

OCEANOGRAPHICAL STATION LIST

VOLUME 55

INVESTIGATIONS BY F.R.V. *WEERUTTA* ON THE
SOUTH AUSTRALIAN TUNA GROUNDS IN 1961

DIVISION OF FISHERIES AND OCEANOGRAPHY
COMMONWEALTH SCIENTIFIC AND INDUSTRIAL
RESEARCH ORGANIZATION, AUSTRALIA 1968

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MELBOURNE, 1968

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When citing this station list, abbreviate as follows:
CSIRO Aust. Oceanogr. Stn List 55.

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I. INTRODUCTION

This report records the data collected during three cruises by F.R.V. Weerutta in 1961 (We1/61-We3/61).

These cruises were planned to investigate hydrological conditions on the tuna grounds and to tag tuna. Track charts and station positions are given in Figures 1-3.

F.R.V. Weerutta is a 55-ft converted wooden fishing vessel built in 1948. In 1955, she was bought by the South Australian Department of Fisheries and Fauna Conservation for research and inspection projects. At the end of 1961, Weerutta was extensively rebuilt and refitted, and renamed Investigator. A full description of F.R.V. Investigator is given in CSIRO Aust. 1968.

II. WORK ACCOMPLISHED

Table 1 gives details of cruises and work done. On Cruise We1/61 the work was done by Messrs R. Bradley and R. Spaulding, on Cruise We2/61 by Messrs R. Bradley and K. Godfrey, and on Cruise We3/61 by Mr Bradley.

TABLE 1
DETAILS OF CRUISES AND WORK DONE

Cruise	Dates	Number of Stations Occupied	BT	Hydrology		Tuna Tagged
				1	2	
We1/61	Jan. 12-22	14	14	14	14	
We2/61	Feb. 1-Mar. 3	9	3	7	7	3
We3/61	Mar. 7-28	29	14	28	15	15

BT Bathythermographs

Hydrology 1 Number of stations at which surface samples
were collected

2 Number of stations at which subsurface samples
were collected

III. METHOD OF COLLECTION AND ANALYSIS OF SAMPLES

1. Physics

Temperature.—Water temperatures were taken with deep-sea reversing thermometers graduated to 0.1 degC, and used in pairs on each Nansen water-bottle. Only four water-bottles were used on each cast. During Cruise 1, one unprotected thermometer was used on each cast, whilst on Cruises 2 and 3, two unprotected thermometers were used on each cast. Temperatures are considered accurate to ± 0.05 degC.

Bathythermograph.—A 200-ft bathythermograph was used at selected stations and the slides obtained were digitized according to the method of the U.S. National Oceanographic Data Centre (1964). The results were transferred to punched cards and computer listings are held at Cronulla.

Thermometric Depth.—Depth calculations were made by the second method described by La Fond (1951), plotting thermometric depth against the difference between thermometric and wire depths. Depths are considered accurate to within about 5%.

Sigma-t.—Sigma-t values were computed from temperature and salinity values, using the equations of Knudsen (La Fond 1951).

2. Chemistry

Salinity.—A chlorinity-temperature meter of the conductivity type (Hamon 1956) was used to estimate chlorinity, which was subsequently converted to salinity by the relation -

$$\text{Salinity} = 0.03 + 1.805 \times \text{Chlorinity}$$

Salinities are considered accurate to about $\pm 0.05\%$.

Dissolved Oxygen.—A version of the standard Winkler method was used to determine the amount of dissolved oxygen in the seawater samples. The version used is a modification of that described by Thompson and Robinson (1939) and differs in some respects from the revision by Jacobsen, Robinson, and Thompson (1950). Potassium iodate was used as the iodometric standard, and the reagents necessary to fix the oxygen in solution were used at different concentrations (Rochford 1963). Duplicate titrations were made on approximately every tenth sample. Saturation values, given as ml/l, were computed, using the simpler of the equations given by Richards and Corwin (1956) -

$$O_2(\%Satn.) = \frac{O_2(ml/l) \times (33.5 + T^\circ C) \times 100}{332.4 - (1.854 \times S\%)}$$

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- LA FOND, E.C. (1951).—Processing oceanographic data. U.S. Navy Hydrogr. Off. Publ. No. 614.
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- THOMPSON, T.G., and ROBINSON, R.J. (1939).—Notes on the determination of dissolved oxygen in seawater. J. mar. Res. 2, 1-8.
- U.S. NATIONAL OCEANOGRAPHIC DATA CENTRE (1964).—Manual for processing bathythermograph data. Part 1 Instructions for manually digitizing bathythermograph data. Publ. M-3. (U.S. Naval Oceanographic Office : Washington, D.C.)
- U.S. NAVY HYDROGRAPHIC OFFICE (1955).—Instruction manual for oceanographic observations. Publ. No. 607.

IV. TRACK CHARTS

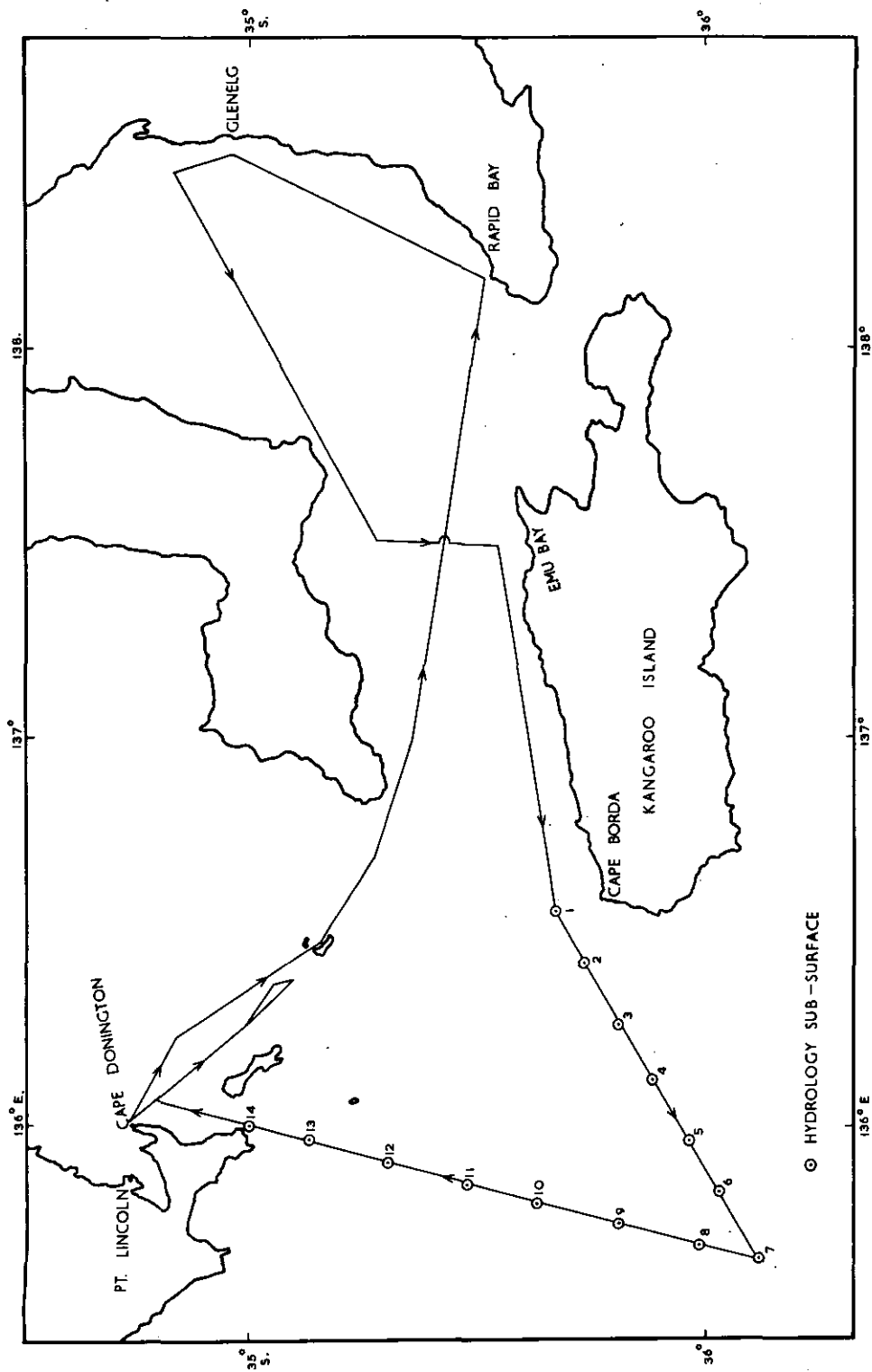


Fig. 1:- Track chart Cruise We 1/61

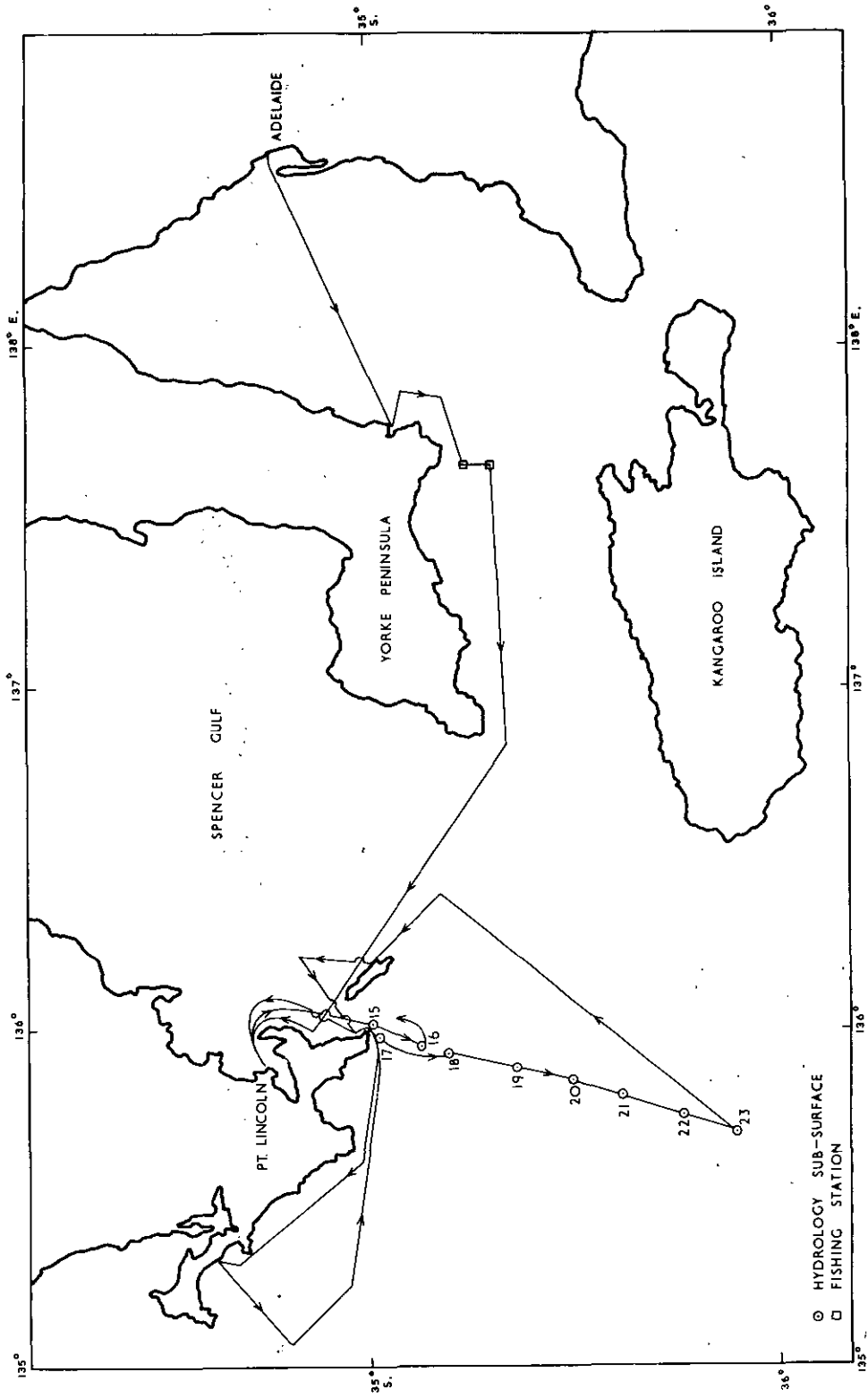


Fig. 2:- Track chart Cruise We 2/61

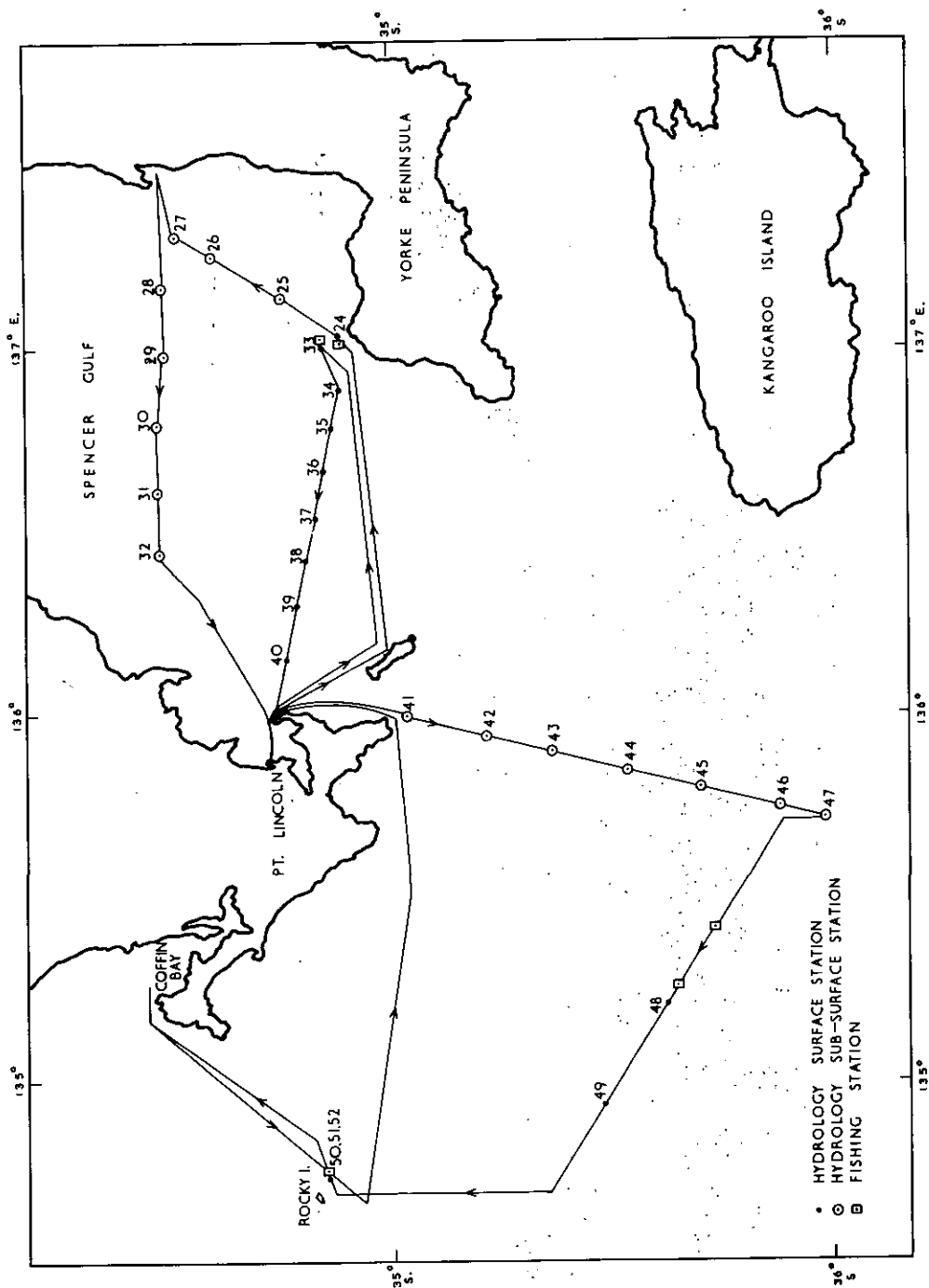


Fig. 3:- Track chart Cruise We 3/61

V. DATA SHEETS

The data were processed in a C.D.C. 3600 Computer. An explanation of the headings used is given at the beginning of the surface listing.

DATA
PART 1
HYDROLOGY
SURFACE SAMPLES

EXPLANATION OF HEADINGS

Part 1 and 2Hydrology

STATION	Gives the station identification. For example, Wel/1/61 signifies the 1st station worked by <u>Weerutta</u> in 1961, on her first cruise for that year
DATE	Given as day/month/year
TIME	Given in Zone Time, and is the time at the beginning of the first cast. Zone Time in all cases was Central Australian Standard Time, GMT +9 $\frac{1}{2}$ hr, Code J
LATITUDE LONGITUDE	Given in degrees and minutes
SONIC DEPTH	Given in metres, measured at standard sound velocity of 800 fm (1463 m) per second
WIND DIR. SP.	Wind direction and speed are coded using Tables 8 and 9 in U.S. Navy Hydrogr. Office (1955)
VIS.	Visibility is coded using Table 4 in U.S. Navy Hydrogr. Office (1955)
SEA DIR. AMT.	Sea direction and amount are coded using Tables 5 and 8 in U.S. Navy Hydrogr. Office (1955)
SWELL DIR. AMT.	Sea swell direction and amount are coded using Tables 6 and 8 in U.S. Navy Hydrogr. Office (1955)
BAROM. or ATMOS. PRESSURE	Atmospheric pressure given in millibars
WIRE ANGLES CAST 1 CAST 2 CAST 3	Wire angles are measured at the surface and expressed in degrees for each cast
CAST	Gives the cast number
DEPTH	Sampling depth given in metres

TEMP.	Sea temperatures recorded in °C
SALINITY	Given in parts per thousand
SIGMA-T	Sigma-t to 2 decimal places
OXYGEN	Given in ml/l
OXYGEN % SAT.	Oxygen percentage saturation

*, ***, or a blank indicates no data available

VESSEL CRUISE STATION YR. MTH. DAY TIME LATITUDE LONGITUDE TEMP. SALINITY WIND HIND SEA SHELL WEA. VIS. BAROM. SAMPLING METHOD

VESSEL	CRUISE NUMBER	STATION	YR.	MTH.	DAY	TIME	LATITUDE	LONGITUDE	TEMP.	SALINITY	WIND DN, AMT.	HIND DN, AMT.	SEA DN, AMT.	SHELL DN, AMT.	WEA.	VIS.	BAROM.	SAMPLING METHOD
76	1	1	61	1	14	0040	J 35 42 S 136	33 E 19.6	36.00									1
76	1	1	61	1	14	0242	J 35 46 S 136	25 E 19.4	36.04									1
76	1	1	61	1	14	0428	J 35 50 S 136	15 E 19.3	36.02	20	2	2					1035.9	1
76	1	1	61	1	14	0612	J 35 54 S 136	06 E 18.6	35.75	20	3	2					1035.9	1
76	1	1	61	1	14	0815	J 35 57 S 135	57 E 18.3	35.68	20	3	2					1035.9	1
76	1	1	61	1	14	0955	J 36 02 S 135	49 E 18.0	35.46									1
76	1	1	61	1	14	1222	J 36 07 S 135	38 E 18.2	35.35									1
76	1	1	61	1	14	1430	J 35 59 S 135	41 E 18.5	35.41									1
76	1	1	61	1	14	1642	J 35 49 S 135	44 E 18.8	35.68									1
76	1	1	61	1	14	1838	J 35 39 S 135	47 E 18.5	35.53									1
76	1	1	61	1	14	2039	J 35 29 S 135	51 E 18.4	35.53									1
76	1	1	61	1	14	2253	J 35 19 S 135	54 E 18.5										1
76	1	1	61	1	15	0117	J 35 10 S 135	57 E 18.5	35.90	20	3	2					1038.3	1
76	1	1	61	1	15	0649	J 35 00 S 136	00 E 17.2	36.08									1
76	2	1	61	2	7	1300	J 35 01 S 136	01 E		14	4	4						1
76	2	1	61	2	7	1430	J 35 08 S 136	08 E		14	4	4						1
76	2	1	61	2	19	0608	J 35 02 S 135	57 E 19.5	35.85	14	5	4						1
76	2	1	61	2	19	0805	J 35 12 S 135	57 E 20.6	35.79	36	3	2					1012.9	1
76	2	1	61	2	19	1003	J 35 21 S 135	54 E 20.8	35.85	36	3	2					1012.9	1
76	2	1	61	2	19	1120	J 35 34 S 135	50 E 20.8	35.82	36	3	2					1011.5	1
76	2	1	61	2	19	1358	J 35 42 S 135	48 E 20.8	35.81	99	1	1					1010.8	1
76	2	1	61	2	19	1543	J 35 45 S 135	42 E 20.5	35.68	99	1	2					1010.2	1
76	2	2	61	2	19	1750	J 35 54 S 135	42 E 20.1	35.60									1
76	2	2	61	2	19	1820	J 34 53 S 137	01 E 21.3	36.66	99	1	00	0				1019.0	1
76	2	2	61	2	19	1900	J 34 45 S 137	08 E 21.4	36.78	99	1	00	0				1020.0	1
76	2	2	61	2	19	2046	J 34 36 S 137	15 E 21.4	36.89									1
76	2	2	61	2	19	2212	J 34 31 S 137	18 E 21.2	36.99	99	1	00	0				1020.3	1
76	2	2	61	2	19	2320	J 34 29 S 137	10 E 21.1	36.92	14	1	2					1022.4	1
76	2	2	61	2	19	2454	J 34 29 S 136	59 E 21.6	36.99	14	1	2					1022.4	1
76	2	2	61	2	19	2603	J 34 28 S 136	48 E 21.8	36.99	16	3	3					1023.0	1
76	2	2	61	2	19	2750	J 34 28 S 136	37 E 22.5	37.19	16	3	3					1023.0	1
76	2	2	61	2	19	2900	J 34 28 S 136	27 E 22.1	36.69									1
76	2	2	61	2	19	3000	J 34 28 S 136	27 E 22.1	36.69	18	1	2					1025.1	1
76	2	2	61	2	19	3100	J 34 28 S 136	27 E 22.1	36.69	18	1	2					1024.4	1
76	2	2	61	2	19	3200	J 34 28 S 136	27 E 22.1	36.69	18	1	2					1024.4	1
76	2	2	61	2	19	3300	J 34 28 S 136	27 E 22.1	36.69	18	1	2					1024.4	1
76	2	2	61	2	19	3400	J 34 28 S 136	27 E 22.1	36.69	18	1	2					1024.4	1
76	2	2	61	2	19	3500	J 34 28 S 136	27 E 22.1	36.69	18	1	2					1024.4	1
76	2	2	61	2	19	3600	J 34 28 S 136	27 E 22.1	36.69	18	1	2					1024.4	1
76	2	2	61	2	19	3700	J 34 28 S 136	27 E 22.1	36.69	18	1	2					1024.4	1
76	2	2	61	2	19	3800	J 34 28 S 136	27 E 22.1	36.69	18	1	2					1024.4	1
76	2	2	61	2	19	3900	J 34 28 S 136	27 E 22.1	36.69	18	1	2					1024.4	1
76	2	2	61	2	19	4000	J 34 28 S 136	27 E 22.1	36.69	18	1	2					1024.4	1

VESSEL	CRUISE NUMBER	STATION	YR.	MTH.	DAY	TIME	Z	LATITUDE	LONGITUDE	TEMP.	SALINITY	WIND DN, AMT,	SEA DN, AMT,	SHELL DN, AMT,	VIS.	BAROM.	SAMPLING METHOD	
76	3	41	61	3	21	0615	J	35	02 S	136	00 E	17.9	99	1	99	2	1022.0	1
76	3	42	61	3	21	0804	J	35	13 S	135	57 E	17.8	99	1	99	2	1022.7	1
76	3	43	61	3	21	1000	J	35	22 S	135	54 E	19.1	14	1	99	2	1023.4	1
76	3	44	61	3	21	1145	J	35	32 S	135	51 E	19.6	99	1	99	2	1023.0	1
76	3	45	61	3	21	1341	J	35	42 S	135	49 E	20.5	99	1	00	0	1022.7	1
76	3	46	61	3	21	1547	J	35	53 S	135	45 E	20.9	99	1	00	0	1022.4	1
76	3	47	61	3	21	1704	J	35	59 S	135	44 E	20.9	99	1	00	0	1021.7	1
76	3	48	61	3	22	0820	J	35	37 S	135	13 E	21.2	99	1	99	2	1021.7	1
76	3	49	61	3	22	1013	J	35	29 S	134	57 E	20.8	99	1	99	2	1021.7	1
76	3	50	61	3	22	1613	J	34	51 S	134	55 E	21.2	99	1	99	2	1021.7	1
76	3	51	61	3	27	1530	J	34	50 S	134	45 E	21.3	99	1	99	2	1021.7	1
76	3	52	61	3	27	1810	J	34	50 S	134	45 E	21.3	99	1	99	2	1021.7	1

DATA
PART 2
HYDROLOGY
SUBSURFACE SAMPLES

STATION	DATE	TIME	LATITUDE		LONGITUDE				
WE 1/	3/61	0428 J	35	50 S	136	15 E			
SONIC AIR TEMP.	WIND DIR. SP.	WIND DIR. SP.	ANEM. HEIGHT	CLOUD TYPE	AMT.	SEA DIR. AMT.	SWELL DIR. AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1 CAST2 CAST3
99 ***	*** 20 2	*** 20 2	*	*	*	*	*	1035.9	0 0 *
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	CXYGEN % SAT.	INORG. P	TOTAL P	NITRATE	
2	19.34	36.020	25.73	5.10	101	***	***	***	
1	19.34	36.040	25.74	5.08	101	***	***	***	
1	14.28	35.350	26.42	5.64	101	***	***	***	
1	12.77	35.280	26.67	5.08	88	***	***	***	
1	12.74	35.280	26.68	5.02	87	***	***	***	

STATION	DATE	TIME	LATITUDE		LONGITUDE				
WE 1/	4/61	0612 J	35	54 S	136	06 E			
SONIC AIR TEMP.	WIND DIR. SP.	WIND DIR. SP.	ANEM. HEIGHT	CLOUD TYPE	AMT.	SEA DIR. AMT.	SWELL DIR. AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1 CAST2 CAST3
101 ***	*** 20 3	*** 20 3	*	*	*	*	*	1035.9	0 0 *
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE	
2	18.58	35.750	25.72	5.33	104	***	***	***	
1	18.59	35.840	25.78	5.25	103	***	***	***	
1	14.01	35.230	26.38	5.67	101	***	***	***	
1	12.78	35.230	26.63	5.30	92	***	***	***	
1	12.72	35.280	26.68	5.13	89	***	***	***	

STATION	DATE	TIME	LATITUDE		LONGITUDE		
*F 1/	5/61	0815 J	35	57 S	135	57 E	
SONIC AIR TEMP.	WIND	ANEM.	CLOUD	SEA	SWELL	ATMOS.	WIRE ANGLES
DEPTH WET DRY	DIR. SP.	HEIGHT	TYPE AMT.	DIR. AMT.	DIR. AMT.	PRESSURE	CAST1 CAST2 CAST3
110 ***	*** 20 3	*	*	*	*	1035.9	0 0 *
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P NITRATE
2 0	18.30	35.680	25.74	5.25	102	***	***
1 25	18.23	35.730	25.79	5.19	101	***	***
1 50	15.37	35.410	26.22	5.61	103	***	***
1 75	13.10	35.340	26.65	5.64	98	***	***
1 100	12.76	35.260	26.66	5.30	92	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE		
*E 1/	6/61	0955 J	36	02 S	135	49 E	
SONIC AIR TEMP.	WIND	ANEM.	CLOUD	SEA	SWELL	ATMOS.	WIRE ANGLES
DEPTH WET DRY	DIR. SP.	HEIGHT	TYPE AMT.	DIR. AMT.	DIR. AMT.	PRESSURE	CAST1 CAST2 CAST3
117 ***	*** * *	*	*	*	*	*	0 0 *
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P NITRATE
2 0	18.04	35.460	25.63	5.36	104	***	***
2 25	18.03	35.790	25.89	5.27	102	***	***
1 50	15.80	35.340	26.07	5.61	104	***	***
1 75	14.11	35.250	26.37	5.64	101	***	***
1 100	13.22	35.230	26.55	5.50	96	***	***
1 115	12.79	35.230	26.63	5.30	92	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE						
WF 1/	7/61	1222 J	36	07 S	135	38 E					
SONIC AIR TEMP. WIND ANEM. CLOUD SWELL ATMOS. WIRE ANGLES											
DEPTH MET DRY	DIR. SP.	DIR. SP.	DIR. AMT.	DIR. AMT.	PRESSURE	CAST1 CAST2 CAST3					
***	***	*	*	*	*	0 0 *					
CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE		
2	0	18.18	35.350	25.51	5.36	104	***	***	***		
2	25	17.74	35.340	25.61	5.27	101	***	***	***		
2	50	15.02	***	***	***	***	***	***	***		
1	75	13.22	35.160	26.49	5.25	92	***	***	***		
1	100	12.94	35.170	26.55	5.53	96	***	***	***		
1	150	12.42	35.170	26.66	5.36	92	***	***	***		
1	200	12.42	35.170	26.66	5.36	92	***	***	***		
1	300	11.54	***	***	5.25	***	***	***	***		
STATION							LATITUDE		LONGITUDE		
WF 1/	8/61	1430 J	35	59 S	135	41 E					
SONIC AIR TEMP. WIND ANEM. CLOUD SWELL ATMOS. WIRE ANGLES											
DEPTH MET DRY	DIR. SP.	DIR. SP.	DIR. AMT.	DIR. AMT.	PRESSURE	CAST1 CAST2 CAST3					
139	***	*	*	*	*	*	*	*	0	0	*
CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE		
2	0	18.54	35.410	25.47	5.25	102	***	***	***		
2	25	17.88	35.410	25.63	5.25	101	***	***	***		
1	50	15.34	35.280	26.13	5.53	101	***	***	***		
1	75	13.98	35.170	26.34	5.25	93	***	***	***		
1	100	12.94	35.300	26.66	5.56	97	***	***	***		
1	125	12.94	35.230	26.60	5.53	96	***	***	***		

STATION	DATE	TIME	LATITUDE		LONGITUDE							
WE 1/	9/61	1642 J	35	49 S	135	44 E						
SONIC AIR TEMP.	WIND DIR.	SP.	WIND ANEM. HEIGHT	CLOUD TYPE	AMT.	VIS. DIR.	SEA DIR.	AMT. PRESSURE	ATMOS. PRESSURE	WIRE ANGLES CAST1	WIRE ANGLES CAST2	WIRE ANGLES CAST3
119 ***	***	*	*	*	*	*	*	*	*	0	0	*
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE				
2 0	18.75	35.680	25.62	5.02	99	***	***	***				
1 25	18.28	35.620	25.69	5.33	104	***	***	***				
1 50	14.37	35.340	26.39	5.72	103	***	***	***				
1 75	13.25	35.230	26.54	5.61	98	***	***	***				
1 100	12.86	35.250	26.63	5.44	94	***	***	***				

STATION	DATE	TIME	LATITUDE		LONGITUDE							
WE 1/	10/61	1838 J	35	39 S	135	47 E						
SONIC AIR TEMP.	WIND DIR.	SP.	WIND ANEM. HEIGHT	CLOUD TYPE	AMT.	VIS. DIR.	SEA DIR.	AMT. PRESSURE	ATMOS. PRESSURE	WIRE ANGLES CAST1	WIRE ANGLES CAST2	WIRE ANGLES CAST3
106 ***	***	*	*	*	*	*	*	*	*	0	0	*
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE				
2 0	18.50	35.530	25.57	5.58	109	***	***	***				
1 25	17.08	35.590	25.97	5.50	104	***	***	***				
1 50	14.49	35.230	26.28	5.75	103	***	***	***				
1 75	13.39	35.250	26.53	5.70	100	***	***	***				
1 100	12.94	***	***	5.25	***	***	***	***				

STATION	DATE	TIME	LATITUDE		LONGITUDE			
WF 1/ 11/61	14/ 1/61	2039 J	35	29 S	135	51 E		
SONIC AIR TEMP.	WIND DIR, SP.	WIND ANEM. HEIGHT	CLOUD TYPE AMT.	SEA DIR. AMT.	VIS. DIR. AMT.	SWELL DIR. AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1 CAST2 CAST3
60 ***	** *	** *	** *	** *	** *	** *	** *	0 * *
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	18.40	35.530	25.60	5.30	103	***	***	***
1	14.12	35.530	25.67	5.25	102	***	***	***
1	13.80	35.230	26.43	5.92	105	***	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE			
WF 1/ 12/61	14/ 1/61	2253 J	35	19 S	135	54 E		
SONIC AIR TEMP.	WIND DIR, SP.	WIND ANEM. HEIGHT	CLOUD TYPE AMT.	SEA DIR. AMT.	VIS. DIR. AMT.	SWELL DIR. AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1 CAST2 CAST3
86 ***	** *	** *	** *	** *	** *	** *	** *	0 * *
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	14.50	***	***	5.30	***	***	***	***
1	14.23	35.710	25.78	5.33	104	***	***	***
1	14.32	35.640	26.63	5.89	106	***	***	***
1	13.48	35.370	26.60	5.22	92	***	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE	
WF 1/ 13/61	15/ 1/61	0117 J	35	10 S	135	57 E
SONIC AIR TEMP.	WIND	CLOUD	ANEM.	SEA	ATMOS.	WIRE ANGLES
DEPTH WFT DRY	DIR. SP.	TYPE AMT.	HEIGHT	DIR. AMT.	PRESSURE	CAST1 CAST2 CAST3
75 ***	20 3	* * *	* * *	* * 2	1038.3	0 * *
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	TOTAL P NITRATE
1 0	18.48	35.900	25.86	5.35	105	***
1 25	17.51	35.810	26.03	5.58	107	***
1 50	13.77	35.460	26.61	5.10	90	***
1 75	13.49	35.460	26.67	4.77	84	***

STATION	DATE	TIME	LATITUDE		LONGITUDE	
WF J/ 14/61	15/ 1/61	0649 J	35	00 S	136	00 E
SONIC AIR TEMP.	WIND	CLOUD	ANEM.	SEA	ATMOS.	WIRE ANGLES
DEPTH WFT DRY	DIR. SP.	TYPE AMT.	HEIGHT	DIR. AMT.	PRESSURE	CAST1 CAST2 CAST3
44 ***	* * *	* * *	* * *	* * *		0 * *
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	TOTAL P NITRATE
1 0	17.23	36.080	26.31	5.39	103	***
1 25	17.12	35.820	26.13	5.39	103	***
1 40	16.29	35.750	26.28	5.30	99	***

STATION WE 2/ 17/61 DATE 19/ 2/61 TIME 0608 J LATITUDE 35 02 S LONGITUDE 135 59 E

SONIC DEPTH	AIR TEMP. WIND DIR. SP.	WIND DIR. SP.	CLOUD TYPE AMT.	ANEM. HEIGHT	VIS.	SEA DIR. AMT.	SWELL DIR. AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1 CAST2 CAST3				
55	***	***	36	3	*	*	2	14	1	1012.9	0	0	*
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE					
2	0	19.47	35.855	25.57	100	***	***	***					
2	10	17.21	35.693	26.01	100	***	***	***					
1	20	17.14	35.721	26.05	93	***	***	***					
1	30	16.50	35.612	26.12	100	***	***	***					
1	40	15.82	35.604	26.27	95	***	***	***					
1	50	13.99	35.421	26.53	83	***	***	***					

STATION WE 2/ 18/61 DATE 19/ 2/61 TIME 0805 J LATITUDE 35 12 S LONGITUDE 135 57 E

SONIC DEPTH	AIR TEMP. WIND DIR. SP.	WIND DIR. SP.	CLOUD TYPE AMT.	ANEM. HEIGHT	VIS.	SEA DIR. AMT.	SWELL DIR. AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1 CAST2 CAST3				
77	***	***	36	3	*	*	2	14	1	1012.9	*	0	*
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE					
2	0	20.57	35.789	25.23	104	***	***	***					
2	10	20.21	35.799	25.33	103	***	***	***					
2	20	19.09	35.693	25.55	104	***	***	***					
2	30	17.08	35.454	25.86	106	***	***	***					
2	40	15.06	35.257	26.18	105	***	***	***					
2	50	14.43	35.235	26.30	104	***	***	***					
2	70	13.70	35.415	26.59	***	***	***	***					

STATION DATE TIME LATITUDE LONGITUDE
 WF 2/ 19/61 19/ 2/61 1003 J 35 21 S 135 54 E

SONIC AIR TEMP. WIND ANEM. CLOUD SWELL ATMOS. WIRE ANGLES
 DEPTH WET DRY DIR, SP, HEIGHT TYPE AMT. VIS, DIR, AMT. DIR, AMT. PRESSURE CAST1 CAST2 CAST3

86 *** ** 36 3 * * * * * 2 14 1 1012.9 0 0 * *

CAST DEPTH TEMP. SALINITY SIGMA-T OXYGEN OXYGEN % SAT. INORG. P TOTAL P NITRATE

2 0 20.80 35.855 25.22 5.12 *** ***

2 10 20.56 *** 25.22 5.12 *** ***

2 20 19.77 35.839 25.48 5.24 *** ***

1 30 19.13 35.733 25.57 5.41 *** ***

1 40 15.54 35.273 26.08 5.76 *** ***

1 50 14.66 35.227 26.24 5.87 *** ***

1 75 13.54 35.342 26.57 5.06 *** ***

STATION DATE TIME LATITUDE LONGITUDE
 WF 2/ 20/61 19/ 2/61 1120 J 35 34 S 135 50 E

SONIC AIR TEMP. WIND ANEM. CLOUD SWELL ATMOS. WIRE ANGLES
 DEPTH WET DRY DIR, SP, HEIGHT TYPE AMT. VIS, DIR, AMT. DIR, AMT. PRESSURE CAST1 CAST2 CAST3

*** ** 36 3 * * * * * 2 14 1 1011.5 0 0 * *

CAST DEPTH TEMP. SALINITY SIGMA-T OXYGEN OXYGEN % SAT. INORG. P TOTAL P NITRATE

1 0 20.78 35.823 25.20 5.01 *** ***

1 10 20.39 35.876 25.34 5.12 *** ***

1 20 19.94 35.824 25.42 5.18 *** ***

1 30 *** 35.431 *** 5.70 *** ***

2 40 15.28 35.251 26.12 5.81 *** ***

2 50 14.66 35.277 26.28 5.81 *** ***

2 75 13.77 35.353 26.53 5.32 *** ***

2 85 13.84 35.416 26.56 5.09 *** ***

STATION	DATE	TIME	LATITUDE		LONGITUDE			
WE 2/ 21/61	19/ 2/61	1358 J	35	37 S	135	48 E		
SONIC AIR TEMP, WIND DIR, SP, ANEM. CLOUD VIS. SEA SWELL ATMOS. WIRE ANGLES DEPTH MET DRY DIR, SP, HEIGHT TYPE AMT, HEIGHT TYPE AMT, DIR, AMT, PRESSURE CAST1 CAST2 CAST3								
110 ***	99 1 *	*	*	2 *	1010.8	0 0 *		
CAST DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRATE
2 0	20.76	35.814	25.20	5.06	103	***	***	***
1 25	19.29	35.624	25.44	5.24	104	***	***	***
1 50	16.25	35.524	26.11	5.70	106	***	***	***
1 75	14.60	35.368	26.36	5.81	105	***	***	***
1 100	13.71	35.377	26.56	5.15	91	***	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE			
WE 2/ 22/61	19/ 2/61	1543 J	35	45 S	135	45 E		
SONIC AIR TEMP, WIND DIR, SP, ANEM. CLOUD VIS. SEA SWELL ATMOS. WIRE ANGLES DEPTH MET DRY DIR, SP, HEIGHT TYPE AMT, HEIGHT TYPE AMT, DIR, AMT, PRESSURE CAST1 CAST2 CAST3								
113 ***	99 1 *	*	*	2 *	1010.2	0 0 *		
CAST DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRATE
2 0	20.48	35.684	25.17	***	***	***	***	***
1 25	19.85	35.638	25.31	5.21	104	***	***	***
1 50	17.10	35.513	25.90	5.58	106	***	***	***
1 75	14.66	35.413	26.38	5.58	101	***	***	***
1 100	13.88	***	***	5.18	***	***	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE									
WE 2/ 23/61	19/ 2/61	1750 J	35	54 S	135	42 E								
SONIC AIR TEMP.	WIND DIR.	SP.	ANEM. HEIGHT	CLOUD TYPE	AMT.	VIS. DIR.	SEA DIR.	AMT.	SWELL DIR.	AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
154 ***	***	*	*	*	*	*	*	*	*	*	*	0	0	*
CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE					
2	0	20.11	35.604	25.21	5.01	101	***	***	***					
2	25	19.77	35.587	25.29	5.18	104	***	***	***					
1	50	17.08	35.426	25.84	5.64	107	***	***	***					
1	75	14.39	35.204	26.28	5.81	104	***	***	***					
1	100	13.07	35.145	26.51	5.64	98	***	***	***					
1	150	12.98	35.245	26.61	5.35	93	***	***	***					

STATION	DATE	TIME	LATITUDE		LONGITUDE									
WE 3/ 25/61	8/ 3/61	0900 J	34	45 S	137	08 E								
SONIC AIR TEMP.	WIND DIR.	SP.	ANEM. HEIGHT	CLOUD TYPE	AMT.	VIS. DIR.	SEA DIR.	AMT.	SWELL DIR.	AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
31 ***	***	99	1	*	*	*	*	*	*	*	1020.0	0	*	*
CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE					
1	0	21.36	36.785	25.77	5.01	104	***	***	***					
1	10	21.37	36.869	25.83	4.89	102	***	***	***					
1	20	21.37	36.862	25.83	4.89	102	***	***	***					
1	30	21.42	36.878	25.83	4.83	100	***	***	***					

STATION	DATE	TIME	LATITUDE		LONGITUDE		
WE 3/ 28/61	9/ 3/61	0820 J	34	29 S	137	10 E	
SONIC AIR TEMP.	WIND	ANEM.	CLOUD	VIS.	SEA	ATMOS.	WIRE ANGLES
DEPTH WET DRY	DIR. SP.	HEIGHT	TYPE AMT.	DIR. AMT.	DIR. AMT.	PRESSURE	CAST1 CAST2 CAST3
24 ***	14 1	*	*	*	2	1022.4	0 * *
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P NITRATE
1	0 21.13	36.917	25.93	5.50	114	***	***
1	10 21.14	36.927	25.94	4.83	100	***	***
1	20 21.14	36.943	25.95	4.89	101	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE		
WE 3/ 29/61	9/ 3/61	0954 J	34	29 S	136	59 E	
SONIC AIR TEMP.	WIND	ANEM.	CLOUD	VIS.	SEA	ATMOS.	WIRE ANGLES
DEPTH WET DRY	DIR. SP.	HEIGHT	TYPE AMT.	DIR. AMT.	DIR. AMT.	PRESSURE	CAST1 CAST2 CAST3
27 ***	14 1	*	*	*	2	1022.4	0 * *
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P NITRATE
1	0 21.62	36.986	25.85	4.78	100	***	***
1	10 21.61	36.994	25.86	4.78	100	***	***
1	20 21.62	37.082	25.93	4.75	99	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE			
WE 3/ 30/61	9/ 3/61	1120 J	34	28 S	136	48 E		
SONIC AIR TEMP.	WIND DIR, SP.	CLOUD	SEA DIR, AMT.	SWELL DIR, AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1 CAST2 CAST3		
DEPTH MET	DRY DIR, SP.	TYPE AMT.	* * * * *	* * * * *	1023.0	0 * * *		
27 ***	16 3	* * *	* * *	* * *				
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	CXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0 21.83	36.990	25.80	4.83	101	***	***	***
1	10 21.80	36.984	25.80	4.81	101	***	***	***
1	20 21.79	36.963	25.79	4.83	101	***	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE			
WE 3/ 31/61	9/ 3/61	1303 J	34	28 S	136	37 E		
SONIC AIR TEMP.	WIND DIR, SP.	CLOUD	SEA DIR, AMT.	SWELL DIR, AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1 CAST2 CAST3		
DEPTH MET	DRY DIR, SP.	TYPE AMT.	* * * * *	* * * * *	1023.0	0 * * *		
45 ***	16 3	* * *	* * *	* * *				
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0 22.47	37.189	25.76	4.78	102	***	***	***
1	10 22.44	37.246	25.82	4.75	101	***	***	***
1	20 22.45	37.186	25.77	4.78	102	***	***	***
1	30 ***	37.305	***	4.55	***	***	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE			
WE 3/ 32/61	9/ 3/61	1438 J	34 28 S		136 27 E			
SONIC AIR TEMP.	WIND DIR. SP.	WIND ANEM. HEIGHT	CLOUD TYPE AMT.	VIS. DIR. AMT.	SEA SWELL DIR. AMT.	ATMOS. PRESSURE		
DEPTH WFT	DIR. SP.	HEIGHT	TYPE AMT.	DIR. AMT.	DIR. AMT.	CAST1 CAST2 CAST3		
27 ***	**	**	**	**	**	0 * *		
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	36.687	25.49	4.72	99	***	***	***
1	10	36.708	25.51	4.75	100	***	***	***
1	20	36.705	25.50	4.75	100	***	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE			
WE 3/ 41/61	21/ 3/61	0615 J	35 02 S		136 00 E			
SONIC AIR TEMP.	WIND DIR. SP.	WIND ANEM. HEIGHT	CLOUD TYPE AMT.	VIS. DIR. AMT.	SEA SWELL DIR. AMT.	ATMOS. PRESSURE		
DEPTH WFT	DIR. SP.	HEIGHT	TYPE AMT.	DIR. AMT.	DIR. AMT.	CAST1 CAST2 CAST3		
55 ***	99 1	*	**	**	**	1022.0	0 * *	
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	35.015	25.34	5.18	99	***	***	***
1	25	35.757	26.19	5.18	98	***	***	***
1	50	35.469	26.45	4.90	88	***	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE		
WE 3/ 42/61	21/ 3/61	0804 J	35	13 S	135	57 E	
SONIC AIR TEMP.	WIND	ANEM. HEIGHT	CLOUD TYPE	SEA DIR. AMT.	SWELL DIR. AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1 CAST2 CAST3
DEPTH WET DRY	DIR. SP.	DIR. SP.	TYPE AMT.	DIR. AMT.	DIR. AMT.	PRESSURE	
82 *** ***	99 1	*	*	*	*	1022.7	0 * *
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P NITRATE
1 0	17.82	35.880	26.01	5.30	102	***	***
1 25	14.78	35.737	26.15	5.30	100	***	***
1 50	14.57	35.496	26.47	5.07	91	***	***
1 75	14.21	35.459	26.51	***	***	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE		
WE 3/ 43/61	21/ 3/61	1000 J	35	22 S	135	54 E	
SONIC AIR TEMP.	WIND	ANEM. HEIGHT	CLOUD TYPE	SEA DIR. AMT.	SWELL DIR. AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1 CAST2 CAST3
DEPTH WET DRY	DIR. SP.	DIR. SP.	TYPE AMT.	DIR. AMT.	DIR. AMT.	PRESSURE	
91 *** ***	14 1	*	*	*	*	1023.4	0 0 *
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P NITRATE
1 0	19.10	35.810	25.63	5.21	103	***	***
2 25	19.03	35.796	25.64	5.21	103	***	***
2 50	16.19	35.484	26.09	5.53	103	***	***
2 75	14.18	35.469	26.53	4.96	89	***	***
2 85	14.08	35.502	26.58	4.90	87	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE				
WE 3/ 44/61	21/ 3/61	1145 J	35 32 S	135 51 E				
SONIC AIR TEMP.	WIND	ANEM.	CLOUD	VIS.	SEA	SWELL	ATMOS.	WIRE ANGLES
DEPTH WFT DRY	DIR. SP.	HEIGHT	TYPE AMT.	DIR. AMT.	DIR. AMT.	DIR. AMT.	PRESSURE	CAST1 CAST2 CAST3
106 ***	99 1	*	*	*	99 2	*	1023.0	0 0 *
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1 0	19.59	35.746	25.46	5.04	101	***	***	***
2 25	19.33	35.762	25.54	5.07	101	***	***	***
2 50	17.97	35.637	25.79	5.33	103	***	***	***
2 75	14.75	35.385	26.34	5.58	101	***	***	***
2 100	14.35	35.486	26.51	5.01	90	***	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE				
WE 3/ 45/61	21/ 3/61	1341 J	35 42 S	135 49 E				
SONIC AIR TEMP.	WIND	ANEM.	CLOUD	VIS.	SEA	SWELL	ATMOS.	WIRE ANGLES
DEPTH WFT DRY	DIR. SP.	HEIGHT	TYPE AMT.	DIR. AMT.	DIR. AMT.	DIR. AMT.	PRESSURE	CAST1 CAST2 CAST3
108 ***	99 1	*	*	*	00 0	*	1022.7	0 0 *
CAST DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2 0	20.45	35.824	25.29	5.13	104	***	***	***
1 25	20.11	35.828	25.38	5.13	103	***	***	***
1 50	20.03	35.855	25.42	5.16	104	***	***	***
1 75	16.54	35.482	26.01	5.73	108	***	***	***
1 100	14.65	35.479	26.44	5.36	97	***	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE			
WF 3/ 46/61	21/ 3/61	1547 J	35 53 S	135 45 E			
SONIC AIR TEMP.	WIND	ANEM.	CLOUD	SEA	SWELL	ATMOS.	WIRE ANGLES
DEPTH WET DRY	DIR. SP.	HEIGHT	TYPE	DIR. AMT.	DIR. AMT.	PRESSURE	CAST1 CAST2 CAST3
146 *** **	09 1	*	*	*	*	1022.4	0 0 *

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	20.92	35.835	25.17	5.13	105	***	***	***
2	25	20.12	35.818	25.37	5.16	104	***	***	***
2	50	19.95	35.797	25.40	5.13	103	***	***	***
1	75	15.82	35.484	26.18	5.73	106	***	***	***
1	100	14.56	35.506	26.48	5.30	96	***	***	***
1	125	14.07	35.486	26.57	5.30	95	***	***	***
1	140	13.98	35.465	26.57	5.30	94	***	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE			
WF 3/ 47/61	21/ 3/61	1704 J	35 59 S	135 44 E			
SONIC AIR TEMP.	WIND	ANEM.	CLOUD	SEA	SWELL	ATMOS.	WIRE ANGLES
DEPTH WET DRY	DIR. SP.	HEIGHT	TYPE	DIR. AMT.	DIR. AMT.	PRESSURE	CAST1 CAST2 CAST3
*** **	09 1	*	*	*	*	1021.7	0 0 *

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	20.94	35.856	25.18	5.01	103	***	***	***
2	25	20.07	35.830	25.39	5.07	102	***	***	***
2	50	19.57	35.746	25.46	5.16	103	***	***	***
1	60	19.23	35.715	25.53	5.27	104	***	***	***
1	110	14.02	35.311	26.44	5.64	100	***	***	***
1	160	13.27	35.296	26.59	5.33	93	***	***	***
1	260	11.98	35.118	26.70	5.27	90	***	***	***

OCEANOGRAPHICAL STATION LISTS

1. Hydrological and planktological observations by F.R.V. *Warreen* in south-eastern Australian waters, 1938-39
2. Hydrological and planktological observations by F.R.V. *Warreen* in south-eastern Australian waters, 1940-42
3. Hydrological and plantological observations by F.R.V. *Warreen* in south-western Australian waters, 1947-50
4. Onshore hydrological investigations in eastern Australia, 1942-50
5. Estuarine hydrological investigations in eastern Australia, 1940-50. Queensland: Nerang and Coomera Rivers, Moreton Bay and Brisbane River, Logan River, Dunwich Oyster Lease; New South Wales: Richmond River, Clarence River, Macleay River, Hastings River, Manning River, Port Stephens, Tilligerry Creek, Hawkesbury River
6. Estuarine hydrological investigations in eastern Australia, 1940-50. New South Wales: Middle Harbour and Port Jackson, Georges River-Botany Bay
7. Estuarine hydrological investigations in eastern Australia, 1940-50. New South Wales: Port Hacking, Lake Illawarra, Shoalhaven River, Jervis Bay, Clyde River, Moruya River, Tuross River, Wagonga Inlet; Victoria: Port Phillip; Tasmania: Tamar River, Derwent River, Huon River, D'Entrecasteaux Channel, Pittwater, Lake Dobson (freshwater), Penna Dam (freshwater)
8. Hydrological investigations in south-western Australia, 1944-50
9. Records of twenty-four hourly hydrological observations at selected stations in eastern Australian estuarine systems, 1942-50. Queensland: Logan River; New South Wales: Richmond River, Clarence River, Macleay River, Hastings River, Manning River, Port Stephens, Hawkesbury River, Georges River, Port Hacking, Clyde River, Tuross River; Tasmania: Tamar River, Derwent River
10. Records of twenty-four hourly hydrological observations at Shell Point, Georges River, New South Wales, 1942-50
11. Analyses of bottom deposits in eastern Australia, 1946-50
12. Estuarine hydrological investigations in eastern and south-western Australia, 1951
13. Analysis of bottom deposits in eastern and south-western Australia, 1951 and records of twenty-four hourly hydrological observations at selected stations in eastern Australian estuarine systems, 1951
14. Onshore hydrological investigations in eastern and south-western Australia, 1951
15. Estuarine hydrological investigations in eastern and south-western Australia, 1952
16. Analysis of bottom deposits in eastern and south-western Australia, 1952 and records of twenty-four hourly hydrological observations at selected stations in eastern Australian estuarine systems, 1952
17. Onshore hydrological investigations in eastern and south-western Australia, 1952
18. Onshore hydrological investigations in eastern and south-western Australia, 1953
19. Onshore planktological investigations in eastern Australia, 1945-54
20. Surface sampling in the Tasman Sea, 1953
21. Estuarine hydrological investigations in eastern and south-western Australia, 1953
22. Further onshore planktological investigations in eastern Australia, 1945-54
23. Planktological investigations made by F.R.V. *Derwent Hunter* in eastern Australian waters, 1952-54
24. Onshore hydrological investigations in eastern and south-western Australia, 1954
25. Surface sampling in the Tasman Sea, 1954
26. Estuarine hydrological investigations in eastern and south-western Australia, 1954
27. Onshore and oceanic hydrological investigations in eastern and south-western Australia, 1955
28. Surface sampling in the Tasman and Coral Seas, 1955
29. Estuarine hydrological investigations in eastern and south-western Australia, 1955
30. Onshore and oceanic hydrological investigations in eastern and south-western Australia, 1956
31. Surface sampling in the Tasman and Coral Seas and the south-eastern Indian Ocean, 1956
32. Estuarine hydrological investigations in eastern and south-western Australia, 1956
33. Coastal hydrological investigations in eastern and south-western Australia, 1957
34. Coastal hydrological investigations at Port Hacking, New South Wales, 1957
35. Coastal hydrological investigations at Eden, New South Wales, 1957

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(Continued)

36. Surface sampling in the Tasman and Coral Seas, 1957
37. Hydrological investigations from F.R.V. *Derwent Hunter*, 1957
38. Coastal hydrological investigations in the New South Wales tuna fishing area, 1958
39. Surface sampling in the Coral and Tasman Seas, 1958
40. Coastal hydrological investigations in south-eastern Australia, 1958
41. Oceanic investigations in eastern Australian waters, F.R.V. *Derwent Hunter*, 1958
42. Coastal investigations at Port Hacking, New South Wales, 1958
43. Oceanic investigations in eastern Australia, H.M.A. Ships *Queenborough*, *Quickmatch*, and *Warrego*, 1958
44. Oceanic observations in Antarctic waters, M.V. *Magga Dan*, 1959
45. Coastal hydrological investigations in eastern Australia, 1959
46. Coastal hydrological investigations in the New South Wales tuna fishing area, 1959
47. Coastal investigations at Port Hacking, New South Wales, 1959
48. Oceanic investigations in eastern Australian waters, F.R.V. *Derwent Hunter*, 1959
49. Coastal hydrological sampling Rottneest Island, W.A., and Port Moresby, Papua, during the I.G.Y. (1957-58), and surface sampling in the Tasman and Coral Seas, 1959
50. Surface sampling in the Coral and Tasman Seas, 1960
51. Coastal hydrological investigations in eastern Australia, 1960
52. Coastal investigations at Port Hacking, New South Wales, 1960
53. Coastal hydrological investigations in the New South Wales tuna fishing area, 1960
54. Investigations by F.R.V. *Derwent Hunter* on the eastern Australian tuna grounds in 1961
55. Investigations by F.R.V. *Weerutta* on the South Australian tuna grounds in 1961