.94	
75	9.64	0.00	33.201	0.002	25.63	238.2			5.01	0.00	0.94	
100	9.18	0.00	33.449	0.000	25.90	213.2			4.16	0.00	0.94	
150	8.31	0.00	33.716	0.001	26.24	181.3			2.97	0.01		
200	7.91	0.07	33.915	0.005	26.46	161.6			2.11	0.04	1.62	
250	6.94	0.13	33.977	0.009	26.68	144.2			2.38	0.09	1.87	
300	6.02	0.05	34.007	0.002	26.79	130.7			1.94	0.01	0.96	
400	5.33	0.14	34.068	0.006	26.92	118.8			1.33	0.02	0.75	
500	5.05	0.00	34.123	0.001	27.00	112.6			0.84	0.00	0.86	
600	4.66	0.01	34.193	0.003	27.10	103.7			0.53	0.01	0.67	
700	4.32	0.00	34.264	0.000	27.19	95.4			0.37	0.00	0.96	
800	4.02	0.00	34.325	0.000	27.27	88.3			0.34	0.02	0.63	
1000	3.54	0.01	34.418	0.003	27.39	77.4			0.47	0.00	0.95	
1200	3.17	0.03	34.474	0.007	27.47	70.5			0.62	0.01	0.89	
1500	2.68	0.00	34.523	0.001	27.56	63.0			0.94	0.00	9.99	

BROWN BEAR CRUISE 320 STATION 024 OBSERVED VALUES

DATE 5/04/63 HR 15.2 LAT 45-06 N LONG 126-15 W SNOG 2779 WEA 45 WIND VEL 4 DIR 12
 BAROM 03.7 TEMP DRY 11.8 WEI 11.1 RELHU 93 WTRCLR SEA 1 DIR 13 SWELL 0 DIR 12
 CLOUD TYPE 7 AMT 9 VIS 2 WIRE ANGLE(S) 0.7

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	AOU	SATN
					MGA/L			
2	0	10.02	32.545	25.06	7.02	0.627	-0.071	113
2	5	10.00	32.560	25.07	6.80	0.607	-0.051	109
2	10	10.00	32.606	25.11	6.71	0.599	-0.043	108
2	20	9.99	32.636	25.13	6.64	0.593	-0.037	107
2	30	10.02	32.638	25.13	6.54	0.584	-0.028	105
2	50	9.99	32.649	25.14	6.43	0.574	-0.018	103
2	74	9.63	33.011	25.48	5.43	0.485	0.074	87
2	99	9.13	33.406	25.87	4.39	0.392	0.172	70
2	124	8.74						
2	149	8.37	33.644	26.18	3.04	0.272	0.301	47
2	174	7.93	33.790	26.36	2.97	0.265	0.313	46
1	198	7.60	33.884	26.48	2.63	0.235	0.348	40
1	297	6.38	34.012	26.75	2.04	0.182	0.417	30
1	496	5.04	34.138	27.01	0.78	0.070	0.549	11
1	743	4.19	34.296	27.23	0.38	0.034	0.597	15
1	990	3.48	34.420	27.40	0.46	0.041	0.601	6
1	1486	2.58	34.529	27.57	0.90	0.080	0.576	12
1	1784	2.12	34.574	27.64	1.37	0.122	0.542	18

BROWN BEAR CRUISE 320 STATION 024 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.90	0.91		32.556
6	0.99	1.58		32.557
16	1.35	1.45		32.625
31	1.06	0.97		32.624
100	0.05	0.01		33.420

35.45 40.85 - WATER COLUMN VALUES

MESSENGER TIME 0750 INCOMING SOLAR RADIATION - AM 134 PM 156

BROWN BEAR STATION 024 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	10.02	0.00	32.545	0.000	25.06	291.4	0.000	0.00	7.02	0.00	
10	10.00	0.00	32.606	0.000	25.11	286.7	0.030	0.02	6.71	0.00	
20	9.99	0.00	32.636	0.000	25.13	284.6	0.058	0.06	6.64	0.00	
30	10.02	0.00	32.638	0.000	25.13	285.1	0.087	0.13	6.54	0.00	
50	9.99	0.00	32.649	0.000	25.14	284.2	0.144	0.37	6.43	0.00	
75	9.61	0.00	33.028	0.001	25.50	250.6	0.212	0.80	5.39	0.00	0.95
100	9.11	0.00	33.414	0.003	25.88	214.8	0.270	1.32	4.35	0.00	0.99
150	8.35	0.00	33.650	0.000	26.18	186.8	0.372	2.60	3.04	0.00	0.94
200	7.57	0.00	33.889	0.001	26.49	158.7	0.459	4.14	2.61	0.00	1.04
250	6.92	0.01	33.980	0.016	26.65	143.8	0.535	5.90	2.24	0.06	1.31
300	6.35	0.00	34.015	0.000	26.75	134.4	0.605	7.88	2.02	0.00	0.99
400	5.56	0.04	34.088	0.007	26.91	120.2	0.734	12.46	1.34	0.04	0.78
500	5.02	0.00	34.141	0.000	27.01	110.9	0.850	17.83	0.77	0.00	0.98
600	4.62	0.03	34.206	0.001	27.11	102.2	0.958	23.90	0.50	0.03	0.68
700	4.30	0.02	34.270	0.001	27.20	94.8	1.057	30.53	0.39	0.02	0.79
800	4.01	0.00	34.328	0.000	27.27	88.0	1.150	37.64	0.37	0.01	0.74
1000	3.46	0.00	34.423	0.000	27.40	76.1	1.316	52.90	0.46	0.00	0.99
1200	3.05	0.02	34.480	0.006	27.49	68.6	1.462	69.43	0.60	0.00	0.90
1500	2.56	0.00	34.531	0.000	27.57	61.0	1.660	96.69	0.92	0.00	1.00

BROWN BEAR CRUISE 320 STATION 025 OBSERVED VALUES

DATE	5/04/63	HR	19.9	LAT	45-15 N	LONG	126-41 W	WEA	02	WIND	VEL	12	DIR	25
BAROM	03.7	TEMP	DRY	11.2	WET	10.7	RELHU	95	WTRCLR	SEA	1	DIR	25	SMELL
CLOUD	TYPE	7	AMT	8	VIS	3	WIRE	ANGLE(S)	--	SECDI	2761	SEA	1	DIR
CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN	SECDI	2761	SEA	1	DIR
1	0	10.25	32.635	25.09	6.62	0.591	-0.038	107	107	SECDI	2761	SEA	1	DIR
1	5	10.19	32.631	25.09	6.62	0.591	-0.038	107	107	SECDI	2761	SEA	1	DIR
1	10	10.11	32.633	25.11	6.65	0.594	-0.039	107	107	SECDI	2761	SEA	1	DIR
1	20	10.11	32.633	25.11	6.62	0.591	-0.037	107	107	SECDI	2761	SEA	1	DIR
1	30	10.09	32.644	25.12	6.56	0.586	-0.031	106	106	SECDI	2761	SEA	1	DIR
1	50	10.00	32.655	25.14	6.45	0.576	-0.020	104	104	SECDI	2761	SEA	1	DIR
1	74	9.90	33.316	25.68	4.92	0.439	0.115	79	79	SECDI	2761	SEA	1	DIR
1	99	9.33	33.552	25.95	3.99	0.356	0.204	64	64	SECDI	2761	SEA	1	DIR
1	124	8.75	33.772	26.22	3.55	0.317	0.250	56	56	SECDI	2761	SEA	1	DIR
1	149	8.39	33.888	26.36	2.69	0.240	0.331	42	42	SECDI	2761	SEA	1	DIR
1	174	7.97	33.942	26.47	2.55	0.228	0.349	39	39	SECDI	2761	SEA	1	DIR

BROWN BEAR CRUISE 320 STATION 025 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL	PHOS	NITR	SIL
0	1.17	2.61	17.00	2.38	100	50	32.631	0.66	2.4	4
6	1.27	2.41	12.14	2.22	77		32.629	0.39	3.8	4
				1.57	59					
20		1.90	1.86	1.19	32	10	32.634	0.67	2.4	4
				1.01	21					
				0.07	4					
42	1.12	1.10	0.04			1	32.645	0.69	2.3	5
100	0.10						33.522	1.68	23.1	25
200	0.00						33.963	2.19	34.0	42

50.34 78.24 206.30 - WATER COLUMN VALUES

MESSANGER TIME 1136 INCOMING SOLAR RADIATION - AM 134 PM 156

LIGHT SATURATION INCUBATOR ILLUMINATION 18800

BROWN BEAR CRUISE 320 STATION 025										INTERPOLATED AND COMPUTED VALUES			
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	10.25	0.00	32.635	0.000	25.09	288.4	0.000	0.00	6.62	0.00			
10	10.11	0.00	32.633	0.000	25.11	286.5	0.029	0.02	6.65	0.00			
20	10.11	0.00	32.633	0.000	25.11	286.7	0.058	0.06	6.62	0.00			
30	10.09	0.00	32.644	0.000	25.12	285.7	0.087	0.13	6.56	0.00			
50	10.00	0.00	32.655	0.000	25.14	283.9	0.145	0.37	6.45	0.00	0.94		
75	9.88	0.00	33.330	0.003	25.69	232.5	0.210	0.78	4.87	0.00	0.94		
100	9.30	0.00	33.562	0.001	25.97	206.8	0.265	1.27	3.97	0.01	1.04		
150	8.38	0.00	33.891	0.000	26.37	169.3	0.360	2.46	2.66	0.01			

BROWN BEAR CRUISE 320 STATION 026 OBSERVED VALUES

DATE 6/04/63 HR 02-2 LAT 45-38 N LONG 127-41 W SNDG 2834 MEA 03 WIND VEL 10 DIR 20
 BAROM 03.0 TEMP DRY 10.6 WET 9.0 RELHU 82 WTRCLR SEA 2 DIR 20 SWELL 2 DIR 21
 CLOUD TYPE 3 AMT 8 VIS 6 WIRE ANGLE(S) 17, 6

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
2	0	9.78	32.547	25.10	6.63	0.592	-0.033	106	
2	5	9.75	32.547	25.10	6.68	0.597	-0.037	107	
2	10	9.70	32.544	25.11	6.62	0.591	-0.031	106	
2	20	9.70	32.555	25.12	6.62	0.591	-0.031	106	
2	30	9.64	32.568	25.14	6.50	0.581	-0.020	104	
2	50	9.60	32.568	25.14	6.50	0.581	-0.019	103	
2	74	8.40	33.051	25.71	5.08	0.454	0.121	179	
2	99	8.24	33.566	26.13	3.61	0.322	0.253	56	
2	124	8.03	33.827	26.37	2.92	0.261	0.316	45	
2	153	7.67	33.888	26.47	2.69	0.240	0.341	41	
1	172	7.45	33.944	26.55	2.51	0.224	0.360	36	
2	174	7.40	33.926	26.54	2.59	0.231	0.354	40	
1	276	6.32	34.008	26.75	1.89	0.169	0.431	28	
1	466	5.10	34.108	26.98	0.96	0.086	0.532	14	
1	706	4.26	34.276	27.21	0.44	0.039	0.591	6	
1	948	3.58	34.409	27.38	0.38	0.034	0.607	5	
1	1432	2.76	34.507	27.54	0.75	0.067	0.587	10	
1	1728	2.18	34.558	27.63	1.22	0.109	0.555	16	

BROWN BEAR CRUISE 320 STATION 026 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I DECK-I	SAL
0	0.54	0.34	32.595
6	0.56	0.50	32.552
20	0.61	0.48	32.546
42	0.57	0.23	32.566

24.51 17.21 - WATER COLUMN VALUES

MESSENGER TIME 1950 INCOMING SOLAR RADIATION - AM 134 PM 156

BROWN BEAR CRUISE 320 STATION 026				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.78	0.00	32.547	0.000	25.10	287.5	0.000	0.00	6.63	0.00	
10	9.70	0.00	32.544	0.000	25.11	286.6	0.029	0.02	6.62	0.00	
20	9.70	0.00	32.555	0.000	25.12	286.0	0.058	0.06	6.62	0.00	
30	9.64	0.00	32.568	0.000	25.14	284.3	0.087	0.13	6.50	0.00	
50	9.60	0.00	32.568	0.000	25.14	284.0	0.144	0.37	6.50	0.00	0.94
75	8.38	0.01	33.074	0.002	25.73	228.7	0.209	0.77	5.01	0.00	0.94
100	8.23	0.00	33.581	0.000	26.15	189.3	0.261	1.24	3.57	0.00	0.91
150	7.71	0.00	33.887	0.004	26.46	160.0	0.349	2.35	2.70	0.00	
200	7.11	0.01	33.975	0.018	26.62	146.0	0.427	3.73	2.34	0.04	1.81
250	6.58	0.01	34.010	0.014	26.72	137.0	0.498	5.37	2.02	0.02	1.24
300	6.12	0.01	34.022	0.002	26.79	131.0	0.566	7.28	1.75	0.00	0.93
400	5.44	0.02	34.075	0.004	26.91	119.6	0.692	11.80	1.23	0.00	0.73
500	4.95	0.01	34.131	0.002	27.01	110.7	0.808	17.15	0.85	0.01	0.85
600	4.57	0.03	34.201	0.003	27.11	102.1	0.916	23.21	0.60	0.01	0.67
700	4.28	0.00	34.272	0.000	27.20	94.3	1.015	29.83	0.45	0.00	0.96
800	3.98	0.00	34.333	0.001	27.28	87.2	1.107	36.89	0.38	0.01	0.63
1000	3.48	0.01	34.425	0.003	27.40	76.2	1.272	52.09	0.39	0.00	0.95
1200	3.12	0.04	34.475	0.009	27.48	69.8	1.420	68.78	0.50	0.01	0.88
1500	2.65	0.01	34.516	0.002	27.55	63.2	1.622	96.78	0.84	0.00	0.96

BROWN BEAR CRUISE 320 STATION 027 OBSERVED VALUES

DATE 6/04/63 HR 09.3 LAT 45-51 N LONG 127-13 W WEA 21 WIND VEL 0 DIR 00
 BAROM 02.0 TEMP DRY 9.0 MET 7.6 RELHU 82 WTRCLR SEA 0 DIR 00 SWELL 1 DIR 24
 CLOUD TYPE 7 AMT 9 VIS 5 WIRE ANGLE(S) 5 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L			
1	0	9.70	32.474	25.05	6.62	0.591	-0.031	106
1	5	9.74	32.506	25.07	6.68	0.597	-0.037	107
1	10	9.74	32.528	25.09	6.69	0.598	-0.038	107
1	20	9.70	32.539	25.10	6.65	0.594	-0.034	106
1	30	9.69	32.546	25.11	6.60	0.589	-0.029	105
1	50	9.68	32.535	25.10	6.56	0.586	-0.026	105
1	74	8.44	33.020	25.68	5.12	0.457	0.117	80
1	99	8.24	33.579	26.14	3.47	0.310	0.265	54
1	124	8.05	33.774	26.33	2.88	0.257	0.319	45
1	149	7.82	33.859	26.43	2.56	0.229	0.351	39
1	170	7.53	33.920	26.52	2.36	0.211	0.372	36

BROWN BEAR CRUISE 320 STATION 027 BIOLOGICAL DATA

INCOMING SOLAR RADIATION - AM 330 PM 302

ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0012-0022 DEPTHS 100, 70
 0039-0049 35, 0

BROWN BEAR		CRUISE 320		STATION 027		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEO POT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.70	0.00	32.474	0.000	25.05	291.6	0.000	0.00	6.62	0.00	
10	9.74	0.00	32.528	0.000	25.09	288.4	0.030	0.02	6.69	0.00	
20	9.70	0.00	32.539	0.000	25.10	287.2	0.059	0.06	6.65	0.00	
30	9.69	0.00	32.546	0.000	25.11	286.7	0.088	0.13	6.60	0.00	
50	9.68	0.00	32.535	0.000	25.10	287.7	0.145	0.37	6.56	0.00	0.94
75	8.42	0.01	33.045	0.003	25.70	231.4	0.211	0.78	5.05	0.01	0.94
100	8.23	0.00	33.591	0.002	26.16	188.6	0.264	1.25	3.43	0.01	0.94
150	7.81	0.00	33.862	0.000	26.43	163.3	0.352	2.37	2.55	0.00	1.02

BROWN BEAR CRUISE 320 STATION 028 OBSERVED VALUES
 DATE 6/04/63 HR 15.8 LAT 46-15 N LONG 126-24 W WEA 04 WIND VEL 20 DIR 24
 BAROM 02.0 TEMP DRY 10.7 WET 8.8 RELHU 80 WTRCLR SEA 2 DIR 24 SWELL 1 DIR 21
 CLOUD TYPE 1 AMT 7 VIS 7 WIRE ANGLE(S) 20, 8 SMDG 2651 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN	ADU	SATN
					MGA/L			
2	0	9.56	32.495	25.09	6.62	0.591	-0.029	105
2	5	9.54						
2	10	9.52	32.502	25.10	6.64	0.593	-0.031	105
2	20	9.53	32.509	25.11	6.65	0.594	-0.032	106
2	30	9.43	32.524	25.14	6.57	0.587	-0.023	104
2	50	9.42	32.513	25.13	6.55	0.585	-0.021	104
2	74	9.40	32.524	25.14	6.56	0.586	-0.022	104
2	99	8.30	32.840	25.56	5.70	0.509	0.068	88
2	124	7.64	33.262	25.98	4.83	0.431	0.153	74
2	148	7.85	33.692	26.29	3.60	0.322	0.258	55
2	173	7.30	33.870	26.51	3.08	0.275	0.312	47
1	189	7.30	33.917	26.55	2.83	0.253	0.334	43
1	284	6.17	33.966	26.74	2.22	0.198	0.404	33
1	475	5.01	34.073	26.96	0.97	0.087	0.533	14
1	714	4.17	34.252	27.20	0.27	0.024	0.608	4
1	953	3.67	34.386	27.35	0.24	0.021	0.618	3
1	1433	2.80	34.505	27.53	0.63	0.056	0.597	9
1	1725	2.17	34.561	27.63	1.10	0.098	0.566	15

BROWN BEAR CRUISE 320 STATION 028 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0				32.296
6	0.70	1.25		32.480
20	0.74	1.00		32.480
42	0.75	0.91		32.487

22.48 44.26 - WATER COLUMN VALUES

MESSANGER TIME 0719 INCOMING SOLAR RADIATION - AM 330 PM 302

BROWN BEAR CRUISE 320 STATION 028				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.56	0.00	32.495	0.000	25.09	287.9	0.000	0.00	6.62	0.00	
10	9.52	0.00	32.502	0.000	25.10	287.0	0.029	0.02	6.64	0.00	
20	9.53	0.00	32.509	0.000	25.11	286.8	0.058	0.06	6.65	0.00	
30	9.43	0.00	32.524	0.000	25.14	284.3	0.087	0.13	6.57	0.00	
50	9.42	0.00	32.513	0.000	25.13	285.3	0.144	0.37	6.55	0.00	0.94
75	9.36	0.00	32.533	0.001	25.15	283.4	0.216	0.83	6.53	0.01	0.94
100	8.26	0.00	32.856	0.001	25.58	243.6	0.283	1.42	5.67	0.00	0.89
150	7.81	0.02	33.714	0.002	26.31	174.2	0.388	2.73	3.54	0.01	
200	7.21	0.04	33.933	0.007	26.57	150.5	0.470	4.18	2.72	0.03	1.45
250	6.66	0.09	33.971	0.015	26.68	141.1	0.543	5.87	2.35	0.06	1.71
300	6.04	0.01	33.974	0.000	26.76	133.4	0.612	7.83	2.10	0.01	0.96
400	5.35	0.04	34.028	0.001	26.89	122.1	0.741	12.43	1.43	0.03	0.75
500	4.90	0.01	34.092	0.001	26.99	113.1	0.860	17.90	0.86	0.00	0.88
600	4.51	0.01	34.166	0.004	27.09	103.9	0.969	24.07	0.50	0.01	0.67
700	4.21	0.00	34.241	0.001	27.18	95.8	1.070	30.80	0.29	0.00	0.92
800	3.97	0.01	34.306	0.000	27.26	89.1	1.164	37.99	0.21	0.02	0.65
1000	3.59	0.01	34.403	0.002	27.38	79.1	1.334	53.66	0.25	0.00	0.95
1200	3.22	0.02	34.462	0.007	27.46	72.0	1.487	70.93	0.37	0.01	0.88
1500	2.67	0.00	34.516	0.002	27.55	63.4	1.693	99.39	0.72	0.00	0.96

BROWN BEAR CRUISE 320 STATION 28A BIOLOGICAL DATA

DATE 6/04/63 LAT 46-12 N LONG 126-28 W

DEPTH CHL-A PRODUCTIVITY
LAB-I DECK-I

0 0.39 0.37 2.26

MESSENGER TIME 0558 INCOMING SOLAR RADIATION - AM 330 PM 302

BROWN BEAR CRUISE 320 STATION 029 OBSERVED VALUES

DATE 6/04/63 HR 20.6 LAT 46-14 N LONG 125-50 W WEA 01 WIND VEL 20 DIR 24
 BAROM 06.4 TEMP DRY 10.0 MET 8.8 RELHU 77 WTRCLR SEA 2 DIR 24 SWELL 3 DIR 24
 CLOUD TYPE 8 VIS 8 WIRE ANGLE(S) 30,10,12

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
2	0	9.61	32.316	24.94	6.65	0.594	-0.032		106
2	5	9.59	32.313	24.95	6.69	0.598	-0.035		106
2	10	9.54	32.314	24.95	6.68	0.597	-0.034		106
2	20	9.52	32.320	24.96	6.65	0.594	-0.031		105
2	30	9.48	32.408	25.04	6.62	0.591	-0.028		105
2	50	9.40	32.419	25.06	6.51	0.581	-0.017		103
2	74	9.37	32.565	25.18	6.15	0.549	0.015		97
2	99	8.35	33.205	25.84	4.51	0.403	0.172		70
2	124	8.01	33.527	26.14	3.70	0.330	0.248		57
2	149	7.57	33.807	26.42	3.04	0.272	0.312		47
2	174	7.33	33.881	26.51	2.83	0.253	0.333		43
3	194	7.02	33.937	26.60	2.45	0.219	0.371		37
3	292	6.00	33.992	26.78	1.83	0.163	0.441		27
3	489	4.93	34.113	27.00	0.72	0.064	0.556		10
3	735	4.17	34.284	27.22	0.30	0.027	0.605		4
3	980	3.45	34.391	27.38	0.27	0.024	0.619		4
3	1475	2.53	34.510	27.56	0.69	0.062	0.596		9
1	1676	2.24	34.550	27.61	0.97	0.087	0.576		13
3	1776	2.10	34.579	27.65	1.17	0.104	0.560		16
1	1842	2.04	34.578	27.65	1.31	0.117	0.549		18
1	2062	1.79	34.606	27.69	1.48	0.132	0.538		20
1	2186	1.74	34.628	27.72	1.83	0.163	0.508		24

BROWN BEAR CRUISE 320 STATION 029										BIOLOGICAL DATA			
DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	SAL	PHOS	NITR	SIL				
0	0.98	1.95	14.78	2.21 2.06 1.87 1.23	100 77 59 32	32.316	0.56	1.8	7				
6	1.02	1.63	14.66	0.90	21	32.311	0.56	1.0	5				
20	1.03	1.66	3.80	0.04	4	32.319	0.58	1.2	6				
42	1.12	1.05	0.46			32.311	0.61	1.5	6				

43.90 63.57 264.40 - WATER COLUMN VALUES

MESSENGER TIME 1151 INCOMING SOLAR RADIATION - AM 330 PM 302

LIGHT SATURATION INCUBATOR ILLUMINATION 18000

BROWN BEAR				CRUISE 320				STATION 029				INTERPOLATED AND COMPUTED VALUES			
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO				
0	9.61	0.00	32.316	0.000	24.94	302.0	0.000	0.00	6.65	0.00					
10	9.54	0.00	32.314	0.000	24.95	301.2	0.031	0.02	6.68	0.00					
20	9.52	0.00	32.320	0.000	24.96	300.6	0.061	0.06	6.65	0.00					
30	9.48	0.00	32.408	0.000	25.04	293.7	0.091	0.14	6.62	0.00					
50	9.40	0.00	32.419	0.000	25.06	292.0	0.150	0.38	6.51	0.00					
75	9.33	0.01	32.589	0.005	25.20	278.8	0.222	0.84	6.09	0.01	0.94				
100	8.33	0.00	33.221	0.002	25.85	217.4	0.284	1.39	4.47	0.00	0.94				
150	7.56	0.00	33.812	0.001	26.43	163.4	0.380	2.59	3.03	0.00	0.94				
200	6.94	0.00	33.946	0.004	26.62	145.9	0.458	3.98	2.38	0.02	1.16				
250	6.37	0.02	33.991	0.015	26.73	135.7	0.529	5.61	1.97	0.08	1.51				
300	5.94	0.01	33.997	0.000	26.79	130.5	0.597	7.51	1.78	0.00	0.98				
400	5.31	0.04	34.057	0.000	26.91	119.4	0.723	12.01	1.17	0.02	0.77				
500	4.89	0.00	34.121	0.001	27.01	110.7	0.839	17.36	0.69	0.00	0.95				
600	4.55	0.02	34.193	0.004	27.11	102.4	0.946	23.43	0.44	0.03	0.68				
700	4.26	0.01	34.261	0.002	27.19	94.9	1.046	30.07	0.32	0.01	0.82				
800	3.97	0.00	34.317	0.001	27.27	88.3	1.139	37.20	0.27	0.01	0.71				
1000	3.40	0.00	34.396	0.001	27.39	77.5	1.306	52.62	0.27	0.00	1.01				
1200	2.98	0.02	34.452	0.005	27.47	69.9	1.456	69.45	0.39	0.01	0.89				
1500	2.50	0.01	34.509	0.004	27.56	61.9	1.656	97.14	0.70	0.01	1.73				
2000	1.85	0.01	34.595	0.001	27.68	50.2	1.941	147.79	1.43	0.03	1.06				

BROWN BEAR CRUISE 320 STATION 030 OBSERVED VALUES

DATE 7/04/63 HR 04.4 LAT 46-14 N LONG 124-55 W MEA 02 WIND VEL 4 DIR 20
 BAROM 06.1 TEMP DRY 12.8 WET 9.9 RELHU 70 WTRCLR SECDI 777
 CLOUD TYPE 0 AMT 1 VIS 8 WIRE ANGLE(S) 4 SEA 0 DIR 20 SWELL 2 DIR 22

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.89	31.857	24.54	6.62	0.591	-0.031		106
1	5	9.95	31.857	24.53	6.63	0.592	-0.033		106
1	10	9.83	31.861	24.55	6.62	0.591	-0.030		105
1	20	9.83	31.858	24.55	6.57	0.587	-0.026		105
1	30	9.56	32.017	24.72	6.43	0.574	-0.010		102
1	50	9.47	32.354	25.00	6.29	0.562	0.002		100
1	74	9.36	32.582	25.19	5.96	0.532	0.032		94
1	99	9.27	33.262	25.74	4.50	0.402	0.161		71
1	124	8.71	33.638	26.12	3.51	0.313	0.255		55
1	149	7.84	33.768	26.35	3.15	0.281	0.298		49
1	174	7.63	33.854	26.45	2.89	0.258	0.324		44
1	198	7.33	33.903	26.53	2.68	0.239	0.347		41
1	297	6.23	33.969	26.73	1.99	0.178	0.424		30
1	496	5.09	34.101	26.97	0.76	0.068	0.550		11
1	759	4.05	34.315	27.26	0.30	0.027	0.607		4

BROWN BEAR CRUISE 320 STATION 030 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0	0.81	0.67	31.853
2	0.98	1.02	31.853
9	1.06	1.13	31.852
24	1.19	1.19	31.862
25.80	26.65	-	WATER COLUMN VALUES

MESSANGER TIME 1950 INCOMING SOLAR RADIATION - AM 330 PM 302

BROWN BEAR			CRUISE 320			STATION 030			INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO			
0	9.89	0.00	31.857	0.000	24.54	340.3	0.000	0.00	6.62	0.00				
10	9.83	0.00	31.861	0.000	24.55	339.3	0.035	0.02	6.62	0.00				
20	9.83	0.00	31.858	0.000	24.55	339.7	0.069	0.07	6.57	0.00				
30	9.56	0.00	32.017	0.000	24.72	323.9	0.102	0.16	6.43	0.00				
50	9.47	0.00	32.354	0.000	25.00	297.9	0.165	0.41	6.29	0.00				
75	9.36	0.00	32.608	0.005	25.21	277.8	0.237	0.87	5.91	0.01	0.94			
100	9.26	0.00	33.282	0.000	25.76	226.7	0.301	1.44	4.45	0.00	0.94			
150	7.83	0.00	33.772	0.000	26.36	170.1	0.401	2.68	3.14	0.00	0.94			
200	7.30	0.00	33.905	0.001	26.54	153.8	0.483	4.14	2.66	0.00	1.04			
250	6.72	0.01	33.951	0.009	26.65	143.2	0.557	5.86	2.30	0.01	1.31			
300	6.21	0.00	33.971	0.000	26.74	135.8	0.628	7.85	1.97	0.00	0.99			
400	5.53	0.05	34.036	0.001	26.87	123.7	0.759	12.52	1.29	0.02	0.77			
500	5.08	0.00	34.104	0.000	26.98	114.2	0.879	18.06	0.74	0.00	13.62			
600	4.74	0.04	34.177	0.001	27.07	105.8	0.950	24.32	0.36	0.02	19.85			
700	4.36	0.04	34.260	0.001	27.18	96.1	1.092	31.12	0.23	0.02	16.98			

BROWN BEAR CRUISE 320 STATION 031 OBSERVED VALUES

COLUMBIA RIVER ENTRANCE

DATE 7/04/63 HR 10.9 LAT 46-13 N LONG 124-12 W SNDC 37 MEA 53 WIND VEL 20 DIR 09
 BAROM 98.0 TEMP DRY 9.4 WET 7.5 RELHU 76 WTRCLR SECDI SEA 2 DIR 09 SWELL 1 DIR 24
 CLOUD TYPE 9 AMT 7 VIS 8 WIRE ANGLE(S) 25

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	AOU	SATN
1	0	9.89	27.251	20.96	6.65	0.594	-0.016	103
1	5	9.90	29.649	22.82	6.45	0.576	-0.007	101
1	9	9.87	31.040	23.91	6.50	0.581	-0.017	103
1	14	9.86	31.262	24.08	6.31	0.564	-0.001	100
1	18	9.76	31.437	24.24	6.29	0.562	0.002	100
1	23	9.70	31.508	24.30	6.19	0.553	0.011	98
1	27	9.73	31.756	24.49	6.29	0.562	0.001	100

BROWN BEAR CRUISE 320 STATION 031 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	1.08	3.79		26.566
2	1.23	3.36		27.039
6	0.69	1.83		30.381
10	0.60	1.40		31.231

8.73 24.01 - WATER COLUMN VALUES

MESSENGER TIME 0245 INCOMING SOLAR RADIATION - AM 134 PM 182

ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0022-0032 DEPTHS 75, 50
 0050-0100 35, 0

BROWN BEAR CRUISE 320 STATION 031				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.89	0.00	27.251	0.000	20.96	682.6	0.000	0.00	6.65	0.00	0.80
10	9.87	0.00	31.152	0.045	24.00	392.5	0.055	0.02	6.47	0.01	0.71
20	9.73	0.00	31.459	0.017	24.26	367.6	0.093	0.08	6.24	0.01	

BROWN BEAR CRUISE 320 STATION 032 OBSERVED VALUES

GRAYLAND

DATE 7/04/63 HR 16.0 LAT 46-52 N LONG 124-14 W SNGD 33 WEA 03 WIND VEL 36 DIR 17
 BAROM 93.9 TEMP DRY 11.2 WET 8.7 RELHU 73 WTRCLR SECDI SEA 3 DIR 17 SWELL 6 DIR 16
 CLOUD TYPE 8 AMT 8 VIS 6 WIRE ANGLE(S) 30

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.68	27.134	20.90	6.62	0.591	-0.010	102	
1	4	9.70	27.149	20.91	6.62	0.591	-0.010	102	
1	9	9.67	28.573	22.02	6.57	0.587	-0.011	102	
1	13	9.66	30.986	23.90	6.52	0.582	-0.016	103	
1	17	9.58	31.363	24.21	6.43	0.574	-0.008	101	
1	22	9.50	31.555	24.37	6.36	0.568	-0.002	100	
1	26	9.47	31.746	24.52	6.07	0.542	0.024	96	

BROWN BEAR CRUISE 320 STATION 032 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.68	0.00	27.134	0.000	20.90	688.3	0.009	0.00	6.62	0.00	0.70
10	9.67	0.00	29.219	0.099	22.52	533.0	0.062	0.03	6.56	0.00	0.71
20	9.53	0.00	31.494	0.014	24.32	362.0	0.107	0.09	6.40	0.01	0.71

BROWN BEAR CRUISE 320 STATION 32A BIOLOGICAL DATA

DATE 7/04/63 LAT 46-43 N LONG 124-34 W

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	10.60	LIGHT PROD	SAT FILT	SAL
0	0.68	2.15			1.93	100	31.167
					2.38	77	
					1.96	59	
					1.27	32	
					0.90	21	
					0.07	4	

MESSENGER TIME 1210 INCOMING SOLAR RADIATION - AM 134 PM 182
 LIGHT SATURATION INCUBATOR ILLUMINATION 17100

BROWN BEAR CRUISE 320 STATION 033 OBSERVED VALUES
 DATE 8/04/63 HR 01.5 LAT 46-51 N LONG 125-10 W WEA 02 WIND VEL 30 DIR 19
 BAROM 00.0 TEMP DRY 9.1 NET 7.8 RELHU 77 WTRCLR SECDI 744 SEA 4 DIR 19 SWELL 8 DIR 16
 CLOUD TYPE 8 AMT 6 VIS 6 WIRE ANGLE(S) 18

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.42	32.207	24.89	6.46	0.577	-0.012		102
1	5	9.38	32.204	24.89	6.46	0.577	-0.012		102
1	10	9.37	32.209	24.90	6.51	0.581	-0.016		103
1	19	9.38	32.209	24.90	6.50	0.581	-0.015		103
1	29	9.36	32.234	24.92	6.43	0.574	-0.009		102
1	48	9.16	32.422	25.10	5.99	0.535	0.032		94
1	71		32.833		5.25	0.469			
1	95	8.14	33.078	25.77	4.09	0.365	0.213		63
1	119	8.17	33.707	26.26	3.15	0.281	0.294		49
1	143	7.86	33.800	26.37	2.88	0.257	0.322		44
1	180	7.60	33.862	26.46	2.79	0.249	0.333		43
1	197	7.37	33.900	26.52	2.69	0.240	0.345		41
1	249	6.23	33.995	26.75	1.79	0.160	0.442		27
1	476	5.18	34.080	26.95	0.88	0.079	0.538		13
1	666	4.39	34.227	27.15	0.11	0.010	0.619		2

BROWN BEAR CRUISE 320 STATION 033 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY	SAL
	LAB-I	DECK-I	
0			32.201
5		0.69	32.204
17		1.08	32.199
34		1.11	32.226
		0.74	

37.57 33.29 - WATER COLUMN VALUES

MESSANGER TIME 1802 INCOMING SOLAR RADIATION - AM 134 PM 182

DEPTH	BROWN BEAR			CRUISE 320			STATION 033			INTERPOLATED AND COMPUTED VALUES					
	TEMP	E(T)		SAL	E(S)	SIGMA-T	SP VCL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO			
0	9.42	0.00		32.207	0.000	24.89	307.1	0.000	0.00	6.46	0.00				
10	9.37	0.00		32.209	0.000	24.90	306.4	0.031	0.02	6.51	0.00				
20	9.38	0.00		32.210	0.000	24.90	306.7	0.062	0.06	6.50	0.00				0.88
30	9.35	0.00		32.240	0.000	24.93	304.2	0.093	0.14	6.41	0.00				0.98
50	9.11	0.01		32.457	0.005	25.13	284.7	0.152	0.38	5.94	0.00				1.00
75	8.53	0.09		32.867	0.013	25.54	246.2	0.219	0.81	5.06	0.01				1.02
100	8.14	0.02		33.215	0.025	25.87	215.2	0.277	1.32	3.86	0.01				0.76
150	7.81	0.02		33.814	0.003	26.39	166.8	0.374	2.53	2.85	0.01				0.88
200	7.31	0.01		33.906	0.000	26.54	153.8	0.454	3.97	2.65	0.01				1.05
250	6.22	0.00		33.996	0.000	26.75	133.4	0.527	5.63	1.78	0.00				1.01
300	5.71	0.18		34.033	0.018	26.85	124.9	0.592	7.47	1.37	0.14				1.39
400	5.17	0.23		34.076	0.024	26.95	116.3	0.714	11.82	0.91	0.18				1.24
500	4.32	0.50		34.082	0.004	27.04	107.1	0.826	17.02	0.19	0.39				50.91
600	5.03	0.12		34.130	0.013	27.00	112.8	0.937	23.31	0.67	0.10				34.90

BROWN BEAR CRUISE 320 STATION 034 OBSERVED VALUES

DATE 8/04/63 HR 09.7 LAT 46-51 N LONG 125-58 W WEA 21 WIND VEL 18 DIR 13
 BAROM 01.0 TEMP DRY 8.9 WET 7.2 RELHU 83 WTRCLR SECDI 2505 SEA 3 DIR 13 SWELL 5 DIR 12
 CLOUD TYPE 8 AMT 9 VIS 6 WIRE ANGLE(S) 21, 5

CST	DEPTH	TEMP	SAL	SIGMA-T	OXYGEN		SATN	
					ML/L	MGA/L		
2	0	9.50	32.314	24.96	6.60	0.589	-0.026	105
2	5	9.49	32.318	24.97	6.66	0.595	-0.031	106
2	10	9.46	32.313	24.97	6.73	0.601	-0.037	107
2	20	9.48	32.314	24.96	6.61	0.590	-0.027	105
2	30	9.48	32.334	24.98	6.61	0.590	-0.027	105
2	50	9.23	32.448	25.11	6.26	0.559	0.007	99
2	74	9.20	32.672	25.29	5.69	0.508	0.058	90
2	99	8.35	33.346	25.95	4.05	0.362	0.213	63
2	124	7.92	33.635	26.24	3.52	0.314	0.265	54
2	148	7.96	33.822	26.38	2.80	0.250	0.328	43
2	173	7.64	33.885	26.47	2.64	0.236	0.346	41
1	187	7.49	33.905	26.51	2.58	0.230	0.353	39
1	280	6.17	33.990	26.76	1.89	0.169	0.434	28
1	470	5.07	34.095	26.97	0.81	0.072	0.546	12
1	708	4.17	34.247	27.19	0.31	0.028	0.604	4
1	947	3.65	34.368	27.34	0.25	0.022	0.617	-
1	1429	2.67	34.495	27.53	0.55	0.049	0.606	7
1	1720	2.18	34.549	27.62	1.05	0.094	0.570	14

BROWN BEAR CRUISE 320 STATION 034 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	1.37	1.29		32.314
4	1.37	1.41		32.311
11	1.50	1.42		32.311
30	1.38	1.26		32.327

42.88 40.67 - WATER COLUMN VALUES

MESSENGER TIME 0113 INCOMING SOLAR RADIATION - AM 244 PM 175

ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 0028-0038 DEPTHS 100, 70
35, 0

BROWN BEAR		CRUISE 320		STATION 034		INTERPOLATED AND COMPUTED VALUES						
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO	
0	9.50	0.00	32.314	0.000	24.96	300.4	0.000	0.00	6.60	0.00		
10	9.46	0.00	32.313	0.000	24.97	300.1	0.031	0.02	6.73	0.00		
20	9.48	0.00	32.314	0.000	24.96	300.5	0.061	0.06	6.61	0.00		
30	9.48	0.00	32.334	0.000	24.98	299.2	0.091	0.14	6.61	0.00		
50	9.23	0.00	32.448	0.000	25.11	287.2	0.150	0.38	6.26	0.00	0.94	
75	9.17	0.01	32.698	0.005	25.31	268.2	0.220	0.83	5.62	0.01	0.94	
100	8.32	0.00	33.362	0.002	25.96	206.9	0.280	1.36	4.02	0.01	0.89	
150	7.94	0.01	33.830	0.001	26.39	167.4	0.374	2.54	2.77	0.01	0.89	
200	7.31	0.02	33.920	0.001	26.55	152.7	0.455	3.98	2.50	0.01	1.67	
250	6.60	0.04	33.968	0.002	26.68	140.3	0.529	5.68	2.13	0.02	1.83	
300	6.00	0.03	34.003	0.002	26.79	130.7	0.597	7.61	1.75	0.00	0.96	
400	5.33	0.07	34.061	0.004	26.91	119.4	0.723	12.12	1.15	0.01	0.75	
500	4.93	0.00	34.114	0.001	27.00	111.7	0.840	17.49	0.71	0.01	0.86	
600	4.52	0.01	34.179	0.002	27.10	103.1	0.949	23.61	0.45	0.02	0.67	
700	4.19	0.00	34.242	0.000	27.19	95.5	1.049	30.30	0.32	0.00	0.95	
800	3.95	0.01	34.298	0.000	27.26	89.4	1.143	37.50	0.25	0.01	0.63	
1000	3.53	0.00	34.387	0.002	27.37	79.7	1.314	53.25	0.25	0.00	0.95	
1200	3.15	0.00	34.447	0.005	27.49	71.8	1.467	70.55	0.33	0.00	0.89	
1500	2.54	0.00	34.508	0.001	27.55	62.5	1.671	98.75	0.65	0.00	10.50	

BROWN BEAR CRUISE 320 STATION 34A BIOLOGICAL DATA
 DATE 8/04/63 LAT 46-51 N LONG 126-35 W

DEPTH CHL-A PRODUCTIVITY SAL
 LAB-I DECK-I
 0 1.10 2.08 14.74 32.257

MESSENGER TIME 0548 INCOMING SOLAR RADIATION - AM 244 PM 175

BROWN BEAR CRUISE 320 STATION 035 OBSERVED VALUES

DATE 8/04/63 HR 15.0 LAT 46-50 N LONG 126-44 W WEA 02 WIND VEL 10 DIR 36
 BAROM 03.0 TEMP DRY 10.3 WET 8.9 RELHU 84 WTRCLR SECGI SECGI SEA 2 DIR 36 SWELL 4 DIR 32
 CLOUD TYPE 4 AMT 6 VIS 7 WIRE ANGLE(S) 2.10

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
2	0	9.67	32.510	25.09	6.50	0.581	0.020	104	
2	5	9.67	32.505	25.08	6.57	0.587	0.026	105	
2	10	9.61	32.511	25.10	6.57	0.587	0.025	105	
2	20	9.63	32.507	25.09	6.55	0.585	0.024	104	
2	30	9.64	32.503	25.09	6.54	0.584	0.023	104	
2	50	9.57	32.528	25.12	6.53	0.583	0.021	104	
2	74	9.49	32.531	25.13	6.46	0.577	0.014	103	
2	99	7.97	32.920	25.67	5.53	0.494	0.087	85	
2	122	7.30			5.20	0.464			
2	153	7.45	33.204	25.97	4.12	0.368	0.219	63	
2	175	7.05	33.623	26.35	3.85	0.344	0.247	58	
1	195	6.95	33.823	26.52	3.58	0.320	0.272	54	
1	293	5.78	33.932	26.76	2.45	0.219	0.390	36	
1	490	4.53	34.064	27.01	0.95	0.085	0.542	14	
1	736	3.91	34.253	27.22	0.47	0.042	0.594	7	
1	982	3.43	34.384	27.38	0.38	0.034	0.609	5	
1	1477	2.59	34.512	27.55	0.77	0.069	0.588	10	
1	1776	2.10	34.554	27.63	1.20	0.107	0.558	16	

BROWN BEAR CRUISE 320 STATION 035 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	0.46	0.54		32.507
8	0.37	0.57		32.502
29	0.47	0.60		32.502
47	0.45	0.44		32.509
100	0.11	0.08		32.736

20.54 26.10 - WATER COLUMN VALUES

MESSANGER TIME 0753 INCOMING SOLAR RADIATION - AM 244 PM 175

BROWN BEAR		CRUISE 320		STATION 035		INTERPOLATED AND COMPUTED VALUES					
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.67	0.00	32.510	0.000	25.09	288.5	0.000	0.00	6.50	0.00	
10	9.61	0.00	32.511	0.000	25.10	287.7	0.030	0.02	6.57	0.00	
20	9.63	0.00	32.507	0.000	25.09	288.5	0.059	0.06	6.55	0.00	
30	9.64	0.00	32.503	0.000	25.09	289.1	0.088	0.13	6.54	0.00	
50	9.57	0.00	32.528	0.000	25.12	286.5	0.146	0.37	6.53	0.00	0.95
75	9.44	0.01	32.544	0.004	25.15	283.7	0.217	0.83	6.43	0.01	0.99
100	7.93	0.00	32.924	0.006	25.68	233.8	0.283	1.41	5.51	0.01	0.99
150	7.43	0.03	33.184	0.016	25.95	208.3	0.394	2.82	4.22	0.02	
200	6.90	0.01	33.846	0.011	26.55	152.7	0.485	4.42	3.52	0.00	1.13
250	6.34	0.06	33.975	0.058	26.72	136.5	0.558	6.10	2.91	0.00	1.52
300	5.72	0.00	33.938	0.001	26.77	132.1	0.626	8.01	2.38	0.00	0.98
400	4.97	0.03	34.010	0.006	26.92	118.9	0.752	12.53	1.51	0.00	0.77
500	4.49	0.01	34.072	0.001	27.02	109.8	0.868	17.85	0.91	0.01	0.95
600	4.18	0.04	34.150	0.003	27.11	101.3	0.974	23.85	0.62	0.05	0.68
700	3.96	0.02	34.226	0.002	27.20	94.1	1.073	30.43	0.48	0.02	0.82
800	3.78	0.00	34.292	0.000	27.27	87.9	1.165	37.51	0.42	0.01	0.72
1000	3.40	0.00	34.391	0.001	27.38	77.8	1.333	52.94	0.38	0.00	0.98
1200	3.05	0.01	34.456	0.004	27.47	70.4	1.483	69.87	0.48	0.01	0.89
1500	2.55	0.00	34.515	0.000	27.56	62.1	1.684	97.70	0.80	0.00	12.54

BROWN BEAR CRUISE 320 STATION 036 OBSERVED VALUES

DATE 8/04/63 HR 19.6 LAT 47-01 N LONG 126-25 W SMDG 2472 WEA 02 WIND VEL 10 DIR 35
 BAROM 05.1 TEMP DRY 9.8 WET 8.5 RELHU 85 WTRCLR SEA 1 DIR 35 SWELL 1 DIR 14
 CLOUD TYPE 8 AMT 6 VIS 8 WIRE ANGLE(S) ---

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.57	32.279	24.92	6.62	0.591	-0.029		105
1	5	9.51	32.275	24.93	6.70	0.598	-0.035		106
1	10	9.37	32.291	24.96	6.69	0.598	-0.032		106
1	20	9.35	32.281	24.96	6.65	0.594	-0.028		105
1	30	9.39	32.286	24.96	6.62	0.591	-0.026		105
1	50	9.29	32.424	25.08	6.56	0.586	-0.020		104
1	74	9.20	32.635	25.26	5.91	0.528	0.038		93
1	99	8.48	33.278	25.87	4.30	0.384	0.189		67
1	124	8.01	33.578	26.18	3.65	0.326	0.252		56
1	149	7.78	33.795	26.38	3.01	0.269	0.311		46
1	176	7.58	33.890	26.48	2.69	0.240	0.342		41

BROWN BEAR CRUISE 320 STATION 036 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	LIGHT PROD	SAT FILT	IRRAD	SAL	PHOS	NITR	SIL
0	1.10	2.04	16.02			50	32.283	0.57	1.1	6
6	1.00	1.64	10.16			10	32.282	0.42	0.6	8
20	1.29	1.28	2.56			1	32.280	0.48	0.6	7
38	0.54	0.42	0.00	0.30	100		32.314	0.59	1.7	6
				0.37	77					
				0.31	59					
				0.20	21					
100	0.06			0.00	4		33.362	1.74	23.7	28
150	0.03						33.840	2.09	32.0	39

38.78 46.79 190.62 - WATER COLUMN VALUES

MESSANGER TIME 1112 INCOMING SOLAR RADIATION - AM 244 PM 175

LIGHT SATURATION INCUBATOR ILLUMINATION 18700

BROWN BEAR CRUISE 320 STATION 036										INTERPOLATED AND COMPUTED VALUES			
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	9.57	0.00	32.279	0.000	24.92	304.1	0.000	0.00	6.62	0.00			
10	9.37	0.00	32.291	0.000	24.96	300.3	0.031	0.02	6.69	0.00			
20	9.35	0.00	32.281	0.000	24.96	300.9	0.061	0.06	6.65	0.00			
30	9.39	0.00	32.286	0.000	24.96	301.3	0.092	0.14	6.62	0.00			
50	9.29	0.00	32.424	0.000	25.08	289.9	0.151	0.38	6.56	0.00	0.94		
75	9.17	0.01	32.660	0.005	25.28	271.1	0.222	0.83	5.85	0.01	0.94		
100	8.46	0.00	33.294	0.002	25.89	213.8	0.283	1.37	4.26	0.01	0.94		
150	7.77	0.00	33.801	0.000	26.39	167.2	0.379	2.58	2.99	0.00	5.20		

BROWN BEAR CRUISE 320 STATION 037 OBSERVED VALUES
 DATE 8/04/63 HR 22-1 LAT 47-11 N LONG 126-06 W SNOG 2395 MEA 02 WIND VEL 6 DIR 08
 BAROM 05.0 TEMP DRY 10.0 WET 8.4 RELHU 81 WTRCLR SEA 2 DIR 08 SWELL 1 DIR 14
 CLOUD TYPE 8 AMT 6 VIS 8 WIRE ANGLE(S) 2, 6, 5

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
2	0	9.61	32.356	24.98	6.65	0.594	0.032	106	
2	5	9.59	32.356	24.98	6.73	0.601	-0.039	107	
2	10	9.46	32.355	25.00	6.70	0.598	-0.035	106	
2	20	9.30	32.358	25.03	6.61	0.590	-0.024	104	
2	30	9.30	32.364	25.03	6.72	0.600	0.034	106	
2	50	9.23	32.456	25.11	6.45	0.576	-0.010	102	
2	74	9.03	32.651	25.30	5.84	0.521	0.047	92	
2	99	8.42	33.242	25.85	4.32	0.386	0.188	67	
2	124	7.91	33.518	26.15	3.77	0.337	0.243	58	
2	149	7.69	33.669	26.30	3.54	0.316	0.266	54	
2	176	7.48	33.836	26.46	2.99	0.267	0.317	46	
3	197	7.30	33.897	26.53	2.68	0.239	0.347	41	
3	294	6.21	33.981	26.74	2.48	0.221	0.380	37	
3	492	5.05	34.106	26.98	0.49	0.044	0.575	7	
3	738	4.19	34.267	27.21	0.44	0.039	0.592	6	
3	985	3.59	34.376	27.35	0.38	0.034	0.607	5	
3	1486	2.52	34.508	27.56	0.81	0.072	0.586	11	
1	1776	2.08	34.587	27.66	1.18	0.105	0.560	16	
3	1782	2.05	34.563	27.64	1.39	0.124	0.542	19	
1	1925	1.96	34.587	27.67	1.40	0.125	0.542	19	
1	2173	1.81	34.609	27.70	1.65	0.147	0.523	22	
1	2323	1.75	34.614	27.70	1.79	0.160	0.511	24	

DEPTH	BROWN BEAR			CRUISE 320			STATION 037			INTERPOLATED AND COMPUTED VALUES				
	TEMP	E(T)	SAL	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO		
0	9.61	0.00	32.356	32.355	0.000	24.98	299.0	0.000	0.00	6.65	0.00			
10	9.46	0.00	32.355	32.355	0.000	25.00	296.9	0.031	0.02	6.70	0.00			
20	9.30	0.00	32.358	32.358	0.000	25.03	294.5	0.060	0.06	6.61	0.00			
30	9.30	0.00	32.364	32.364	0.000	25.03	294.2	0.090	0.14	6.72	0.00			
50	9.23	0.00	32.456	32.456	0.000	25.11	286.6	0.148	0.38	6.45	0.00	0.94		
75	9.01	0.00	32.674	32.674	0.005	25.37	267.0	0.279	0.82	5.78	0.00	0.94		
100	8.40	0.00	33.257	33.257	0.001	25.87	215.2	0.378	1.36	4.29	0.00	0.95		
150	7.68	0.00	33.676	33.676	0.001	26.30	175.2	0.478	2.60	3.52	0.00			
200	7.27	0.00	33.902	33.902	0.002	26.54	152.5	0.560	4.07	2.66	0.01	1.07		
250	6.71	0.03	33.964	33.964	0.013	26.66	142.1	0.555	5.79	2.48	0.10	1.45		
300	6.19	0.00	33.985	33.985	0.000	26.75	134.8	0.539	7.75	2.42	0.02	0.99		
400	5.47	0.04	34.052	34.052	0.003	26.89	121.8	0.739	12.37	1.44	0.16	0.78		
500	5.01	0.00	34.112	34.112	0.000	26.99	112.9	0.852	17.83	0.47	0.01	0.96		
600	4.62	0.02	34.180	34.180	0.002	27.09	104.2	0.962	24.00	0.30	0.11	0.68		
700	4.29	0.01	34.244	34.244	0.001	27.18	96.6	1.063	30.77	0.36	0.06	0.81		
800	4.02	0.01	34.298	34.298	0.001	27.25	90.3	1.153	36.04	0.42	0.01	0.72		
1000	3.55	0.00	34.381	34.381	0.001	27.36	80.4	1.331	53.93	0.39	0.00	0.98		
1200	3.09	0.01	34.440	34.440	0.005	27.45	72.1	1.485	71.34	0.50	0.02	0.91		
1500	2.69	0.00	34.511	34.511	0.000	27.56	61.7	1.689	99.41	0.84	0.01	0.91		
2000	1.91	0.00	34.596	34.596	0.000	27.68	50.8	1.974	150.29	1.46	0.01	0.86		

BROWN BEAR CRUISE 320 STATION 038 OBSERVED VALUES

DATE 9/04/63 HR 05.2 LAT 47-33 N LONG 125-27 W SNDC 1188 WEA 02 WIND VEL 6 DIR 15
 BAROM 90.0 TEMP DRY 8.9 WET 7.5 RELHU 81 WTRCLR SEA 0 DIR 15 SWELL 1 DIR 16
 CLOUD TYPE 6 AMT 6 VIS 8 WIRE ANGLE(S) 17.10 SECDI

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	ADU	SATN
2	0	9.24	32.187	24.90	6.66	0.595	-0.027	105	
2	5	9.24	32.177	24.90	6.70	0.598	-0.031	105	
2	10	9.20	32.176	24.90	6.65	0.594	-0.026	105	
2	20	9.23	32.184	24.90	6.65	0.594	-0.026	105	
2	30	9.21	32.226	24.94	6.57	0.587	-0.019	103	
2	50	9.21	32.253	24.96	6.57	0.587	-0.019	103	
2	74	8.79	32.684	25.36	5.49	0.490	0.081	186	
2	99	8.39	33.065	25.72	4.61	0.412	0.163	72	
2	124	7.87	33.678	26.28	3.11	0.278	0.302	48	
2	149	7.72	33.840	26.43	2.64	0.236	0.345	41	
2	174	7.44	33.895	26.51	2.44	0.218	0.367	37	
1	190	7.32	33.902	26.53	2.39	0.213	0.373	36	
1	285	6.45	33.966	26.70	2.11	0.188	0.410	31	
1	475	5.18	34.078	26.95	0.94	0.084	0.533	14	
1	712	4.26	34.242	27.18	0.32	0.029	0.602	5	
1	998	3.60	34.350	27.33	0.27	0.024	0.617	4	

BROWN BEAR CRUISE 320 STATION 038 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I DECK-I	SAL
0	1.19	0.82	32.175
6	1.28	1.11	32.175
20	1.39	1.04	32.176
38	1.24	1.06	32.233
100	0.12	0.07	33.017

49.85 39.81 - WATER COLUMN VALUES

MESSANGER TIME 2213 INCOMING SOLAR RADIATION - AM 305 PM 340
 ZOOPLANKTON (CLARKE-BUMPUS) HORIZ - TIME 2321-2331 DEPTHS 100, 70
 2349-2359 35, 0

BROWN BEAR CRUISE 320 STATION 038				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VUL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.24	0.00	32.187	0.000	24.90	305.9	0.000	0.00	6.66	0.00	0.94
10	9.20	0.00	32.176	0.000	24.90	306.3	0.031	0.02	6.65	0.00	0.94
20	9.23	0.00	32.184	0.000	24.90	306.3	0.062	0.06	6.65	0.00	0.94
30	9.21	0.00	32.226	0.000	24.94	303.1	0.093	0.14	6.57	0.00	0.94
50	9.21	0.00	32.253	0.000	24.96	301.4	0.154	0.39	6.57	0.00	1.41
75	8.77	0.00	32.698	0.002	25.37	262.3	0.225	0.84	5.46	0.01	1.74
100	8.37	0.00	33.092	0.004	25.74	227.6	0.286	1.39	4.55	0.01	0.97
150	7.71	0.00	33.844	0.000	26.43	163.2	0.385	2.61	2.63	0.00	0.75
200	7.23	0.01	33.908	0.001	26.55	152.6	0.465	4.04	2.36	0.00	1.41
250	6.78	0.02	33.940	0.002	26.64	144.8	0.539	5.76	2.22	0.01	1.74
300	6.33	0.00	33.975	0.000	26.72	137.0	0.611	7.77	2.02	0.02	0.97
400	5.62	0.01	34.034	0.002	26.86	124.9	0.743	12.49	1.41	0.06	0.75
500	5.06	0.01	34.096	0.001	26.97	114.6	0.864	18.05	0.84	0.01	0.88
600	4.63	0.02	34.167	0.004	27.08	105.2	0.975	24.31	0.52	0.02	0.65
700	4.29	0.00	34.234	0.001	27.17	97.3	1.077	31.13	0.33	0.00	0.92
800	4.03	0.01	34.292	0.002	27.24	90.8	1.172	38.45	0.25	0.01	8.36

BROWN BEAR CRUISE 320 STATION 38A BIOLOGICAL DATA

DATE 9/04/63 LAT 48-08 N LONG 124-50 W

DEPTH CHL-A PRODUCTIVITY SAL
LAB-I DECK-I

0 0.93 2.69 26.32 32.749

MESSENGER TIME 0543 INCOMING SOLAR RADIATION - AM 305 PM 340

BROWN BEAR CRUISE 320 STATION 039 OBSERVED VALUES

TOLEAK POINT

DATE 9/04/63 HR 12-2 LAT 47-52 N LONG 124-50 W SNDC 73 WEA 60 WIND VEL 26 DIR 14
 BAROM 09.0 TEMP DRY 8.9 WET 7.2 RELHU 80 WTRCLR SEA 2 DIR 14 SWELL 1 DIR 20
 CLOUD TYPE 6 VIS 7 WIRE ANGLE(S) 15

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	MGA/L	OXYGEN	AOU	SATN
1	0	9.51	31.591	24.40	6.57	0.587	-0.021	104	104
1	5	9.49	31.604	24.41	6.57	0.587	-0.020	104	104
1	10	9.51	31.604	24.41	6.45	0.576	-0.010	102	102
1	19	9.49	31.605	24.41	6.34	0.566	0.000	100	100
1	29	9.50	31.610	24.41	6.38	0.570	-0.004	101	101
1	39	9.47	31.606	24.41	6.45	0.576	-0.009	102	102
1	48	9.46	31.623	24.43	6.43	0.574	-0.008	101	101
1	58	9.42	31.631	24.44	6.15	0.549	0.018	97	97
1	67	9.40	31.656	24.46	6.50	0.581	-0.013	102	102

BROWN BEAR CRUISE 320 STATION 039 INTERPOLATED AND COMPUTED VALUES

DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPT ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.51	0.00	31.591	0.000	24.40	354.2	0.000	0.00	6.57	0.00	
10	9.51	0.00	31.604	0.000	24.41	353.4	0.036	0.02	6.45	0.00	
20	9.49	0.00	31.606	0.000	24.41	353.2	0.072	0.07	6.34	0.00	0.88
30	9.50	0.00	31.609	0.000	24.41	353.2	0.107	0.16	6.39	0.00	0.87
50	9.45	0.00	31.624	0.001	24.43	351.7	0.178	0.46	6.36	0.03	0.78

BROWN BEAR CRUISE 320 STATION 040 OBSERVED VALUES

TATOOSH ISLAND

DATE 9/04/63 HR 16.2 LAT 48-27 N LONG 124-40 W SNDG 1554 WEA 01 WIND VEL 4 DIR 90
 BAROM 12.0 TEMP DRY 11.1 MET 5.7 RELHU 67 WTRCLR SEA 0 DIR 90 SWELL 1 DIR 22
 CLOUD TYPE 6 VIS 7 WIRE ANGLE(S) 24,---

CST	DEPTH	TEMP	SAL	SIGMA-T	ML/L	OXYGEN MGA/L	AOU	SATN
1	0	9.32	28.385	21.93	6.71	0.599	-0.018	103
1	5	9.30	28.481	22.01	6.71	0.599	-0.018	103
1	9	9.26	28.593	22.10	6.56	0.586	-0.005	101
1	18	9.30	29.341	22.68	6.70	0.598	-0.021	104
1	27	9.40	30.524	23.58	6.66	0.595	-0.023	104
1	46	9.39	31.693	24.49	6.44	0.575	-0.008	101
2	64	9.40	31.827	24.60	6.47	0.578	-0.011	102
2	85	9.26	32.082	24.82	6.44	0.575	-0.008	101
2	106	7.94	32.607	25.43	4.30	0.384	0.199	66
2	127	8.24	33.083	25.76	4.05	0.362	0.215	63
2	148	7.63	33.454	26.14	3.28	0.293	0.291	50
2	160	7.39	33.571	26.26	3.01	0.269	0.318	46
2	210	7.07	33.703	26.41	2.78	0.248	0.342	42

BROWN BEAR CRUISE 320 STATION 040 BIOLOGICAL DATA

DEPTH	CHL-A	PRODUCTIVITY LAB-I	DECK-I	SAL
0	1.99	6.23		28.967
3	2.07	6.09		29.096
6	1.75	4.83		29.738
12	1.89	5.19		29.696
100	0.75	1.06		32.105

22.73 64.92 - WATER COLUMN VALUES

MESSANGER TIME 0836 INCOMING SOLAR RADIATION - AM 305 PM 340

BROWN BEAR CRUISE 320 STATION 040				INTERPOLATED AND COMPUTED VALUES							
DEPTH	TEMP	E(T)	SAL	E(S)	SIGMA-T	SP VOL ANOMALY	GEOPOY ANOMALY	POT ENERGY	OXY ML/L	E(O)	VAR RATIO
0	9.32	0.00	28.385	0.000	21.93	589.9	0.000	0.00	6.71	0.00	0.97
10	9.26	0.00	28.648	0.004	22.14	569.5	0.059	0.03	6.56	0.01	0.75
20	9.32	0.00	29.603	0.024	22.88	499.5	0.113	0.11	6.70	0.00	0.94
30	9.41	0.01	30.804	0.017	23.80	411.6	0.159	0.23	6.62	0.01	
50	9.40	0.00	31.760	0.030	24.55	340.8	0.234	0.53	6.44	0.01	0.74
75	9.41	0.04	31.937	0.007	24.68	328.3	0.319	1.07	6.59	0.08	0.66
100	8.29	0.10	32.446	0.011	25.25	274.5	0.395	1.74	4.92	0.14	0.70
150	7.59	0.00	33.477	0.001	26.16	188.7	0.511	3.19	3.23	0.00	0.76
200	7.06	0.00	33.691	0.010	26.40	166.4	0.601	4.78	2.75	0.01	15.97

Unclassified

Security Classification

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<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
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		2b GROUP
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4 DESCRIPTIVE NOTES (Type of report and inclusive dates) Interim Report January - June 1963		
5 AUTHOR(S) (Last name, first name, initial) Love, Cuthbert M. With the Data Analysis Staff		
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11 SUPPLEMENTARY NOTES	12 SPONSORING MILITARY ACTIVITY Office of Naval Research San Francisco California	
13 ABSTRACT This report contains tabulated physical, chemical, and biological data collected during Cruise Oshawa-1 of the CNAV Oshawa and Cruise 220 of the Research Vessel Brown Bear during the months of March - April 1963 in an area within 255 miles of the coasts of Vancouver Island, Washington, and Oregon. These data were collected as part of a year-round study which has as its objective the determination of the gross features of the move- ment and dispersion of Columbia River effluent water in the northeast Pacific.		

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Unclassified

Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Oceanographic data Physical oceanographic data Chemical oceanographic data Biological oceanographic data Oceanographic cruises Research Vessel <u>Brown Bear</u> CNAV <u>Oshawa</u> Northeast Pacific Ocean Washington - Oregon coast Columbia River Effluent water						

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